



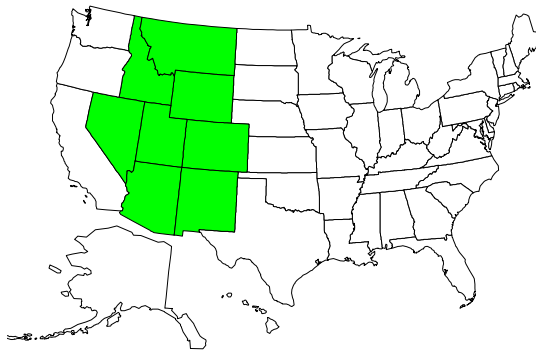
WESTERN RESOURCE ADVOCATES

**State Clean Energy Policies for
the Electric Sector: A Guide for
the Rocky Mountain Region**

Prepared for

Western Progress

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This report was prepared for Western Progress by Western Resource Advocates to support Western Progress' efforts to educate key decision-makers in the Rocky Mountain region about the status of clean energy policies. The author is David Berry.

The report describes and analyzes major public policies in the Rocky Mountain region intended to foster the deployment of both renewable energy in the production of electricity and energy efficiency measures to reduce the demand for electricity. The policies considered in this analysis are statewide in scope, including executive actions, regulatory actions and legislative actions. To the extent practicable, the analysis considered policies that have been adopted through April 15, 2007.

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I. Introduction

This report describes the elements of state level clean energy policies for the electric power sector in the Rocky Mountain region – Montana, Idaho, Utah, Wyoming, Colorado, Nevada, New Mexico, and Arizona. It provides a guide to crafting policies to accelerate the deployment of renewable energy for generating electricity and the diffusion of energy efficiency to reduce the demand for electricity.

Renewable energy and energy efficiency are means to achieving several goals:

- Reduced environmental impacts of power generation
- Stable energy prices in contrast to rising and volatile prices for fossil fuels
- Lower costs for energy services (heating, space cooling, refrigeration, motor power, etc.) through energy efficiency
- Reduced reliance on fossil fuels

Additionally, energy efficiency and renewable energy may create regional economic impacts from the local manufacture of energy generating equipment or energy efficient devices and from the use of local labor to install and operate clean energy equipment.

Four state level policies are central:

- A **renewable portfolio standard** that requires utilities to obtain at least 15% to 25% of electricity from renewable energy resources in the next 10 to 15 years. Good examples of such policies can be found in New Mexico and Colorado.
- **Energy efficiency programs** that seek to reduce the demand for electricity by about 8% to 10% within 10 years. These policies are not as far along as renewable portfolio standards, but initial efforts are underway in Nevada, New Mexico, and Utah on a statewide basis.
- An **integrated resource planning** process that focuses utilities and utility regulators on substantially increasing the roles of energy efficiency and renewable energy. Integrated resource planning has advanced clean energy in Colorado, for example.
- **Financial incentives** to promote use of clean energy resources at customers' premises, such as rooftop photovoltaics or energy efficient appliances and buildings. Many states offer financial incentives.

Other policies can be important as well. The report discusses a range of state clean energy policies for the electric power sector and provides examples of those policies.

Successful results depend not only on good policies, but on other circumstances too:

- **Ready availability of renewable energy resources.** Most Rocky Mountain states have plentiful renewable resources.

- **The means to deliver energy from renewable resources to load centers.** New transmission capacity will be needed in many cases and some states – New Mexico and Colorado, for example – have developed policies to encourage transmission investment.
- **Public support.** Recent polls indicate that there is strong public support for renewable energy and energy efficiency. Renewable energy and energy efficiency projects that are highly visible, such as those on public buildings, can reinforce public support.
- **Receptive utilities.** Some utilities are leaders in investing in energy efficiency and renewable energy while others are focused on reasons why they cannot make significant investments in clean energy resources. Geographic variations in clean energy investment are in large part due to utility receptiveness.
- **Entrepreneurship.** Clean energy resources are supplied by project developers, equipment and appliance manufacturers, and others. Without entrepreneurial and innovative suppliers and developers, clean energy costs would be high and projects infrequent.
- **Willing regulators.** Many policies depend on utility regulators or other state agencies for their success. If a regulatory body does not support clean energy or does so only grudgingly, progress will lag.
- **Favorable outside forces.** Sometimes forces outside the control of policymakers, consumers, or utilities induce investment in clean energy. As natural gas prices increased dramatically in the past few years, the cost competitiveness of renewable energy and energy efficiency improved. Thus, investments in clean energy are more attractive economically and it is easier to convince utilities and consumers to acquire clean energy resources.

Section II provides background information on renewable energy and energy efficiency. In Section III we review state policy options for fostering energy efficiency and renewable energy and describe the major components of these policies. An important element of energy policy is risk management, so in Section IV we identify what can go wrong and discuss methods for limiting bad outcomes. Regional approaches to clean energy are briefly reviewed in Section V and conclusions are presented in Section VI. The appendix contains statistical information on each of the states in the Rocky Mountain region, a list of government and other contacts who may be able to assist in developing policies, and a list of references cited in the report.

Terminology

Watt: a unit of electrical power

kW, MW, GW: electrical power generated or consumed: 1 kilowatt (kW) = 1,000 watts, 1 Megawatt (MW) = 1 million watts, and 1 Gigawatt (GW) = 1 billion watts

Watt hour: electrical energy equal to one watt of power consumed or generated for one hour
kWh, MWh, GWh: 1 Kilowatt hour, 1 Megawatt hour, 1 Gigawatt hour, respectively, consisting of 1,000 watt hours, 1 million watt hours, and 1 billion watt hours

Renewable energy resources: energy resources which are naturally replenishing in a relatively short period of time, such as solar energy, geothermal energy, wind energy, biomass, and hydropower

Energy efficiency: actions or measures which reduce energy used for various services such as space cooling, refrigeration, lighting, torque, etc., without degrading the quality of the services provided, sometimes called demand-side management (DSM)

II. Background

Renewable energy projects can be large or small, ranging from utility-scale central station plants, such as 200 MW wind farms, to 2 kW projects located on a residence. Projects located at residential, commercial, or industrial sites are referred to as distributed generation. Examples of distributed generation are rooftop photovoltaic systems and facilities that convert wood waste into power at a manufacturing plant.

