



Clean Energy, a Strong Economy and a Healthy Environment

Report of the Clean and Diversified Energy Advisory Committee
to the Western Governors

Western Governors' Association - June, 2006

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To the Western Governors:

The Clean and Diversified Energy Advisory Committee (CDEAC) is pleased to present you with its report and recommendations for achieving and potentially exceeding your clean and diversified energy objectives.

This report represents the culmination of an enormous effort by hundreds of individuals representing a broad range of backgrounds and interests. This report and the reports of the CDEAC task forces represent a comprehensive and balanced look at transmission, energy efficiency and clean energy resources. These documents represent the best thinking of some of the most accomplished experts across an array of issues.

The strength of the CDEAC report is the recommendations for consideration by the Governors. We have organized the recommendations into those that can be considered by individual states, those that suggest opportunities for action on a regional level, and those that offer the potential for influencing national policy. As requested by your charge to the CDEAC, the recommendations stress non-mandatory, incentive-based approaches. The CDEAC believes that the suite of recommendations is worthy of consideration and adoption by the Western Governors where appropriate.

The CDEAC believes this report offers the Western Governors a host of viable options for increasing the amount of energy efficiency and the construction of clean energy facilities in the West. It also offers real solutions for the long term safety and reliability of the transmission grid.

The members of the CDEAC and its task forces wish to thank the Western Governors for the opportunity to have worked on this project of great importance to the West. Through the vision and leadership of the Western Governors, the West can achieve a reliable, secure and affordable energy future.



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- ▶ The William and Flora Hewlett Foundation
- ▶ Renewable Energy and Energy Efficiency Partnership
- ▶ The U.S. Environmental Protection Agency

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PREFACE

In April 2004 the Western Governors' Association held the North American Energy Summit. This event brought together more than 700 participants to discuss a broad range of energy issues. Just two months later, the Governors launched the Clean and Diversified Energy Initiative with the adoption of a resolution that established three important goals for the West:

- ▶ Develop an additional 30,000 megawatts of clean energy by 2015 from both traditional and renewable sources;
- ▶ Achieve a 20% increase in energy efficiency by 2020; and
- ▶ Ensure a reliable and secure transmission grid for the next 25 years.

The Clean and Diversified Energy Advisory Committee (CDEAC) was commissioned by the Western Governors to identify technically and financially viable policy mechanisms, stressing non-mandatory, incentive-based approaches, to meet the goals established in the Governors' resolution. The CDEAC was to be guided by the Western Governors' Enlibra principles, a doctrine created to guide natural resource and environmental policy development and decision-making in the West.



In developing these recommendations, the CDEAC was required to:

- ▶ Examine the deliverability and adequacy of energy resources, including an assessment of promising new resources and technologies;
- ▶ Examine the obstacles to both intrastate and interstate transmission siting and construction in order to access clean energy resources;
- ▶ Consider price, reliability, and the mitigation of environmental impacts of all recommendations;
- ▶ Develop energy efficiency and conservation recommendations that take into account all types of energy used in facilities, not just electricity; and
- ▶ Address both technical and policy issues.

At its first meeting in San Francisco, the CDEAC established task forces to assess resource potential and costs and to develop policy recommendations to meet the Governors' goals. Task forces that submitted reports were: Advanced Coal, Biomass, Energy Efficiency, Geothermal, Solar, Transmission, and Wind. These task forces comprised some of the foremost technical experts in each of their fields. The task forces worked in cooperation with a quantitative working group to provide consistent economic data across the reports.

The task forces developed their reports through a series of meetings and conference calls. The CDEAC held meetings throughout the drafting of the task force reports, providing guidance when necessary. Draft reports from each of the task forces were posted for a public comment period of 30 days in order to identify any issues that had not been addressed. The public comments were reviewed by each of the task forces and incorporated into the reports, as appropriate, prior to their publication. Final reports from each of the task forces were published throughout the early months of 2006 and presented to the CDEAC.

Additional proposals were submitted to the CDEAC as white papers in order to identify clean energy resources that went beyond the scope of the task forces chartered by the CDEAC. Combined heat and power (CHP) was considered as a potential attribute in a number of areas, and the CDEAC reviewed a white paper on this subject.

Additionally, the CDEAC reviewed a white paper on ocean- and hydro-power. A report on advanced natural gas was received too late for the CDEAC to formally consider.

Based on the reports and white papers it reviewed, the CDEAC produced a consolidated suite of recommendations for Western Governors to consider at their 2006 Annual Meeting in Sedona, Arizona. A strong, overarching theme of all the reports is the need for stable, long-term policies at both the federal and state levels to achieve the stated objectives. This report represents the work of the CDEAC and more than 250 stakeholders from an encompassing array of interests.

INTRODUCTION

Clean Energy, a Strong Economy and a Healthy Environment

The West is the fastest growing region of the country, and our ability to provide energy must keep pace with an ever expanding population. However, energy shortages and price spikes have become an increasing part of the global energy picture. While data from the Energy Information Administration (EIA) shows overall consumption of natural gas has remained relatively flat over the last several years, reliance on natural gas as a fuel source for electricity production has increased dramatically. In addition, natural gas has recently tripled in price, and analysts believe higher natural gas prices will be a fixture well in the future.

There is broad agreement that the Western U.S. must act now to ensure it will have a diverse supply of secure, environmentally responsible and affordable energy well in the future. By acting now, we will be able to continue our economic progress, protect our outstanding quality of life and harness our abundant domestic energy resources.

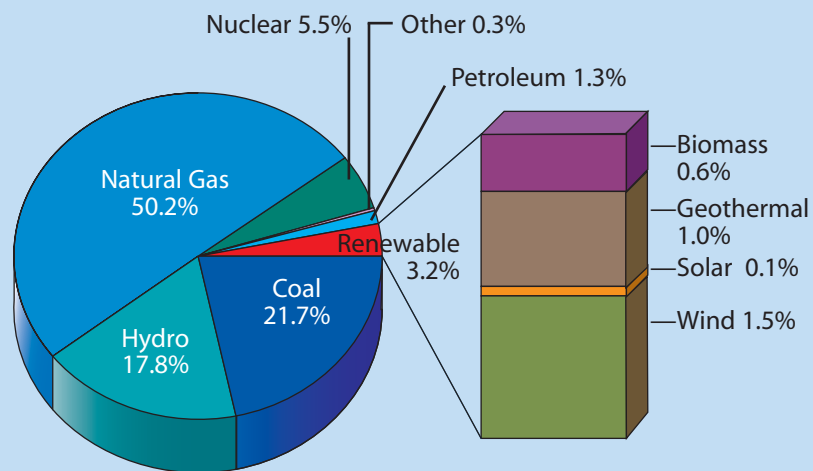
While future energy demand is dependent on many factors, it is certain that the West will require more capacity in 2015. An examination of utility integrated resource plans and state requirements for renewable portfolio standards — without accounting for all the potential gains in energy efficiency — shows nameplate capacity may increase from 319,500 megawatts in 2004 to 363,000 megawatts in 2015 and to 400,000 megawatts in 2020. The increase over the next 15 years could be as high as 80,000 megawatts. The magnitude of projected increases underscores the need to simultaneously pursue aggressive implementation of energy efficiency measures and to develop cleaner, more efficient energy generation.

Historically, the West has relied heavily upon natural gas, coal and hydropower to meet its energy needs. In the future, these generating sources will continue to play an integral role.

Electricity demand in the future is dependent upon our ability to use energy more efficiently. In its Annual Energy

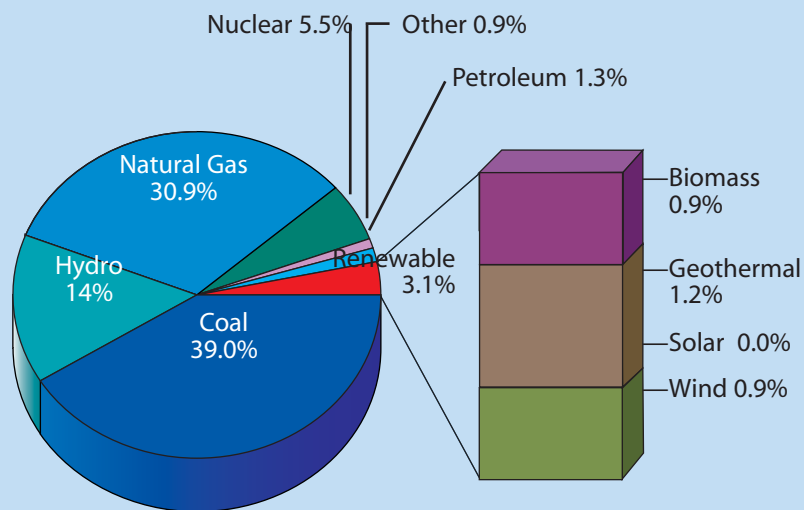
Generating Capacity by Fuel Source - 2004

Nameplate Generating Capacity in WGA States- 319,500 MW



Generation - 2004

Net Generation in WGA States - 1,216,272,570 MWh



Source: 2004 EIA Annual Power Plant Report, excerpted for WGA member states

Outlook for 2006, the EIA stated:

The energy efficiency of new household appliances plays a large role in determining the type and amount of energy used in the residential sector. As a result of stock turnover and purchases of more efficient equipment, the amount of energy used by residential consumers on a per household basis has fallen over time, and many technologies exist today that can further reduce residential energy consumption if they are purchased and used by more consumers.

The CDEAC recognizes that a number of forces affect electrical demand and production. The Renewable Portfolio Standards adopted by several states were designed to expand the role of renewable energy in Western resource

portfolios. In fact, a substantial portion of the WGA's 30,000 megawatt clean energy goal is already reflected in Western integrated resource plans and renewable portfolio standards. It is imperative that state, regional and federal policies promote energy efficiency and the development of advanced generation together with the necessary transmission infrastructure.

The original goals of the Clean and Diversified Energy Initiative were viewed by some as optimistic. The work of the CDEAC demonstrates there are proven energy efficiency measures, abundant renewable resources, and emerging advanced fossil fuel technologies that can not only help the West achieve the Governors' ambitious energy goals for the region, but also exceed them in an environmentally responsible way. Timely action to adopt and implement the policy recommendations contained in this report will ensure a cleaner, more diverse and stable energy future for the West.

