

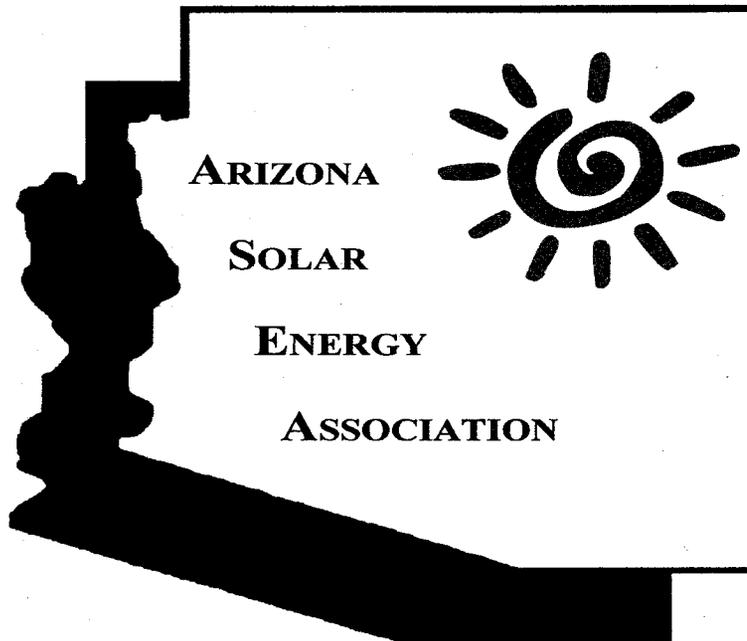


NET METERING

Arizona Corporation Commission
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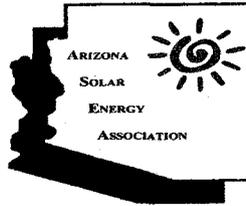
Docket # E-00000A-99-0431

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The Arizona Solar Energy Association (ASEA), the State chapter of the national American Solar Energy Society (ASES), is an organization of technical and professional people dedicated to the development and adoption of renewable energy in all its forms. The ACC has brought to the table the matter of net-metering for renewable energy sources.

ASEA also recognizes from many different levels the strong need for net-metering; ASEA is also pleased to see that other organizations and groups also see this need, some examples follow.

On February 2nd 2005, Governor Janet Napolitano signed an Executive Order 2005-02 that formed the Climate Change Advisory Group (CCAG). The CCAG during the month of September 2006 released their findings and it contained the following.

“Overarching Recommendation: Set a State Goal to Reduce Arizona’s GHG Emissions to 2000 Levels by 2020 and to 50% below 2000 Levels by 2040.”

In a need to reduce GHG in Arizona, the supporting of renewable energy is an integral part of the answer to this challenge.

The Executive Summary titled Arizona Climate Change Advisory Group is being submitted for your reading pleasure.

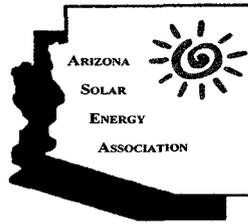
For every MW hour of fossil fuel electric production in the State of Arizona we are producing at least 1,066 pounds of Carbon Dioxide.¹

With the above Carbon Dioxide emissions in mind one has to realize that the gross MW hours produced in this State are projected to grow at a very strong rate.

Bill Post at the Pinnacle West Capital Corporation Meeting on May 17, 2006 states: “Our peak demand grew 9.3 percent last year, to 7,000 megawatts. If we were to continue to grow at that rate, our company would double in just eight years. While we don’t expect that level of growth every year, we do realize we must be prepared for what lies ahead, just as we have done in the past.”²

With a major Utility in Arizona projecting continued exceptional growth one has to consider the sources of this growth.

In 2004 Arizona energy mix was Coal 38%, Natural Gas 27%, Nuclear 26.9%, Hydro Electric 6.7%, and other 1.3%.³



As we look at this mix, we know that any nuclear expansion, if it is going to happen is many years out. Hydro Electric is highly utilized in this state; this gives two options for expansions that are both fossil fuels based; Coal and Natural Gas.

Natural Gas in the United States has peaked, so any future use of Natural Gas will probably be met with higher prices and questionable availability. According to the largest publicly traded oil company in the world in a question and answer session with its Chief Executive he publicly states:

"Gas production has peaked in North America," Chief Executive Lee Raymond told reporters at the Reuters Energy Summit.

Asked whether production would continue to decline even if two huge arctic gas pipeline projects were built, Raymond said, "I think that's a fair statement, unless there's some huge find that nobody has any idea where it would be."

"The facts are that gas production continues to decline, and will start to decline even more rapidly. By the time we get to that period (2010-2012), we'll need it badly."

While the number of U.S. rigs drilling for natural gas has climbed about 20 percent over the last year and prices are at record highs, producers have been struggling to raise output.

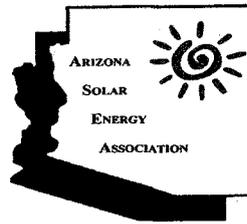
Experts said easy onshore and shallow water basins have been mostly tapped or are off limits for environmental reasons, and new technologies like horizontal drilling have been draining wells in two or three years, a much faster rate than the five years or more during the 1990s.

The U.S. Energy Information Administration estimates that natural gas production will be flat this year and increase only one-half percent next year.

At the same time, demand for the cleaner burning fossil fuel is expected to grow by two percent this year and almost 2.5 percent in 2006, according to EIA, the statistical arm of the Department of Energy. [My emphasis]

This is a big issue where natural gas is used to produce at least 17% of the US's electricity and to heat more than half of US homes, including some 70% of new homes.

The problem is that we are pretty much limited to the natural gas (methane) available within our own continent. Since methane is a gas at normal temperatures, the only way to ship it between continents is to cool it to very cold temperatures (about -260 degrees F), ship it in special tankers as LNG (liquefied natural gas), and offload it in specially-equipped ports. The tankers and ports do



not exist to handle any significant fraction of US natural gas use. Currently, only about 1% of natural gas used in the US comes from LNG.

The other alarming aspect of a natural gas production peak is that gas production falls off much more sharply than oil production after it has peaked. Gas rises in a reservoir of its own accord, maintaining pressure and a high rate of production even in a depleted reservoir. By the time a reservoir's production peaks, it is much closer to being fully depleted than an oil reservoir is when it peaks.

Bottom line: natural gas production is about to become a problem for the US, and the problem could worsen very, very rapidly.⁴

In the supplemental there are two graphs showing the massive declines in production of Natural Gas from new holes and the incredible increase in new wells just to keep the supply constant. There is also a graph showing the strong natural gas demand for electrical production.

This at present leaves only the dirtiest of the traditional electrical generating fuels, Coal as the source of last resort.

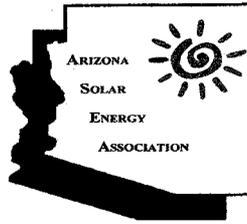
Presently, it is virtually impossible to obtain long term financing from the usual sources to build a gas fired power plant even with its inherent advantages of lower initial cost, lower emissions and quick start abilities to help with peak loads. Those with the money are not betting on natural gas being a reasonable future source of energy in US.⁵

Back on June 13th of this year Toyota Motor Corporation, the second largest car manufacture in the world that are rising fast to gain the number one spot, released a statement that they are working on the next generation of Hybrids. This next Generation

is going to include plug-in capabilities for the new Toyota fleet of vehicles. This can only put an increased demand on the electrical grid that at present might not be fully accounted for. Though plug-ins will be generally be charged during off-peak hours, it is a fair assumption that many will still be charged during peak load periods, due to work schedules, and fleet purchasing usage.

There will still be a major increase in electrical demand as each vehicle switches from being powered by fossil fuel to more grid fed electrification.

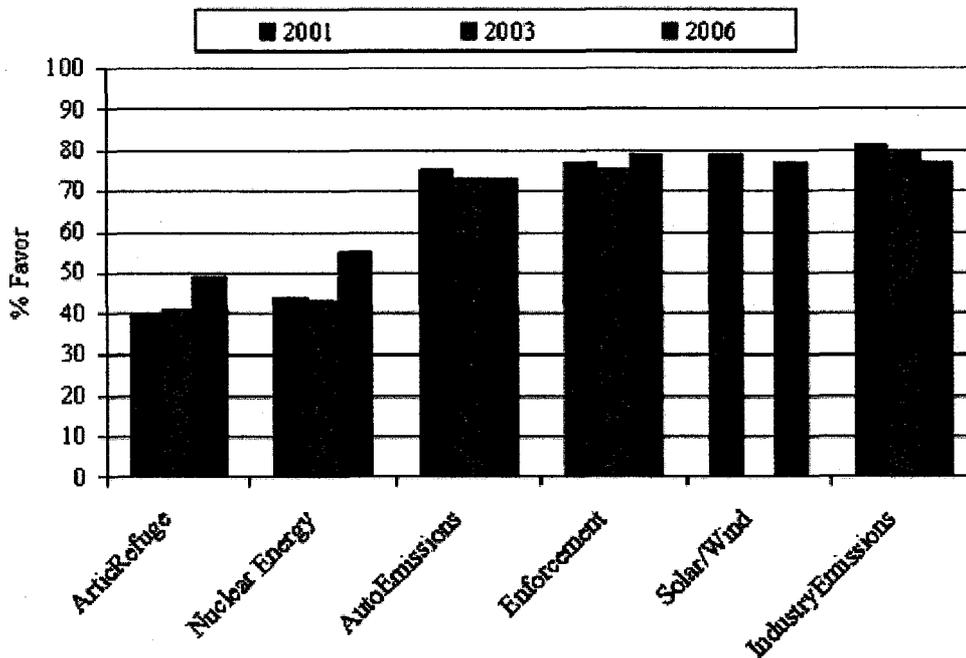
Solar is an answer that can help alleviate this increased demand as more people in a quest to be more environmentally responsible will be able to offset increased electrical usage for Hybrids via Distributed Generation.



The article titled "Toyota Reinforces Efforts for Environmental Technologies and Environmentally Friendly Vehicles" is being submitted for your reading pleasure.

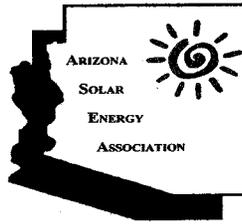
One can also find the general public is behind this move to increasing the use solar/wind. In a Gallop Poll where respondents were asked if they generally favor or oppose on a number of questions, the favor results areas shown in the following chart:

Figure 4. NUCLEAR ENERGY COMPARED TO OTHER ENVIRONMENTAL PROPOSALS



Note: Gallup asked respondents: "Next I am going to read some specific environmental proposals. For each one, please say whether you generally favor or oppose it. How about... opening up the Arctic National Wildlife Refuge in Alaska for oil exploration?... expanding the use of nuclear energy?... setting higher auto emissions standards for automobiles?... more strongly enforcing federal environmental regulations?... spending more government money on developing solar and wind power?... setting higher emissions and pollution standards for business and industry?" Solar and wind not asked in 2003.

The whole article titled: Going Nuclear: Frames and Public Opinion about Atomic Energy, is being submitted for your reading pleasure.



There are also surveys conducted like one in California back in 2004 that showed a very favorable acceptance of Solar from both Democrats and Republicans. This titled: Public Attitudes and Support for Solar Power, is being submitted for your reading pleasure.

A survey done by Roper Public Affairs for Sharp found that 79% felt homebuilders should offer PV as an option on all new homes. A copy of this article titled: Most Americans support solar power on new homes, is being submitted for your reading pleasure.

Though there are many other points that can be covered there is one that must be addressed.

The Energy Policy Act of 2005
Title XII – Electricity
Subtitle E – Amendments to PURPA
Section 1251. Net Metering and Additional Standards

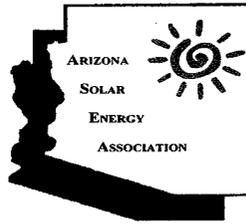
Section 111(d)(11) Net Metering.—This standard requires each electric utility to make available upon request net metering service to any electric consumer that the electric utility serves. “Net metering” means service to an electric consumer under which electric energy generated by the consumer from an eligible on-site generating facility and delivered to the local distribution facilities may be used to offset electric energy provided to the consumer during the applicable billing period.

Section 111(d)(12) Fuel Sources.—This standard requires each electric utility to develop a plan to minimize dependence on one fuel source and to ensure it uses a diverse range of fuels and technologies to generate electricity.

Section 111(d)(13) Fossil Fuel Generation Efficiency.—This standard requires each electric utility to develop and implement a 10-year plan to increase the efficiency of its fossil fuel generation.

States and nonregulated electric utilities must make their determinations whether to adopt these standards within three years of enactment. States do not have to comply if the state has already adopted or considered a comparable provision.

PURPA is stating here that Net Metering, diversification of Fuel Sources, increased Fossil Fuel Generation Efficiency must be addressed by 2008, or a comparable adoption of a like program is to address these three areas.



In Conclusion, the Governor of the State through a task force has stated that the issue of GHG must be addressed with a very aggressive goal. Bill Post of Pinnacle West Capital Corporation has stated large electrical growth in Arizona will continue. That the present fuel mix for electrification is out of balance with coal the dirtiest of all fuels as the only visible answer to meet the present growth. Private Corporations like Toyota are actively working to make a difference by moving to feasible alternative sources of energy, which will lead to an unaddressed demand for electricity in the coming years. The tax paying Public as found in a number of polls is behind the advancement of sustainable renewable energies. PURPA is requiring that this situation of Net Metering is to be addressed.

These are just a few points as to why net-metering in Arizona must move forward post haste; it must be properly funded and supported within all levels to make sure that it can happen.

ASEA on the following page is submitting what must be the bare minimum that is to be taken to promote a sustainable future for all the residents of Arizona.