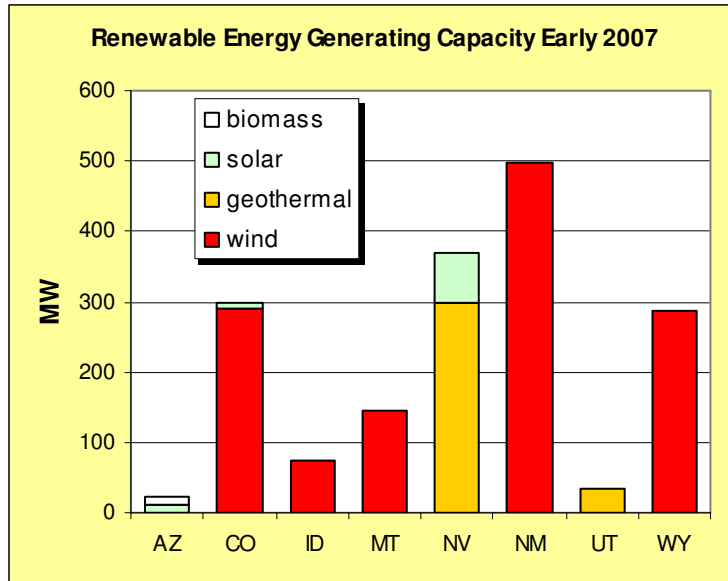
Figure 1 shows renewable energy generating capacity in the Rocky Mountain states as of early 2007. Wind and geothermal resources are the major technologies. Investments in solar power are increasing and include both photovoltaics, in which sunlight falling on solar panels generates electricity, and solar thermal projects, which focus sunlight on tubes with a heat transfer fluid and then use the heat to make steam or other vapor that drives a turbine which in turn drives a generator.

Biomass projects include landfill gas projects and projects which use wood waste.

The amount of renewable energy generation varies greatly across states. New Mexico, Nevada, Colorado, and Wyoming are the leading states in the Rocky Mountain region in terms of renewable energy generation capacity. Most of the geothermal capacity has been in place since the 1980s or early 1990s. Wind energy investments have largely occurred in the past few years, due to the low cost of wind energy, the high cost of natural gas, the abundance of wind resources, and the entrepreneurship of wind developers.

Energy efficiency can be accomplished through a variety of measures and programs (see Box A). When properly targeted, energy efficiency measures and activities save electricity more cheaply than electricity can be generated. Figure 2 shows energy efficiency savings in 2005 as a percentage of electricity sales for several individual large utilities with service territories in one or more Rocky Mountain states. So far, energy efficiency has made only a modest dent in the demand for electricity in the Rocky Mountain states.

Figure 1

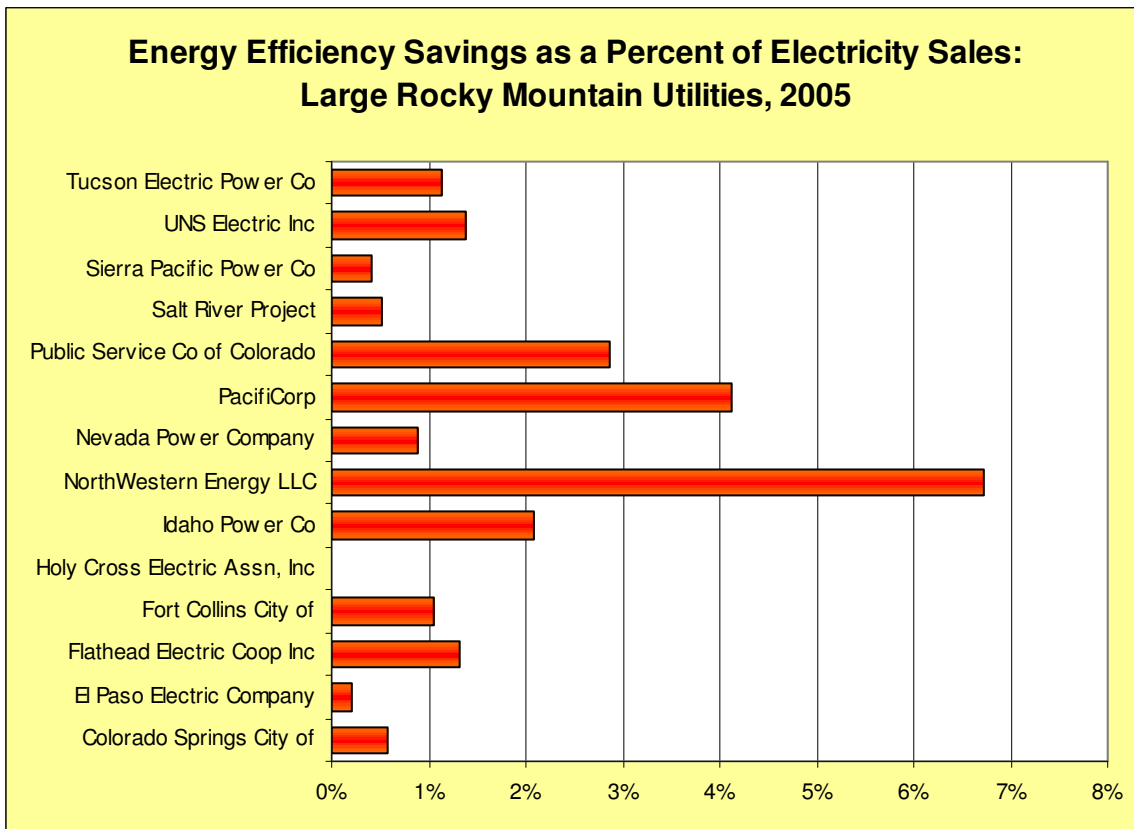


Sources: American Wind Energy Association (data pertain to December 31, 2006), Nevada Division of Minerals, US Department of Energy, Energy Efficiency and Renewable Energy, various utility websites.