This report is a compilation of policy options developed through the work of all participants. Not all the recommendations represent a consensus. However, the CDEAC requests that all the recommendations be considered for support by each state where appropriate.

Policy Recommendations for Consideration by Western Governors

Planning for our Energy Future

The CDEAC is providing Western Governors with a suite of policy options that, if adopted, will cost-effectively increase energy efficiency and deliver clean energy resources to consumers in the West. The recommendations that follow were developed and adopted by the CDEAC after analyzing and balancing affordability, environmental performance, resource diversity, domestic energy security and reliability implications. The recommendations span state, regional and federal forums.

While the CDEAC recognizes that the Governors have a wide range of policy priorities, their support for these policies at the national level will greatly increase the chances of their adoption and implementation. The regional recommendations will require cooperation among states to be successful. The state policy recommendations are presented as a menu of options from which the Governors can select the most appropriate policies for their states. Finally, the CDEAC agrees that policy and funding predictability is critical to achieving the energy efficiency and clean energy goals established by Western Governors.

State Policies

Market Incentives

Energy Efficiency

- Create incentives for and promote energy efficiency levels that go beyond the standard energy efficiency

codes for new buildings, commercial construction, appliances and equipment.

- Expand those energy efficiency programs that have proven effective in promoting best practices in industrial energy management and combined heat and power.



Wind turbines located on the coast of Hawaii. Photo Courtesy NREL/Pix - Hawaiian Electric Light Company

Renewable Energy

- Consider the establishment of state-based incentive programs to promote the development of energy efficiency, conservation and clean energy technologies, including, but not limited to, production incentives and clean energy bonds.
- Consider the provision of property and sales tax incentives and credits for energy efficiency, conservation and clean energy developments.
- Facilitate investments in clean distributed generation by developing net metering, interconnection standards and time-of-use rate structures.
- Develop a methodology that fairly and fully evaluates the net non-energy benefits of all clean energy technologies, particularly Bioenergy projects. Develop model incentives that convert those benefits to bankable credits (GHG credits, emission trade-offs in permitting and fire hazard reduction credits).



Advanced coal technologies, such as IGCC, will help electrical generation from coal move towards near-zero emissions. Photo courtesy of U.S. DOE.

Advanced Fossil Fuel Generation

- Support continuing efforts to improve the efficiency and environmental performance of all advanced coal technologies, with the ultimate goal of achieving near zero emissions at a competitive cost of electricity.
- Support incentives directed only to certain advanced coal technologies in two “tiers.” An explanation of these two tiers and the specific recommendations are contained in Appendix A to this report.

Incentive Regulation/Planning

Energy Efficiency and Combined Heat and Power

- Encourage electric and natural gas utilities to invest in all cost-effective energy efficiency measures using best practices for utility energy efficiency and conservation programs.
- Work with state PUCs to establish energy savings targets; provide utilities with necessary cost recovery; consider performance-based incentives, and eliminate disincentives to utility investment in cost-effective energy efficiency measures for their customers;



A net-zero house combines state-of-the-art, energy-efficient construction and appliances with renewable energy systems such as solar water heating and solar electricity to produce as much energy as it consumes. Photo Courtesy NREL/Pix - Paul Norton

- Upgrade to state-of-the-art efficiency building codes and appliance standards (for products not yet covered by national standards) and provide support for code implementation through education, training and enhanced building inspection and enforcement.
- Establish public sector procurement programs for ENERGY STAR and other types of high-efficiency appliances and equipment.
- Give fair credit for power plant emissions reductions in environmental review of CHP projects.
- Decouple utility revenues from throughput and ensure that electricity rates are not discriminatory to CHP.

Renewable Energy

- Support well-designed comprehensive integrated resource planning and procurement rules that weigh the full costs, benefits and risks (including environmental)

of various resource options for public and investor-owned utilities. Planning should integrate consideration of supply-side resources, demand-side resources and transmission needs. Planning and procurement rules should be transparent and allow full participation of the public.

- For emerging clean energy technologies, provide regulatory incentives such as full and accelerated cost-recovery.



Agricultural residue, such as these walnuts, is just one form of biomass that is used to produce electricity. Photo Courtesy NREL/Pix - Warren Gretz

- Evaluate and develop appropriate incentives/policies that recognize the non-energy benefits of renewable energy projects, particularly the environmental and waste management services provided by biomass projects. If utilities are the entities selected to provide supplemental support to the renewable project, they should receive full cost recovery for such activities.
- Standardize the process for procurement and infrastructure planning/integration for clean energy technologies (long-term Power Purchase Agreements permitting, interconnection).

Advanced Fossil Fuel Generation

- Allow utility recovery of costs for Tier 1 and Tier II project development studies.
- Allow utility recovery of costs for studies of the carbon sequestration potential of existing and potential plant sites.
- To address higher costs and operational risks, allow pre-approval and full-cost recovery for Tier 1 and Tier II projects, provided appropriate steps are taken to

manage costs and risks.

- Expedite permitting for Tier 1 and Tier II projects, while maintaining full public participation and the protection of human health and the environment, including consideration of the full range of impacts of associated infrastructure.
- An explanation of the two tiers and details on additional recommendations are contained in Appendix A to this report.

Transmission

Smart Transmission Planning

- Ensure that targeted energy efficiency, CHP, and other demand-side resources are incorporated into state transmission planning.
- Ensure that utility interconnection policies best facilitate the use of a wide range of clean energy resources.
- Urge utilities to assess available transmission capacity and opportunities to make better use of the existing transmission systems.



Continued regional transmission planning is a necessary step to ensure that new clean and diverse generation can be brought online. Photo Courtesy NREL/Pix - Warren Gretz

Reduce Costs and Risks for Clean Energy

- Encourage the elimination of rate pancaking (separate transmission payments to multiple line owners for delivering electricity) and offer short-term transmission services and products (such as "conditional firm" [firm transmission service during months of the year when it is available and some reduced level of service during less available months of the year]).
- Encourage the implementation of cost-recovery mechanisms for transmission, such as state transmission authorities, and provide for state and utility review and participation in regional transmission planning processes.
- Consider the establishment of tiered standards of review for prudence and the application of incentives for transmission expansion costs. They should feature a

lower standard for screening studies and planning, a moderate standard for permitting and the acquisition of rights-of-way, and a higher standard for construction costs.

- Work with companies to ensure transmission is expanded in advance of generation to enable the modular development of location-constrained, clean and diversified resource areas to meet cost-effective renewable portfolio standards, and resource planning goals in an environmentally sound manner.
- Work with utilities to establish policies that reward, not penalize, appropriately sized facilities for local load and voltage support.

Regional Cooperation

Energy Efficiency

- Facilitate the creation of regional market-transformation organizations for energy efficiency modeled on the Northwest Energy Efficiency Alliance.

Interstate Clean Energy Trading

- Consider the establishment of a forum for interstate negotiations that match consumer states and generator states to develop and provide funding for major interstate clean energy projects. Collaborate on the design of a variety of incentive mechanisms, such as rate base, sales/severance tax forgiveness.
- Develop and accelerate mechanisms for clean-energy regional markets, such as the Western Renewable Energy Generation Information System, which verifies and tracks regional renewable energy generation.
- Encourage Western state trading for appropriately defined environmental attributes as agreed upon by the participants. Such a framework can be extended in the future for any environmental attribute. This approach will facilitate compliance reporting by load-serving entities that are required to comply with state-adopted renewable portfolio standards.
- Work for the implementation of state-level incentives to reduce the program costs for energy efficiency and clean energy technologies through economies of scale and consistency across state programs.

Unified Policies

- Continue regional collaboration on clean energy policy, linking efficiency, clean generation and transmission.

Transmission

- Continue regional transmission planning efforts, including establishment of energy transmission corridors that facilitate wheeling of energy from clean energy sources and an open season process by project developers to demonstrate demand and value for new transmission projects.
- Urge Power Marketing Administrations to offer short-term transmission services, such as "conditional firm."

- Synchronize regional transmission planning efforts to resource acquisition plans of load serving entities (LSE) and plans of generators.
- Urge FERC and PUCs to form joint panels on transmission cost recovery that would explicitly consider risks and the need for incentive policies.
- Coordinate multi-state review of transmission projects by developing common principles for cost allocation and cost recovery, and adopt a common Western procedural process that would identify and coordinate the applications, forms, analyses and deadlines.

National Policy Recommendations

Energy Efficiency

- Encourage timely adoption of updates to the national appliance efficiency standards.
- Encourage Congress to extend current tax incentives for 10 years for innovative energy efficiency technologies.



Renewable technologies can often be combined to increase reliability and output. Photo Courtesy NREL/Pix - Warren Gretz

Renewable Energy

- Extend the long-term (10 years) production tax credit and investment tax credit across all clean energy technologies; provide for partnership sharing of tax credits for certain entities, such as tribes; extend and raise the cap on new clean energy bonding authority for nonprofits (public power) and Native American tribal authorities; and raise the cap on the residential investment tax credit to \$10,000.
- Provide long-term (10 years), adequate funding for energy efficiency and clean generation and storage technology RD&D, Energy Star programs, state-based clean energy initiatives.
- Encourage federal agencies to collaborate and work with states and Western regional organizations on siting of new generation and infrastructure facilities,

- consistent with sound, sustainable environmental practices.
- Support power marketing administration studies of opportunities to integrate wind.
- Encourage long-term (20-years) and large forest-health contracting, collaboratively determined, using a science-based assessment of the resource to allow for biomass resource development.

Advanced Fossil Fuel Generation

- Provide for a five year extension of the federal IGCC tax credit and propose a five- to ten-year tax credit program for carbon capture and sequestration.
- Increase federal support and tax incentives for the construction of multiple pilot facilities that demonstrate IGCC using Western coal at high altitude in the Western United States.