If you have any questions or need clarification on any points please contact ASEA at ASEA@relaxjane.com or Geoff Sutton at 602 768-8229

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Carbon Dioxide (lbs/MWh)

1,066

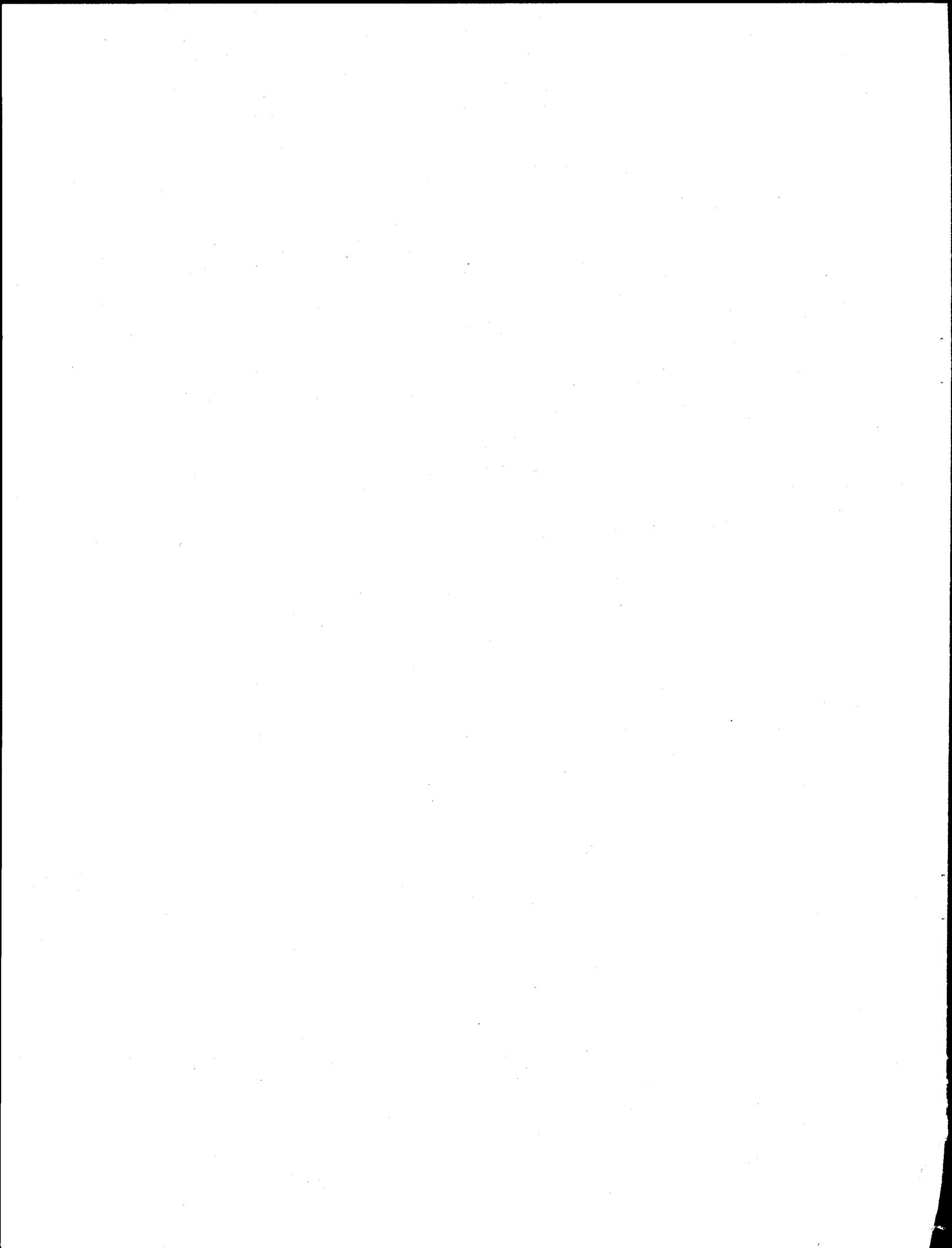
http://www.eia.doe.gov/cneaf/electricity/st_profiles/arizona.html

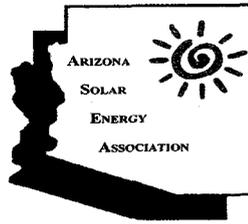
² http://www.pinnaclewest.com/main/pnw/investors/presentations/presentations_47.html

³ http://www.eia.doe.gov/cneaf/electricity/st_profiles/sept05az.xls

⁴ http://www.pastpeak.com/archives/2005/06/exxon_natural_g.htm

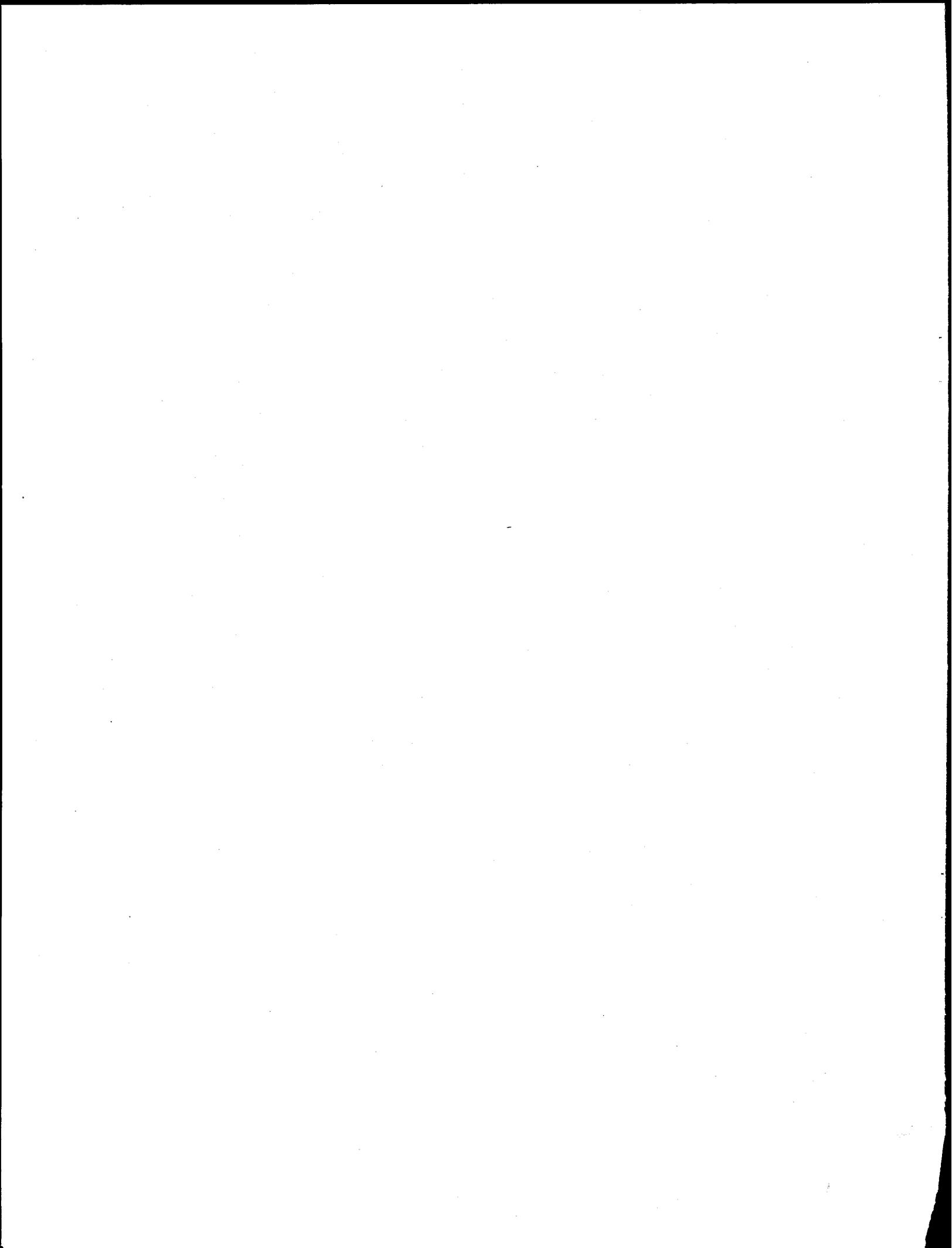
⁵ ---Stated at Scottsdale Green Building Meeting in 2005





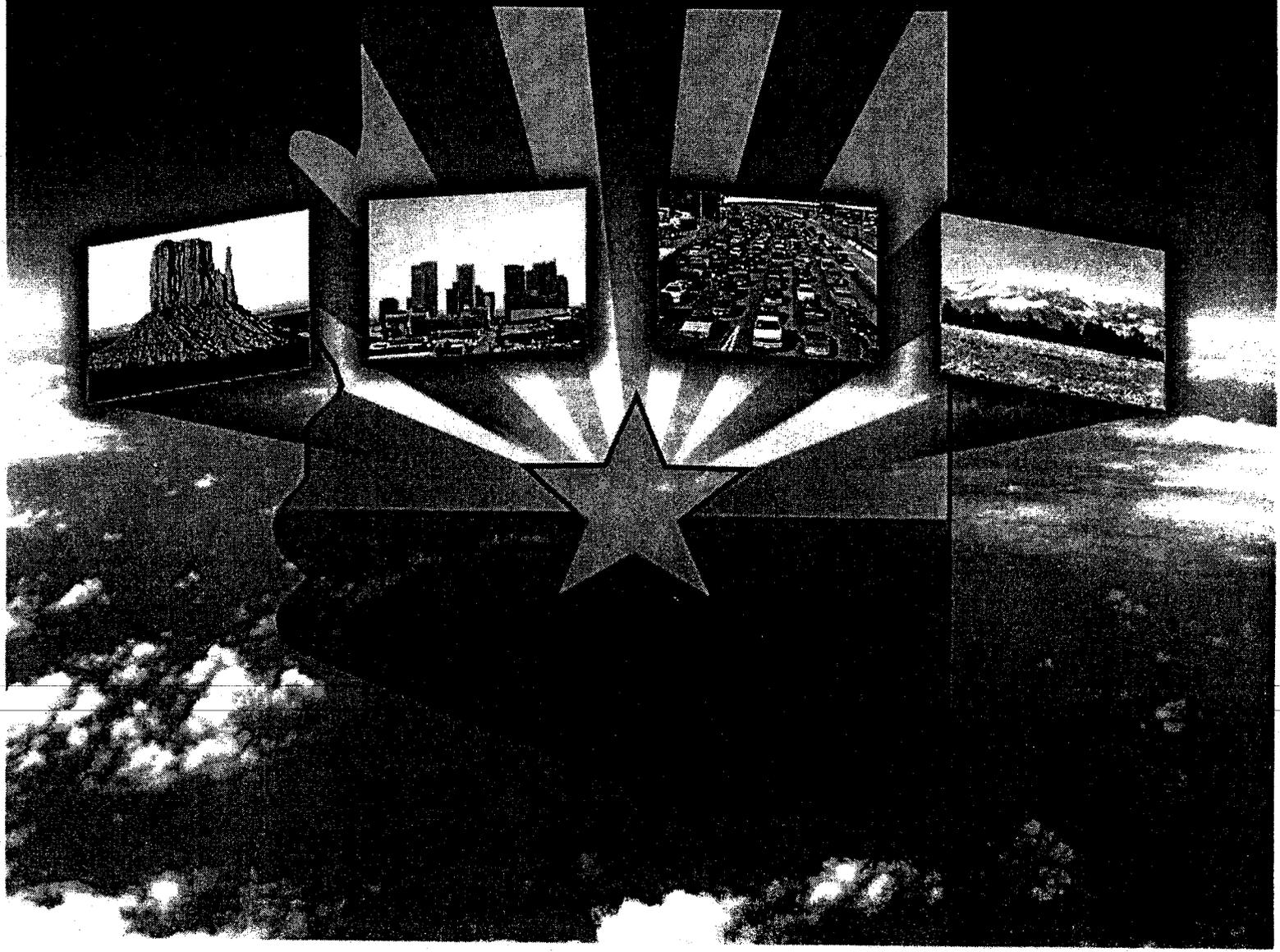
ASEA has taken the below position on Net Metering in Arizona:

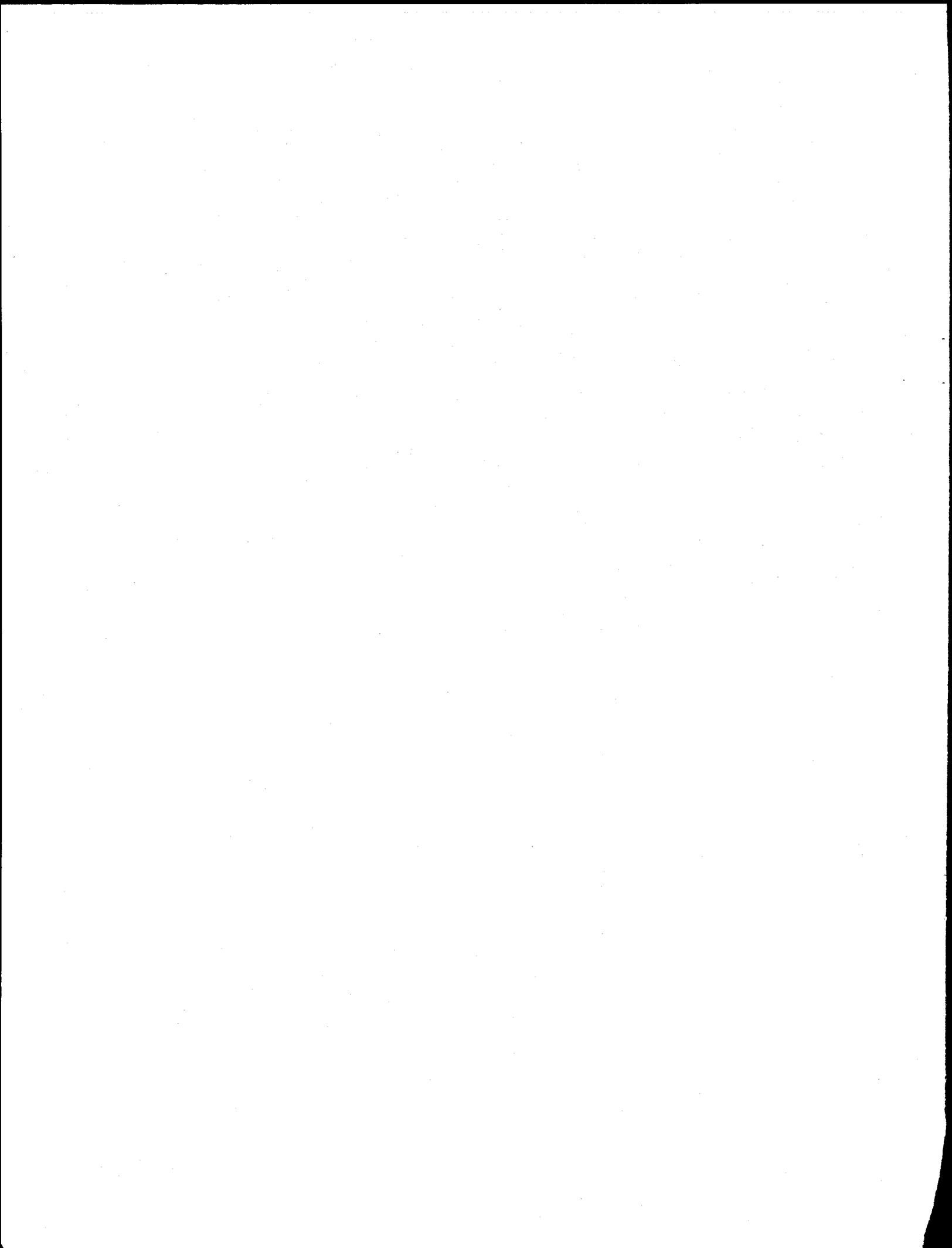
1. System Sizing for renewable generation is to see that fair value is given to the allotment of applicable funding.
 2. Total Utility Capacity of Net Metered Systems to be limited to no more than .5% of a Utilities peak yearly load.
 3. Utilities cannot impose special fees on customers who net meter.
 4. There is to be no penalties or restrictions on the rate plan used with net-metering.
 5. Net excess generation (NEG) is credited to the following month for up to 12 months, after the end of an annualized period all excess generation is granted to the utility with no compensation to the customer.
 6. The bill each month would show the amount sold back in kW hours and/or dollars so it is clearly shown.
 7. As a note ASEA questions the signing off of all RECs to the utilities only because the system rebate from the Utilities originates as a specific charge from ratepayer generated monies, ASEA though does not take a position on this at present.
-



ARIZONA
CLIMATE CHANGE ADVISORY GROUP

CLIMATE CHANGE ACTION PLAN
AUGUST 2006





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EXECUTIVE SUMMARY

Executive Order 2005-02

On February 2, 2005, Governor Janet Napolitano signed Executive Order 2005-02 establishing the Climate Change Advisory Group (CCAG). Appointed by the Governor, the 35-member CCAG comprised a diverse group of stakeholders who brought broad perspective and expertise to the topic of climate change in Arizona. The Governor's Executive Order directed the CCAG, under the coordination of the Arizona Department of Environmental Quality (ADEQ), to:

- 1) prepare an inventory and forecast of Arizona greenhouse gas (GHG) emissions; and
- 2) develop a Climate Change Action Plan with recommendations for reducing GHG emissions in Arizona.

