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American Public Power Association

2301 M Street, N.W.

Washington, D.C. 20037-1484

202/467-2900

July 21, 1993

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Dr. John H. Gibbons
Assistant to the President/Director
Office of Science and Technology Policy
Old Executive Office Building, NW
Washington, DC 20500

Dear Jack:

The American Public Power Association (APPA), the national service organization representing more than 2,000 local, publicly owned not-for-profit electric utilities throughout the country, applauds the administration's effort to return U.S. greenhouse gas emissions to their 1990 levels by the year 2000 through the use of voluntary efforts rather than command-and-control measures. While the causes and effects of human induced global climate change are still subject to debate and uncertainty, it is important to pursue national energy policies that are sound public policy irrespective of the final outcome of global climate change research.

To that end, APPA believes that the U.S. National Action Plan now undergoing revision should support the implementation of those national energy policies that make environmental and economic sense, including such plans that would:

- consider demand-side as well as supply-side measures in utility resource planning;
- promote the use of energy-efficient equipment and processes;
- accelerate research, development, demonstration and market commercialization of non-fossil electricity supply technologies; and
- promote the development of alternative fuel vehicles.

In addition to the above-cited principles drawn from APPA's global climate resolution, we urge the administration to consider a series of detailed options designed to minimize net U.S. greenhouse gas emissions through voluntary and cost-effective technology and efficiency improvement programs. These options are listed on the attached document.

Dr. John H. Gibbons
July 21, 1993
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Thank you for your consideration. APPA looks forward to working with the administration on the inclusion of these and other strategies in the U.S. National Action Plan for minimizing greenhouse gas emissions.

Sincerely,

A handwritten signature in black ink, appearing to read "Larry", with a stylized, slightly slanted script.

Larry Hobart
Executive Director

LH/mb
enclosure

cc: Robert Watson

AMERICAN PUBLIC POWER ASSOCIATION

Options for Greenhouse Gas Emissions Reductions

- **Fully fund the EPACT Renewable Energy Production Incentive.** Sec. 1212 of the Energy Policy Act of 1992 gives authorization for a federal production payment of 1.5 cents/kilowatt-hour to consumer-owned (3,000 publicly and cooperatively owned) electric utilities who build renewable energy capacity. Renewable energy tax credits and incentives available to private entities are not available to not-for-profit consumer owned electric utilities.

An APPA survey of publicly owned utilities found that funding of the provision could spur at a minimum 2,000 megawatts of new renewables by 2003. Sustained, predictable funding of the production incentive would likely spur needed cost reductions for renewables, thus leading to even much greater market penetration. For FY95, funding of \$13 million is suggested. If consistently funded over the authorized ten year period, the production incentive will directly provide a conservative 2 million metric tons of carbon emissions equivalent reduction by 2000. Additional reductions are likely from the spurring of additional interest in renewable energy by consumer owned electric utilities, as well as resulting cost reductions that will increase interest in renewable energy by all sectors of the utility industry.

- **Assist implementation of integrated resource planning in the consumer-owned electric utility sector.** Many of the 3,000 consumer owned (publicly and cooperatively owned) electric utilities that reach one in four Americans already conduct integrated resource planning, but others do not. Efforts by the Department of Energy and the Environmental Protection Agency to work with state public utility commissions to encourage greater use of integrated resource planning and energy efficiency normally only reach investor owned utilities.

A coalition of the two national trade associations (APPA and the National Rural Electric Cooperative Association), federal power marketing administrations and the Tennessee Valley Authority have agreed to work together on a national effort to achieve maximum use of integrated resource planning and cost effective energy efficiency at the nation's 3,000 consumer owned electric utilities. Assistance by the federal government through the Department of Energy and the Environmental Protection Agency is needed to help develop and promote the tools and programs needed to carry out the ambitious goal.

Annual greenhouse gas reductions of 6 to 12 million metric tons of carbon emissions equivalent are possible by 2000 if an additional 1-2 percent of electricity is saved as a result.

