PRINTOUTS OF SELECTED PORTIONS OF WORKSHEETS USED TO PREPARE ESTIMATES OF COSTS AND BENEFITS OF RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL POLICY OPTIONS

Common Assumptions for New Mexico RCI GHG Analysis

Date Last Modified: 7/27/2006 M. Lazarus/D. Von Hippel

Common Assumptions

Real Discount Rate **5%**

Levelized, Avoided Costs (2006-2020, 2005$)

Electricity - Sales-Weighted Average **$52** $/MWh

Electricity avoided costs are based on PNM's 2001S Marginal Cost Study & 2003 FERC Form 1, as cited in GDS, 2005, Appendix G (Natural Gas Efficiency Study)

Electricity - Residential **$54** $/MWh
Electricity - Commercial **$52** $/MWh
Electricity - Industrial **$49** $/MWh

Natural Gas **$7.0** $/MMBtu

Gas avoided costs are taken from GDS, 2005, Appendix G (Natural Gas Efficiency Study) and levelized.

Prices

Electricity Price - Sales-Weighted, Levelized **$71** $/MWh

Prices are based on DOE data http://www.eia.doe.gov/cneaf/electricity/esr/esr_sum.html. Changes from 2005 to 2020 are based on the relative changes in projected Mountain region prices in US DOE Annual Energy Outlook 2006 (same % changes). AEO 2006 projects prices to rise through 2007, then declining to below 2004 levels from 2010 onward.

Electricity - Residential Prices (Levelized, 2006-2020) **$83** $/MWh
Electricity - Commercial Prices (Levelized, 2006-2020) **$72** $/MWh
Electricity - Industrial Prices (Levelized, 2006-2020) **$56** $/MWh

Natural Gas (Delivered, RCI sales-weighted average) **$7.7** $/MMBtu

Natural gas prices are estimated as described for electricity above.

Natural Gas - Residential Prices (Levelized, 2006-2020) **$9.1** $/MMBtu
Natural Gas - Commercial Prices (Levelized, 2006-2020) **$7.3** $/MMBtu
Natural Gas - IndustrialPrices (Levelized, 2006-2020) **$6.1** $/MMBtu

Biomass - All Users **$2.6** $/MMBtu

Estimate based on national study of state-by-state biomass resource resource assessments--see worksheet "Biomass_Data" in this workbook. Price equivalent of $41/dry ton at 16 MMBtu/dry ton. Replace with more NM-specific estimates (for example, from AF group when available).

Coal - Industrial Users **$2.0** $/MMBtu

EMNRD reports average coal heat content of 10, 392 BTU/lb, based on 2001 USDOE/EIA data. USDOE/EIA figures for 2004 from suggest US average of around $40 per ton for coal for "Other Industrial Users". No data points for NM other industrial uses. Average coal prices for NM electricity users is close to national average, therefore national average for other industrial users is used here. See www.emnrd.state.nm.us/emnrd/Mining/Publications/documents/MinIndNM2001Article.pdf, and www.eia.doe.gov/cneaf/coal/page/acr/table34.html

Oil - Distillate/Diesel **$12.8** $/MMBtu

USDOE/EIA data gives FOB Los Angeles average spot prices for low-sulfur diesel oil of $1.7618 per gallon in 2005 (from http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_a.htm). This cost does not include fuel taxes. An appendix to the 2006 Annual Energy Outlook by USDOE/EIA (see http://www.eia.doe.gov/oiaf/aeo/pdf/appendixes.pdf) lists an energy content for distillate oil of 5.799 MMBtu/bbl, or 0.138 MMBtu/gallon.

LPG **$10.0** $/MMBtu ***See Note 1***
Landfill Gas - All Users **$5.0** $/MMBtu

Placeholder Estimate

Biogas Gas - All Users **$5.0** $/MMBtu

Placeholder Estimate

Emission Rates, etc.	2010	2020	Units	2000
Electricity T&D losses (fraction of total generation)	9.6%	9.6%		
Avoided electricity emissions rate	0.905	0.751	tCO_2/MWh	

Assumes that reductions in electricity generation requirements through 2010 will come from the average emissions rate of then-existing fossil-fueled sources; by 2020 the predominant effect is assumed to be a reduction in reference case new coal and gas builds during the 2010-2020 period.