Box A
Common Energy Efficiency Measures & Programs

- Compact fluorescent lamps
- Delamping
- Daylighting
- Efficient chillers & air conditioners
- High performance glazing
- Cool roofs & cool pavements
- Shade trees
- Efficient motors
- Energy efficient new homes (HVAC equipment, thermostats, ductwork , envelope measures, windows, water heaters)
- Low income weatherization
- Training, certification, and outreach to builders, contractors, and other energy service providers
- Training and technical assistance for commercial and industrial facility managers
- Design assistance for builders

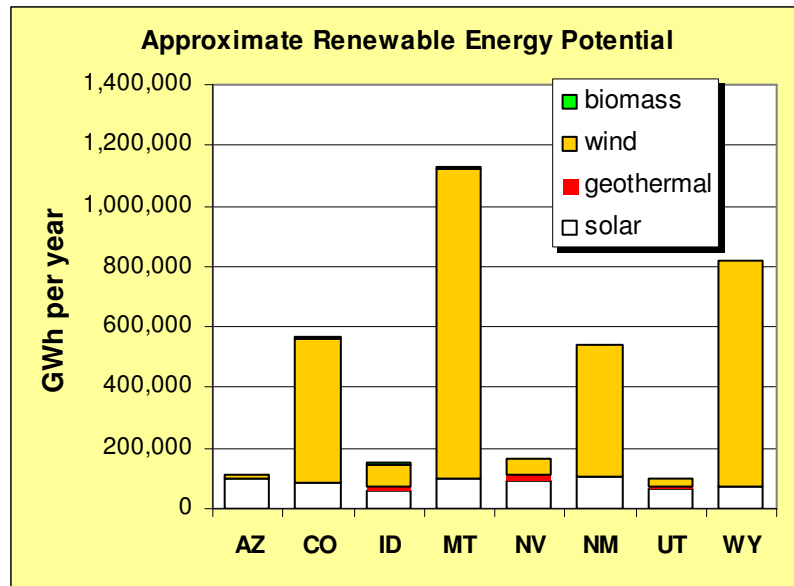
Figure 2



Source: Energy Information Administration Form 861 for 2005. The EIA database does not contain information on all utilities; for example, no data are reported for APS or PNM. For multi-state utilities, data refer to entire utility.

Several analyses estimate the potential for developing renewable energy and deploying energy efficiency. These studies make different assumptions about the technical, economic and achievable potential for various resources. Consequently, estimates of potential generation from renewable resources and estimates of potential savings from energy efficiency are not necessarily comparable and may be only rough indicators. Figure 3 provides recent

Figure 3



Sources: American Wind Energy Association (wind); Western Governors' Association (geothermal); Western Resource Advocates et al. (solar & biomass); Western Resource Advocates (biomass).

estimates of renewable resource potential in the Rocky Mountain states. Despite the imprecision of the estimates, the general picture is consistent with our everyday observations: wind energy potential is enormous and solar energy potential is widespread. Geothermal potential is concentrated in Nevada, Idaho, and Utah, and biomass potential is relatively small in the region.

Installation of renewable energy projects generates local and regional economic impacts. Box B presents some of the direct impacts of installing a large wind power project.

With regard to energy efficiency, the Western Governors' Association Energy Efficiency Task Force Report concluded that it is feasible to reduce electricity use by 20% by 2020 relative to baseline demand forecasts. The report found that leading utility energy efficiency programs reduce electricity use by 0.8% to 1.0% each year (i.e., 8%-10% after 10 years) and that such programs are very cost effective, saving electricity at an average total cost of \$0.02 to \$0.03 per kWh saved.

Box B
Direct Economic Impacts of a 162 MW Colorado Wind Energy Project

Construction phase
 679,000 person-hours of labor to install the project, including services for construction workers

Operations phase
 14 full-time jobs
 Increased tax revenues for the county in which the project is located
 Royalty payments to landowners

Source: Cox, 2004 and 2005

III. Policies to Advance Renewable Energy and Energy Efficiency

State policies have been central in the advancement of renewable energy and energy efficiency. This section discusses the major policies used by states in the Rocky Mountain region and elsewhere.

Table 1 presents an overview of policies to promote renewable energy and energy efficiency. Specific policies used on a *state-wide* basis in the Rocky Mountain states are shown in Table 2. The table does *not* provide a compendium of all policies as it excludes programs approved for individual utilities by state regulators on a case-by-case basis.

Some of the most important clean energy policies are made on a case-by-case basis by utility regulators and in power plant siting reviews. General policy guidelines may be established in legislation in some states, but regulators and siting authorities still have wide discretion. Utility regulation and power plant siting reviews may be conducive to settlement agreements among a utility, clean energy advocates, and other parties. Of course, there is no guarantee that renewable energy or energy efficiency will prevail over conventional power generation in a specific case. Table 3 provides an overview of case-by-case decision-making with some examples. The focus of this report, however, is on state-wide policies, not on regulatory programs approved on a case-by-case basis.

Policies are intended to influence decisions made by energy service providers and consumers. They may do this by setting performance standards, stimulating demand for clean energy, reducing the transaction costs of using the market, encouraging increased supplies of clean energy, accounting for the full range of resource costs and benefits, stimulating research and development, and taxing pollution.

Performance standards. Performance standards for renewable energy, often referred to as renewable energy standards or renewable portfolio standards, require that utilities subject to the standard obtain a specific percentage of their energy (or in some cases a specific amount of generating capacity) from eligible renewable energy technologies. Typically, the percentage increases over time up to a specified target like 20% of all retail kWh sales derived from eligible renewable resources by 2020. Eligible technologies vary from state to state, but common renewable energy technologies which are permitted are wind energy, various forms of solar energy, several biomass technologies, geothermal energy, and small hydropower projects.