Achieving the 20% Energy Efficiency Goal by 2020

A “Win-Win” for consumers and businesses

Energy efficiency and conservation are our cheapest, cleanest, least risky and least controversial energy strategies. Increasing the efficiency of energy use in Western states, without reducing productivity, will provide a broad range of benefits, including: saving consumers and businesses money on their energy bills; reducing vulnerability to energy price spikes; reducing peak demand and improving the utilization of the electricity system; reducing the risk of power shortages; supporting local businesses and stimulating economic development; reducing water consumption and reducing pollutant emissions by reducing the need to construct new power plants.

Successful policies to promote energy efficiency and conservation include a mix of incentives, information, targets and standards. All Western states are engaged to various degrees in implementing energy efficiency and conservation measures, but significant untapped potential remains. An independent analysis of the “best practices” policies and programs in the West compiled by the Energy Efficiency Task Force indicates that it is feasible to cost-effectively reduce electricity use 20% from projected levels in 2020, without sacrificing economic growth. The Task Force work suggests that aggressive deployment of the best practice policies and programs throughout the West, each of which have been successfully implemented in at least one Western state, and all of which rely on existing technologies, can reduce the rate of growth in electricity demand by 1% per year or more.

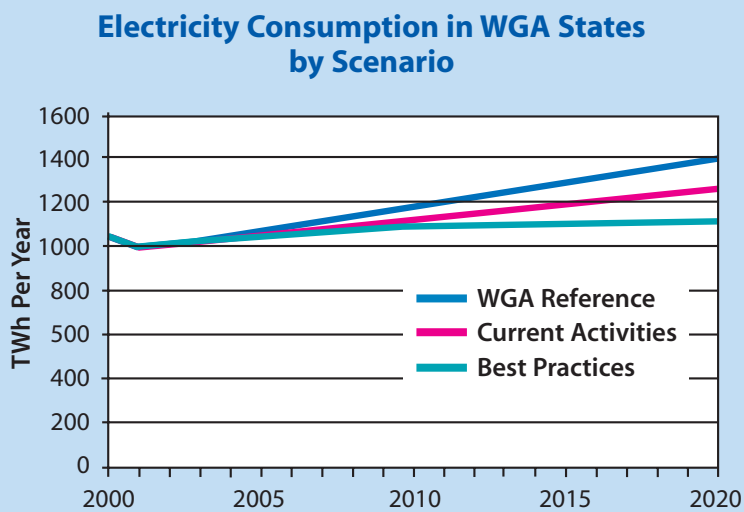
There are several model energy efficiency programs in the West. Exemplary best practice programs include: electricity and natural gas energy efficiency programs where

energy efficiency is considered a resource and all cost-effective savings are pursued with investments of a percentage of revenues, some exceeding 2% (saving energy at 2-3 cents/kWh saved); state-of-the-art building codes, training, enforcement and “beyond code” incentive programs; state appliance efficiency standards on products not covered by federal standards; RD&D and technology transfer; public sector initiatives including aggressive energy efficiency and conservation goals for public buildings, public sector procurement standards, performance contracting to implement efficiency projects in the public sector; tax credits and other financial incentives; pricing and incentive regulation policies; and regional cooperation and market transformation efforts.

Energy Efficiency Potential

In order to assess potential electricity savings and the impacts of more aggressive energy efficiency and conservation efforts in Western states, the Energy Efficiency Task Force conducted an independent energy savings analysis, developing and analyzing the following three scenarios for electricity demand in the 18-state region through 2020:

- ▶ **Reference scenario:** a slightly modified version of the 2005 reference case forecast prepared by the Energy Information Administration, applied to WGA states.
- ▶ **Current Activities scenario:** adjusting the reference scenario to account for the estimated impacts of ongoing and recently enacted policies and programs at the state, regional or utility levels.
- ▶ **Best Practices scenario:** aggressive adoption of “best practice” policies and programs in all 18 states.



As shown in the figure above, load growth during 2003 - 2020 averages 1.9% per year in the reference scenario, 1.3% per year in the current activities scenario, and 0.5% per year in the best practices scenario. As noted above, electricity

consumption increased 1.7% per year on average during 1990 - 2003 in the 18 WGA states. This chart illustrates that the need for construction of new generating facilities would not be eliminated over the next 15 years, but could be reduced by as much as 75%.

The best practices scenario shows that it is possible to reduce electricity consumption in 2020 by 20% relative to that in the reference scenario, or the equivalent of electricity supplied by 100 baseload power plants. The CDEAC believes it is possible to achieve the energy efficiency goal enunciated in the Clean and Diversified Energy Resolution, namely realizing 20% electricity savings by 2020, assuming that a variety of cost-effective incentive-based and other approaches are deployed. Moreover, even greater electricity savings may be possible through adoption of other strategies not included in the best practices scenario, such as R&D, technology transfer or pricing initiatives.

Benefits of the Best Practices Scenario

- ▶ 20% electricity savings by 2020, relative to the reference scenario
- ▶ 48,000 MW of avoided power plant construction during 2005 - 2020
- ▶ Small reduction in electricity prices in the latter part of study period
- ▶ \$53 billion in net economic benefits for consumers and businesses
- ▶ Substantial avoidance of power plant emissions
- ▶ Approximately 1.8 trillion gallons of water savings during 2005 - 2020

Implementing the best practice energy efficiency and conservation policies and programs would provide substantial economic benefits for households and businesses in Western states. By 2020, these efforts could lower electricity bills in the aggregate by \$21 billion per year. Based on the analyses done by the Energy Efficiency Task Force, the best practices scenario would yield \$53 billion in net economic benefits during 2005 - 2020 on a net present value basis, with an overall benefit-cost ratio of 2.5. The benefits result mainly from avoided fuel purchases by utilities, and avoided investment in generation, transmission and distribution infrastructure. Furthermore, the benefits could be even greater as the cost of natural gas increases.

Implementing the best practice energy efficiency and conservation policies and programs would also provide environmental benefits, including but not limited to, reduced impacts on air quality, water resources, terrestrial and marine biological resources, land use, traffic and visual impacts. For emissions, it would reduce

sulfur oxides, nitrogen oxides, particulate matter, carbon dioxide, and mercury.

Energy efficiency and conservation best practices would result in water savings from both increased use of energy and water saving devices and from reduced power plant operation. In addition, water savings resulting from these programs will provide reductions in energy required for water treatment, pumping, distribution and heating. The task force estimates that the best practices scenario would save 260 billion gallons of water per year by 2020 relative to the reference scenario, equivalent to the annual water use of about 1.4 million households. Total water savings during 2005 - 2020 in this scenario would be approximately 1.8 trillion gallons.

The CDEAC believes increasing energy efficiency and conservation should be an important component of the clean energy strategies developed and implemented in the West. Governors, legislatures, state regulatory commissions and the private sector should work in concert to enact new incentive-based and other policies aimed at increasing the efficiency of electricity and natural gas use. While there is no "silver bullet" for overcoming the barriers that are inhibiting widespread energy efficiency and conservation improvements, there are a variety of proven policies and programs that are available to states.

Achieving the 30,000 MW Clean Energy Goal by 2015

The Future Potential

Clean energy technologies represent some of the fastest growing sectors of the energy market. It was the goal of the CDEAC to determine what portion of the West's energy needs could be met through these technologies. Using the expertise from its task forces, the CDEAC examined each of the following technologies: energy efficiency, solar, geothermal, wind, biomass, advanced coal and transmission. In addition, white papers were presented to the CDEAC on water power potential and natural gas. Our conclusion is inescapably clear — these technologies present the West with a rich array of choices to meet or even exceed the 30,000 MW goal.

"The results of this process were surprisingly robust and optimistic. While some might consider the goal of 30,000 MW quite aggressive, the process documents that clean energy technologies can meet and even exceed this goal."

The CDEAC recognized that each of these technologies could provide substantially more energy to meet the West's power needs if just their technical potential was considered. However, the Governors' request to the CDEAC required a more specific examination of what could be realistically achieved by 2015. Therefore, the CDEAC took a critical look at the task force reports to ensure they clearly identified the limitations and obstacles that each technology would face in ramping up to meet the Governors' challenge.

The results of this process were surprisingly robust and optimistic. While some might consider the goal of 30,000 MW



Concentrating photovoltaic cells, such as this array in Arizona, help the West take advantage of its vast solar resources. Photo Courtesy NREL/Pix - Robert McConnell

quite aggressive, the process documents that clean energy technologies can meet and even exceed this goal. While each task force took a slightly different analytical approach, the results demonstrated that significant contributions could be expected from each technology and, together, they could surpass expectations. Furthermore, the task forces only considered reasonable development scenarios, understanding that the technical potential for clean energy in the Western states is far greater than the 30,000MW goal.

Any summary presentation of the task force reports (and white papers) should be carefully qualified. Each makes certain assumptions and involves a degree of uncertainty, and each presents conclusions that demonstrate substantial future contributions to the West's energy needs beyond achieving the CDEAC goals. But, together, the reports paint a reasonably reliable picture of the overall clean energy potential in the West and what can be achieved by 2015.

Here are some of the highlights of the task force conclusions:

- ▶ According to the report of the Solar Energy Task Force, as much as 8,000 megawatts of capacity could be installed with a combination of distributed solar electricity systems and central concentrating solar power (CSP) plants, while another 2,000 MW (thermal) of solar hot water is realistically available.

- ▶ The Geothermal Energy Task Force identified 13,000 MW of geothermal energy that could be developed within a reasonable time frame, and estimated that 5,600 MW of this would be commercially viable.
- ▶ The Advanced Coal Task Force recognized the major contribution coal currently makes in meeting the West's energy needs. The task force supported continuing efforts to improve the operational and environmental performance of all of the advanced coal technologies listed in a Technology Report, beyond current performance levels, with the ultimate goal of achieving near zero emissions at a competitive cost of electricity. The task force recognized that with these improvements advanced coal technologies could continue to provide our region with a sizeable share of its overall baseload power needs. Further, it recommended specific state-level incentives for the development of advanced coal technologies that are not yet commercially viable and operate with superior environmental performance. These state-level incentives are outlined in Appendix A to this report.
- ▶ The Biomass Task Force concluded that biomass has the potential to supply 10,000 MW of electricity by 2015.
- ▶ The Wind Task Force concluded that wind development that is either in progress or can be reasonably assumed with minimal transmission additions would be between 5,000 and 9,175 MW. This amount could rise dramatically (to more than 25,000 MW) as transmission becomes available.
- ▶ The white paper on Combined Heat and Power (CHP) estimates a technical potential of 42,800 MW of additional CHP potential in the WGA region.
- ▶ Finally, the water power white paper presented to the CDEAC identified incremental hydropower potential of 3,000 MW at existing sites already connected to the grid.