The Executive Order emphasized that "Arizona and other Western States have particular concerns about the impacts of climate change and climate variability on the environment, including the potential for prolonged drought, severe forest fires, warmer temperatures, increased snowmelt, reduced snow pack and other effects."

The Executive Order also recognized that "actions to reduce GHG emissions, including increasing energy efficiency, conserving natural resources and developing renewable energy sources, may have multiple benefits including economic development, job creation, cost savings, and improved air quality."

The CCAG Process

The CCAG held its first meeting on July 14, 2005, followed by a year of intensive fact-finding and consensus building, facilitated by the Center for Climate Strategies (CCS). The CCAG met six times during this period, and five sector-based technical work groups (TWGs) of the CCAG – Energy Supply (ES); Residential, Commercial, Industrial and Waste Management (RCI); Transportation and Land Use (TLU); Agriculture and Forestry (AF); and Cross-Cutting Issues (CC) – met a total of 40 times via teleconference.

The recommendations adopted by the CCAG underwent two levels of screening. First, a potential policy option being considered by a TWG was accepted as a "priority for analysis" and developed for full analysis only if it had a supermajority of support from CCAG members (with a "supermajority" defined as five or fewer "no" votes or objections). Second, after the analyses were conducted, only policy options that received at least majority support from CCAG members were adopted as recommendations by the CCAG and included in this report.

Of the 49 policy recommendations adopted by the CCAG, 45 received unanimous consent, two (2) received a supermajority of support, and two (2) received a majority of support.

Emissions Inventory and Forecast

Prior to the first meeting of the CCAG, a preliminary inventory and forecast of GHG emissions for Arizona for years 1990 through 2020 was produced pursuant to Executive Order 2005-02.

The inventory provided several critical findings, including:

- Between 1990 and 2005 Arizona's net GHG emissions increased by nearly 56%, from an estimated 59.3 million metric tons carbon dioxide equivalent (MMtCO₂e) to an estimated 92.6 MMtCO₂e.
- Arizona's GHG emissions are forecasted to increase by 148% from 1990 to 2020, taking into account the effects of recent energy efficiency actions adopted by the State. Without these actions emissions growth in 2020 would be forecasted to increase by 159% over 1990 levels.
- The transportation and electricity sectors account for more than three-fourths – roughly 77% – of Arizona's total GHG emissions.

Figure E-1 below shows the relative amount of GHG emissions contributed by each sector in 2000.

Figure E-1 Arizona Greenhouse Gas (GHG) Emissions in 2000

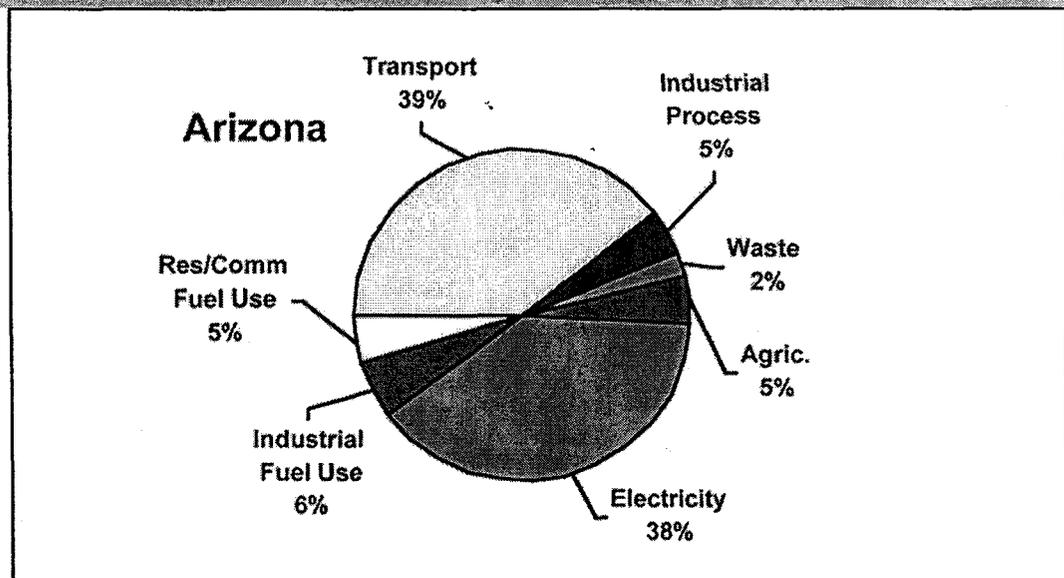
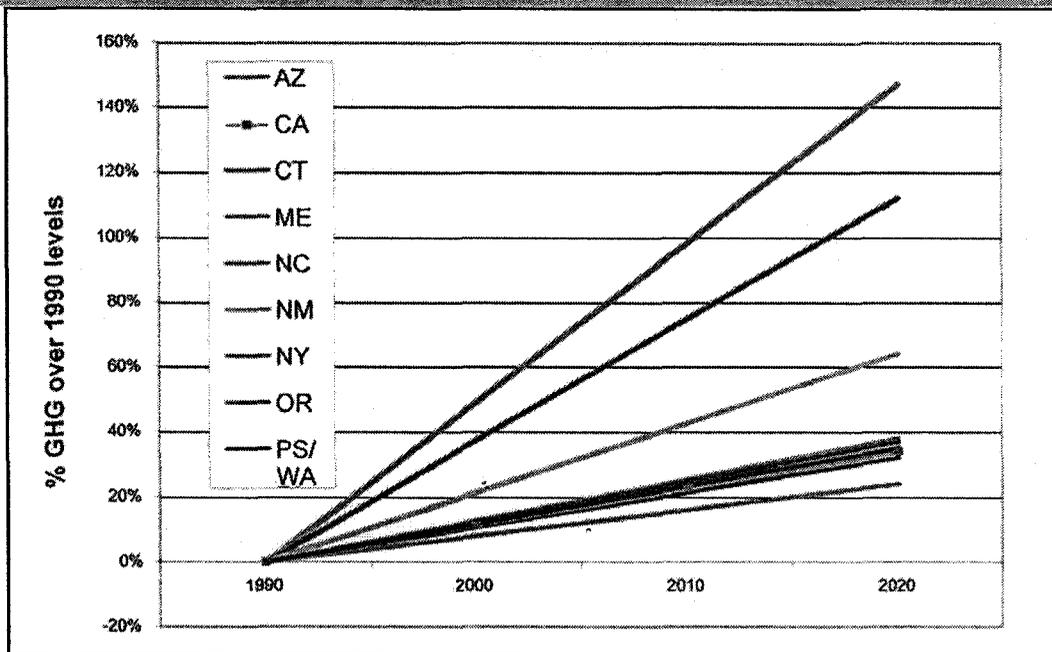


Figure E-2 below shows how Arizona's projected growth in GHG emissions compares to the growth rates in other states with climate action plans.

Figure E-2 Comparison of 1990-2020 GHG Emissions Growth for States with Climate Plans



While Arizona's high emissions growth rate presents challenges, it also provides major opportunities. Because more than three-fourths of Arizona's GHG emissions are directly related to energy and transportation, the opportunity exists for Arizona to reduce its GHG emissions while continuing its strong economic growth by being more energy efficient, using more renewable energy sources, building new infrastructure "right" in the first place to produce lower GHG emissions and increasing the use of cleaner transportation modes, technologies and fuels.

The CCAG's Recommended Policy Options

The CCAG is recommending a comprehensive set of 49 policy options to reduce GHG emissions in Arizona. The CCAG strongly recommends early and aggressive implementation of the recommendations and a corresponding set of incentives to promote their early adoption. The CCAG believes that early action and implementation of its policy recommendations are critical to put Arizona quickly on the path toward significant emissions reductions. The CCAG also urges that the policy options be implemented as a set, to the greatest extent practicable, to achieve the maximum GHG emissions reductions possible.

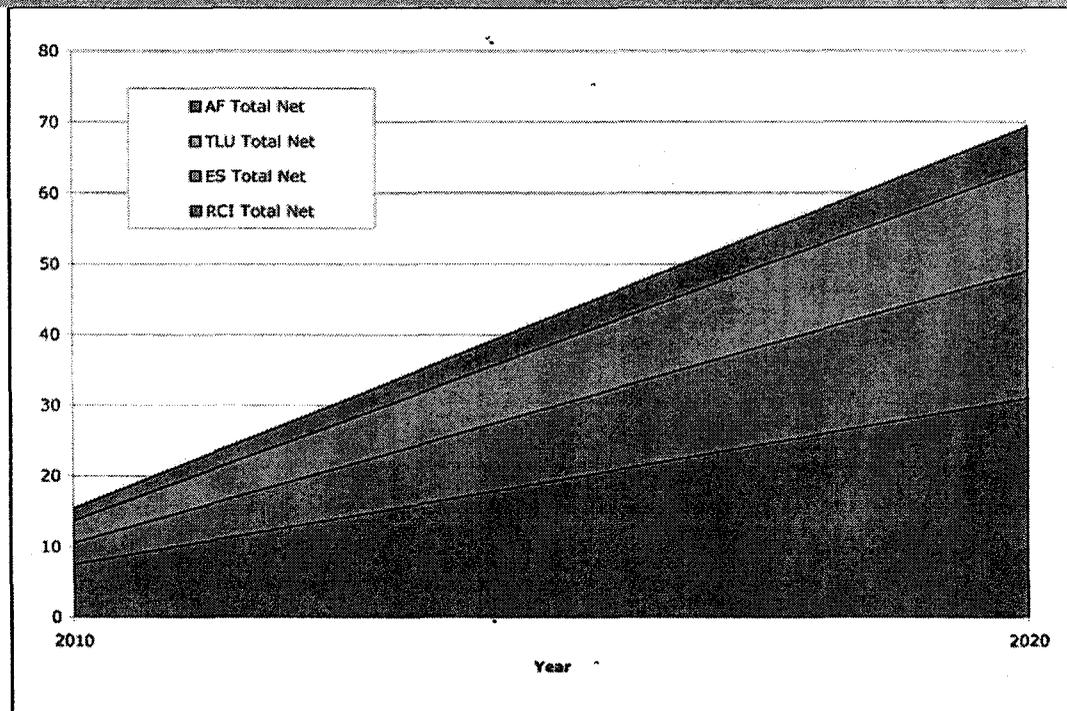
Overarching Recommendation: Set a State Goal to Reduce Arizona's GHG Emissions to 2000 Levels by 2020 and to 50% below 2000 Levels by 2040.

As an overarching policy matter, the CCAG recommends that Arizona establish a statewide goal of reducing future GHG emissions to a level equal to 2000 emissions by the year 2020 and to 50% below the 2000 emissions level by the year 2040.

The recommended goal for reductions in Arizona's GHG emissions reflects the CCAG's policy options recommendations. In fact, the CCAG's recommended policy options, if fully implemented, could reduce GHG emissions in Arizona by several million metric tons more than the amounts called for in the recommended goal. The CCAG's policy options could cut Arizona's GHG emissions by more than 69 MMtCO₂e in 2020, reducing GHG emissions to more than five percent (5%) below the 2000 level. Cumulative GHG emissions reductions from 2007-2020 for all the policy options combined could total more than 485 MMtCO₂e (adjusted for overlap to avoid double-counting of reductions).

Figure E-3 below shows the annual GHG reductions that could be achieved by sector through the CCAG's recommended policy options from 2010 to 2020. As Figure E-3 illustrates, a significant portion of the achievable reductions are associated with energy efficiency and renewable energy policy options in the residential, commercial, and industrial sectors.

Figure E-3 2010 through 2020 GHG Reductions, by Sector



AF - Agriculture and Forestry
 TLU - Transportation and Land Use
 ES - Energy Supply
 RCI - Residential Commercial Industrial (fuel use)

The recommended goal for Arizona is consistent with the goals set by other states, including those in the West, that are implementing GHG reduction strategies:

AZ	2000 levels by 2020; 50 percent below 2000 levels by 2040
CA	2000 levels by 2010; 1990 levels by 2020; 80 percent below 1990 levels by 2050
CT	1990 levels by 2010; 10 percent below by 2020; 75 percent below by 2100
MA	1990 levels by 2010; 10 percent below by 2020; 75 percent below by 2100
ME	1990 levels by 2010; 10 percent below by 2020; 75 percent below by 2100
NJ	3.5 percent below 1990 levels by 2005
NM	2000 levels by 2012; 10 percent below by 2020; 75 percent below 2050
NY	5 percent below 1990 by 2010; 10 percent below 1990 levels by 2020
OR	1990 levels by 2010; 10 percent below by 2020; 75 percent by 2050
RI	1990 levels by 2010; 10 percent below by 2020; 75 percent by 2100
WA	1990 levels by 2020; 70-80 percent below 1990 levels by 2050 (Puget Sound)

Reducing Arizona's GHG emissions to the recommended levels through full implementation of all of the CCAG's recommendations also would result in significant economic benefits for the state, including substantial economic cost savings, new job creation and enhanced economic development. The Center for Climate Strategies (CCS) has calculated overall net economic cost savings from the CCAG's recommendations of more than \$5.5 billion between 2007-2020, with additional significant cost savings also expected between 2020-2040 (although not calculated by CCS). The CCS also has calculated an average net economic cost savings of nearly \$13 per ton of GHG emissions reduced under the CCAG's recommended policy options (if fully implemented).