Table 1. Overview of Policy Options

Policy Type	Leverage	Examples	Risks
Setting performance standards for utilities, manufacturers, designers, etc.	<ul style="list-style-type: none"> Provides direction to regulated entities on society's desired outcomes and processes Focuses regulated entities on learning about renewable energy or energy efficiency 	<ul style="list-style-type: none"> Renewable portfolio standards Appliance efficiency standards Building energy standards Utility efficiency program goals 	<ul style="list-style-type: none"> Performance shortfalls, especially without enforcement Unattainable goals Ineffectual goals High cost Interpretation of target as a maximum, not as a minimum
Stimulating demand for clean energy	<ul style="list-style-type: none"> Increases demand for energy efficiency and renewable energy by lowering effective prices or expanding the market 	<ul style="list-style-type: none"> Rebates or tax reductions for energy efficiency or renewable energy that lower the effective price Green power programs 	<ul style="list-style-type: none"> Subsidies paid by non-participants Low participation Free riders
Reducing transaction costs for participants	<ul style="list-style-type: none"> Reduces hassle and associated costs of using markets for energy efficiency and renewable energy Informs consumers and suppliers about energy efficiency and renewable energy 	<ul style="list-style-type: none"> Education or information about energy efficiency or renewable energy Standardized interconnection procedures for distributed resources Removal of onerous requirements on participants 	
Stimulating increased supply of clean energy	<ul style="list-style-type: none"> Sets price for wholesale purchases of renewable energy to encourage greater supply Expands the market 	<ul style="list-style-type: none"> Net metering Feed-in tariffs Tradable renewable energy credits Increased transmission infrastructure 	<ul style="list-style-type: none"> Potentially high cost Amount of renewable energy forthcoming not certain
Accounting for full range of resource costs and benefits	<ul style="list-style-type: none"> Reveals to decision-makers the costs & benefits of clean energy and conventional resources 	<ul style="list-style-type: none"> Integrated Resource Planning (IRP) Carbon dioxide cost adders to recognize risk of future climate regulations 	<ul style="list-style-type: none"> Difficulty in determining value of environmental benefits and of future streams of costs (especially for conventional resources)
Stimulating R&D	<ul style="list-style-type: none"> Provides funding for development and commercialization of new technologies 	<ul style="list-style-type: none"> New York State Energy Research and Development Authority Connecticut Clean Energy Fund 	<ul style="list-style-type: none"> Some projects may not become commercial successes Unfunded projects might have been successful
Taxing pollution	<ul style="list-style-type: none"> Increases costs of using polluting technologies relative to clean energy resources 	<ul style="list-style-type: none"> Exemption from regulatory tax in the Netherlands for electricity generated with renewable resources 	<ul style="list-style-type: none"> Political difficulty of imposing new taxes

Table 2. Overview of Major State-wide Clean Energy Policies in the Rocky Mountain Region (excludes individual utility programs approved by regulators on a case-by-case basis)

Resource	Policy	AZ	CO	ID	MT	NV	NM	UT	WY
Renewable Resources	Renewable Portfolio Standard (RPS)	15% by 2025 with 30% of RPS requirements from distributed resources by 2012 (pending AG approval)	20% by 2020 of which 4% is solar electric (1 kWh of CO resources counts as 1.25 kWh)		15% by 2015; community renewable energy project set aside up to 75 MW	20% by 2015 of which 5% must be solar; energy efficiency can be used to meet 25% of standard	20% by 2020 (target for cooperatives = 10% by 2020)		
	Financial Incentives*	I, P, S, R	P (for utility-scale projects), R	I, S	I, P	P, R, credits can be sold to utilities to meet RPS	S, PTC, I, incentives for utility to exceed RPS to be developed	S, I, PTC	S, R
	Facilitation of Distributed Resources	Interconnection standards pending	Interconnection standards, net metering	Net metering & interconnection standards approved for specific utilities	Net metering for IOUs, inter-connection standards	Interconnection standards, net metering	Interconnection standards pending, net metering	Net metering & inter-connection standards	Inter-connection standards, net metering
	Other	Renewable energy requirements for new state bldgs	Transmission planning to include renewables; green power for municipal utilities		Green power program, public benefits fund		Green power, Renewable Energy Trans. Auth., tax credit for mfg of alt. energy products		
Energy Efficiency	Utility Efficiency Programs					Up to 25% of RPS can be met with efficiency	Efficiency programs required	Efficiency program cost recovery permitted	
	State Building Efficiency Standards	15% reduction in building energy use by 2011; new buildings meet silver LEED standard	LEED standards			20% reduction in grid purchases of electricity by 2015, LEED standards for new buildings	LEED silver level for larger buildings, performance standards for smaller buildings	Guidelines to be developed; adopt conservation procedures in state facilities	
	Financial Incentives*	I (for original owner of efficient new home)		I (weather-ization of older residences)	I	P, credits can be sold to utilities to meet RPS	I (for sustainable new or renovated buildings)		
	Other	Appliance efficiency standards			Public benefits fund				
Both	IRP	Suspended	IRP	IRP	IRP	IRP	IRP	IRP	Stipulated

* I = income tax credit or deduction, P = property tax exemption or reduction, S = sales tax exemption, PTC = production tax credit, R = rebate or buy-down for eligible projects
 Primary sources: North Carolina Solar Center, Interwest Energy Alliance, www.interwest.org, Regulatory Assistance Project, state government web sites for statutes & rules.

Table 3. Overview of Venues for Case-by-Case Policymaking

	Venue		
	Rate Case or Tariff Filing	Integrated Resource Planning	Power Plant Siting
Nature of venue	<ul style="list-style-type: none"> Sets rates for utility services based on utility costs Establishes new services 	<ul style="list-style-type: none"> Reviews and may approve, modify, or reject resource plans (note: plans may be informational only) 	<ul style="list-style-type: none"> Reviews and approves, modifies, or rejects power plant plans for specific locations based on environmental and other criteria
Relevance	<ul style="list-style-type: none"> May establish energy efficiency or renewable energy programs and targets and provide for cost recovery 	<ul style="list-style-type: none"> Generally considers renewable energy and energy efficiency as resource options 	<ul style="list-style-type: none"> May consider renewable energy or energy efficiency as alternatives to proposed power plant
Examples*	<ul style="list-style-type: none"> AZ: Regulator accepted settlement agreement in which Arizona Public Service Company would pursue energy efficiency spending targets and renewable energy acquisition targets; a performance incentive concept was approved for APS' energy efficiency programs UT: PacifiCorp recovers efficiency program costs through a tariff rider for approved programs 	<ul style="list-style-type: none"> CO: Regulator accepted settlement agreement in which Xcel Energy would pursue spending and savings targets for energy efficiency programs NV: Regulator rejected additional energy efficiency and renewable energy as alternatives to a proposed coal fired power plant 	

* Sources: Arizona Corporation Commission Decision No. 67744. Public Utilities Commission of Nevada Docket Nos. 06-06051 and 06-07010. Geller, 2006. Utah Public Service Commission, Docket No. 02-035-T12 (order issued October 3, 2003).