Each of the reports goes much further than these highlights represent, but they demonstrate energy potential that substantially exceeds the 30,000 MW goal. Clearly, many thousands of megawatts more are available from each of these technologies, but the CDEAC did not seek to determine precise contributions from each one or to compare and contrast the different opportunities. It is fair to say that each of these technologies can make a significant contribution to achieving the 30,000 MW goal. They also demonstrate that the West has the luxury of pursuing a variety of options to meet this clean power goal, while diversifying the Western resource portfolio. By pursuing a portfolio of clean energy technologies, the West should be able to achieve the CDEAC goal with substantial certainty.

While there are many questions that remain about the development of clean energy technologies, a common challenge to their ultimate development is transmission. A Transmission Task Force examined this cross cutting issue and concluded that while transmission is always a large consideration with respect to the location of new generating



The average power generation at the Grand Coulee Dam in Washington is 21 billion kilowatt hours per year.

facilities, transmission in and of itself should not be a barrier to achieving the 30,000 MW goal. That task force found:

There are many uncertainties in estimating what transmission additions are required. Looking out to 2015, the task force estimates that additional transmission investment needed in the WGA States in the Eastern Interconnection is in the range of 1.2 to 2.6 billion dollars, in the Electric Reliability Council of Texas (ERCOT) 1.7 to 3.0 billion, and the Western Interconnection several additional billions of dollars. While relatively large, transmission costs are less than 10 percent of the cost of the power delivered to customers. Implementation of the recommendations of the Efficiency Task Force can potentially defer or even lessen the need for some new transmission investment. The evaluation of transmission needs is not a one-time process. Changing circumstances require an on-going robust transmission planning process that continually reassesses the uncertainties inherent in long-term transmission planning.

Additionally, many of the clean energy technologies examined by the previously discussed task forces can provide distributed generation. Distributed generation from solar, wind, geothermal and other technologies may be able to obviate some transmission expenses and provide support to the existing grid.

The goal of achieving 30,000 MW of clean energy by 2015 is within reach. The benefits of this goal would be substantial. Together, these technologies can provide reliable, cost-effective energy to meet the needs of the West, while improving environmental quality, enhancing national security, and providing tens of thousands of new jobs and stimulating economic growth. The real questions that need to be addressed are less those of technical potential or transmission investment, and more questions of public policy. To achieve these goals and realize the potential benefits, sustained state and federal policies need to be in place supporting the development and deployment of these technologies and the transmission investment needed to move these energy resources to consumers.

Environmental, Reliability and Cost Considerations

A Western energy system that meets the WGA clean and diversified energy objectives will significantly mitigate some of the region's most serious environmental and public health problems and result in overall environmental benefits to the West, including reduction in land impacts, consumption and pollution of scarce water resources, and air emissions such as sulfur oxides, nitrogen oxides, particulate matter and mercury. In addition, the recommendations in this report, including those from the Advanced Coal Task Force, will drive toward reductions in emissions of carbon dioxide and potentially toward recovery and sequestration of carbon for beneficial uses.



The largest geothermal field in the world is The Geysers, near San Francisco. Photo Courtesy NREL/Pix - Pacific Gas and Electric

The resource task force reports individually identified cost and reliability issues and the CDEAC considered these during the discussion of recommendations. The CDEAC also recognizes that Integrated Resource Plans look closely at these issues and encourage planners to carefully evaluate these aspects of clean energy development and use. In addition, individual state public utility commissions and legislatures are encouraged to address a series of practical issues that are part of the planning process. Each state will need to consider which resources and technologies are available in their area, the demand growth in their state, and whether these require considering technologies to meet base- and peak-load needs, fuel reduction or other needs.

In comparison to today's energy system, or the projected energy situation without adoption of progressive policies, the recommended energy policies will:

- ▶ Diversify the region's energy resource base, providing further protection from consumers against energy price spikes and shortages.

- ▶ Produce more affordable, reliable and clean power to fuel economic growth throughout the region and help increase family incomes.
- ▶ Increase America's ability to produce more American energy, thus lessening our reliance on foreign sources of energy.
- ▶ Increase the efficiency with which we use energy, thereby reducing the rate of growth of energy demand and lessening the environmental impacts inherent with all energy generation technologies;
- ▶ Increase generation from low water-consuming and zero- and low-emission renewable energy resources; and
- ▶ Increase generation from near-zero emission advanced coal technologies.

Energy efficiency programs and policies can reduce the need for new generating facilities and improve the operations efficiency of existing power resources. This translates directly into lower emissions, such as particulate matter, mercury, nitrogen oxide, carbon dioxide and sulfur oxide. They also save water and decrease risks to water quality — both in electric generation facilities and in homes, offices and industrial facilities.

Solar, geothermal and wind resources emit little or no pollutants and require little or no water for system operation. Use of biomass electricity provides multiple ancillary environmental benefits. CHP is an efficient, clean, economical and reliable resource option as well.

Advanced coal technologies offer the potential for greatly improved emission performance for criteria pollutants and mercury, with the ability to integrate capture systems that are capable of removing substantial emissions.

APPENDIX A – Fuel Task Force Recommendations

Advanced Coal

The Advanced Coal Task Force reached a carefully crafted agreement with regard to its support for advanced coal technologies. The language of that agreement, and the state-level incentives targeted only to Tier 1 and Tier 2 technologies that were agreed to are listed below.

In addition to these state-level incentives, the CDEAC agrees to support two federal-level incentives for advanced coal technologies listed earlier in this report.

ACTF Agreement on Advanced Coal Technologies

A. Support for continuing efforts to improve the efficiency and environmental performance of all advanced coal technologies examined by the task force.

The ACTF's Technology Work Group examined the costs, performance and environmental characteristics of a variety of commercially available and emerging advanced coal-fired electrical generation technologies, including supercritical and ultra supercritical pulverized and circulating fluidized bed combustion technologies, integrated gasification combined cycle technologies. The Technology Work Group report found that the advanced technologies examined typically demonstrate higher performance levels and lower emissions of criteria pollutants, toxic pollutants and CO₂ emissions than new subcritical designs, as well as the current fleet of pulverized coal plants now in operation. The task force supports continuing efforts to improve the operational and environmental performance of all of the advanced coal technologies listed in the Technology Report, beyond current performance levels, with the ultimate goal of achieving near zero emissions at a competitive cost of electricity.

B. Support incentives for the development of advanced coal technologies that are not yet commercially viable and operate with superior environmental performance.

The ACTF recommends that state-level incentives should be directed only to certain advanced coal technologies in two "Tiers." The ACTF recognizes that the process for approving the incentives for specific projects will be through existing state-level legislative and regulatory proceedings, and that these will be subject to full participation by interested stakeholders and the public.

Tier I:

The ACTF recommends that Western Governors and the Western states place the highest priority on providing incentives to facilitate the development of four to five electricity

generating plants (approximately 2,000 MW total) that use coal for fuel and that capture and sequester at least 60% of their CO₂ emissions. The ACTF recommends that a full set of state-level incentives be provided to Tier I projects.

Tier II

In addition, the ACTF recommends that a subset of state incentives be provided to projects (approximately 3,000 MW total) employing technologies not yet commercially deployed in the West that most cost-effectively and rapidly move toward zero emissions and carbon capture and sequestration. These technologies could include, but are not limited to, gasification, ultra supercritical coal and oxy-combustion.

Tier I and Tier II Incentives:

Incentives available for Tier I and II projects should include the following:

Development

- ▶ Direct state Public Utility Commissions to allow utility recovery of costs for Tier I and Tier II project development studies.
- ▶ Direct state PUCs to allow utility recovery of costs for studies of the sequestration potential of existing and potential plant sites.

Siting and Permitting

- ▶ Provide expedited permitting for Tier I and Tier II projects, while maintaining full public participation and the protection of human health and the environment, including consideration of the full range of impacts of associated infrastructure.
- ▶ Direct the relevant state agencies to evaluate and, if appropriate, considering other relevant siting factors, facilitate the siting of Tier I and Tier II projects in proximity to geologic sequestration, CO₂ transportation infrastructure, or opportunities to use CO₂ in economically beneficial activities.

Cost Recovery Certainty

- ▶ Allow resource pre-approval and full cost recovery. To address the higher costs and operational risks of Tier I and Tier II projects, utilities developing such projects should be ensured full and timely cost recovery, provided they take appropriate steps to manage costs and risks. Regulators should also consider additional cost recovery incentives to address the higher costs of financing the construction of Tier I and Tier II projects.
- ▶ Utility power purchase agreements (PPAs) with an independent power producer to develop Tier I or Tier II projects should also be allowed pre-approval and full cost recovery, provided appropriate steps are taken to manage costs and risks.

- ▶ Adopt Integrated Resource Planning rules that recognize the full benefits of Tier I and Tier II projects.
- ▶ Direct PUCs to provide for cost recovery for participating in sequestration demonstration projects or geological assessments designed to facilitate the siting of Tier I and Tier II projects.

Performance

- ▶ Encourage appropriate “pass through” of purchase power costs or, in the case of gasification plants, replacement combustion turbine fuel necessary, if a Tier I or Tier II project does not deliver anticipated electrical generation availability.

Research

- ▶ Direct the relevant state agencies to conduct or support assessments to identify sites for Tier I and Tier II projects with access to geological sequestration opportunities, CO₂ transportation infrastructure, or opportunities to use CO₂ in economically beneficial activities.

Tier I Incentives:

In addition to the incentives outlined above, Tier I projects should be provided the additional incentives listed below. Tier I incentives would be available to Tier II projects that undergo modification to qualify as Tier I facilities. It is the ACTF’s belief that the development of Tier I facilities in the West offers the best opportunity to move toward the ultimate goal of near zero emissions for new coal-fired generation. To the extent that there is a conflict due to limited resources for providing incentives to Tier I or Tier II projects, the ATCF believes that Tier I resources should be given priority.