Notes	2010	2020	Units	2000

Multi-Gas Emission Factors

Except as noted, the following emission factors are calculated from values in the New Mexico Inventory and Forecast prepared for the CCAG, and reflect the average emissions in 2000 per BTU and physical amount of fuel. They include combustion CH_4 and N_20 as well as CO_2 emissions for consistency with the inventory.

	tCO_2e/billion BTU	
LPG - RCI	62.980	
Coal - RCI	93.831	
Natural Gas - RCI	53.040	
Biomass - RCI	6.795	
Oil - RCI	73.806	assumed equal to CO_2 factor for misc pet prods
Landfill Gas - RCI	5.000	*Placeholder Value--May in fact be negative*
Biogas - RCI	5.000	*Placeholder Value--May in fact be negative*

GDP Deflators (to 2005$)	Cost Year	Index
	1997	1.18
	1998	1.16
	1999	1.15
	2000	1.12
	2001	1.09
	2002	1.08
	2003	1.05
	2004	1.03
	2005	1.00

Natural Gas Conversion	1.03	million Btu/ thousand cf

NOTES AND DATA FROM SOURCES

Note 1:

USDOE/EIA data gives FOB Mont Belvieu, Texas average spot prices for propane of $0.9141 per gallon in 2005 (from http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_a.htm). This cost does not include fuel taxes. Prices expressed on $/MMBtu basis a conversion factor of 0.09133 MMBtu/gallon (see "Fuel Data" worksheet in this workbook).

RCI-1 Electricity DSM Programs, Efficiency Funds, and/or Requirements

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Key Data and Assumptions	2010	2020/all	Units
First Year Results Accrue		2006	
Electricity			
Current/expected efficiency spending (1.5%)			
Fraction of revenues spent on efficiency		1.5%	
As allowed by Efficient Use of Energy Act.			
Year that action begins		2006	
Year that target is achieved		2010	
Fraction of Statewide Electricity Sales Covered			
Residential		100%	TBD
Commercial		100%	TBD
Industrial		100%	TBD
RCI-1 Scenario ("full achievable potential")			
Annual reduction in sales achievable		1.0%	per year
Starting in year		2012	
Ramping up from expected levels in year		2010	

Pending results of ongoing PNM electricity efficiency study, the achievable efficiency potential is estimated based on the analysis of best practices and of other efficiency potential studies in the Western US (see WGA CDEAC EE , 2005). This analysis suggests a range from 0.8 to 1.0 percent savings per year is achievable, and we used the high end of that range here (1.0%). These estimates are based on programs and policies that aim for cost-effectiveness for all measures. The CCAG has suggested looking at "positive cost" options, i.e. up to $15/tCO2. However, few studies have examined such positive cost options in detail, and there has been limited experience with programs. Available studies (perhaps as a result) typically show steeply upward sloping cost curves near the cost-effectiveness threshold, suggesting limited saving potential at measure costs above the avoided cost of electricity.

Spending on efficiency needed to meet reduction target		2.7%	
Spending level "back-calculated" based on savings per $ spent.			
Fraction of Sales by Sector Covered			
Residential		100%	TBD
Commercial		100%	TBD
Industrial		100%	TBD
Levelized Cost of Electricity Savings		$25	$/MWh

Based on WGA CDEAC EE (2005), which in turn is based on Funding and Savings for Energy Efficiency Programs in Program Years 2000 through 2004 (CEC Rogers, Messenger Bender 2005) and on The Fifth Northwest Electric Power and Conservation Plan (Northwest Power and Conservation Council 2005)

Electricity Savings per Program Spending (first year savings)		6	MWh/$1000 spent, or
		$167	$/MWh 1st yr savings

Based on rough average of several sources. Since 2000, NW utilities have achieved around 7 MWh/$1000 (T. Eckman, 2006, ttp://www.nwcouncil.org/energy/present/idaho.pdf), while CA utilities have averaged closer to 5 MWh/$1000 (M. Messenger, 2003, http://www.energy.ca.gov/reports/2003-09-24_400-03-022D.PDF).