The Policy Options

The CCAG is recommending a comprehensive set of forty-nine (49) policy options:

Cross-Cutting (CC) Issues

The CCAG is recommending five (5) policy options to facilitate reductions in Arizona's GHG emissions across economic sectors and address issues associated with climate change. These policy options include:

- Set a State GHG Reduction Goal (as stated above) (CC-1)
- Establish a GHG Emissions Reporting Mechanism (CC-2)
- Establish a GHG Emissions Registry (CC-3)
- Undertake Climate Action Education and Outreach (CC-4)
- Develop a State Climate Change Adaptation Strategy (CC-5)

Residential, Commercial, Industrial and Waste Management (RCI) Sectors

The CCAG is recommending a set of twelve (12) policy options to reduce emissions from the RCI sector, including improving energy efficiency, substituting lower-emissions energy resources, and strategies to reduce emissions from the production of electricity consumed by the RCI sector. The state's rapid growth and limited pursuit of energy efficiency to date offers particularly strong opportunities to reduce emissions through improving the efficiency of buildings, appliances and industrial practices. The RCI policy options include:

- Set Demand-Side Efficiency Goals and Establish Funds, Incentives, and Programs to Achieve Them (RCI-1)
- Establish State Leadership Programs to Achieve Energy Savings and Promote Clean Energy (RCI-2)
- Implement Enhanced Appliance Efficiency Standards (RCI-3)
- Adopt Building Standards/Codes/Design Incentives for Energy Efficiency and Smart Growth (RCI-4 & RCI 5)
- Encourage Distributed Generation of Renewable Energy and Combined Heat and Power (RCI-6 & RCI 7)
- Implement Electricity Pricing Strategies that Support Energy Conservation (RCI-8)
- Promote Low-Global-Warming-Potential Refrigerants in Commercial Operations (RCI-9)
- Provide Incentives for Consumers to Switch to Low GHG Energy Sources (RCI-10)
- Increase Recycling and Solid Waste Management and Reduction (RCI-12)
- Increase Water Use Efficiency and Promote Energy Efficiency and Renewable Energy Production from Water and Wastewater Management (RCI-13)

Energy Supply (ES) Sector

The CCAG is recommending a set of eight (8) policy options to significantly reduce GHG emissions from the ES sector. The principal challenge in addressing GHG emissions from Arizona's electricity sector is the state's extraordinary growth rate and the accompanying projected increase in energy demand. New policies are needed to increase utilization of Arizona's renewable energy resources, like solar, wind, biomass and geothermal, and reduce reliance on pulverized coal technology. The ES policy options include:

- Increase the Environmental Portfolio Standard by 1% each year through 2025 (ES-1)
- Provide Incentives for and Encourage Investment in Renewable Energy (ES-3)
- Explore Development of a National or Regional GHG Cap and Trade Program (ES-4)
- Implement Carbon Intensity Targets (ES-6)
- Reduce Barriers to Renewables and Distributed Generation of Clean Energy (ES-9)
- Implement Net Metering and Advanced Metering for Energy Consumption (ES-10)
- Implement Pricing Strategies to Promote Energy Conservation and Use of Renewable Energy (ES-11)
- Implement Integrated Resource Planning (ES-12)

Transportation and Land Use (TLU) Sector

The CCAG is recommending a set of thirteen (13) policy options to reduce GHG emissions reductions from the TLU sector, including improved vehicle fuel efficiency, increased usage of lower-emissions fuels, greater use of lower-emissions means of travel and land use and other strategies to decrease the growth in fuel use and vehicle miles traveled (VMT). GHG emissions from the TLU sector, which are expected to more than double by 2020 (over 1990 levels), are influenced by transportation technologies and fuels, along with population, economic growth and land use policies that affect the demand for transportation services. The TLU policy options include:

- Adopt the Clean Car Program (TLU-1)
- Implement Policies to Promote Smart Growth Planning, Infill, Increased Density and Transit-Oriented/Pedestrian Friendly Development (TLU-2)
- Promote Multi-Modal Transit (TLU-3)
- Reduce Vehicle Idling (TLU-4)
- Set Standards for Alternative Fuels (TLU-5)
- Provide Incentives for Hybrid Vehicles (TLU-7)
- Explore Feebates (TLU-8)
- Implement a Pilot Program for Pay-As-You-Drive Insurance (TLU-9)

- Encourage Low Rolling Resistance Tires and Promote Proper Tire Inflation (TLU-10)
- Provide Incentives for Accelerated Replacement/Retirement of High-Emitting Diesel Vehicles (TLU-11)
- Increase the Use of Biodiesel (TLU-12)
- Implement Practices and Procurement Policies to Achieve a Lower-GHG-Emitting State Vehicle Fleet (TLU-13)
- Reduce the Speed Limit to 60 mph for Commercial Trucks on Highways/Freeways (TLU-14)

Agriculture and Forestry (AF) Sectors

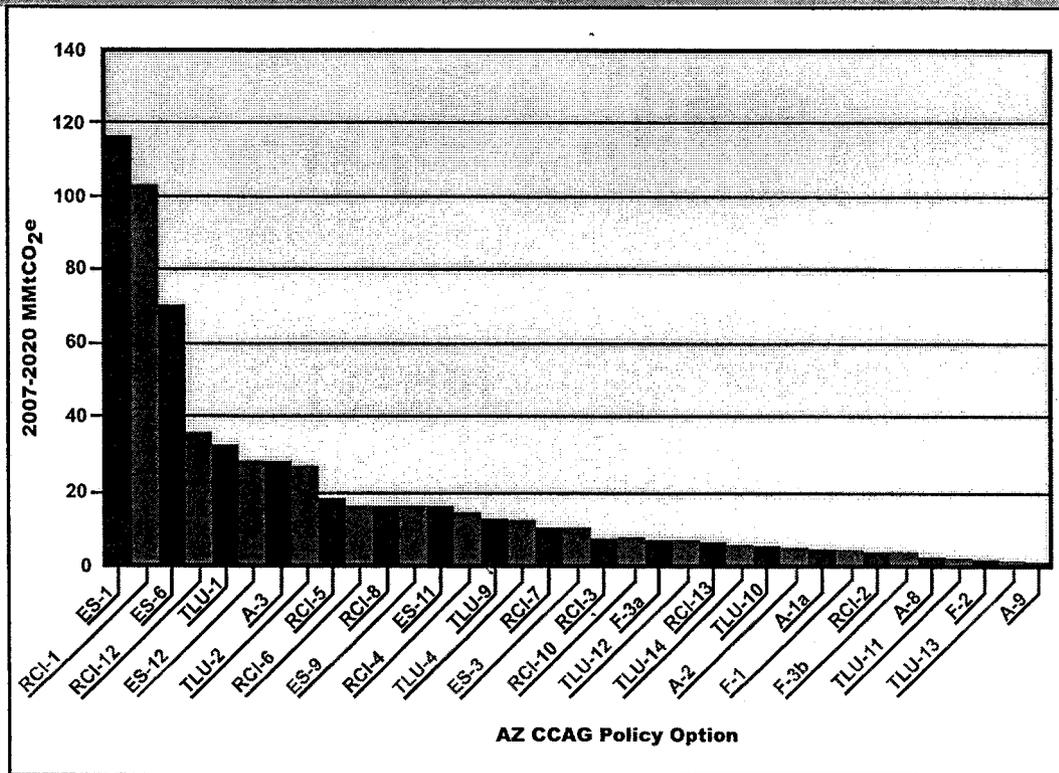
The CCAG is recommending eleven (11) policy options for the AF sectors. While the AF sectors are directly responsible for only a small amount of Arizona's current GHG emissions, there are opportunities for GHG reductions in the sectors, as well as reductions in overall GHG emissions in the state by increased carbon sequestration through new policies and practices in the AF sectors. The AF policy options include:

- Use Manure Digesters to Reduce Methane Emissions from Livestock Operations and Promote Energy Use of the Captured Methane (A-1)
- Use Biomass Feedstocks for Electricity or Steam Production (A-2)
- Increase Ethanol Production and Use (A-3)
- Convert Agricultural Land to Grassland or Forest to Increase Carbon Sequestration (A-7)
- Reduce Conversion of Farm and Rangelands to Developed Uses (A-8)
- Promote Consumption of Locally Produced Agricultural Commodities to Reduce Transportation Emissions (A-9)
- Decrease the Conversion of Forestland to Developed Uses (F-1)
- Increase Reforestation and Restoration of Forestland (F-2)
- Improve Forest Ecosystem Management (F-3a & 3b)
- Improve Commercialization of Biomass Gasification and Combined Cycle Technologies (F-4)

GHG Reductions from the Recommended Policy Options

Figure E-4 below shows the amount of GHG emissions reductions achievable under each individual, quantified policy option cumulatively from 2007-2020, ranked by its GHG reduction potential. The CCS was able to quantify the GHG emissions reduction potential for 35 of the 49 total recommended policy options.

Figure E-4 CCAG Recommended Policy Options, by Quantified Individual GHG Reduction 2007-2020



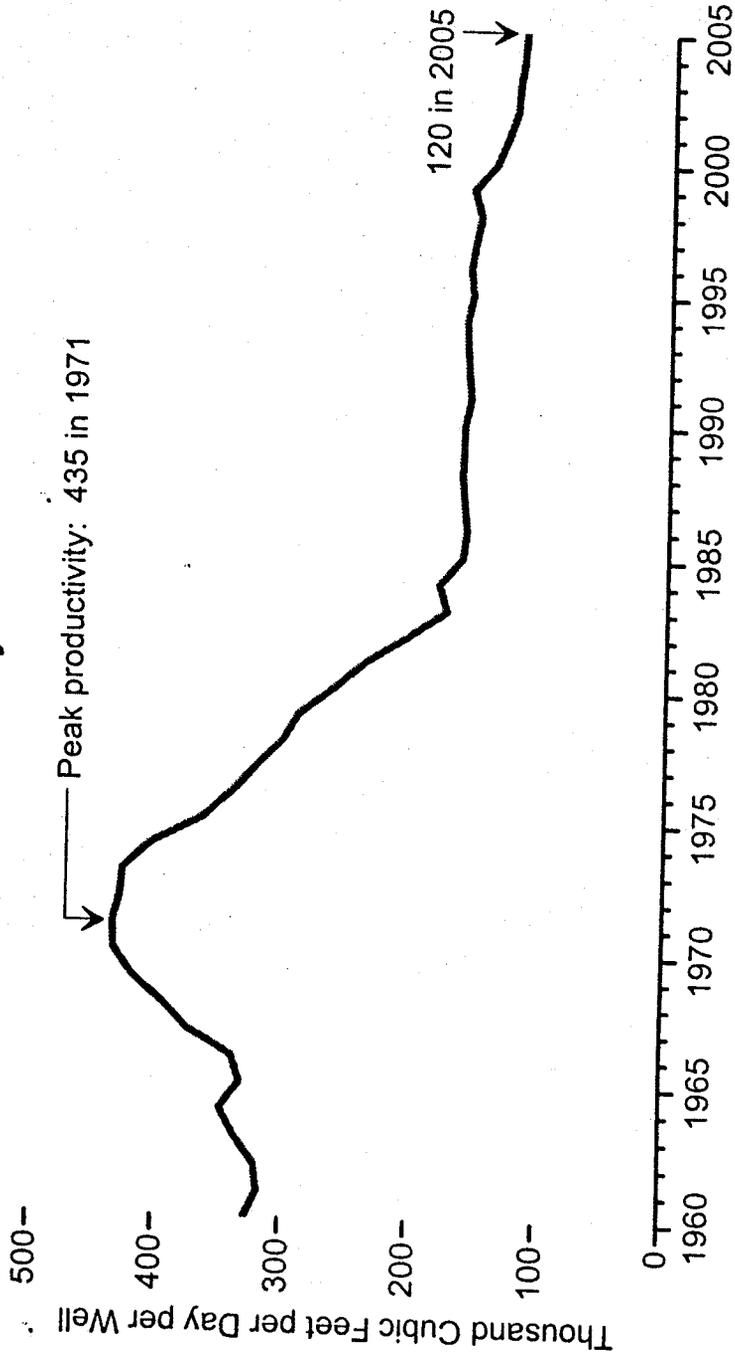
Policy Option	MMtCO ₂ e
Environmental Portfolio Standard/Renewable Energy Standard and Tariff (ES-1)	116.00
Demand-Side Efficiency Goals, Funds, Incentives, and Programs (RCI-1)	103.00
Carbon Intensity Targets (ES-6)	70.40
Solid Waste Management (RCI-12)	36.00
State Clean Car Program (TLU-1)	32.50
Integrated Resource Planning (ES-12)	28.00
Ethanol Production and Use (A-3)	28.00
Smart Growth Bundle of Options (TLU-2)	26.70
"Beyond Code" Building Design Incentives and Programs for Smart Growth (RCI-5)	18.00
Distributed Generation/Combined Heat and Power (RCI-6)	16.00
Electricity Pricing Strategies (RCI-8)	16.00
Reduce Barriers to Renewables and Clean Distributed Generation (ES-9)	16.00
Pricing Strategies (ES-11)	16.00
Building Standards/Codes for Smart Growth (RCI-4)	14.00
Pay-As-You-Drive Insurance (TLU-9)	12.30
Reduction of Vehicle Idling (TLU-4)	11.80
Distributed Generation/Renewable Energy Applications (RCI-7)	10.00
Direct Renewable Energy Support (ES-3) (including Tax Credits and Incentives, R&D, and siting/zoning)	10.00
Appliance Standards (RCI-3)	7.00
Demand-Side Fuel Switching (RCI-10)	7.00
Forest Ecosystem Management - Residential Lands (F-3a)	6.40

Policy Option	MMtCO₂e
Biodiesel Implementation (TLU-12)	6.20
Water Use and Wastewater Management (RCI-13)	6.00
60 mph Speed Limit for Commercial Trucks (TLU-14)	5.20
Low Rolling Resistance Tires and Tire Inflation (TLU-10)	4.80
Biomass Feedstocks for Electricity or Steam Production (A-2)	4.54
Manure Management – Manure Digesters (A-1)	3.82
Forestland Protection from Developed Uses (F-1)	3.73
State Leadership Programs (RCI-2)	3.00
Forest Ecosystem Management – Other Lands (F-3b)	2.90
Reduce Conversion of Farm and Rangelands to Developed Uses (A-8)	1.59
Accelerated Replacement/ Retirement of High-Emitting Diesel Fleet (TLU-11)	1.20
Reforestation/Restoration of Forestland (F-2)	0.65
State Lead-By-Example (via Procurement and SmartWay) (TLU-13)	0.40
Programs to Support Local Farming/Buy Local (A-9)	0.15

The data presented illustrate the potential “stand alone” GHG emissions reductions achievable separately under each individual policy option if the option was implemented solely by itself and not in conjunction with other policy options. The potential GHG emissions reduction figures do not account for overlaps that could occur between reductions achievable under individual policy options if the options were implemented together.

For example, while Figure E-4 shows cumulative GHG emissions reductions of 116 MMtCO₂e for policy option ES-1 as a “stand alone” option, the total would become 70.3 MMtCO₂e if the option were implemented in conjunction with all of the other recommended policy options, due to overlaps (especially with the RCI sector). See pages H-3 to H-4 in Appendix H. The same principle applies for ES-6, which changes from 70.4 MMtCO₂e to 50.3 MMtCO₂e. See page H-18 in Appendix H. When adjusted for overlaps to avoid double counting, the cumulative GHG emissions reductions potentially achievable from 2007-2020 through full implementation of all of the CCAG’s recommended policy options is 485.4 MMtCO₂e. See Table 1-3 on page 24 and footnote 15.