Financial Incentives

- ▶ Provide direct financial incentives, such as investment tax credits, loan guarantees, etc., to Tier I projects. The same or similar financial incentives in the Federal Energy Policy Act could be utilized at the state level for Tier I projects.
- ▶ Direct state PUCs to allow higher rates of return for Tier I projects.
- ▶ Provide direct payments, subsidies, or tax credits on a dollar per ton basis for CO₂ sequestered from a Tier I facility.
- ▶ Use a portion of state severance (excise), property (ad valorem), and sales taxes, or provide royalty relief, to provide financial incentives for encouraging the use of CO₂ captured from Tier I projects in enhanced oil recovery projects (EOR) or other economically beneficial use of captured CO₂.
- ▶ Establish loan guarantees or bond funds to assist with CO₂ capture, compression and transportation infrastructure necessary for Tier I projects.

Regulatory

- ▶ Have relevant state agencies develop CO₂ storage regulations for Tier I projects that protect public health and the environment without putting unnecessary roadblocks in the way of the implementation of Tier I projects.
- ▶ Direct relevant state agencies to develop and implement protocols to account for and monitor the fate of sequestered CO₂ (including leakage) from Tier I projects.
- ▶ Authorize new positions within the appropriate state regulatory agencies responsible for the oversight and monitoring (including leakage) of EOR and other sequestration activities associated with Tier I projects.

Research

- ▶ Fund pilot programs for geologic sequestration in a variety of formations, including technology research, development and demonstration; monitoring the fate of sequestered CO₂ (including leakage); and evaluating environmental and public health and safety impacts to gather information to help site and successfully develop Tier I projects.

Education and Outreach

- ▶ Fund education and outreach programs to inform stakeholders and the public of the issues involved in sequestration from Tier I projects.
- ▶ Fund education and outreach programs to reverse the current perception of limited career opportunities within the energy and regulatory fields related to EOR and other sequestration activities. Encourage/support educational programs at the collegiate level, focused on internships, and/or field experience with knowledgeable practitioners.

Coordination of State-level Incentives

Some measures may be more effective than others in any given state; and adopting some measures may be more politically feasible in some states than in others. To the extent that states coordinate their incentives, they will be able to foster a more consistent project development environment across state boundaries. Such consistency will allow multi-state utility “consortiums” in advanced coal project development to take advantage of lower overall costs through economies of scale.

Biomass

The report’s analysis shows that Governors can have a tremendous positive impact on the region’s energy supply, transmission capacity and economic health by implementing a few realistic policy recommendations.

Recommendations

The Biomass Task Force developed the following ten recommendations to respond to challenges that biomass resource from meeting its true energy, environmental, and economic potential. The recommendations come from an analysis of the most important barriers to competitiveness of the resource relative to other fuel sources and barriers to realizing the benefits of the resource that come from avoiding the environmental costs of not using woody or wet biomass as an energy source.

The Task Force stresses in the report that each recommendation is an important step in realizing the full use of biomass. Selecting one or two of the recommendations will not have the same effect as if those same recommendations were implemented along with the others. The recommendations with brief descriptions follow:

- 1. Achieve Tax Parity Among Renewable Technologies.**

Governors should work at the federal level with their congressional delegations to promote biomass as part of the Production Tax Credit contained in Section 45 of IRS Regulations. Parity should be achieved with wind and geothermal technologies in credit level and the credit should be permanent. Credit for existing facilities should be extended to 10 years to match current provisions for new facilities. At the state level, Governors should advocate for parity in state tax incentives and they should be based on actual energy generation (both heat and power) as opposed to investment tax incentives. Again, programs should be at least for 10 years. Parity continues to net metering for plants of less than 1 MW of production. Compensation should be provided for export of excess power. The Western Governors can play an important part in ensuring the widespread adoption of these policies across the region.
- 2. Strengthen Federal Land Management Policies to Allow Larger, Longer Restoration Projects.**

Only long term, large-scale activities will attract infrastructure investment. Governors should work within their borders with federal land managers to ensure that they are using the most appropriate land management tool such as stewardship contracting or timber sale methods. Contracting tools are most helpful when they are long term (20-year minimum) and large scale (up to 150,000 acres or larger). Contracts should be based on the science-based needs of the resource to improve forest health. Project parameters should be collaboratively decided at the local level on a project-by-project basis. There should not be pre-determined artificial constraints on material use or tree diameter size. These should also be collaboratively determined based on the science-

based needs of the resource. Arbitrary constraints hinder the commercial viability of the resource.

- 3. Environmental Benefits of Biomass Should Be Paid for by Beneficiaries.**

Governors should advocate their legislatures and regulatory bodies on behalf of the ability of biomass projects to help solve problems such as waste disposal, air quality and forest land/fire management. Solutions could include fuel subsidies and "biomass only" RFPs to address specific situations. Above-market costs should be borne by the primary beneficiaries of the environmental and waste management services. If utilities are the entities selected to provide supplemental support to biomass power, they should receive cost recovery for those activities.
- 4. Demonstrate Government Leadership by Purchasing Power/RECs from Biomass Projects and by Supporting Biomass R&D.**

The state and federal governments should purchase biomass power directly, or an equivalent amount of renewable energy credits (RECs), to meet renewable purchase requirements. This would be a tangible demonstration that agencies realize the benefits biomass brings in addressing air quality, forest health, landfill space and rural economic growth. Programs should rely on incentives that are independent of annual budget and appropriations cycles. The Governors should also take a leadership role in supporting cost shared R&D in partnership with the private sector to demonstrate the use of new biomass technologies and to conduct engineering development research that will lead to near-term commercialization of improved conversion and harvesting technology.
- 5. Recognize the Value of Firm Capacity in Renewable Purchase Programs.**

The Governors should work with the state utility commissions to ensure that utility renewable purchase programs (renewable portfolio standards or otherwise) recognize the firming capacity of biomass by establishing the appropriate price structure. The ability of biomass to provide constant power is both a benefit in and of itself, and it can also be used to address the intermittent nature of other resources.
- 6. Renewable Energy Credits Should Not Include Ancillary Environmental Benefits.**

The many benefits of biomass may be accounted for in future credit schemes (such as air quality compliance) and can bring added value to the resource. Current RECs should be defined in a way that they only transfer the renewable nature of the power and only the environ-

mental benefits that result directly from displacement of a like amount of fossil-fueled generation.

7. Establish a Single Definition for Biomass.

Governors should work with their state public utility commissioners and green power certification groups to require that the Federal Energy Regulatory Commission's definition of biomass (18CFR Part 292.202) is used to determine the eligibility of the resources as renewable. This definition, "any organic material not derived from fossil fuels," affords biomass energy projects the greatest opportunity and flexibility to use technology innovation to create productive uses for all types of biomass materials. The ability of biomass facilities to choose from the wide array of biomass resources, while conforming to all federal, state and community environmental standards, will allow the technology to improve both on technical performance and on production economics.

8. Revise Utility Interconnection Policies.

Governors can work with their state public utility commissions to recognize the importance of local load and voltage support by remote plants. This would help prevent artificial imposition of line losses and promote reliability in remote areas. An emphasis on centralized load centers falsely works from the assumption that all power is consumed from a centralized location.

9. Provide Long-term Certainty for Biomass Programs.

Governors should require that long-term programs in support of biomass should be implemented. Long-term power purchase contracts, fuel supply incentives, tax credits and other measures will help provide the investment environment needed for infrastructure growth.

10. Consider Fuel-based Emissions When Issuing Air Quality Permits.

The avoided emissions of air pollutants from biomass plants' fuel, if that fuel is left to its alternate fate, should be recognized and credited to the biomass plants in the permitting process. True netting of the plant emissions should be done.

Geothermal

The Geothermal Task Force of the Clean and Diversified Energy Initiative reviewed geothermal resources of the states in the Western Governors' Association region. On July 25, 2005, two dozen members of the geothermal community met in Reno, Nevada, to assess the potential for commercial development of roughly 140 known geothermal sites. The task force also estimated the economics of developing these sites for commercial power production for projects that could be online in a timeframe extending to

2015. Finally, the task force compiled a profile of recommendations for interstate policy and regulatory frameworks to induce development of the Western states' renewable energy by 2015. The options for policy and regulatory direction outlined in this report provide a rich opportunity to set a common, strategic energy development. In summary, the Geothermal Task Force offers these recommendations to the CDEAC and WGA:

Market Development - The marketplace needs to support the continued development of geothermal resources.

1. Federal and state tax credits are important to reduce the risk and high capital cost of new projects. The federal production tax credit (and clean renewable bonding authority) should be made permanent, or at least extended 10 years.
2. State laws and regulations should promote a continuing series of opportunities for power purchase agreements between developers and utilities. Whether generated through Renewable Portfolio Standards, Integrated Resource Planning, or other mechanisms, power purchase contracts are fundamental drivers of the market.
3. Federal and state laws and regulations should provide incentives for utilities and others to enter into long-term contracts for renewable power. Accounting and regulatory standards should treat renewable power contracts as benefits instead of liabilities, and power purchase contracts should have the backing of the government to ensure their credit worthiness.

Timely Permitting and Environmental Reviews -

Geothermal projects should be prioritized to ensure that permitting, leasing and environmental reviews are completed in a timely and efficient manner.

1. Federal, state and local agencies should coordinate resources and requirements. Agencies should be designated to take the lead on specific issues to avoid duplication, and once issues are resolved, they should not be revisited without cause.
2. A critical path for new projects should be defined as part of this cooperative effort, and timeframes for key agency decisions along the pathway should be established.

Transmission Access and Adequacy - The Western Governors should lead the process to ensure that adequate transmission is available for the identified resources.

1. There should be consistent Western state policies on inter-connection to the grid that facilitate new geothermal (and other renewable) power development.
2. A fee to support the cost of new transmission could be set that would spread the cost across all states, parties and technologies on a capacity basis.

3. Both inter- and intra-state transmission is needed to support the identified resources and should be fast-tracked for permitting and environmental reviews.