- **Promotion of increased transmission access in the electric utility industry.** In order to reduce costs to the consumer and the nation through the promotion of increased competition in the heavily concentrated electric utility industry, Congress in the Energy Policy

Act of 1992, gave the Federal Regulatory Energy Commission clear authority to order an electric utility to provide access to its transmission lines to a third party. Increased "transmission access" will allow more competitive bulk power markets, with greater efficiencies and lower costs resulting. Transmission access will assist non-CO₂ emitting technologies such as renewable energy and demand side management programs. Utilities that experience loss of sales due to demand side management now have a greater chance of being able to sell Demand Side Management-idled capacity through increased transmission access, thus reducing a financial disincentive to utility-sponsored energy efficiency programs. Renewable energy is aided by allowing projects to be developed in areas that are resource-rich but are located far from population centers.

Through the Department of Energy, the Federal Energy Regulatory Commission should be encouraged to promote more efficient wholesale electric power markets, including the issuance of transmission orders by FERC to aid in effective movement of power.

- **Promote development and adoption of better electric transmission technology.** Increased economic growth and greater interconnection of electric utility power grids will stretch existing electricity delivery systems to their limits and create new requirements for flow control, system stability, and capacity enhancement. Development of non-CO₂ emitting renewable energy projects in remote areas, where much of the potential exists, will be aided by better technical means of getting power to where the people are. Flexible ac transmission systems (FACTS), based on advanced solid state controllers, have the capabilities that are needed, in contrast to today's mechanical switching devices. With FACTS technology, larger power flows can flow over longer distances without compromising system reliability.

Working with industry, the Department of Energy should co-fund development of FACTS technology, as well as promote its market acceptance. Currently, the Bonneville Power Administration, Tennessee Valley Authority, and the Western Power Administration all are planning to or are presently hosting demonstrations of early FACTS technology.

- **Increase renewable hydroelectric capacity and generation at existing federal and non-federal dams.** Hydropower resources have the potential to provide a greater portion of the nation's electric power needs without any additional emissions of carbon. This potential exists for two reasons. First, estimates indicate that hydropower output from existing projects can be increased as much as ten percent, or 8,000 megawatts, through efficiency improvements and operational changes. Secondly, at least 2,400 megawatts of hydropower potential exists at non-power dams that could be harnessed as new resources for electric utilities. Combined, development of these additional resources could offset carbon emissions 6 million metric tons per year by the year 2000.

Another method of increasing hydropower resources is to accelerate the relicensing process for non-federal hydroelectric projects at the

Federal Energy Regulatory Commission. Projects up for relicensing between now and 2010 represent 25,600 megawatts of hydropower capacity.

- **Assist accelerated market commercialization of fuel cells.** Natural gas-burning electrochemical fuel cells offer a 70-80 percent reduction in CO₂ emissions compared to today's fossil electric generation. Fuel cells are relatively small, modular devices that directly convert natural gas into electricity with minimal emissions. Their small size allow placement in a range of industrial, and commercial buildings, often allowing use of the waste heat for heating and cooling, as well as reducing electric line losses. Fuel cells also offer the potential of a large export market, with a large need for U.S. primary manufacturing. Prototype and demonstration fuel cells are being made by a number of U.S. and Japanese manufacturers, though additional demonstrations are needed to assure buyers of cost and performance.

Recognizing the fuel cell potential, a group of 40 utilities has formed the Fuel Cell Commercialization Group as an organization of potential fuel cell buyers. This utility-led group presently is several years into a commercialization plan that will result in the commercial market introduction of molten-carbonate fuel cells by 2000.

The Department of Energy should be directed to continue necessary funding levels over the next several crucial years to assist the fuel cell industry with successful market entry, as well as fund additional demonstrations to look at other fuel sources such as biomass. Cost-sharing by the federal government can help guarantee the development of a viable market by 2000 for a fossil generation technology that has very high CO₂ reduction capability.