Several states mandate or encourage distributed renewable resources. Examples are:

- Requiring that 30% of renewable resources be distributed resources (Arizona).
- Requiring that 75 MW of renewable energy resources be obtained from community renewable energy projects by 2015, where a community renewable energy project means an eligible renewable resource that is interconnected on the utility side of the meter in which local owners have a controlling interest and that is less than or equal to 5 megawatts in total nameplate capacity (Montana).
- Counting each kWh of generation by community-based projects as 1.5 kWh toward meeting the standard, where a community-based project is located in the state, is less than 30 MW, and is owned by individual residents, a non-profit organization, cooperative, local government, or tribal council (Colorado).

States may also set energy efficiency standards. For example, states may set efficiency performance standards in which utilities are to reduce load by a specified amount (e.g., 1%) relative to what would have occurred in the absence of the standard (see the 2007 report by the U.S. Department of Energy in the reference list). Nevada’s renewable portfolio standard includes energy efficiency (see Table 2). Additionally, several Rocky Mountain states require that new or extensively remodeled state government buildings

meet energy efficiency levels such as those prepared by the U.S. Green Building Council (Leadership in Energy and Environmental Design or LEED). Appliance standards are primarily a federal responsibility, but states occasionally require appliance efficiency levels for products not covered by federal standards.

Stimulating demand. Some consumers desire to purchase electricity derived from renewable energy. Green power programs provide a way to do this and stimulate the demand for renewable energy. Specifically, green power programs enable consumers to obtain, from their power supplier, a portion of their electricity from renewable resources, usually by paying a premium price for the green power. Thus, a consumer would have the option to purchase, for example, 50% of his or her electricity from renewable energy resources. Green power programs are gaining in popularity -- the median participation rate in utility green power programs is about 1.5% and the top programs enroll more than 5% of customers (Bird and Brown, 2006).

Another way to stimulate demand for clean energy is to lower the costs of installing energy efficiency measures or renewable energy projects through rebates or tax reductions. The effect of incentives can be seen in Table 4, which shows the costs of installing a photovoltaic system on a residential rooftop in Phoenix. There is a buy-down from the utility which pays \$3.00 per watt of DC (direct current) power generation capacity up to a maximum of \$30,000 per system. In addition, there is a combination of state and federal income tax credits. (In Arizona, expenditures on the construction of a solar power system are exempt from state and county sales taxes, thereby lowering the contractor's installed cost).

Table 4. Effect of Financial Incentives on a Residential Photovoltaic System: 3.7 kW System on a Pitched Roof in Phoenix

Component	Price
Installed price	\$27,548
Utility incentive	-\$11,070
State personal income tax credit	-\$1,000
Federal personal income tax credit	-\$2,000
Installed price after incentives	\$13,478

Source: American Solar Electric price list, February 2007.

Reducing transaction costs. Consumers may want to invest in clean energy but are dissuaded because of hassles in hooking up a photovoltaic project to the power grid, for example. Or they may be unaware of the availability of energy efficient lighting, air conditioning, refrigerators, and the like. Thus, there are barriers to using the market to make clean energy investments. These barriers are called transaction costs because they increase the cost of making transactions. Programs have been developed to reduce transaction costs. For example, many energy efficiency programs focus on educating or training contractors to offer energy efficient devices to customers and to properly size and install equipment. Thus the market can work more efficiently as buyers and sellers have better information. One area where reduced transaction costs have received extensive attention is interconnection requirements for distributed renewable energy

systems. Utility interconnection requirements have thwarted distributed generation by making it expensive, time-consuming, and perhaps impossible for consumers to install generation equipment that is connected to the grid. Several states have adopted interconnection standards that streamline interconnection to the grid without compromising safety. The specifics of a streamlined interconnection process are technical and involve electrical engineering issues. States typically use a workshop process including utilities, distributed generation equipment suppliers, and consumer organizations to hammer out details. The Federal Energy Regulatory Commission (2005) Small Generation Interconnection Procedures serve as a useful guide for states interested in pursuing interconnection standards that foster distributed generation.

Stimulating supply. Several policies have been developed to stimulate the supply of clean energy. One approach is to expand the market for renewable energy through the use of tradable renewable energy credits or certificates (RECs). Rocky Mountain states with renewable portfolio standards allow the use of tradable credits, thereby permitting utilities to meet the standard by purchasing just the renewable energy attributes of electric generation using eligible resources without having to also purchase the kWh. Box C provides more explanation.

Net metering for distributed energy projects is another approach to stimulating supply. Under net metering, when a customer with a distributed energy project, such as a rooftop photovoltaic system, generates excess electricity, the electric meter will run backward, essentially crediting the customer with the retail value of the kWh produced. Further, if there is excess generation at the end of the billing month, the customer may receive a kWh credit on the next month's electricity bill valued at the retail kWh rate. State policies vary on the details of net metering.

Box C
Tradable Renewable Energy Credits

- To meet portfolio standard requirements a utility may purchase renewable energy credits or certificates (RECs).
- RECs are an attribute of generating electricity with renewable resources separable from the actual energy produced by a renewable energy generation facility.
 - RECs are usually defined in terms of kWh or MWh of electricity generated from eligible renewable resources.
 - A state may define a REC as including the environmental attributes of renewable energy.
- AZ, CO, MT, NV, and NM explicitly or implicitly allow utilities to use RECs to meet renewable portfolio standard requirements.
 - In some cases, the associated kWh of electricity must be delivered to the state.
- RECs used to help meet a portfolio standard requirement must be retired, cannot have been previously used to meet another renewable energy requirement, and cannot have been previously transferred to a retail purchaser such as a residence or business buying "green tags" to meet their own environmental goals.