Federal Program Support - Continuing support from key federal programs is needed to achieve the 2015 goals. Federal programs should be coordinated with state agencies.

1. As the National Research Council concluded (Renewable Power Pathways, 2002), given the enormous potential of the resource base, geothermal research by the U.S. Department of Energy should be increased, particularly into technologies that can reduce risk, reduce costs or expand the accessible resource base.
2. Better resource information is needed. The USGS' new resource assessment and DOE's cost-shared drilling and exploration technology efforts should be priorities.

The US Department of Energy's GeoPowering the West initiative should continue to support state and local governments, Indian tribes and others seeking to utilize the West's untapped geothermal resources.

Solar

The Solar Task Force offers the following set of recommendations to the Governors that, if enacted, will enable solar technologies to make a meaningful contribution to the 30,000 MW of new clean, diversified energy:

- ▶ Work aggressively with Congressional delegations to extend the 30% federal investment tax credit to a 10-year term and remove the \$2,000 cap on residential systems.
- ▶ Expand the deployment of central solar plants by encouraging 30-year power purchase agreements and aggregation of utility plant orders and project bids to accelerate scale-up cost reductions.
- ▶ Encourage widespread adoption of distributed solar by creating incentives either in the form of declining up-front rebates that help reduce the "first cost" challenge in purchasing a solar system or by establishing ongoing performance-based incentives that pay for production of electricity, both of which have been adopted in certain WGA states. Incentives should be available to both solar thermal (space heating and cooling as well as water heating) and solar electricity systems and apply equally to residential and commercial buildings.
- ▶ Reward solar production and encourage conservation during critical peak periods by facilitating simplified interconnection standards, net metering and rate structures that will benefit distributed solar systems.
- ▶ Exempt both CSP plants and distributed solar systems from state and local sales and property taxes. The loss to state treasuries of these taxes will be more than compensated by increases in tax revenues through growth in personal and corporate income taxes, gross receipts taxes from equipment sales, compensating taxes on imported

equipment and other taxes specific to electric utilities. In addition, some of the money that now leaves states' economies for energy purchases will instead remain at home.

- ▶ Integrate solar into existing state policies such as a Renewable Portfolio Standard, which can help develop central and distributed solar markets when structured properly.
- ▶ Consider adopting target tariffs that reflect the value of solar energy for peak periods and that adjust for natural gas price changes.

Wind

The Task Force believes that implementation of the following top 10 recommendations will result in far more wind development than would otherwise be the case.

Financial Incentives

The Production Tax Credit (PTC) has been instrumental in encouraging investment in wind energy projects, increasing the economies of scale in the production of wind turbines, and thereby lowering the costs of production. Unfortunately, the stop-and-start nature of the PTC undercuts the incentive benefits of the PTC and undermines stable growth of the emerging wind energy industry. A long-term extension of the federal PTC is vital to expand the experience with integrating large amounts of intermittent resources into the power system, continue technology advances, and drive costs down through mass deployment.

Recommendation 1: Enact a long-term extension of the federal Production Tax Credit and comparable incentives that would be useful to nonprofits, tax exempt entities, public utilities and tribes. Alternative financial incentive policies include the use of tax exempt bond financing, tradable tax credits and partnership sharing of tax credits for certain entities, such as tribes.

Efficient Use of the Existing Transmission System

Transmission is a critical limiting factor in the deployment of wind resources. The Wind Task Force has identified numerous opportunities where changes to tariffs, policies and operations would lead to a more efficient use of the existing transmission system. These short-term reforms could enable wind energy, which can be deployed in as little as 18 months, to expand in advance of major transmission additions.

Recommendation 2: Implement a conditional-firm, re-dispatch, and related tariff reform transmission products where feasible and consistent with the policy of an inde-

pendent system operator or regional transmission organization. Support the review and reasonable assessment of Available Transfer Capability (ATC) on existing transmission paths.

Recommendation 3: Reform imbalance penalty policy based on cost-causation principles and link to near-term scheduling and wind forecasting.

Transmission Expansion

Future wind energy development necessary to attain WGA's 30,000 MW goal in a cost effective manner will require expanding the existing transmission system. Numerous existing barriers hinder future transmission expansion. The Wind Task Force recommends following mid- and long-term reforms to ensure a more rational approach to transmission expansion consistent with developing wind and other clean energy resources.

Recommendation 4: Urge state commissions, state legislatures and the Federal Energy Regulatory Commission (FERC) to encourage expanded transmission services and facilities for wind resource development areas to meet renewable portfolio standards (RPS), integrated resource plans (IRP) and state goals. Such actions should, build upon recent Texas and Minnesota legislation and the renewable trunk line (Tehachapi) model for new transmission to major wind resource areas.

Recommendation 5:

- (a) Enhance regional transmission planning capabilities to better identify beneficiaries of transmission expansion, recognizing that some benefits of transmission expansion are widely distributed;
- (b) urge public utility commissions in states with RPS requirements to recognize the public benefits of transmission that supports renewable generation, and grant rolled-in rates/cost recovery; and
- (c) coordinate federal, state, local, and tribal siting for transmission and wind projects, and develop transmission corridors on federal lands.

Integration Costs and Reliability

A growing body of studies and experience in different parts of the world confirms that large amounts of wind can be integrated into utility systems without detrimental effects on system reliability. The evidence suggests that the cost of integrating wind generation increases as the percentage of wind in the system increases. However, on average, the cost of integrating wind at levels of 10 - 20 percent of system capacity is small compared to the price of power, according to studies performed to date. The ability to integrate large amounts of wind depends on many factors, including the

size of control areas (or virtual control areas), the commitment and skill of system operators, the other types of generation in the system and the implementation of storage.

Recommendation 6: Support studies of integration costs for higher levels of wind penetrations and allow utility cost recovery of such study costs. Such studies should examine how choices of other generating resources affect the ability to incorporate large amounts of wind resources.

Recommendation 7: Support studies of opportunities for federal power marketing administrations to integrate large amounts of wind into the power system.

Recommendation 8: Support studies and R&D to develop storage and generating options that can complement the intermittency of wind generation.

Regulatory and Procurement Policies

State government through its utility regulatory policies and procurement policies has the capability to significantly increase the deployment of wind resources. Many Western states have adopted Renewable Portfolio Standards and System Benefit Charges that provide incentives for additional wind generation. Other states have provisions for regulated utilities to provide their PUCs with utility resource plans indicating the preferred mix of generating resource additions.

Recommendation 9: Require that state utility commissions implement incentives for regulated utilities that make new wind resource acquisitions a profitable course of action through performance-based regulatory systems. For municipal and cooperative utilities, seek revisions to federal and state financing tools or tax structures to provide financial incentives encouraging increased use of wind energy.

Recommendation 10: Governors can take the following government procurement steps to support wind energy:

- (a) Direct state agencies and public educational institutions to procure wind energy through green power marketing and purchasing programs and/or by acquiring Renewable Energy Certificates. A minimum 10% of a governmental entity's electricity requirements is recommended as a goal;
- (b) Encourage tribal and local governments to procure wind energy through green power marketing and purchasing programs and/or by the acquisition of Renewable Energy Certificates. A minimum 10% of a governmental entity's electricity requirements is recommended as a goal;
- (c) Pursue smaller-scale wind projects for self-generation through the use of net-metering, wheeling of power or other available mechanisms. A commitment of funding and governmental technical assistance is critical to the success of most such projects.

Other Recommendations

- ▶ Regional transmission planning efforts need to be closely linked to the resource acquisition plans of load serving entities (LSE) and the plans of generators.
- ▶ States should take steps to coordinate their respective regulatory reviews of multi-state transmission projects in a manner that builds upon existing regulatory principles and respects the public interest of individual states.
- ▶ States and federal regulators should extend a rebuttable presumption of prudence for multi-state project proposals that have been endorsed as an economically efficient investment, based on a detailed economic assessment by a regional planning entity.
- ▶ Support of future research on turbine design, wind farm layout features, animal vision, hearing and other senses will yield additional information on how to reduce wind-farm risk to birds and bats.
- ▶ States should establish a working group of their agencies concerned with energy resources, including, but not limited to, representatives from the Governor's office, energy office, state siting authority, fish and wildlife agencies and public utility commission. The goal of the group would be to ensure the actions taken by each agency are consistent with state energy policy on energy resources and coordinated consistently between the agencies.
- ▶ Reforms in the utility regulation and planning area should:
 - (1) account for natural gas price risk in assessing resource options;
 - (2) provide rate of return incentives for power purchase of renewable contracts; and
 - (3) result in policies that include renewable energy in future cap-and-trade programs via state implementation of such programs, channel a portion of funds from violations of environmental laws to renewable energy, such as through supplemental environmental projects, and include renewable energy as a control measure in State Implementation Plans (SIP).

Discussion of the Recommendations

Technical Feasibility: The Wind Task Force finds all the recommendations technically feasible.

Cost: The two-year extension of the federal Production Tax Credit for all renewable energy fuels enacted by Congress in 2005 is estimated to cost \$3.2 billion. Other recommendations will lower costs, such as the implementation of conditional-firm transmission service to more fully utilize the existing transmission system. More importantly, the task force believes the recommendations will lower the cost of wind generation to the point that it may be the lowest-cost generating resource in the West, when considering total costs, including environmental impacts. This will result in significant savings for Western electricity consumers. Additionally, large scale deployment of wind (as with other non-gas-fired generation) will put downward pressure on natural gas prices that will benefit consumers. Generation of electricity from wind has no national energy security costs.