Natural Gas Well Average Productivity



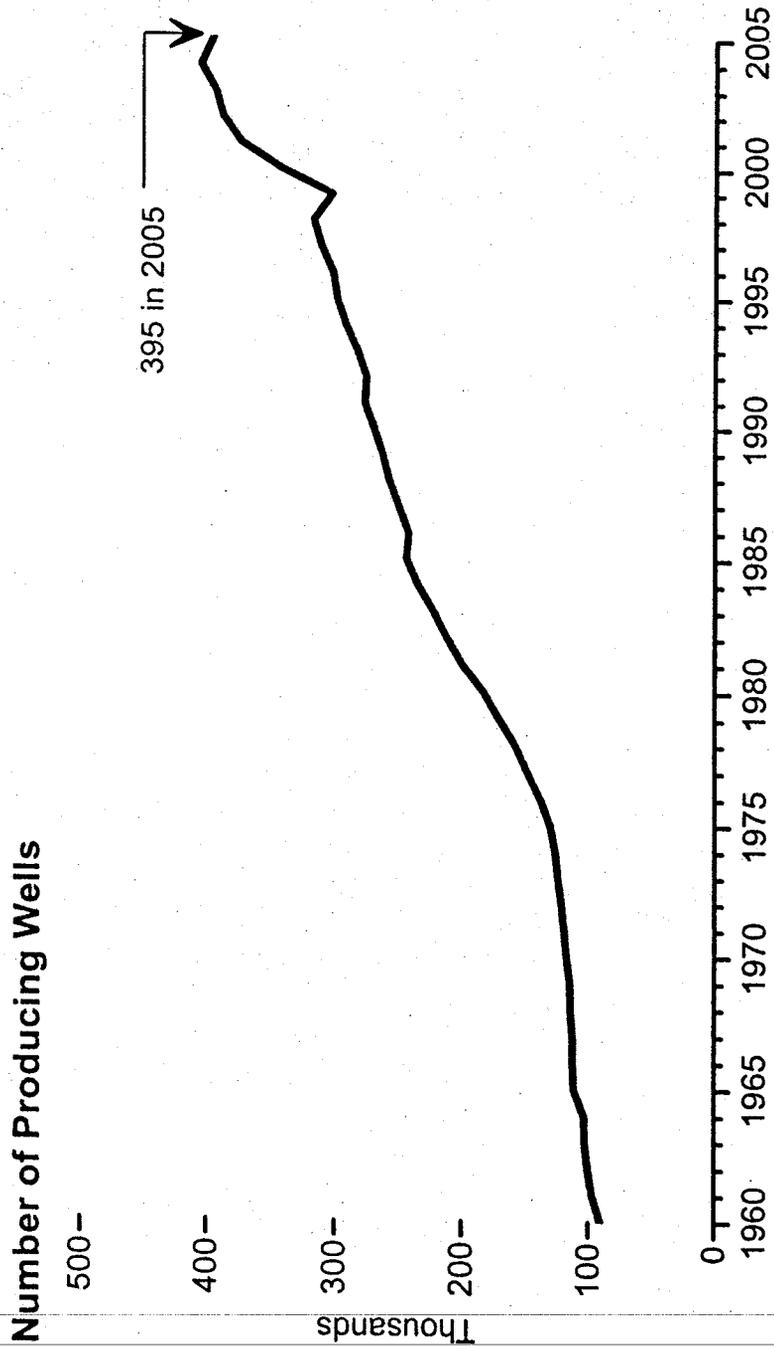


Figure 6.5 Natural Gas Consumption by Sector

By Sector, 1949-2005

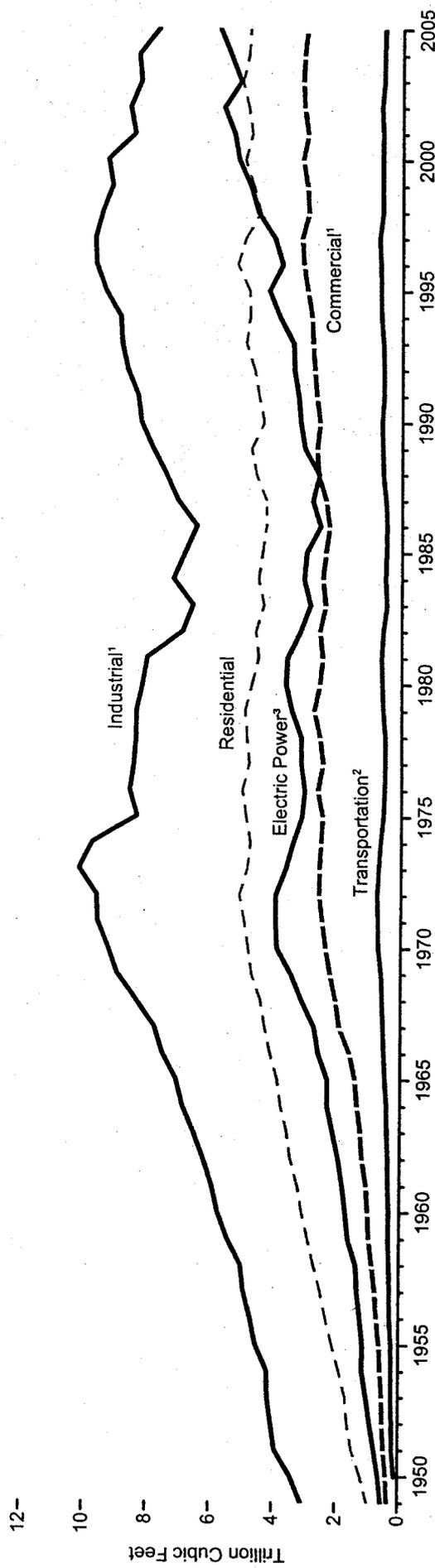
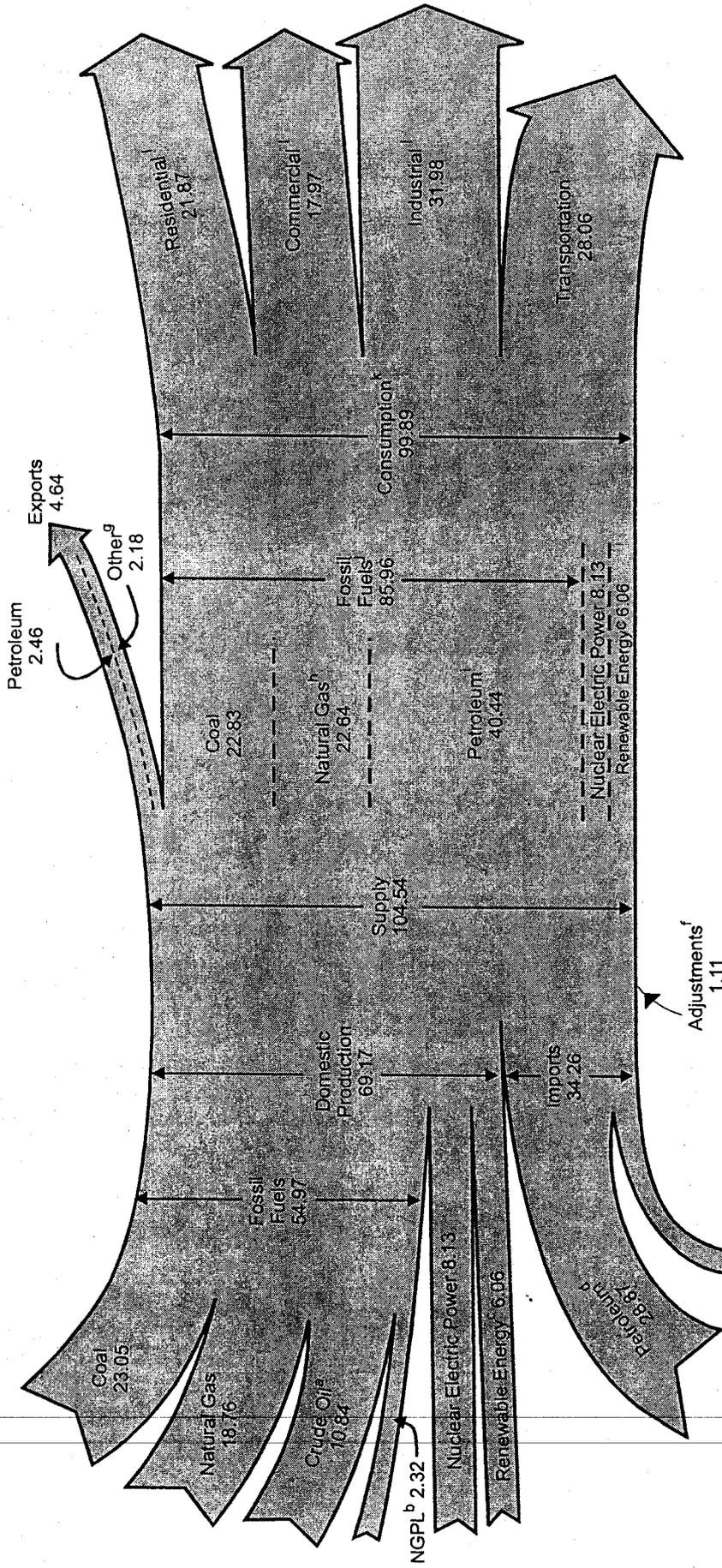


Diagram 1. Energy Flow, 2005
(Quadrillion Btu)



http://www.eia.doe.gov/emeu/aer/pdf/pages/sec1_3.pdf

^a Includes lease condensate.
^b Natural gas plant liquids.
^c Conventional hydroelectric power, wood, waste, ethanol blended into motor gasoline, geothermal, solar, and wind.
^d Crude oil and petroleum products. Includes imports into the Strategic Petroleum Reserve.
^e Natural gas, coal, coal coke, and electricity.
^f Stock changes, losses, gains, miscellaneous blending components, and unaccounted-for supply.
^g Coal, natural gas, coal coke, and electricity.
^h Includes supplemental gaseous fuels.

ⁱ Petroleum products, including natural gas plant liquids.
^j Includes 0.04 quadrillion Btu of coal coke net imports.
^k Includes, in quadrillion Btu, 0.34 ethanol blended into motor gasoline, which is accounted for in both fossil fuels and renewable energy but counted only once in total consumption; and 0.08 electricity net imports.
^l Primary consumption, electricity retail sales, and electrical system energy losses, which are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales. See Note, "Electrical Systems Energy Losses," at end of Section 2.
 Notes: • Data are preliminary. • Values are derived from source data prior to rounding for publication. • Totals may not equal sum of components due to independent rounding.
 Sources: Tables 1.1, 1.2, 1.3, 1.4, and 2.1a.

TOYOTA

News Release

June 13, 2006

Toyota Reinforces Efforts for Environmental Technologies and Environmentally Friendly Vehicles

Tokyo — TOYOTA MOTOR CORPORATION (TMC) announced today that—to achieve sustainable mobility and help preserve the global environment—it is enhancing its development of environmental technologies and strengthening its efforts to introduce environmentally friendly vehicles.

TMC's intensified engagement, represented by activities and achievements such as those described below, is being carried out with a view toward: 1) improving fuel efficiency to reduce emissions of CO₂, which is considered as a cause of global warming, 2) making exhaust emissions cleaner to help abate atmospheric pollution and 3) pursuing energy diversification to limit the use of fossil fuels, particularly that of petroleum.

Status of Technology Development / Plan for Environmentally Friendly Vehicles

1) Revamping of entire gasoline engine and transmission lineup

- TMC plans to completely revamp its gasoline engine and transmission lineup by 2010 in an effort that started with the development of a new type of V6 engine in 2003. As part of this effort, a new 1.8-liter gasoline engine (see below for details) and continuously variable transmission have been developed as the main powertrain for Toyota compact and midsize passenger vehicles. This new powertrain—to be introduced in new-model vehicles due out in the fall of 2006—is intended to reduce CO₂ emissions through high fuel efficiency and to achieve cleaner exhaust emissions.
- TMC achieved the Japanese government's 2010 fuel efficiency standards^{*1} in all weight categories of Toyota vehicles ahead of schedule in 2005^{*2}.
- As a target for 2010, TMC aims to achieve emissions levels that are 75% lower than the 2005 emissions standards^{*3} and to exceed the level called for by the Japanese 2010 fuel efficiency standards by 10% or more for most passenger vehicle.

2) Making hybrid vehicles more widespread and developing new technologies

- TMC aims to make hybrid vehicles more widespread by doubling the number of hybrid models by the early years of the 2010s.
- TMC will advance its research and development of plug-in hybrid vehicles (which can be charged from an external power source and provide electricity) and is currently working on a next-generation vehicle that can extend the distance traveled by the electric motor alone and that is expected to have a significant effect on reducing CO₂ and helping to abate atmospheric pollution.

3) Initiatives toward the diversification of energy sources

- Regarding TMC's introduction of bioethanol-compatible vehicles, TMC has achieved the technology necessary to allow all TMC gasoline engines to run reliably on gasoline with 10 percent bioethanol content. TMC plans to introduce to the Brazilian market (where bioethanol fuel is widely used) flex-fuel vehicles^{*4} that can run on 100 percent ethanol in the spring of 2007. For the United States, TMC is considering introducing flex-fuel vehicles in consideration of policies to promote bioethanol fuels.
- TMC plans to further its development of fuel cell passenger vehicles and has successfully reduced by a large margin the time required for sub-zero fuel-cell-system startup and has achieved system startup at minus 30 degrees Celsius.

TMC positions global environmental preservation, along with traffic safety, as a priority management issue in terms of its corporate social responsibility. TMC is continuing to enhance its development of environmentally friendly vehicles and environmental technologies as it strives to actively deliver technologies and products that contribute to realizing

sustainable mobility. TMC is also working to actively implement measures in accordance with its basic environmental policy, the Toyota Earth Charter, and in line with the Toyota Environmental Action Plan, which sets out specific medium and long-term activity targets.

*1 Specified by the Japanese Law Concerning the Rational Use of Energy (for the business year from April 1, 2010)

*2 The business year from April 1, 2005

*3 Specified under the Japanese Ministry of Land, Infrastructure and Transport's Approval System for Low-emission Vehicles

*4 Vehicles that can run on fuels mixed at any ratio of gasoline and ethanol, etc.

Overview of New 1.8-liter Gasoline Engine

Aiming to create an engine capable of delivering one of the best performances in its displacement class, TMC has developed a new 1.8-liter gasoline engine that features advanced mechanisms such as Dual VVT-i (Variable Valve Timing-intelligent), provides torque-strong output, reduces CO₂ emissions through high fuel efficiency, achieves cleaner exhaust emissions and is light and compact.

Main features of new engine

1) Torque-strong performance

While Dual VVT-i enables continuous control of optimum valve timing for various engine speeds and loads, abundant torque at low and medium speeds allows for easy-to-handle output, providing one of the best torque-strong performances in the 1.8-liter class.

2) Excellent fuel efficiency and clean exhaust emissions

The use of Dual VVT-i and ultra-light pistons, along with efforts to reduce friction loss among parts such as by using roller bearings in the rocker arm valve train, are aimed at achieving at least 5% greater fuel efficiency than that achievable by conventional engines and at achieving clean exhaust emissions (equivalent to 75% lower than the maximum allowed by 2005 emissions standards).

3) Reduced size and weight

Reduced exterior dimensions and weight have been achieved by modularizing the front section of the engine and using smaller-diameter spark plugs, etc.