Avoided Delivered Electricity Cost		$52	$/MWh

See common assumptions ("Common Factors" worksheet in this workbook)

RCI-2 **Natural Gas DSM Programs, Efficiency Funds, and/or Requirements**

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Key Data and Assumptions	2010	2020/all	Units
First Year Results Accrue		**2006**	
Natural Gas			
Recent Actions not included in forecast (current/planned efficiency spending levels)			
As allowed by Efficient Use of Energy Act (fraction of revenues)		**1.5%**	
Year that action begins		**2006**	
Year that target is achieved		**2010**	
Fraction of Sales by Sector Covered			
Residential		**100%**	*TBD*
Commercial		**100%**	*TBD*
Industrial		**100%**	*TBD*
RCI-2 Scenario ("full achievable potential")			
Annual reduction in sales achievable		**1.16%**	per year
Starting in year		**2012**	
Ramping up from expected levels in year		**2010**	
According to PNM's Natural Gas Energy Efficiency Study (GDS Associates, 2005), the maximum cost-effective achievable reduction potential is 11.6% (of future sales) by 2014, or 1.16% per year in incremental improvements (study looked at 2005-2014). The CCAG has also suggested looking at "positive cost" options, i.e. up to $15/tCO2. However, the (steeply upward sloping) cost curves shown in the GDS report suggest limited gas saving potential at costs above the avoided cost of gas. This may be attributable to a number of factors, including the common focus of energy efficiency studies on highly cost-effective measures (i.e. higher cost efficiency measures are have been examined less thoroughly).			
Spending on efficiency needed to meet reduction target		**2.2%**	
Spending level "back-calculated" based on savings per $ spent.			
Fraction of statewide gas *use/sales/revenues* covered by measure		**100%**	*TBD*
Fraction of Sales by Sector Covered			
Residential		**100%**	*TBD*
Commercial		**100%**	*TBD*
Industrial		**100%**	*TBD*
Natural Gas Savings per Program Spending		**72,700**	MCF/yr per $million
		74,881	MBtu/yr per $million
Based on average cost of gas DSM programs reported in Tegen, S. and Geller, H., 2006. Natural Gas Demand-Side Management Programs: A National Survey, Southwest Energy Efficiency Project, www.swenergy.org.			
Levelized Cost of Natural Gas Savings		**$2.1**	$/MMBtu
Based on the first year costs above and average measure lifetime assumption below			
Assumed average measure lifetime		**8**	years
Avoided Delivered Natural Gas Cost		**$7.0**	$/MMBtu
See common assumptions			

RCI-3 Regional Market Transformation Alliance

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Key Data and Assumptions	2010	2020/all	Units
First Year Results Accrue		**2010**	
Savings from Alliance Programs			
Reduction in overall electricity use		**0.2%**	per year
Based on WGA (2005) - The Potential for More Efficient Electricity Use in the Western United States, Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors' Association. This study estimate market transfomation programs could achieve reductions in electricity consumption of about 0.2% per year, based on programs and experience similar to those of the Northwest Energy Efficiency Alliance. See NEEA 2004 Annual Report. www.nwalliance.org/resources/documents/A_2004AR.pdf. These savings are in addition to those achieved through building energy codes and utility DSM programs (no double counting).			
Assumed Cost of Market Transformation Program Savings		**$12**	$/MWh
From WGA EE Task Force study (2005), which cites the Retrospective Analysis of the Northwest Energy Efficiency Alliance (Violette, Ozog, and Cooney, 2003).			
Avoided Electricity Cost		**$52**	$/MWh
See common assumptions.			

Other Data, Assumptions, Calculations	2010	2020/all	Units
Total Statewide Electricity Sales	**22,967**	**29,413**	**GWh**

Results	2012	2020	Units
Total Net GHG Emission Savings	**0.1**	**0.5**	$MMtCO_2e$
Net Present Value (2007-2020)		**-$79**	$million
Cumulative Emissions Reductions (2007-2020)		2.9	$MMtCO_2e$
Cost-Effectiveness		**-$27**	$/tCO_2e$
TOTAL Reduction in Electricity Sales	141	574	GWh (sales)
as share of projected sales	0.6%	1.9%	
Reduction in Generation Requirements	156	634	GWh (generation)

RCI-4 State Appliance Standards

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Key Data and Assumptions	2010	2020/all	Units
First Year Results Accrue		**2008**	
Projected Electricity Savings from 15 Proposed Standards (in 2020)		**306**	GWh
Projected Natural Gas Savings from 15 Proposed Standards (in 2020)		**86**	million ft3
Projected NPV Savings (to 2030, $2005)		**$239**	million

The above findings are drawn from ASAP and ACEEE, 2006. "Leading the Way: Continued Opportunities for New State Appliance and Equipment Efficiency Standards,"http://www.standardsasap.org/stateops.htm. The NPV results were derived using a 5% discount rate, and electricity prices of 9.0c/kWh ($13.52/Mbtu gas) residential and 7.6c/kWh ($9.65/Mbtu gas) commercial. The resulting NPV savings are thus slightly higher than would be obtained using our avoided delivered electricity and gas cost estimates.