APPENDIX B – Energy Efficiency

The Energy Efficiency Task Force's recommendations are divided into two categories: (1) state-level initiatives, and (2) regional initiatives. While most of our recommendations pertain to actions states can take on their own, we believe there are some important opportunities for advancing more efficient use of energy in a coordinated way throughout the region. Their specific recommendations are highlighted in bold type below (Please note that "We" refers to the Energy Efficiency Task Force and does not imply endorsement by the CDEAC or the Western Governors' Association)

A. State-Level Initiatives

1. **Electric Utility Demand-side Management (DSM) Programs**

- ▶ We recommend that all Western states require utilities to integrate cost-effective energy efficiency options into resource planning and procurement decisions and pursue energy efficiency whenever it is the least cost resource option. Electricity distribution companies in Western states should dedicate at least 2% of revenues to ratepayer-funded energy efficiency programs, assuming that doing so is cost-effective.
- ▶ Western states should establish minimum energy savings requirements or targets, either separately or in combination with renewable energy requirements or targets.
- ▶ We recommend setting a goal of saving 3-5% of projected electricity sales in 2010 through DSM programs, as long as this is cost-effective. We further recommend setting a goal of saving 10-15% of projected sales from DSM programs by 2020. This level of savings we recommend decoupling of electricity sales and revenues so that reduced electricity sales do not adversely affect utility revenues and fixed cost recovery, in combination with the creation of performance incentives that reward utilities for implementing effective DSM programs.

2. **Gas Utility Demand-side Management (DSM) Programs**

- ▶ We recommend that all Western states encourage or require gas utilities to integrate energy efficiency resources into their resource planning and procurement decisions and pursue energy efficiency whenever it is the lowest cost resource option. All Western states should establish ratepayer-funded natural gas energy efficiency programs.
- ▶ We recommend that gas utilities invest at least 1.5-2% of their revenues in energy efficiency programs, and strive to save the equivalent of 0.5-1.0% of gas con-

sumption per year, as long as this is cost-effective.

- ▶ We recommend decoupling of gas utility sales and revenues along with creating performance incentives that reward utilities for implementing effective gas DSM programs.

3. **Building Energy Codes**

- ▶ We recommend that Western states take the following actions in order to realize the energy savings and other benefits offered by state-of-the-art building energy codes:
 - For states with outdated (pre-2003) energy codes, adopt the 2004 International Energy Conservation Code. Also, consider adopting innovative features of California's latest Title 24 building energy codes, such as lighting efficiency requirements in new homes.
 - All states should update their energy codes regularly. A three-year cycle could be timed to coincide with release of the national model codes.
 - In home-rule states, either establish a statewide mandatory code or strongly encourage local jurisdictions to adopt and maintain state-of-the-art codes.
 - Implement code training and technical assistance for architects, builders, and local code inspectors. If these support activities are sustained over time, builders, designers, and code officials can become allies rather than opponents of state-of-the-art building codes. Federal funding for this purpose may be available in the future through a provision in the Energy Policy Act of 2005.
- ▶ Establish a "reach code" for state-owned buildings to demonstrate the feasibility of not only achieving the minimum code requirements but exceeding them. This will encourage the use of advanced energy efficiency products and designs, and will also reward the states with the inherent benefits of more efficient buildings.
- ▶ We recommend that Western states establish a regional building code collaborative

4. **Appliance Efficiency Standards**

- ▶ We recommend that California continue to adopt minimum efficiency standards on products not covered by the federal standards. In addition, we urge other Western states to replicate standards first adopted by California, as long as they are cost-effective and not included in federal standards.

5. **Public Sector Initiatives**

- ▶ We recommend that all Western states adopt "best practices" in public sector energy management including:
 - Establish goals for reducing energy intensity by 2% per year or greater in state buildings, track progress towards the goals using a benchmarking system such

- as the U.S. EPA's Portfolio Manager, and encourage local governments to set similar goals;
- Provide financial and technical assistance for implementation of energy savings projects in existing buildings and facilities;
- Use energy service companies (ESCO) and performance contracting to implement efficiency projects without public sector capital investment;
- Construct new buildings that are exemplary and surpass minimum energy code requirements by a wide margin;
- Purchase only ENERGY STAR-labeled equipment in categories where such products are designated.

6. Financial Incentives

- ▶ We recommend that other Western states consider providing tax incentives to help stimulate greater adoption of energy efficiency measures. In particular, states may want to coordinate qualification levels with the newly adopted federal energy efficiency tax credits.
- ▶ Western states with growing severance tax revenues on fossil fuels production should consider using a portion of these revenues to offset the revenue loss from tax credits on energy efficiency measures.

7. Pricing and Regulatory Policies

- ▶ We recommend decoupling utility revenues from sales and allowing utilities to keep a small percentage of the net economic benefits produced by their energy efficiency programs. In order to implement this policy, it is critical to carefully evaluate the energy savings, peak demand reductions and economic benefits of DSM programs.
- ▶ We recommend that all Western states adopt inverted block rates for electricity consumed by residential customers.
- ▶ We suggest that states consider adopting inverted block rates for natural gas.

8. Education and Training

- ▶ We recommend continuing and, where needed, expanding energy efficiency education and training programs at the state, local and/or regional levels. In particular, we suggest that states:
 - Partner with the U.S. EPA and DOE in promoting ENERGY STAR products, homes, commercial buildings and industries;
 - Implement programs to train builders and contractors on proper heating and air conditioning sizing and installation;
 - Train commercial building energy and facility managers, for example, by making use of the successful building operator training and certification

- program developed in the Pacific Northwest (Putnam et al. 2002);
- Train industrial energy and facility managers in techniques for improving the efficiency of their steam, process heat, pumping, compressed air, motors and other systems, and partner with the U.S. DOE in doing so; and
- Increase awareness of innovative energy efficiency measures, such as modern evaporative cooling systems, reflective roofing materials, sealing thermal distribution systems and use of day-lighting.
- ▶ We recommend that K-12 school- and college-based energy education programs be part of this initiative.

9. Technology R&D and Transfer

- ▶ We recommend that all Western states initiate, continue and, where appropriate, expand programs promoting best practices in industrial energy management. In doing so, a commitment should be made to deliver targeted training and follow-up technical assistance, to the degree funding permits. In addition, states should encourage companies to set goals for energy efficiency improvement and energy savings, and then track progress towards the goals.
- ▶ We recommend that Western states support energy efficiency R&D and technology transfer activities to increase the commercialization and market penetration of innovative energy efficiency technologies.

B. Regional Initiatives

1. Creation of Additional Regional Market Transformation Organizations

- ▶ We recommend creating additional regional market-transformation organizations that would:
 - Promote ENERGY STAR products and programs at the regional level;
 - Train architects, builders, code officials and facility managers on energy efficiency practices, codes and compliance options;
 - Develop and promote voluntary targets or standards for energy efficiency in the commercial and industrial sectors;
 - Coordinate regionally to train commercial and industrial energy managers, and promote "best practices" in energy management; and
 - Research, demonstrate and test innovative energy efficiency technologies or strategies.

2. Building Energy Codes Collaborative

- ▶ We recommend forming a regional building energy code collaborative. The collaborative could implement the following activities:
 - Support code development and adoption, including

providing analysis of technical and economic viability of innovative code elements. Barriers will be broken down as relationships are developed with builders, designers, and code officials.

- Support code implementation through training architects, builders, and code officials at the regional level. In some cases it makes sense to provide this training locally, but in other cases, it could be carried out on a regional basis. Also, the regional collaborative could offer to “train the trainers.”
- Establish a process for code development agencies in the states to coordinate their activities. This will allow states to learn from each other's experiences. It can also be used as an incubator for developing recommendations to submit into the national model code development process, carrying the weight of a considerable block of states and their code officials.
- Establish a “reach code” for state and locally owned buildings to demonstrate the feasibility of exceeding code requirements. This can be done taking into account climatic characteristics at the regional level.
- Support upgrading the HUD manufactured housing energy standards. These homes are outside the scope of state regulation, but they impact energy consumption in the states. Governors should become involved in efforts to upgrade the stringency for this class of homes on the national level.

3. Coordinated Appliances Standards Advocacy

- ▶ We recommend that Western states advocate, as a region, for stronger federal appliance efficiency standards where this is technically feasible and economically justified.

4. Quantification of Air Emissions Benefits

- ▶ We recommend that Western states create or utilize a regional working group to quantify the air emissions benefits of energy efficiency and renewable energy programs and foster inclusion of such programs in state and regional air quality improvement plans. Strategies for implementation of this recommendation include:
 - Create a new or use an existing WGA working group to foster and implement this recommendation, or do so through the WRAP;
 - Develop new or use existing information to quantify potential emissions-reduction benefits in Western States from energy efficiency and renewable energy initiatives;
 - Identify a matrix of federal (e.g., cap & trade) and state regulatory policies (e.g., SIPs, SBCs, RPSs) where inclusion of emissions benefits from energy efficiency and renewable energy efforts bolsters the rationale for adopting these policies; and

- Identify and showcase existing successful state efforts, such as the one in Texas, and those underway or completed in Maryland and Louisiana..

5. Inclusion of Energy Efficiency in Regional Transmission Planning

- ▶ We recommend that Western states collaborate to ensure that the potential for and effects of energy efficiency efforts are incorporated in regional transmission planning.
- ▶ We recommend that the WGA convene a regional planning group similar to the New England Demand Response Initiative (NEDRI) or the Mid-Atlantic Demand Response Initiative (MADRI).

6. Collaboration Among Native American Tribes

- ▶ We recommend that tribes work together to hire energy management professionals or contractors, train existing staff in energy management and/or share staff among several tribes.

7. Reducing Barriers to Performance Contracting and Other Strategies for Increasing Energy Efficiency in Commercial Buildings

- ▶ We recommend forming a working group that would develop a set of recommendations to overcome the barriers to implementing greater energy efficiency in commercial and public buildings. Among the strategies the working group should consider are:
 - Setting energy-savings targets for existing commercial buildings;
 - Promoting benchmarking using guidelines developed by the U.S. EPA and refined by California;
 - Setting up building commissioning and retro-commissioning programs patterned after those operating in California, Texas and Utah; and
 - Adopting mechanisms that will increase performance contracting by both the private and public sectors.

APPENDIX C – Transmission

To ensure adequate transmission for the region to tap its vast clean and diversified energy resources, Western Governors should adopt and take necessary steps to implement the following actions. The recommendations are grouped according to federal, regional, state and local entities and industries that would implement the recommendations.