- **Assist accelerated market commercialization of solar photovoltaics.** Photovoltaics are a renewable electric generation option that emit no CO₂. However, costs are still too high for widespread adoption by electric utilities, although niche markets are being developed. As a high tech technology suitable to mass production, photovoltaic costs will remain high until sufficient production volumes are achieved. But electric utilities and their consumers will not commit to major continued high cost. In response, a group of electric utilities representing one third of U.S. retail electric sales has formed the Utility Photovoltaic Group to provide a market-led pull to commercialize photovoltaics for cost-effective utility use. The Department of Energy should be directed to fully support with sufficient federal cost-sharing the effort by utilities and suppliers to jointly work toward cheap solar photovoltaics for electric generation by 2000.
- **Recognize the environmental benefits of the use of electricity as a transportation fuel and promote the commercialization of electric vehicles.** A significant environmental advantage of electric vehicles is their potential to reduce the emissions of greenhouse gases and improve air quality. Studies have shown that significant net emissions reductions will result when electric vehicles are substituted for gasoline vehicles. Based on the anticipated power mix in the year 2000, an electric vehicle would produce 28 percent less carbon dioxide

than a comparable gasoline-powered vehicle. One study showed that when the electricity is generated based on an overnight charging power mix predominantly reliant on natural gas, greenhouse gas reductions per electric vehicle would be 36 percent and nearly 100 percent if hydro, wind, nuclear or solar electric energy is used.

- **Direct the Department of Energy to conduct a feasibility study for a regional Renewables Power Marketing Administration for the midwest and west.** Just as the rationale for the creation of the Tennessee Valley Authority and the Bonneville Power Administration was regional economic development and job creation, a new Renewables Power Marketing Administration would develop job-intensive renewables. Wind and biomass are particularly suited to agricultural areas such as the midwest. This section of the country is rich in biomass and wind, yet faces more economic problems with the suggested reduction or elimination of various types of agriculture subsidies. Solar is suitable in the near term for areas in the west, such as the federally-owned Nevada Test Site.

Like the creation of the Tennessee Valley Authority and the Bonneville Power Administration, federal leadership can help revive a section of the country using an abundant local energy resource. A Renewables Power Marketing Administration could be established as a new organization or by expanding the authority of the Western Area Power Administration. The development of thousands of megawatts of renewable resources have the potential to displace between 1560 tons of CO₂/megawatt per year to 6480 tons of CO₂/megawatt per year.

- **Improve utility distribution systems.** Efficiency improvements not only improve the economics of power delivery to customers, they have significant potential to reduce carbon emissions. Overall distribution system losses dissipate approximately 5 to 8 percent of all electricity produced. The two components of all electric power distribution systems that contribute the greatest proportion of total system losses are distribution transformer cores, which account for approximately 40 percent of the distribution system losses, and high voltage primary conductors, which also account for approximately 40 percent of the distribution system losses.

Distribution transformer core losses can be reduced by optimally sizing transformers and/or switching to amorphous metal core transformers. Using these techniques it is possible to reduce core losses by 67 percent. High voltage primary conductor losses can be reduced by power factor correction, phase balancing, circuit conversion to higher primary voltages and reconductoring. Through these combined measures, primary conductor losses could be reduced by one-third. A "Green Distribution" or "Green Transformer" program, similar to existing Environmental Protection Agency programs, can be established by the Department of Energy or the Environmental Protection Agency to encourage utility distribution system efficiency improvements. Assuming an industry average distribution system loss factor of 6 percent, the estimated impact of distribution system loss reduction measures on carbon emissions is a decrease of approximately 14.1 million metric tons of carbon emissions per year.

- **Promote increased use of electrotechnologies.** Substitution of electric technologies for certain end uses can improve U.S. productivity, increase energy efficiency, and also reduce CO₂ emissions. Examples of familiar electrotechnologies include computers, fax machines, microwave ovens, cordless electric lawn mowers, lasers, and robotics. Faxing a 20 page document instead of overnight courier saves 2 pounds of CO₂. Less familiar CO₂-beneficial technologies available now or under development include microwave clothes dryers, infrared paint dryers, electric steel manufacturing, geothermal heat pumps, electronic mufflers, toxic waste disposal using vitrification. In all cases, these technologies substitute a more energy efficient electric technology for a less efficient conventional technology. For example, infrared and ultraviolet paint dryers can substitute for less energy efficient fuel-fired paint dryers.