Adjustment factor for NPV timespan		**0.696**	

This is the ratio of NPV values from 2007-2020 vs. 2005-2030 for a constant net benefit starting in 2008.

Adjustment factor for different electricity and gas avoided costs		**0.580**	

Simple adjustment assumes the benefits are largely on the electricity side, and equals the ratio of incremental cost savings per MWh using the following values (appliance standards cost from WGA 2005; ASAP/ACEEE assumes average of res and comm):

Average cost of efficiency improvements via standards		**$12**	$/MWh
Average cost of electricity in ASAP/ACEEE study		**$83**	$/MWh
Avoided cost used here (res/comm avg)		**$53**	$/MWh

Other Data, Assumptions, Calculations	2010	2020/all	Units
National Savings	14	52	TWh

ASAP/ACEEE, 2006. Assume here same ratio of 2010 to 2020 savings in NM for electricity. All gas-saving standards come into force in 2012, so no 2010 gas savings

Results	2012	2020	Units
Electricity			
Reduction in Electricity Sales	107	306	GWh (sales)
Reduction in Generation Requirements	119	338	GWh (generation)
GHG Emission Savings	**0.11**	**0.25**	$MMtCO_2e$
Cumulative Emissions Reductions (2007-2020)		2.1	$MMtCO_2e$
Natural Gas			
Reduction in Gas Use	10	88	Billion BTU
GHG Emission Savings	**0.00**	**0.005**	$MMtCO_2e$
Cumulative Emissions Reductions (2007-2020)		0.02	$MMtCO_2e$
Total for Policy (Natural gas and electricity)			
GHG Emission Savings	**0.11**	**0.26**	$MMtCO_2e$
Net Present Value (2007-2020)		**-$97**	$million
Cumulative Emissions Reductions (2007-2020)		2.1	$MMtCO_2e$
Cost-Effectiveness		**-$46**	$/tCO_2e$

RCI-5 Green Power Purchasing

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Key Data and Assumptions	2010	2020/all	Units
Current State/Local Government Building Energy Consumption			
Electricity Purchases (State Govt) in 2005		169	GWh
Based on Greenhouse Gas Baseline Development for the Chicago Climate Exchange, State Government of New Mexico, Final Report, July 27, 2006, Domani, Denver, Colorado. Includes leased space. Purchases			
Electricity Purchases (Local Govt)		169	GWh
Lacking data on local government, this assumes total electricity use by local government is roughly equal to that used by state government.			
Rate of growth in state building electricity demand		0.0%	per year
Assumes that growth in electricity demand is offset by savings from other efficiency/design measures.			
Green Power Procurement:			
Green Power Purchase (including leased space), 2005		4%	
Policy Start Year		2008	
Target Year for Achieving Purchase Level		2008	
Fraction of electricity purchased as green power in Target Year		20%	
Fraction of electricity purchased as green power by 2020		20%	
Incremental Cost of Green Power		$9.0	$/MWh
This represents the approximate added consumer cost of green power, assuming bulk purchase (see e.g. Pacificorp BlueSky program at http://www.pacificpower.net/Article/Article51258.html where purchases of over 75 MWh/mo pay $8.7/MWh), and assumes, for now, that the incremental cost stays constant through 2020. This is a rough approximation. The incremental cost (and cost-effectiveness) of this measure may also be reflected in the cost of the RPS policy (see ES group), since it considers costs at the wholesale not retail level, from an economic rather than financial perspective.			

RCI-6 Rate Design

Date Last Modified: *6/30/2006 M. Lazarus*

Key Data and Assumptions	2010	2020/all	Units

The following calculation estimates GHG emissions reduction from only one element of 6-RCI, inverted block tariff structures. Other elements of provide GHG emissions reductions largely through supporting other policies in the RCI and Energy Supply sectors.