Specifications

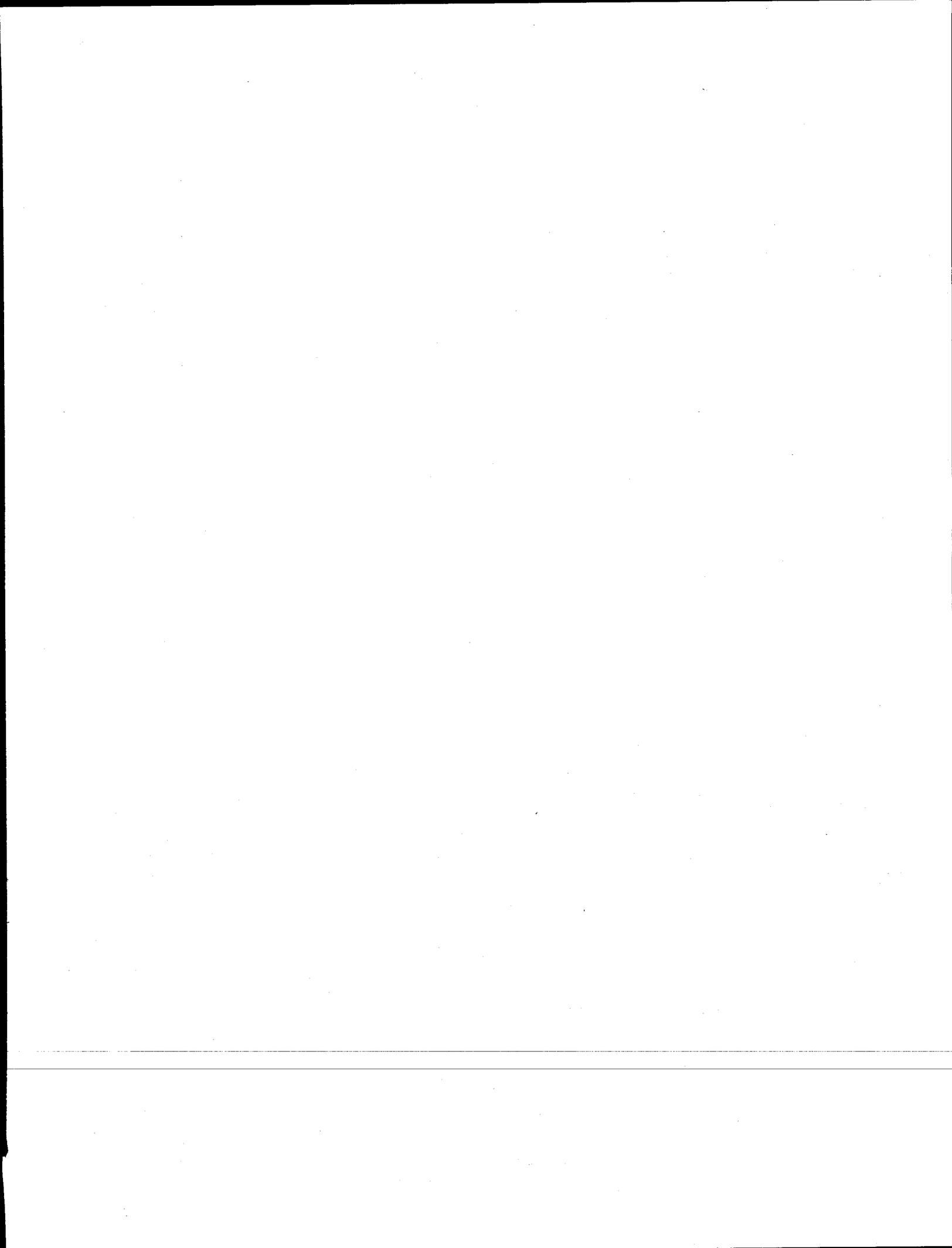
Item	Specifications	
	2ZR-FE (new model)	1ZZ-FE (previous model)
Engine model	2ZR-FE (new model)	1ZZ-FE (previous model)
Engine type	In-line 4-cylinder DOHC-16 valve	←
	Dual VVT-i (intake and exhaust)	VVT-i (exhaust)
Displacement [cc]	1,797	1,794
Bore x stroke [mm]	80.5 x 88.3	79.0 x 91.5
Engine supply system	Electronic fuel Injection (EFI)	←
Fuel type	Regular unleaded gasoline	←
Compression ratio	10.0	←
Maximum output [kW (PS) / rpm]	100 (136) / 6,000*	97 (132) / 6,000
Maximum torque [N-m (kg-m) / rpm]	175 (17.8) / 4,400*	170 (17.3) / 4,200

Level of emissions below maximum allowed by 2005 emissions standards	Equivalent to a 4-star rating under the Japanese approval system for low-emission vehicles	← (Premio 1.8-liter, 2WD)
Fuel efficiency under the 10-15 test cycle outlined by the Japanese Ministry of Land, Infrastructure and Transport (km/l)	5% or higher compared to conventional engines*	16.0
Weight without fuel (kg)	97	96

*Targeted

(Figures for 2ZR-FE engine as measured by TMC)

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Going Nuclear: Frames and Public Opinion about Atomic Energy

Matthew Nisbet
June 1, 2006



The debate over nuclear energy is back. With rising concern over energy independence, and a focus on curbing greenhouse gas emissions, the Bush administration and even some environmentalists are calling for re-investment in nuclear power plants. Yet, the question remains, will the public support nuclear energy? Outside of a technical debate over benefits, trade-offs, and risks, at issue is the perception that public opinion rules out any serious new investment in the technology. In this column I take a look at the re-occurring ways that various players in the debate try to selectively *frame* the issue. I also review recent public opinion polls in an attempt to figure out exactly where the public stands on the matter.

Few Americans associate nuclear energy with slogans like "Atoms for peace" or "electricity too cheap to meter." Yet before the 1970s, nuclear energy production was framed almost exclusively in these terms, with the technology defined as leading to *social progress, economic development*, and a better way of life. When President Dwight Eisenhower in 1953 delivered his "atoms for peace" speech before the United Nations, demand for electricity in the U.S. was doubling each decade, while Europe faced severe energy shortages. The construction of nuclear power plants at home was expected to give the U.S. an important economic advantage, and the promotion of civilian nuclear technology abroad was considered a key diplomatic tool in winning allies against the Soviet Union.

The oil crisis of the early 1970s added a third positive interpretation to the technology, as the development of nuclear power was repackaged as a path to *energy independence*. Frames changed, however, in the mid-1970s as Ralph Nader and other consumer advocates re-interpreted nuclear energy in terms of *public accountability*, arguing that the industry had become a powerful special interest. Environmentalists also began to emphasize *alternative paths* to energy independence, with a focus on energy conservation, and solar, hydro, and wind generation. Other groups such as the Union of Concerned Scientists emphasized that nuclear energy production was simply *not cost-effective*. Atomic energy also became wrapped up in the "nuclear freeze" movement, as the Jimmy Carter administration limited the export of civilian technology abroad, and as protestors swarmed nuclear power plants at home. (For overviews, see [Gamson and Modigliani, 1989](#); [Weart, 1988](#).)

The tipping point for the image of nuclear energy was the [Three Mile Island](#) accident in 1979. As Gamson and Modigliani note, several weeks before the TMI incident, the popular [China Syndrome](#) movie was released. With its focus on industry secrecy and incompetence, the film emphasized an interpretation of *public accountability*. More importantly, with the film's reactor meltdown climax, the movie amplified a new frame focusing on the potential *runaway* nature of the technology. In this

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interpretation, nuclear power was portrayed as a Frankenstein's monster beyond the ability of citizens to control.

When news reports of TMI galvanized national attention, the prevailing frames of *public accountability* and *runaway technology* became the major modes of interpretation. (Consider this [Time magazine cover](#) featuring an ominous picture of the reactor with the headline "Nuclear Nightmare.") The accident helped set in motion a dominant media narrative that went on to spotlight additional examples of construction flaws, incompetence, faulty management, and potential risks at nuclear power plants across the country. Since 1979, no new nuclear power plants have been built in the U.S, though more than 100 power plants remain in operation.

The *public accountability* and *runaway technology* frames were only strengthened in 1986 with the [Chernobyl disaster](#). The accident generated worldwide attention, and although U.S. journalists avoided excessive amounts of fear-inducing imagery, few media reports adequately contextualized the focusing event by providing details on the comparative safety record of the American nuclear energy industry ([Friedman, Gorney, and Egolf, 1992.](#))

New Debate, Same Frames

In 2001, against the backdrop of rising energy costs, the newly elected Bush administration launched a communication campaign to promote nuclear energy as a path to *energy independence*. The terrorist attacks of September 11 dampened the viability of this frame package, as subsequent media reports focused on nuclear power plants as potential terrorist targets. But since 2004, as energy prices have climbed and as the dependence on overseas oil has been defined as a major national security issue, a renewed emphasis on the *energy independence* interpretation has surfaced.

The effort has been complemented by an attempt to sell nuclear energy as a technofix to cut greenhouse gas emissions. Former New Jersey GOP Governor and EPA administrator Christine Todd Whitman along with Greenpeace co-founder Patrick Moore are pushing this theme in a [national media campaign](#). Their tagline is that nuclear energy is "cleaner, cheaper, and safe." According to their argument, if Americans are going to satisfy their energy demands while achieving the goal of cutting greenhouse gas emissions, the country needs to re-invest in nuclear energy.

In a [May 24 speech](#) at the Limerick Generating Station in Pennsylvania, President Bush employed these two frames in promoting his nuclear energy proposal. First, rather confusingly he argued: "People in our country are rightly concerned about greenhouse gases and the environment, and I can understand why—I am, too. As a matter of fact, I try to tell people, let's quit the debate about whether greenhouse gases are caused by mankind or by natural causes; let's just focus on technologies that deal with the issue. Nuclear power will help us deal with the issue of greenhouse gases."

Then Bush moved to pushing nuclear energy as a step towards energy independence, increased national security, and enhanced economic development. "For the sake of economic security and national security, the United States of America must aggressively move forward with the construction of nuclear power plants. Other nations are. Interestingly enough, France has built 58 plants since the 1970s, and now gets 78 percent of its electricity from nuclear power.... China has nine nuclear plants in operation and they got—plan to build 40 more over the next two decades. They understand that in order to be an aggressive nation, an economic nation that is flourishing so that people can benefit, they better do something about their sources of electricity. They see it. India—I just came from India—they're going to build some nuclear power plants."

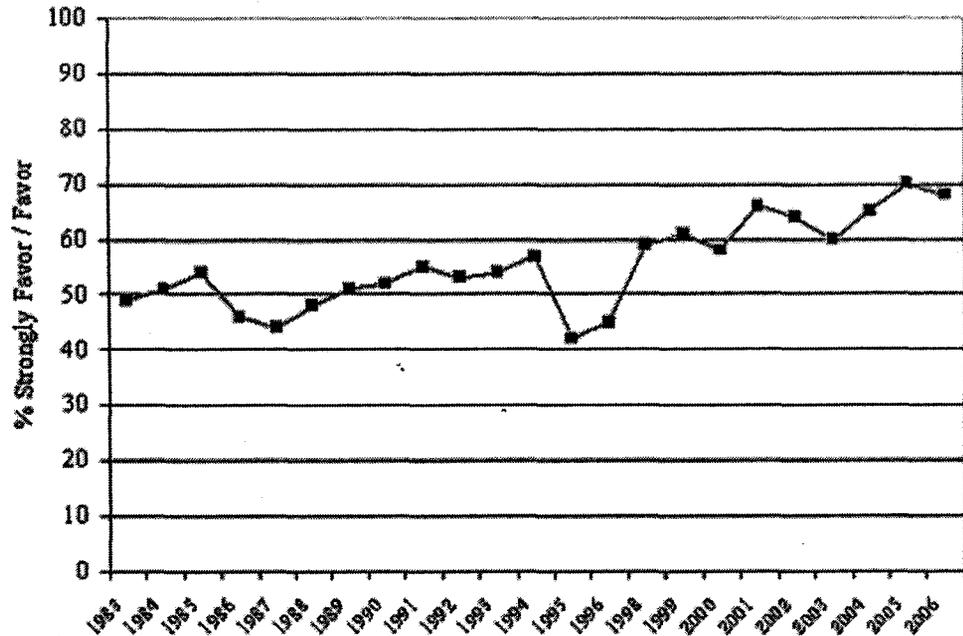
The frames used to argue against nuclear energy also remain familiar, paralleling the interpretations first introduced in the mid-1970s. Groups like the Union of Concerned Scientists push a *public accountability* interpretation, demanding that nuclear plants be tightly regulated. "We continue to find and expose safety problems at individual plants, in industry standards, and in the failure of regulators to take effective action," reports UCS on their Web page. Other groups like Public Citizen, the Sierra Club, Friends of the Earth, and Greenpeace emphasize in their opposition not only the potential *runaway dangers*, but also the absence of *cost-effectiveness*. They advocate instead *soft-path alternatives* like increased energy efficiency and the development of solar, wind, and hydro energy production. They use the tagline that nuclear power is "not safe, not cost effective, and not needed."

Where Does the Public Stand?

As is common in policy debates, advocates on both sides claim that the public backs their preferred policy options. Take for example Christine Todd Whitman and Patrick Moore. In a May Boston Globe op-ed, they write: "A recent nationwide poll by Bisconti Research found that 86 percent of Americans see nuclear energy as an important part of meeting future electricity needs and 77 percent agree that utilities should prepare now to build new nuclear plants in the next decade." But is this an accurate characterization of public opinion?

The Bisconti polling was commissioned by the Nuclear Energy Institute, a pro-industry think tank. As a general rule, polls commissioned by advocacy groups often paint things in rosier terms than polls conducted by news organizations or independent outfits like Gallup or the Pew Center for the People and the Press. The polling on nuclear energy is no exception. The problem, however, is that the NEI surveys are by far the best historical record of public sentiment, with items asked consistently every year since the early 1980s. Other surveys have been administered only intermittently.

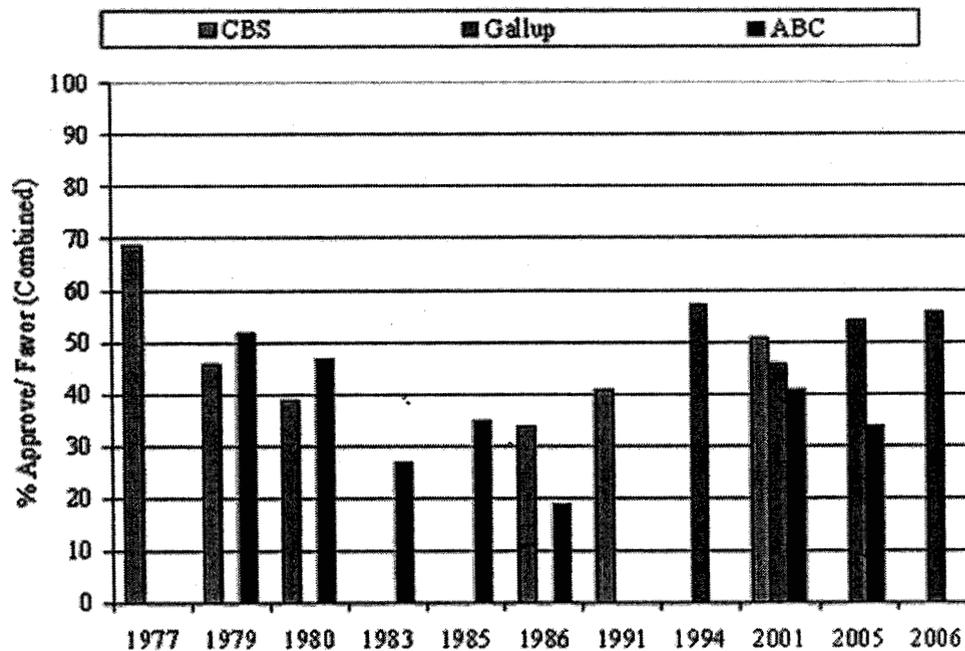
Figure 1. NEI: PERCENTAGE OF PUBLIC FAVORING NUCLEAR ENERGY



Note: The Nuclear Energy Institute asked respondents: "Overall, do you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the use of nuclear energy as one of the ways to provide electricity in the United States?" Survey results based on nationally representative samples of U.S. adults. (Data not available for 1997.)