To spur greater use of electrotechnologies, the federal government can (1) work with industry to accelerate development of electrotechnologies; (2) encourage increased market availability of appropriate environmentally-friendly electrotechnologies; and (3) increase national awareness of electrotechnologies. A program similar to the Environmental Protection Agency's Green Lights program can be used to promote greater usage of appropriate electrotechnologies. CO₂ reductions from greater use of electrotechnologies could reach 40 million metric tons of carbon emissions equivalent by 2000 and 100 million metric tons of carbon emissions equivalent by 2010.

- **Explore the role forestry offsets can play in strategies to reduce net CO₂ emissions.** As part of an overall reduction plan, forestry offsets offer a cost-effective and efficient means to sequester carbon for long periods of time and they provide utilities the time needed for development of new and less polluting methods of producing electricity. For nearly two years, APPA has assisted its members with community tree-planting activities to help meet environmental concerns of their consumers. Through its TREE POWER program, APPA encourages public power systems to implement tree-planting programs, with the goal of planting one tree for every customer served. With 100 percent participation, we can reach our national goal of planting 16 million trees, or one tree for every public power customer in the country.
- **Commercialize biomass for electric generation.** Biomass fuels result in zero net CO₂ emissions when grown on a sustainable basis. Use of biomass energy crops for baseload electric generation would significantly reduce CO₂ emissions, while at the same time creating many jobs in the depressed rural economy.

What is needed for utilities to commit to biomass are demonstrations of appropriate combustion technologies and methods together with assurance of reliable fuel supplies at an economic cost. A combination of changes to federal crop subsidy programs, joint industry/government demonstrations such as for biomass gasifiers, full funding of and changes to existing utility production incentives (Secs. 1212, 1914, and 1916 of the Energy Policy Act of 1992), and technical assistance would provide the necessary stimulus to obtain biomass market penetration.

High levels of biomass market penetration needed to achieve significant CO₂ reductions can only ever be achieved at the present level of low competing energy prices if existing United States Department of Agriculture support programs are reoriented to support energy crops. For example, subsidies paid to keep marginal land out of production (United States Department of Agriculture's \$2 billion Conservation Reserve Program) can be shifted to energy crops for electric power generation and transportation fuels for zero CO₂ emissions. The potential exists in many cases to even replace federal crop subsidies with revenue streams from private biomass energy crops, thus spurring economic development in farming communities and at the same time reducing the federal deficit.

- **Expand "Green Technology" voluntary programs.** Funding of an additional \$150 million should be provided to expand and create new federal programs that promote voluntary manufacture of energy efficient products and installation of energy efficiency measures. Currently, the Environmental Protection Agency Global Change Division sponsors a set of these voluntary programs, including Green Lights, Energy Star Computers, and the Golden Carrot Super-Efficient Refrigerator Program. The Green Technology programs concentrate on increasing the efficiency of electricity use, where cost-effective energy savings of 30-70 percent are possible. In addition to expansion of the Environmental Protection Agency's programs, where appropriate, other federal agencies should begin their own Green programs, or work jointly with the Environmental Protection Agency. If successful, expanded Green Technology programs could lead to 54 million metric tons of carbon emissions equivalent by 2000.
- **Establish a voluntary program with utilities, states, and the wind industry to accelerate installation of wind generating capacity.** Wind generating costs have fallen from 30 cents per kilowatt-hour in 1980 to 5-7 cents per kilowatt-hour today, with the potential to fall to a very attractive 3-4 cents per kilowatt-hour by 2000. Much of the remaining cost reduction will come by achieving the economies of mass production.

A voluntary collaborative commercialization effort can be used to aggregate a sufficient market to allow the wind industry to scale up manufacturing, thus lowering costs. The Department of Energy would serve as a catalyst, supplying technical assistance and ten percent cost-sharing of the projects. An 8,000 megawatt increase in wind capacity by 2000 would generate 18 billion kilowatt-hours, displacing 5-6 million metric tons of carbon emissions equivalent.