1. FERC's ongoing review of its open access transmission policy under Order 888 provides an excellent venue to urge the Federal Energy Regulatory Commission to make needed reforms. The Western Governors should engage the Commission to make changes to its transmission policies to:
 - a. Promote a conditional-firm, priority non-firm and other transmission service products;
 - b. Encourage transparent review and assessment of available transfer capability (ATC);
 - c. Eliminate rate pancaking (i.e. access fees imposed on transmission customers contracting for service across multiple control areas) in the transmission system in a manner that addresses concerns about financial impacts during a transition, recovery of costs and cost shifting;
 - d. Promote control-area consolidation on a case-by-case basis, where an analysis finds that benefits exceed the costs and there are no significant adverse impacts on reliability
 - e. Encourage congestion management systems that allow access to least-cost generation within reliability security constraints;
 - f. Encourage common Web sites for Open Access Same Time Information Systems (OASIS) to facilitate transmission transactions;
 - g. FERC code of conduct rules should ensure that transmission planning processes include as much information about future and existing resources as possible. Given different industry interpretations of code-of-conduct rules, FERC should clarify the rule to allow transmission planners and resource planners of a vertically integrated utility to participate in joint discussions at transparent regional planning meetings and state-approved resource planning and acquisition processes; and
 - h. Request that FERC convene a technical conference to develop needed reforms of interconnection and transmission queuing processes.
2. The Western Governors should take an active leadership role to promote state and regional policies in collaboration with state legislatures to:
 - a. Ensure resources to enable state participation in regional transmission planning;
 - b. Encourage the electric power industry to make the existing proactive, transparent interconnection-wide and sub-regional transmission planning processes a priority;
 - c. Review, and if necessary, amend state laws to require PUCs and public power boards to consider regional transmission needs;
 - d. Support the goal of a regional planning capability that can yield critical information for stakeholders and regulators to allow rigorous evaluation of large, long-term investments in transmission;
 - e. Bring together stakeholders and forge solutions to regional transmission needs, cost allocation and siting where Regional Transmission Organizations (RTO) or Independent System Operators (ISO) do not exist, and ensure state participation in such activities by existing RTOs/ISOs;
 - f. Promote use of an open season process by project developers as a means of demonstrating demand for and value of new transmission projects, and expand project participation;
 - g. Urge FERC and PUCs to form joint panels on transmission cost recovery that would explicitly consider risks and needs for incentives, such as forms of preapproval, higher rates of return on transmission investments, and quicker cost recovery of transmission investments;
 - h. States should consider adopting funding mechanisms to support research, development and demonstration of advanced technologies in the public interest;
 - i. Urge transmission operators to develop workable agreements at seams between ISO and non-ISO systems to enable effective grid operations;
 - j. Ensure that there are resources and political commitments to successfully implement the WGA Transmission Permitting Protocol and the Midwest Electric Transmission Protocol for new interstate transmission proposals; and
 - k. Evaluate the option of forming an interstate compact for creation of a regional siting agency pursuant to Section 1221 of the Energy Policy Act of 2005, and encourage consistent siting processes within their states through use of standardized applications, joint data and studies, coordinated schedules and deadlines and other mechanisms, where possible.
3. Western Governors should urge state public utility commissions to adopt policies and promote legislation, if necessary, to:

- a. Establish tiered standards of review for prudency and application of transmission incentives for transmission expansion costs featuring a lower standard for screening studies and planning, a moderate standard for permitting and the acquisition of rights-of-way, and a higher standard for construction costs;
 - b. For states with mandatory renewable portfolio standards, regulatory commissions should make public interest findings associated with cost effective transmission projects that will enable states to attain energy policy goals;
 - c. Expand transmission in advance of generation to enable the modular development of location-constrained, clean and diversified resource areas to meet cost-effective RPS, IRP and state goals, similar to recent Texas and Minnesota legislation for new transmission and the renewable trunk line (Tehachapi) model for new transmission;
 - d. Coordinate multi-state review of transmission projects by developing common principles for cost allocation and cost recovery, and adopt a common Western procedural process that would identify and coordinate the applications, forms, analyses and deadlines; and
 - e. Promote cost-effective transmission expansion by accommodating both non-dispatchable and dispatchable resources.
4. Western Governors should collaborate with the appropriate federal agency to implement the Energy Policy Act provisions to designate energy corridors on federal lands by:
 - a. Committing state agency resources to participate in the federal effort and to identify contiguous corridors on adjacent state lands;
 - b. Urging Congress to fund federal land management agency corridor planning efforts; and
 - c. Fostering designation of corridors on lands not owned by the federal government or the states to ensure continuity in corridors. Designation and preservation of transmission corridors is important in rapidly urbanizing parts of the region.
 5. Western Governors should encourage the Western electric power industry to:
 - a. Synchronize regional transmission planning efforts to resource acquisition plans of load-serving entities (LSE) and plans of generators;
 - b. Support and collaborate with state infrastructure authorities that have been created to facilitate transmission expansion; and
 - c. Ensure institutional homes for regional transmission planning.

APPENDIX D – CDEAC White Papers

White paper submissions were received by the CDEAC on advanced natural gas, combined heat and power (CHP) and water energy. These white papers concern clean energy issues that went beyond the reports of the task forces chartered by the CDEAC, but nonetheless provide value towards meeting the clean energy goals of the Western Governors. The papers on Combined Heat and Power and Water Energy were developed under the guidance of the CDEAC and submitted for 30 days of public comment, but were not subject to the same consensus building process as the task force reports. The report on Advanced Natural Gas also went through a public comment period, but was received too late for the CDEAC to formally consider. It is posted as an information source on the WGA Web site at www.westgov.org.

Advanced Natural Gas

Natural gas provides over half of the West's generating capacity and the CDEAC acknowledges that natural gas is an important part of the West's clean energy future. The Advanced Natural Gas Task Force was commissioned by the CDEAC in accord with the Governors' original resolution. Interest and participation within the task force proved to be unsubstantial. Nevertheless, a white paper has been submitted to address the very relevant issues of balancing supply and demand to stabilize prices and ensure that natural gas will remain an important part of the West's energy portfolio. While the CDEAC has not had an opportunity to discuss this white paper, it is clear that the improvement of current infrastructure, consideration of liquid natural gas (LNG) as an alternate supply, and continued installation of combined cycle facilities are available options to help maintain stable prices in the future. The white paper sets forth a series of recommendations that can be found on the Web at www.westgov.org.

Combined Heat and Power

Combined heat and power is the simultaneous production of electric and thermal energy, which can create energy-use efficiencies that exceed 80%. Recovered heat energy from CHP systems can be utilized in close proximity, practical applications, such as space heating, hot water, steam, air conditioning and product drying. The cross cutting nature of the distributed use of thermal and electric energy creates efficiency advantages that can be realized by many the resources covered by the task forces. CHP systems can create a reduction in water use, provide for conservation of resources, avoid future emissions and decrease capital expenditures. The WGA currently has over 33,000 MW of CHP capacity and the technical potential for an additional 42,000 MW that can be tapped by considering the following policy options:

- ▶ Adopt FERC's model interconnection standards, procedures and agreements, and apply those to all interconnections in the state.
- ▶ Decouple utility revenues from throughput.
- ▶ Undertake a review of rates, especially standby rates, to make sure they are not discriminatory toward CHP.
- ▶ Ensure that renewable portfolio standards and other renewable energy laws include the full range of renewable CHP options, including waste heat recovery, spent pulping liquor and open-loop biomass.

Water Energy

Hydropower provides nearly 18% of the WGA's electrical generating capacity by utilizing the natural energy created through the West's vast network of streams, rivers and coastlines. A report published by the Idaho National Laboratory identified 30,000 MW of additional hydropower potential in the United States; two-thirds of this potential is in the West. Ninety-eight percent of the dams in the United States do not have a power component attached to them, meaning a significant hydro contribution to the West's future energy portfolio can be made without the construction of any new dams. Water-powered technology has also continued to advance to include many non-conventional applications. Wave, tidal and in-stream capabilities present a tremendous opportunity to explore other technologies for capturing energy from an abundant renewable source. Given the vary-

ing degree of development among these different water energy technologies, Western states should approach their continued development through broad policy options that create incentives, encourage research and development and streamline permitting procedures:

- ▶ Support economic incentives for traditional, new and emerging hydropower technologies:
 1. Extension of the federal Section 45 Production Tax Credit to 2015.
 2. Expand production tax credits to include small hydropower, hydropower at non-hydro dams and hydrokinetic / ocean technologies.
 3. Include hydropower in state clean and renewable energy initiatives.
- ▶ Support Hydropower R&D funding – provide federal and state financial support for the development of emerging hydrokinetic/ocean technologies and new turbine advancements for traditional hydropower technology.
- ▶ Encourage regulatory flexibility to promote the development of small hydropower potential and related emerging technologies.

Acronyms

ACTF – Advanced Coal Task Force
ATC – Available transfer capability
CDEAC – Clean and Diversified Energy Advisory Committee
CFR – Code of Federal Regulations
CHP – Combined heat and power
CO₂ – Carbon dioxide
CSP – Concentrating solar power
DOE – U.S. Department of Energy
DSM – Demand Side Management
EIA – Electricity Information Administration
EOR – Enhanced oil recovery
EPA – U.S. Environmental Protection Agency
ERCOT – Electric Reliability Council of Texas
ESCO – Energy service company
FERC – Federal Energy Regulatory Commission
HUD – Housing and urban development
IGCC – Integrated gasification combined cycle
IRP – Integrated resource plan
IRS – Internal Revenue
ISO – Independent system operator
kWh – Kilowatt-hour
LNG – Liquid natural gas
LSE – Load serving entities
MADRI – Mid-Atlantic Demand Response Initiative
MW - Megawatt
MWh – Megawatt-hour
NEDRI – New England Demand Response Initiative
OASIS - Open Access Same-Time Information System
PMA – power marketing administrations
PPA – power purchasing agreements
PTC – Production tax credit
PUC – Public utility commission
RD&D – Research, development, and demonstration
REC – Renewable energy credit
RFP – Request for proposals
RPS – Renewable portfolio standard
RTO – Regional transmission organization
SBC – System benefits charge
SIP – state implementation plans
TWh – Terawatt-hour
USGS – U.S. Geological Survey
WGA – Western Governors' Association
WRAP – Western Regional Air Partnership
WREGIS – Western Renewable Energy Generation Information System





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