Figure 1 plots the results of one of the standard items asked nearly every year by NEI since the early 1980s. Notice the variations in public support over time, particularly the drop in support after Chernobyl in 1986. The dip again in 1995 and 1996 is not as easily explained, though it could be attributable to negative news attention brought about by the ten year anniversary of Chernobyl. The trend in rising public support appears to recover in 1998, peaks in 2001 during that year's energy debate, declines in 2002 and 2003 with the threat of terrorist attacks on power plants, and then climbs to historic highs in 2004-2006. Today, according to the NEI polls, roughly 70% of the public say that they favor the use of nuclear energy as one of the ways to provide electricity in the U.S.

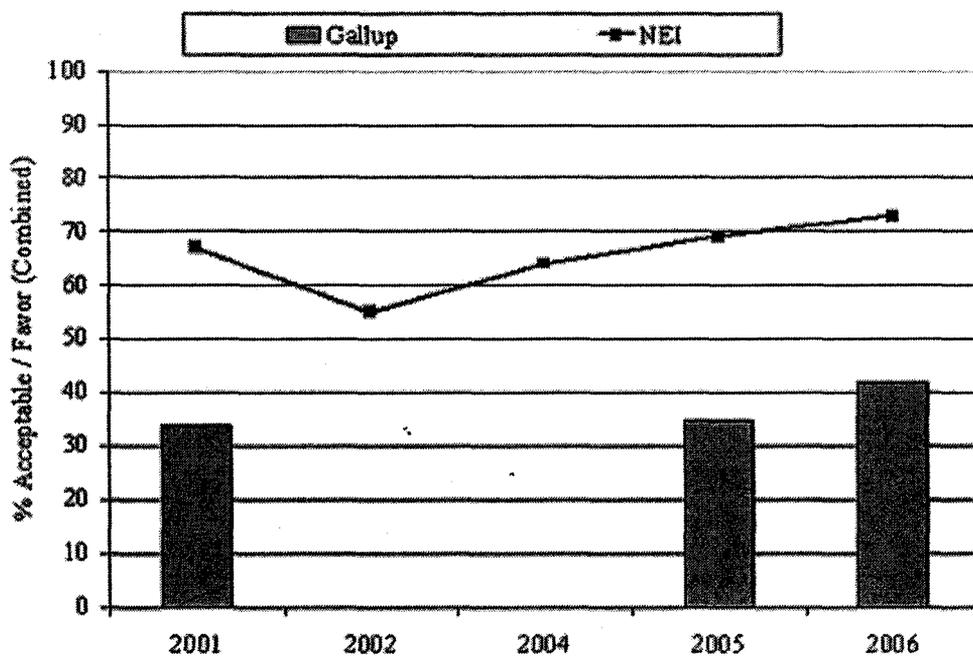
Figure 2. PERCENTAGE OF PUBLIC FAVORING NUCLEAR ENERGY



Note: Gallup asked respondents: "Overall, do you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the use of nuclear energy as one of the ways to provide electricity for the US (United States)?" ABC News asked respondents: "In general, would you favor or oppose building more nuclear power plants at this time?" CBS News asked respondents: "Would you approve or disapprove of building more nuclear power plants to generate electricity?" Survey results based on nationally representative samples of U.S. adults.

It is not surprising that independent polling, conducted intermittently across years, reflects lower levels of public support than the NEI surveys. For example, using almost identical question wording, Gallup finds that in 2006, only a little more than a majority of American adults favor nuclear energy. However, similar to the NEI results, the Gallup trends do reflect an aggregate increase in public support over 2001 levels. Yet, when asked in 2005 by ABC News using different question wording, only a little more than 30% of the public say they favor "building more nuclear power plants at this time." For the ABC News polls, *there is also a decline in support between 2001 and 2005.*

Figure 3. PERCENTAGE FAVORING LOCAL CONSTRUCTION

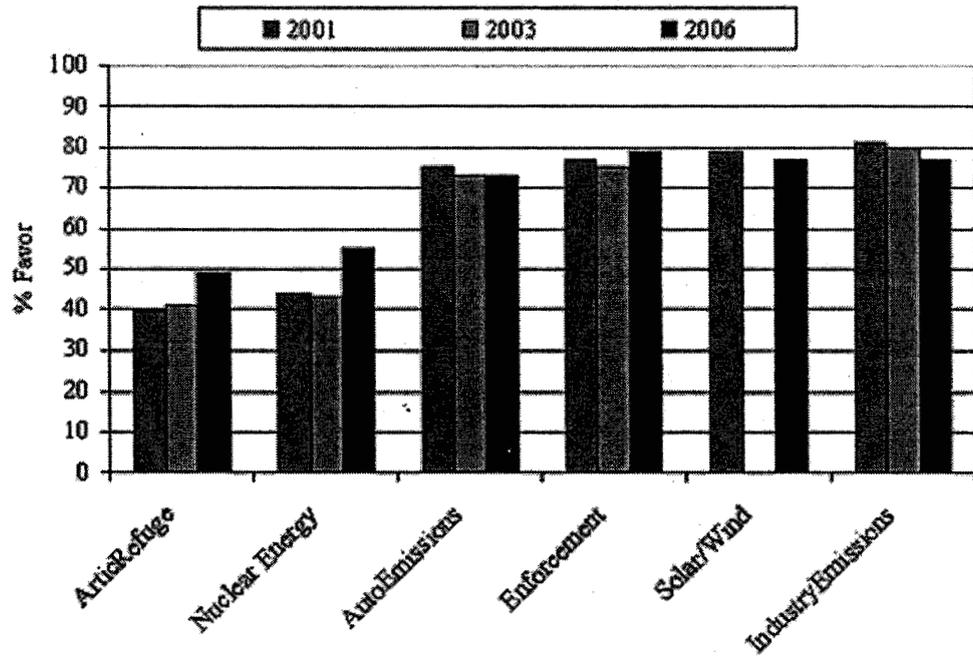


Note: NEI asked respondents: "If a new power plant were needed to supply electricity would it be acceptable to you or not acceptable to you to add a new reactor at the site of the nearest nuclear power plant that already is operating?" Gallup asked respondents: "Overall, would you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the construction of a nuclear energy plant in your area as one of the ways to provide electricity for the US (United States)?" No data available for 2003. Gallup data not available for 2002 and 2004.

Context, however, also matters. For example, the public may favor investment in nuclear energy generally, but when asked about the possibility of a nuclear power plant in their area, the "Not in My Backyard" syndrome may apply. In this case, NEI and Gallup have asked about the issue somewhat differently. NEI has been more technical in their word choice, asking about the construction of a new nuclear power plant in an area where a nuclear plant already exists. The question wording implies a more remote location for the respondent. In these NEI polls, support has increased since 2001, rising to roughly 70% in 2006.

Gallup polls find a similar increase in support across years, but when asked specifically about the possibility of "future construction of a nuclear energy plant in your area," the percentage of the public favoring construction is only slightly more than 40% in 2006.

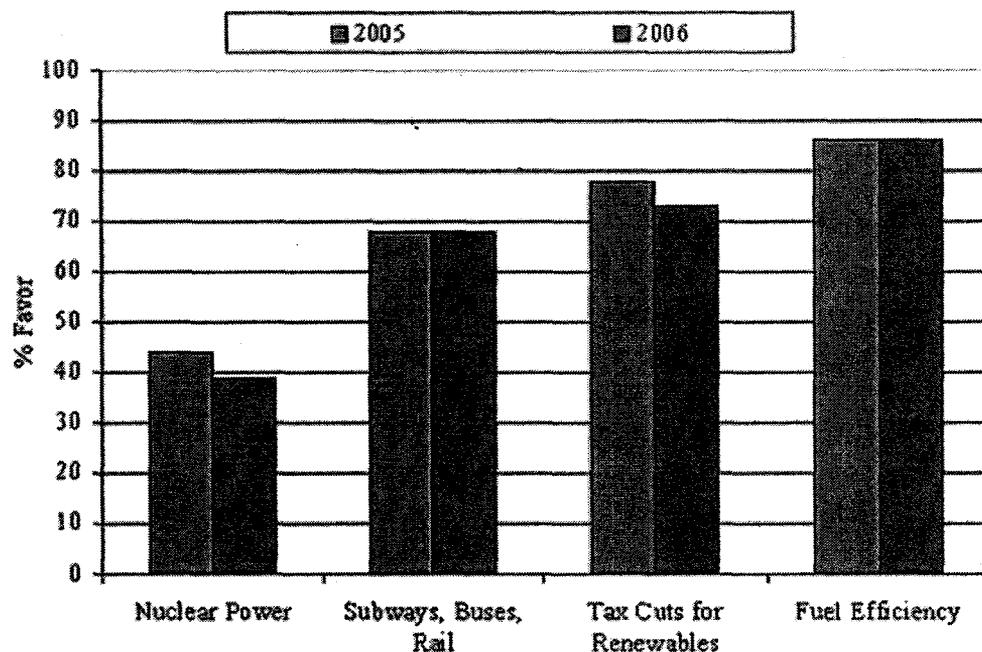
Figure 4. NUCLEAR ENERGY COMPARED TO OTHER ENVIRONMENTAL PROPOSALS



Note: Gallup asked respondents: "Next I am going to read some specific environmental proposals. For each one, please say whether you generally favor or oppose it. How about... opening up the Arctic National Wildlife Refuge in Alaska for oil exploration?... expanding the use of nuclear energy?... setting higher auto emissions standards for automobiles?... more strongly enforcing federal environmental regulations?... spending more government money on developing solar and wind power?... setting higher emissions and pollution standards for business and industry?" Solar and wind not asked in 2003.

Context also matters when thinking about how the need for nuclear energy is defined. When asked by Gallup in survey questions about nuclear energy as an "environmental proposal," the public offers far stronger support for other policy measures than for nuclear energy, though support for the nuclear alternative has indeed increased since 2001. In the poll results displayed in Figure 4, nuclear energy scores only just above drilling in Alaska's Arctic National Refuge in terms of favorability, and does not have nearly as much support as curbing auto emissions, enforcing environmental laws, investing in solar or wind power, or cutting industry emissions.

Figure 5. NUCLEAR ENERGY COMPARED TO OTHER ENERGY PROPOSALS



Note: Pew asked respondents: "As I read some possible government policies to address America's energy supply, tell me whether you would favor or oppose each. Would you favor or oppose the government...promoting the increased use of nuclear power?... spending more on subway, rail and bus systems?... giving tax cuts to energy companies to develop wind, solar and hydrogen technology?... requiring better fuel efficiency for cars, trucks and SUVs?"

However, even when framed directly as a possible solution to the national energy problem, investment in nuclear power is still not a preferred option in comparison to other policy proposals. When Pew asked in 2005 and 2006 about nuclear energy as a specific way to address the country's energy supply, it ranked well behind other policy options, including expanding forms of public transportation, incentives for developing renewable energy sources, and requiring better automobile fuel efficiency.

Outlook

Nuclear energy is likely to remain a "third rail" of environmental politics, with many environmental groups willing to devote heavy resources to opposing any new plant construction. Nuclear energy is also likely to remain an ambivalent issue for the generation of Americans who lived through Three Mile Island and Chernobyl, with the images and frames of a *runaway technology* easily evoked by carefully designed message strategies. However, the more time passes with no new focusing events related to the dangers of nuclear energy, and as the perceived urgency of energy independence and global warming increases, public support in the aggregate is also likely to increase, as recent poll trends suggest. Framing will be the central device by which both advocates and opponents of nuclear energy manage public opinion at the national level. However, if and when the decision is made to build a new nuclear power plant in a specific area, mobilized minorities of local citizens will prove decisive. Who shows up to protest, vote, or speak out at the local level will have a stronger impact on the future of nuclear energy in the U.S. than the current struggle to shape national opinion.

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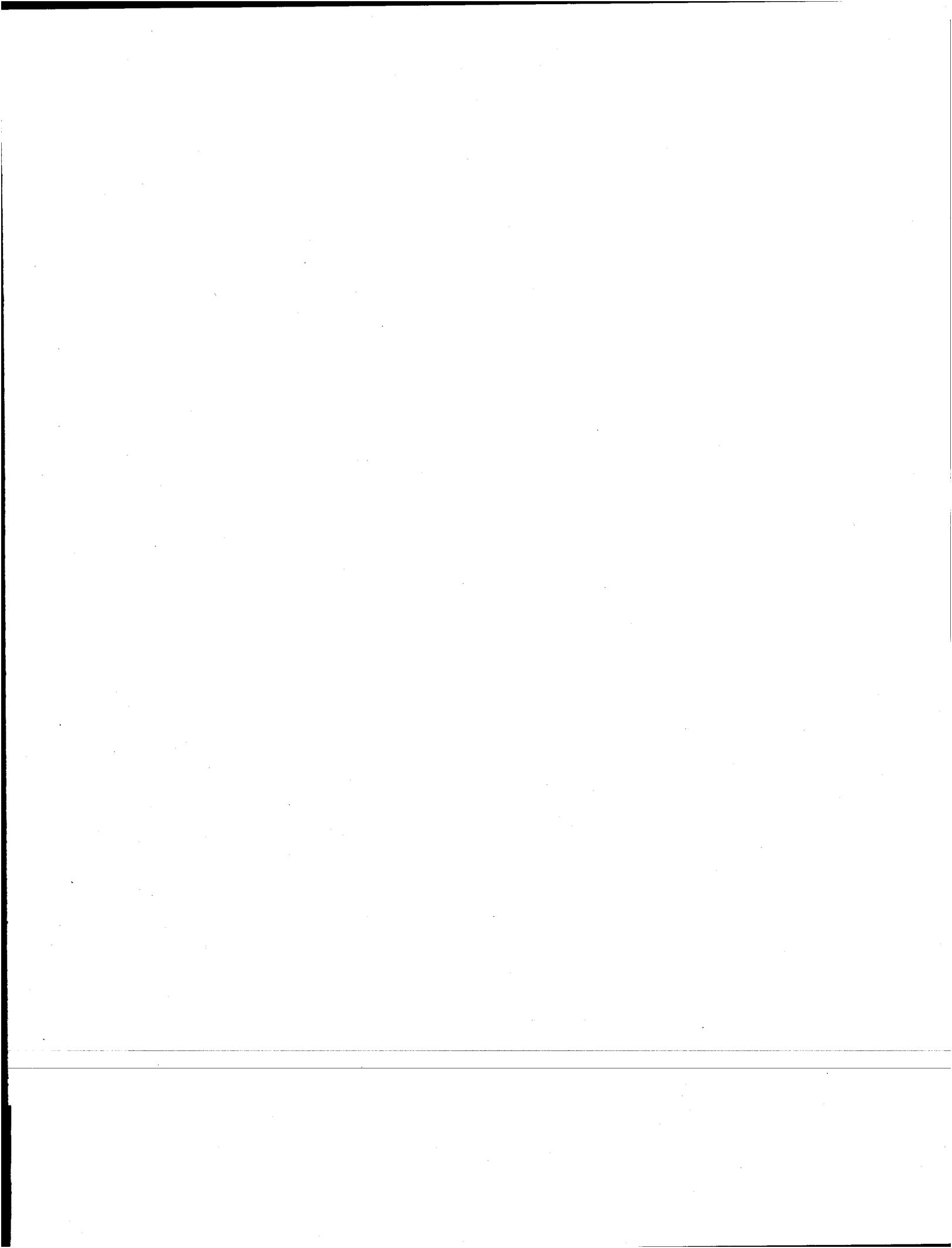
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Public Attitudes and Support for Solar Power
A Survey of Likely Voters in California
Conducted for Environment California Research & Policy Center
By Cheryl Katz, Baldassare Associates
June 2004

HIGHLIGHTS

The June 2004 Public Attitudes and Support for Solar Power Survey was conducted for Environment California Research and Policy Center by Baldassare Associates. The survey included telephone interviews with 600 likely voters living in California. Interviewing was conducted June 24-27, 2004. The margin of error is +/- 4 percent for the total sample. Here are the highlights of the survey:

- Californians show strong support for increasing the use of solar power in the state. By a 2:1 margin, likely voters favor developing more renewable energy sources (61%) over building more power plants (31%) to meet the state's growing energy needs. Support for increasing the use of solar power is greatest among Democrats (67%), and in Los Angeles and the San Francisco Bay Area (64% each).
- Nearly nine in 10 (87%) have a favorable opinion of solar power, with 52 percent *very favorable*. Solid majorities in all demographic and political groups are favorable toward solar power.
- More than seven in 10 (72%) favor a plan to build half of new homes with solar power systems, which was proposed by Arnold Schwarzenegger as part of his energy action plan during his campaign for governor. A majority of Republicans and Democrats alike favor this plan. Two in three voters who favor the plan for 50% of new homes to be built with solar power want this goal accomplished by 2010.
- Overall, six in 10 likely voters want the state to institute standards directing the inclusion of solar power systems in new housing. At least half in all demographic and political groups support state solar standards.
- A similar number (58%) favor including provisions for solar power as part of the state's building code. While a majority of Democrats supports this (66%), fewer than half of Republicans agree (47%).
- Voters strongly support encouraging the use of solar power systems with subsidies. Six in 10 favor providing subsidies to builders to install solar power on new homes, and seven in 10 want subsidies for homeowners to purchase solar systems.
- Sixty-eight percent would be more interested in buying a home if it included solar energy, and 63 percent would be willing to pay more to buy a solar home. Most (52%) would be willing to pay less than \$10,000. Those most inclined to pay more for a home equipped with solar power are Central Valley residents (73%), 18- to 34-year-olds (72%), and those with incomes over \$100,000 (66%).
- Voters see the most important reason to support solar power development as decreasing dependence on foreign oil (35%).