- **Expand development of very high efficiency gas turbines for electric generation.** Currently, gas turbine systems represent over 50 percent of new electric capacity installed, with a total of 7 gigawatts of capacity manufactured in the U.S. By 2000, the Department of Energy estimates that a market for 15 gigawatts annually of gas turbines may alone exist in the U.S. In addition, already substantial exports of gas turbines can be increased if super-efficient machines can be developed.

Funding should be provided for a proposed Department of Energy-led initiative to work with industry and utilities to commercialize gas combustion turbines by 2000 that are much more efficient than currently used. The proposed program aggressively speeds up turbine research and development, which to now has been largely dependent on military spin-offs. The payoff is a combustion turbine that is at least 60 percent efficient (simple cycle), in contrast to today's 30-35 percent (simple cycle) for gas turbines the 35-40 percent for a traditional coal plant. At a Department of Energy-forecasted market for utility-based turbine systems of 15 gigawatts annually after 2000, a CO₂ reduction potential of 3 million metric tons of carbon emissions equivalent annually exists. Such an estimate is conservative, as it is likely that very efficient gas turbines will take market share from new coal-fired electric generation.

- Develop "calorie counter" educational material to allow utilities and industry to adopt voluntary greenhouse gas reduction goals. Simple to use tools that list cost-effective voluntary measures and their greenhouse gas reducing equivalents are needed to encourage voluntary adoption of individual utility and industry goals.
- Accelerate research, development and demonstration on improved equipment efficiency. Over the past fifteen years a number of energy efficient products have come out of federally-funded RD&D, including electronic ballasts, low-e windows, heat pump water heaters, and better refrigeration compressors. It would be useful to expand the Department of Energy's RD&D program on building technologies, particularly shorter-term work jointly funded by private industry and the federal government. Many energy saving technologies have been partially developed by manufacturers, but work to complete their development is proceeding slowly due to cutbacks in private R&D budgets and market concerns. About 5.3 million metric tons of carbon emissions equivalent is possible in reductions.
- Continue the development, and promote the export of clean coal technologies for industry, particularly those technologies designed to curb CO₂ and other greenhouse gas emissions. Given that coal remains the nation's most abundant and cheapest energy resource, it is likely that the U.S. and the world will continue its reliance on coal as a primary energy source. Clean coal technologies are an important option to promote the continued use of coal in a more efficient and environmentally sound manner both domestically and abroad. Many clean coal technologies near commercialization can boost generating efficiencies to the 40 to 45 percent range, resulting in significant CO₂ reductions. The U.S. National Action Plan should include a commitment to implement the Innovative Clean Coal and Renewable Technology Transfer Program authorized in the Energy Policy Act of 1992. It is noteworthy that 6.9 percent of the 14.6 percent anticipated overall CO₂ reductions achieved through the Energy Policy Act are achieved by the use of clean coal technologies world wide.
- Accelerate the issuance of energy efficiency standards. Under the Energy Policy Act, the Department of Energy must issue energy efficiency standards covering a range of products and buildings.

Energy efficiency standards are often the most cost-effective method to rapidly induce greater energy efficiency, bypassing the time delay and administrative cost of voluntary programs. The Department of Energy should be directed to aggressively develop and issue standards ahead of the statutory deadlines.

- Retain existing nuclear capacity and continue research and development of advanced nuclear energy technologies. Since nuclear plants emit no greenhouse gases, the federal government should take appropriate actions to keep existing nuclear capacity in operation through remainder of normal licensed life and support life extensions when appropriate for plants with good operating and safety histories. It is estimated that each thousand megawatts of installed nuclear energy capacity offsets 1.4 million metric tons of carbon emissions per year for fossil fuels.
- Aggressively support implementation of energy efficient building codes by states and localities. About 30 states have mandatory statewide codes, while another 20 leave the decision on code adoption to localities. Many codes have not been updated since the 1970s. Upgrade to the current CABO Residential Model Energy Code results in energy savings of 15-20 percent compared to earlier versions. New residential standards now under development will give another 20 percent improvement if adopted into building codes. Substantial energy can be saved if states adopt up-to-date codes. About 6 million metric tons of carbon emissions equivalent per year is possible if building codes are brought up-to-date and enforced.