As renewable energy plays a larger role in energy supply, states are seeking ways to develop additional transmission capacity to move electricity generated by renewable resources to market. Box D lists some of these efforts.

Performance incentives are beginning to receive more attention for utilities to pursue clean energy resources. For example, Arizona Public Service Company may earn a performance incentive based on the net benefits of its energy efficiency programs and New Mexico legislation requires the utility regulatory commission to develop rules to provide performance-based incentives to encourage utilities to acquire renewable energy in excess of the renewable portfolio standard.

Box D
Transmission for Renewable Energy

New Mexico Renewable Energy Transmission Authority

Finances or acquires transmission, storage and related facilities; at least 30% of the electric energy must come from renewable resources.

Colorado Senate Bill 100 (2007)

Electric utilities designate energy resource zones and develop transmission plans; plans should encourage local ownership of renewable energy facilities and enable the utility to meet RPS requirements; plans are reviewed by the utility regulatory commission.

Accounting for the full range of resource costs and benefits. Resource decision-making is improved if the full range of costs and benefits of conventional technologies and clean energy resources is considered. Several states require a comprehensive and systematic review of the costs and benefits of a full range of conventional and clean energy resource options, including renewable energy and energy efficiency. Environmental costs and benefits and uncertainties in future cost streams may be explicitly considered. This process is commonly called integrated resource planning (IRP), and it is typically conducted by the utility regulatory commission on a regular basis (e.g., every 2 or 3 years). Utilities prepare long-range resource plans, and those plans are reviewed by clean energy advocates and other parties as well as by the regulators. The review process varies – in some states the plans are primarily informational while in others the regulator may adopt or acknowledge a utility’s plan or require revisions in the plan. A hearing may or may not be held. In some states, the utility must implement the approved plan. (For more information, see the Regulatory Assistance Project summaries of state IRPs in the reference list).

As legislators and regulators consider the full range of resource costs and benefits, they are now addressing compliance with impending carbon dioxide emission regulations. One way to incorporate carbon dioxide emission regulation costs is to add a range of possible compliance costs to the operating costs of resources that emit carbon dioxide. This analysis may cause utilities and regulators to deploy more clean energy resources as a hedge against an uncertain stream of costs of complying with carbon dioxide emission regulation.

Other policies. Several programs are used elsewhere but have not been adopted in the Rocky Mountain states, most notably, feed-in tariffs, large-scale research and development programs, and pollution taxes. Feed-in tariffs are used in Europe (Gan et

al., 2007; Wüstenhagen and Bilharz, 2006; and Junginger et al., 2004). They set a wholesale price for utilities to purchase electricity from eligible renewable energy projects. The price is set high to encourage suppliers to enter the market and is usually set for a long period such as 20 years to provide market certainty to suppliers. Different prices may be set for different technologies to reflect the degree to which those technologies' costs exceed the cost of conventional generation.

Research and development are important components of a broad energy policy and several states have established quasi-public corporations to stimulate R&D. The New York State Energy Research and Development Authority is a public benefit corporation created by the state legislature. According to its website (www.nyserda.org), NYSERDA developed and brought into use over 170 clean energy products, processes, and services. Funding is obtained through an assessment on utility sales and from contributions from the New York Power Authority and the Long Island Power Authority. The Connecticut Clean Energy Fund (www.ctinnovations.com) was created by the legislature and is administered by a quasi-public organization. It promotes the development and commercialization of clean energy technologies. Funding is from a surcharge on utility bills. Among other things, the Connecticut Clean Energy Fund coordinates a process to select innovative clean energy projects to be recommended to electric distribution companies.

Another approach is to tax pollution to raise the price of fossil-fueled power generation relative to renewable energy and energy efficiency. For example, a tax on carbon dioxide emissions would raise the price of electricity generated from coal or natural gas but would have little or no effect on the price of electricity generated from renewable resources. The tax revenues could be earmarked for clean energy programs or could supplant other taxes. However, imposition of new taxes is likely to be politically difficult.

Putting It All Together. This section has described numerous state policies that may seem like an orchestra with lots of instruments but no score to play. To see how a variety of policies and venues can come together to dramatically advance clean energy development, we summarize events in Colorado (Nielsen, 2007). In 1997 there were essentially no renewable energy projects operating in Colorado. By the end of 2007, the state will have over 1,000 MW of renewable energy on-line as a result of a series of proactive clean energy policies:

- A green power program was launched by Xcel Energy in 1997 to offer a wind power option to customers. Today, there are 40,000 green power customers to support 60 MW of wind power. This program led to the first utility-scale renewable energy project in the state, demonstrated the demand for renewable energy, provided the utility with experience in the development and operation of wind energy projects, and made renewable energy more visible to the public.
- An integrated resource planning process completed in 2001 led to development of a 162 MW wind project. Through the planning process that included clean energy advocates, the utility regulator concluded that wind energy was cost effective, taking into account the risk of high natural gas costs and the costs of integrating

- an intermittent resource into the grid. The resource planning process overcame utility reluctance to acquire wind energy, recognized the value of a diverse set of resources, started the analysis of integration costs, increased utility experience with wind energy, and turned farmers and ranchers on whose land the wind turbines would be located into renewable energy advocates.
- In 2004, a renewable energy standard was adopted (10% by 2015 with a solar set-aside). This standard was established by a ballot initiative that passed with 54% of the vote after legislative efforts failed. The standard sent a signal that there is strong public support for renewable energy, created a long-term stable market for renewable energy, and fostered development of solar energy resources.
 - A rebate of at least \$2 per watt was established in the portfolio standard for distributed solar electric projects. Xcel Energy, the state's largest utility, currently offers a rebate of \$4.50 per watt.
 - In 2007, the legislature increased the renewable energy standard to 20% by 2020 and established a process for investing in transmission to bring renewable energy to consumers as indicated in the discussion above. The expanded renewable energy standard is projected to add roughly another 1800 MW of renewable energy generating capacity to the state by 2020.

IV. Risks and Risk Management

Policies should be designed to manage risks, i.e., to minimize the chances of bad outcomes while still fostering the deployment of renewable energy and energy efficiency. Table 5 summarizes major risks and risk management tools.