ELECTRICITY SUPPLY AND ENERGY POLICY PREFERENCES

California's likely voters overwhelmingly (79%) see the cost and supply of electricity as an important problem facing the state today, with four in 10 calling it a *big problem*. Those aged 35- to 54 are especially likely to say electricity issues constitute a big problem today (49%), and women are more likely than men to say this is a big problem (45% to 34%). There are no significant differences between political parties or region in perception of the cost and supply of electricity as an important state problem.

How much of a problem is the cost and supply of electricity in California today?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Big problem	39%	26%	49%	36%	39%	42%
Somewhat of a problem	40	48	37	38	38	39
Not much of a problem	16	20	11	21	19	14
Don't know	5	6	3	5	4	5

Asked what strategy the state should pursue to address its growing energy needs, by a 2:1 margin (61% to 31%), voters choose increasing the use of renewable energy over building more power plants. Increasing solar and other types of renewable power is the preference in all groups, with younger voters (70%) and Democrats (67%) especially supportive. Renewable sources are also favored more strongly in Los Angeles and the San Francisco Bay Area (64% each), but a majority in all regions choose this approach.

To address the state's growing energy needs, which of the following approaches do you prefer for California...						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Build more power plants	31%	21%	29%	38%	43%	25%
Increase renewable power	61	70	65	52	49	67
Other	1	1	--	--	--	--
Don't Know	7	8	6	9	8	7

OPINION OF SOLAR POWER

California likely voters are highly favorable toward solar power, with a majority (52%) saying they have a *very favorable* opinion of this power source. All together, nearly nine in 10 (87%) voters have a *very* or *somewhat favorable* view of solar power as an energy source.

Solid majorities in all demographic groups are favorable toward solar power, with more than half of voters under 55, nearly six in 10 (59%) Democrats and 57 percent of college graduates saying they are very favorable. Older voters and Republicans are somewhat less positive, but even in these groups, only about one in 10 are *not favorable* toward solar power. By region, favor for solar power is highest in the Bay Area (57% very favorable).

Thinking about solar power, which uses the sun to make electricity, do you have a very favorable, somewhat favorable, or not too favorable opinion of this energy source?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Very favorable	52%	52%	54%	48%	42%	59%
Somewhat favorable	35	40	35	34	41	30
Not favorable	8	8	6	10	13	4
Don't know	5		5	8	4	7

SCHWARZENEGGER'S SOLAR HOMES PLAN

Overall, California voters are very supportive of Gov. Schwarzenegger's proposal, announced during his campaign, to have half of all new homes built in the state include solar power systems. Nearly three in four (72%) favor Schwarzenegger's proposed energy action plan, with 43 percent saying they *strongly favor* it. Only one in six (16%) are opposed.

More than half of likely voters in all demographic groups support the plan to build new homes with solar capacity. Support is strongest among voters aged 18 to 34, among whom 52% strongly favor the proposal. Democrats favor the solar plan more than do Republicans (49% to 35% very favorable) and renters are more supportive than are homeowners (50% to 41% very favorable). There are no significant differences by region or other demographic variables.

When he was running for office, Arnold Schwarzenegger proposed an environmental action plan that called for half of all new homes to be built with solar power systems. Do you favor or oppose this plan?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Strongly favor	43%	52%	45%	37%	35%	49%
Somewhat favor	29	30	29	29	30	28
Somewhat oppose	9	8	7	11	9	8
Strongly oppose	7	2	7	9	10	5
Don't know	12	8	12	14	15	10

Those who favored the plan to build 50 percent of new homes with solar power systems were asked when they thought it was feasible to reach that goal. A plurality (40%) said the 50 percent goal should be reached by the year 2010, opting for this choice over 2007 (26%) or 2015 (25%).

This six-year timetable is the top choice in all demographic groups. Likely voters 55 and older and those in the Bay Area are somewhat more inclined to opt for a longer time-schedule, with 32 percent in each group saying the target date for the 50 percent solar new homes goal should be 2015.

By what year do you think California should achieve the goal of building half of all new homes with solar power?						
<i>Asked of those who favor 50% solar plan:</i>	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
2007	26%	30%	27%	23%	26%	22%
2010	40	51	42	31	39	42
2015	25	14	24	32	27	28
Other	2	1	1	3	1	1
Don't know	7	4	6	11	7	7

SOLAR STANDARDS

The concept of state standards for including solar power systems in new housing construction is favored by six in 10 California voters, while three in 10 are opposed. While a majority in all groups favor state solar standards, favor is greatest among voters aged 18 to 34 (72%), Democrats (67%) and renters (67%). Opposition is highest among Republicans (41% opposed).

Should the state set standards for the inclusion of solar power on new housing?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Total Favoring Standards	60%	72%	59%	55%	50%	67%
Oppose Standards	31	21	32	34	41	23
Don't know	9	7	9	11	9	10

Nearly six in 10 voters (58%) say they favor requiring solar power systems to be part of the California building code for new construction, while one in three (34%) are opposed. Support for this approach reaches two-thirds or more among younger voters (68%), Democrats (66%), renters (70%) and those with household incomes below \$50,000 a year (67%). Women are much more in favor of this than are men (64% to 52%). Opposition is greatest among Republicans (44% opposed).

Do you favor or oppose requiring solar power systems to be part of California's building codes, just like earthquake safety and energy efficiency standards are today?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Favor	58%	68%	60%	51%	47%	66%
Oppose	34	23	37	37	44	27
Don't know	8	9	3	12	9	7

SOLAR POLICY PREFERENCES

Voters express strong support for subsidies to encourage solar power use, both for builders to install solar systems on new homes (60%) and for homeowners to purchase solar systems (70%). Both types of subsidies are favored by two-thirds or more among voters under 55, Democrats and renters, while the greatest opposition comes from older voters and Republicans.

Subsidies for builders are supported by a majority in all groups, including both homeowners (57%) and renters (66%). Opposition to builders' subsidies is greater in the Central Valley (41%) than elsewhere.

The highly popular homeowners' subsidies are favored by strong majorities in both parties and all demographic groups and regions. More than two in three homeowners (69%) and renters (71%) alike favor encouraging solar use through subsidies to those buying solar systems.

Do you favor or oppose having the state provide subsidies to encourage builders to install solar power on new homes?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Favor	60%	71%	66%	48%	51%	66%
Oppose	35	23	31	46	44	28
Don't know	5	6	3	6	5	6

Do you favor or oppose having the state provide subsidies to encourage homeowners to purchase solar power systems?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Favor	70%	79%	75%	59%	62%	75%
Oppose	25	15	22	34	34	19
Don't know	5	6	3	7	4	6

CONSUMER ATTITUDES TOWARD SOLAR HOMES

More than two in three California likely voters (68%) say that if they were in the market for a house, the presence of a solar power system would make them more interested in buying a particular home. A quarter (23%) say this would make no difference to them, while only 6 percent say a solar system would make them less interested in that house.

More than half in every group would be more interested in a home if it had solar power. The appeal is especially strong for younger voters (78%), Democrats (76%), and renters (76%), but two in three current homeowners also say a solar power system would pique their interest.

If you were buying a home yourself, would you be more interested or less interested in a home with a solar power system so you could provide some of your own electricity?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
More interested	68%	78%	73%	57%	58%	76%
Less interested	6	2	5	9	7	6
No difference	23	20	19	29	30	16
Don't know	3	--	3	5	5	2

Most voters (63%) say they would be willing to pay more to buy a home that had a solar power system with the capacity to cut their electric bills in half, including 70 percent of renters and 60 percent of homeowners. The majority (52%) opt for amounts of less than \$10,000, while one in 10 (11%) say they would pay an extra \$10,000 or more. While a majority in all groups is willing to pay some extra amount for solar power, those most inclined to pay more are Central Valley residents (73%), 18- to 34-year-olds (72%), and those with household incomes of \$100,000 or more (66%).

Would you be willing to pay more to buy a home with a solar power system that cut your electric bills in half? /If yes/ How much more would you be willing to pay?						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Less than \$5,000	20%	21%	20%	20%	20%	18%
\$5,000 to \$9,999	32	42	31	28	29	33
\$10,000 to \$19,999	8	6	9	7	6	9
\$20,000 or more	3	4	3	2	2	3
Not willing to pay more	27	23	26	30	34	25
Don't know	10	4	11	13	9	12

REASONS TO SUPPORT SOLAR AND WILLINGNESS TO PAY

Reducing dependence on foreign sources of oil is the strongest single motivator to voters' support for increasing solar power use (35%), followed by reducing air pollution from fuel-burning power plants (16%), keeping electricity costs down (14%) and eliminating the need to build more power plants (8%). One in four (23%) volunteered the response that all the reasons are important. Women are more likely than men to mention reducing air pollution as a reason to support solar power (20% to 13%). There are no other significant demographic differences on this question.

Which of these do you think is the most important reason to support increasing the use of solar power in California...						
	Total	Age			Party	
		18-34	35-54	55+	Rep	Dem
Decreasing dependence on foreign oil	35%	30%	34%	40%	36%	34%
Reducing air pollution	16	20	14	17	14	21
Reducing electricity costs	14	17	13	12	18	10
Eliminating need for more power plants	8	12	9	5	7	9
All the above <i>[volunteered]</i>	23	19	27	21	19	24
None/Don't support increasing solar <i>[Vol]</i>	2		2	2	3	1
Don't know	2	2	1	3	3	1

SURVEY METHODOLOGY

The June 2004 Public Attitudes and Support for Solar Power Survey was conducted for Environment California Research and Policy Center by Baldassare Associates. The survey included telephone interviews with 600 likely voters living in California. Respondents were selected at random from a list of voters registered in California who voted in the 2000 and 2002 general elections and the 2003 recall election, or registered after 2002 and voted in the recall, or are new registrants. Interviewing was conducted June 24-27 on weekend days and weekday nights. The margin of sampling error is +/- 4 percent at the 95 percent confidence level for the total sample. For subgroups, it would be larger. Sampling error is only one type of error to which surveys are subject. Results may also be affected by factors such as question wording, question order, and survey timing.

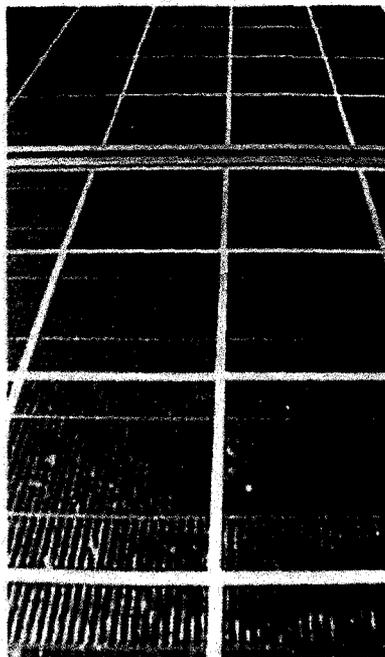
The sample obtained in the survey was closely comparable to available statistics on the demographic and geographic distribution of likely voters registered in California.

Throughout the report, we refer to four geographic regions. "Central Valley" includes Butte, Colusa, El Dorado, Fresno, Glenn, Kern, Kings, Madera, Merced, Placer, Sacramento, San Joaquin, Shasta, Stanislaus, Sutter, Tehama, Tulare, Yolo, and Yuba Counties. "SF Bay Area" includes Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties. "Los Angeles" refers to Los Angeles County, and "Other Southern California" includes the mostly suburban regions of Orange, Riverside, San Bernardino, and San Diego Counties. These four regions were chosen for analysis because they are the major population centers of the state, accounting for approximately 90 percent of the state population.

Note: throughout this report, results may not add up to 100% because of rounding.

Most Americans support solar power on new homes

Homebuilders should offer solar PV as an option for all new homes, according to 79% of respondents in a U.S. survey. Of the 1,004 adults surveyed, 69% of those over the age of 65 agree with the statement while 84% of younger respondents (25 to 49) support solar on new homes. Those living in southern and western regions of the U.S. were more likely to favour solar (83%) than those in the midwest or northeast (74%). "Solar has been popular for a long time in areas like California and Arizona; now we're seeing that the rest of the country is ready to embrace solar energy, and consumers want the option of having solar power their new home," says Ron Kenedi of Sharp Electronics, which commissioned the survey. "As the world's leading solar manufacturer, Sharp is encouraged to see that more and more Americans recognize the economic and



environmental benefits of solar and understand that it is a vital part of the energy solution." The survey was conducted in May by Roper Public Affairs, a division of GfK NOP. The 1,004 adults were measured on their perceptions of solar power. When told that solar homes have a proven higher resale value, 64% said they would be willing to pay more for homes with a PV system. Half

of the respondents said they would spend up to 10% more for a solar-equipped house, "indicating that the cost of a solar system will not prevent Americans from embracing forms of clean, renewable energy," adds Sharp. The most compelling argument for installing solar power for 42% was to save money on utility bills, while 31% said it was to decrease the U.S. dependence on oil and 18% said it was to reduce environmental pollution. The survey also showed that 73% believe solar energy technology to be more important today than ever. Sharp Electronics is the U.S. subsidiary of Sharp of Japan, which has expanded its annual solar cell production output to 450 MW. U.S. solar assembly operations started at the Memphis production facility in October 2003, with an annual production capacity of 60 MW.