Poor performance. One risk of renewable energy or energy efficiency policies is that the policies result in projects that perform poorly, i.e., that don't save energy or don't produce much electricity. For example, energy efficiency measures may not yield expected savings (Gillingham et al., 2004). Poor performance is primarily an implementation issue that must be addressed by the utilities and agencies responsible for carrying out or enforcing the general policy.

Imperfect information. Utilities and agencies responsible for implementation of energy policies must contend with imperfect information about costs, the level of efficiency already in place, and other program factors. An obvious risk management strategy is to get more information through requests for proposals and through studies such as analyses of existing energy efficiency practices or the costs of integrating intermittent renewable energy technologies into the grid. With research and development programs, there is simply insufficient information to know in advance whether a particular technology will become commercially viable. Risk management in R&D programs is often accomplished by vetting proposals in a committee of experts before funding is committed.

Renewable energy and energy efficiency may themselves be risk management tools. Most of these resources have fixed or stable costs and displace fossil-fueled resources with uncertain costs. That is, clean energy can be a hedge against imperfect information.

Table 5. Risks and Risk Management Tools for Clean Energy Programs

Risk	Tools for Energy Efficiency	Tools for Renewable Energy
Poor performance	<ul style="list-style-type: none"> • Monitor and evaluate efficiency measures and programs after they are installed • Seek performance guarantees from installers/contractors • Diversify energy efficiency measures • Target efficiency measures to consumers with certain characteristics to maximize savings 	<ul style="list-style-type: none"> • Pay for performance (e.g., utilities pay for kWh delivered) • Monitor energy production • Diversify renewable resource technologies and locations • Purchase high-quality components and use licensed contractors for installation of distributed generation
Imperfect information	<ul style="list-style-type: none"> • Conduct baseline studies of existing efficiency levels and measure costs • Conduct demonstration projects • Analyze conditions under which measures are likely to be most effective • Design flexible programs and policies to allow timely responses to new information on measure costs or utility avoided costs • Diversify energy efficiency measures • Conduct multi-party review of R&D proposals 	<ul style="list-style-type: none"> • Request proposals from competing suppliers • Conduct studies of integration costs for intermittent resources • Conduct multi-party reviews of R&D proposals • Conduct demonstration projects
Cost exposure	<ul style="list-style-type: none"> • Place caps on incentives or on total program expenditures • Enter into fixed price contracts for efficiency measures 	<ul style="list-style-type: none"> • Share risk through multi-utility projects • Review and revise implementation plans regularly • Place caps on total program expenditures or on costs of individual projects • Enter into fixed or stably priced contracts for renewable energy
Ephemeral policies	<ul style="list-style-type: none"> • Long-term programs • Long-term incentives 	<ul style="list-style-type: none"> • Long-term contracts • Long-term incentives
Legal uncertainty		<ul style="list-style-type: none"> • Avoid conflicts with existing law • Define ownership of RECs and life of RECs

Cost exposure. State governments are wary of programs with large or unlimited cost exposure for taxpayers or ratepayers. One approach to managing this risk is to cap program expenses. For example, Colorado’s renewable portfolio standard legislation has a maximum retail rate impact of 2% of the total annual electric bill for each customer. New Mexico’s renewable portfolio standard has a cost cap on individual technologies and a rate impact cap for large customers. Generally, caps are also placed on various tax incentives, limiting the amount of the incentive per participant or limiting the total value of incentives across all participants. In addition, states may require regular review of utility plans and experience in order to continually monitor program costs and make mid-course corrections if needed. In contrast to capping cost exposure associated with clean energy policies, the cost exposure of utilities and ratepayers to the risk of high fossil fuel prices or escalating conventional power plant construction costs often is not subject to similar prior constraints and limitations.

Ephemeral policies. Some clean energy programs are criticized because they start and stop frequently, making it difficult for suppliers to plan and invest, and making it difficult for consumers to participate due to enrollment limitations. The short term of the federal production tax credit for renewable energy is a salient sample. As a result of ephemeral policies, consumers and suppliers see the market as highly uncertain, clean energy investments are not made, and the industry suffers from boom and bust cycles. To

counter the risks of stop and go policies, states can commit to incentives and other programs on a long-term basis.

Legal uncertainty. One legal issue is a potential conflict with the Commerce Clause of the U.S. Constitution. Renewable energy projects can be seen as a means to enhance local economic development (Madsen et al., 2005 and 2007; and Chen et al., 2007). However, states must be careful about how they seek to increase local economic activity. In the case of *Wyoming v. Oklahoma* (502 US 437), the Supreme Court found an Oklahoma requirement that utilities obtain at least 10% of their coal from Oklahoma mines to be invalid because it discriminates against interstate commerce. (For a discussion of the Commerce Clause as it applies to environmental goals, see the article by Christine Klein, 2003.)

Using tradable renewable energy credits has also raised legal uncertainties.¹ For example, who owns the RECs if a customer installs a distributed generation project and sells power back to the utility? Or, can a REC associated with power generation in 2007 be used to meet a utility's renewable portfolio standard requirement in 2010? States may clarify these kinds of issues in statutes or regulations. For example, New Mexico's portfolio standard legislation (SB 418 (2007)) states that, *with some specified exceptions*, RECs are owned by the generator unless the certificates are transferred through specific agreement. Some states specify a life for RECs – for example, Colorado rules allow a utility to carry forward excess RECs obtained in a given year for use in future years, but the excess RECs must be used within five years. Nevada and New Mexico allow excess RECs to be carried forward for four years.

Implementation. Lastly, any policy can be poorly implemented or enforced. If a state does not follow through on its policies, or seeks to thwart its own policies such as by interpreting energy efficiency or renewable energy standards as maximums and not minimums, clean energy deployment will slow down.

V. Regional Approaches

Many of the benefits of clean energy accrue to an area larger than the state in which clean energy investments are made. In addition, some utilities serve several states and those states may wish to pursue consistent renewable energy and energy efficiency programs for multi-state utilities. Further, there is or could be extensive interstate trade in clean energy, offsets, or credits. Thus, states may wish to coordinate with other states, especially in the absence of uniform federal or international policies.

Multi-state clean energy policies are becoming more widely used. For example, in the northeast, several governors signed a Memorandum of Understanding in December 2005

¹ See, for example, 105 FERC ¶ 61,004 (Docket No. EL03-133-000) which concerned ownership of RECs in cases of contracts to sell power from Qualifying Facilities under the Public Utility Regulatory Policies Act of 1978 when the contract is silent on RECs.

to create a Regional Greenhouse Gas Initiative (RGGI).² RGGI includes a carbon dioxide budget trading program with state emission caps for fossil fuel-fired electric power plants of at least 25 MW of generating capacity, scheduled emission reductions, provisions for use of offsets, and provisions for trading of carbon dioxide allowances.

A second example is the Western Regional Climate Action Initiative signed February 26, 2007 by the governors of Washington, Oregon, California, Arizona, and New Mexico. Under this agreement, the governors agree to collaborate in identifying, evaluating, and implementing ways to reduce greenhouse gas emissions in their states. Collaborative actions include setting an overall regional goal within 6 months to reduce emissions, developing within 18 months a design for a regional market-based multi-sector mechanism to achieve the goals (e.g., a cap and trade program), participating in a multi-state greenhouse gas registry, promoting the development and use of clean and renewable energy within the region, and increasing energy efficiency.

A third example is the Northwest Energy Efficiency Alliance. This alliance creates and operates market transformation programs in Idaho, Montana, Oregon and Washington and works with utilities and public sector administrators. The alliance is a non-profit organization whose purpose is to encourage the development and adoption of energy efficient products and services. Through the alliance, resources can be leveraged with other utilities, adoption of new energy efficient products and services can be encouraged, and market and training programs are provided to utilities. Funding comes from electric utilities, the Energy Trust of Oregon, and the Bonneville Power Administration. The board of directors approves funding for specific projects.

States considering a regional approach to clean energy should address several major generic issues, as outlined below:

- Articulation of the functions of the regional effort
 - ✓ Identifying the common interest in specific issues and the need to take joint action
 - ✓ Defining the geographic scope of the regional issues
- Development of support for the effort
 - ✓ Taking a leadership role among the states
 - ✓ Responding to a constituency which advocates the goals
 - ✓ Securing a long-term source of funding
 - ✓ Managing potential conflicts with other institutions
- Establishment of an operating structure
 - ✓ Setting up a governmental or non-governmental body
 - ▶ Formal entity such as a commission
 - ▶ Informal collaboration through a working group or similar entity

² The original signatories to the RGGI Memorandum of Understanding are: Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. Maryland may join in 2007.

- ✓ Obtaining authority through legislation, executive orders, board directives, etc.
- ✓ Designating individuals or offices responsible for executing the regional activities
- ✓ Protecting democratic values, for example, by incorporating public input through advisory committees or other means, reporting to the public, and seeking to actively represent the views of the entire region

VI. Conclusions

This report has described the major elements of state clean energy policies and the venues in which these policies are developed and implemented. Four state level policies are key:

- A **renewable portfolio standard** that requires utilities to obtain at least 15% to 25% of electricity from renewable energy resources in the next 10 to 15 years. Good examples of such policies can be found in New Mexico and Colorado. Nevada, Arizona, and Montana also have portfolio standards with innovative provisions.
- **Energy efficiency programs** that seek to reduce the demand for electricity by about 8% to 10% within 10 years. These policies are not as far along as renewable portfolio standards, but initial efforts are underway in Nevada, New Mexico, and Utah on a statewide basis. Efficiency programs are also established on a case by case basis in utility rate cases.
- An **integrated resource planning** process that focuses utilities and utility regulators on substantially increasing the roles of energy efficiency and renewable energy. Integrated resource planning has advanced clean energy in Colorado.
- **Financial incentives** to promote use of clean energy resources at customers' premises, such as rooftop photovoltaics or energy efficient lighting. All Rocky Mountain states have some financial incentives for renewable energy but there are fewer statewide incentives for energy efficiency. Incentives for efficiency are primarily a component of utility demand side management programs approved on a case by case basis such as that approved for Arizona Public Service Company.

Other programs can also be beneficial, including **interconnection standards and net metering** for distributed resources, **transmission planning for renewable energy**, **green power programs**, **efficiency and renewable energy requirements for state buildings**, and **research and development programs**.

Successful clean energy policies depend on the institutional and legal context in which they are developed. What works in one state may not be a viable process in another. Clean energy advocates should, therefore, fashion policies and strategies to fit local political and legal constraints, draw upon the strengths of local public and private leadership, and focus on the venues where the potential for progress is greatest.

Statistical Appendix

Row		AZ	CO	ID	MT	NV	NM	UT	WY
1	Population July 1, 2006	6,166,318	4,753,377	1,466,465	944,632	2,495,529	1,954,599	2,550,063	515,004
2	Population July 1, 1990	3,684,097	3,307,618	1,012,384	800,204	1,220,695	1,521,574	1,731,223	453,690
3	KWh sales per person 2005	11,684	10,365	15,292	14,400	13,458	10,705	10,122	27,775
4	KWh sales per dollar of state gross domestic product 2005 (2006 \$)	0.311	0.217	0.450	0.438	0.284	0.291	0.268	0.504
5	CO2 emissions per GWh generated 2004 (metric tons)	484	828	119	713	673	938	920	1,014
6	MW of renewable energy generating capacity early 2007 (excluding hydropower)	22	298	75	146	371	497	34	288

Sources:

- Row 1. US Census Bureau.
- Row 2. US Census Bureau.
- Row 3. Energy Information Administration and US Census Bureau.
- Row 4. Energy Information Administration and Bureau of Economic Analysis.
- Row 5. Energy Information Administration, *State Electricity Profiles*, 2004, Table 1 for each state.
- Row 6. American Wind Energy Association, Nevada Division of Minerals, US Department of Energy, Energy Efficiency and Renewable Energy, and various utility websites. Data refer to early 2007.

State Contacts

This section contains contact information for state agencies, legislators, advocacy groups, and other experts in the region.

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