First Year Results Accrue — 2008

Savings from Inverted Block Rates for Residential Consumers

Reduction in Residential Electricity Use — 4%

Based on estimated from THE NEW MOTHER LODE: The Potential for More Efficient Electricity Use in the Southwest prepared by the Southwest Energy Efficiency Project (SWEEP), November, 2002, http://www.swenergy.org/nml/New_Mother_Lode.pdf. The estimate is based on a simple econometric calculation, assuming a three-block tariff, with the highest block having a tariff 50 percent higher than the average tariff for households, and the lowest block having a tariff half of the average tariff, so that the overall tariff structure was revenue-neutral. Based on empirical studies of the price elasticity of demand for electricity, the authors of the SWEEP study estimate an average savings of about 4% of residential as of 2000.

Assumed Cost of Implementation of Inverted-Block Tariffs — $0 $/MWh

In practice, there are likely to be some costs associated with implementing inverted-block tariff structures, including program costs, changes to billing systems, and possibly (in some cases) changes to metering or meter-reading systems. These costs are not explicitly accounted for in this analysis, but are likely to be quite small relative to the electricity cost savings achieved through the policy.

Avoided Electricity Cost (Residential) — $54 $/MWh

See common assumptions.

Other Data, Assumptions, Calculations	2010	2020/all	Units
Residential Electricity Sales	6,621	8,816	GWh

Results	2012	2020	Units
Electricity			
TOTAL Reduction in Electricity Sales	280	353	GWh (sales)
Reduction in Generation Requirements	310	390	GWh (generation)
Total for Policy (All Fuels)			
Total Net GHG Emission Savings	0.27	0.29	$MMtCO_2e$
Net Present Value (2006-2020)		-$141	$million
Cumulative Emissions Reductions (2006-2020)		3.6	$MMtCO_2e$
Cost-Effectiveness		-$40	$/tCO_2e$

RCI-7A Improved Building Codes

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Key Data and Assumptions	2010	2020/all	Units
First Year Results Accrue		2008	

Electricity	2010	2020/all	Units
Levelized Cost of Electricity Savings		$47	$/MWh
Based on estimate in WGA CDEAC EE Report. (See Note 1, below.)			
Levelized Cost of Natural Gas Savings		$2.1	$/MMBtu
Based on an average for Gas DSM programs as used in evaluation of RCI-2, and derived from data in Tegen, S. and Geller, H., 2006. Natural Gas Demand-Side Management Programs: A National Survey, Southwest Energy Efficiency Project, www.swenergy.org.			
Avoided Electricity Cost		$49	$/MWh
Weighted average over total 2007-2020 electricity savings for this policy in each sector. See common assumptions ("Common Factors" worksheet in this workbook).			
Avoided Natural Gas Cost		$7	$/MMBtu
See common assumptions ("Common Factors" worksheet in this workbook)			

Other Data, Assumptions, Calculations	2010	2020/all	Units
Adjustment for Differential Residential Growth Assumptions between CCAG Inventory and Forecast and Inventory/Forecast in WGA CDEAC EE Report	1.00	1.00	
Adjustment for Differential Commercial Growth Assumptions between CCAG Inventory and Forecast and Inventory/Forecast in WGA CDEAC EE Report	1.00	1.00	
Adjustment for Adding More Stringent Requirements (such as selected CA Title 24 Requirements) to New Residential Codes	1.00	1.00	
This factor, or a different type of adjustment, can be used to adjust the estimated impact for the effects of the requirement (as written into RCI-7A) that new residential buildings "consume 50 percent less energy per square foot than average US buildings of similar building types (on a weather normalized basis)", and work toward "the overall goal that buildings be 'carbon neutral' by 2030".			
Adjustment for Adding More Stringent Requirements (such as selected CA Title 24 Requirements) to New Commercial Codes	1.00	1.00	
This factor, or a different type of adjustment, can be used to adjust the estimated impact for the effects of the requirement (as written into RCI-7A) that new commercial buildings "consume 50 percent less energy per square foot than average US buildings of similar building types (on a weather normalized basis)", and work toward "the overall goal that buildings be 'carbon neutral' by 2030".			
Adjustment for Inclusion of Rennovated Residential Space as Well as New Under New Code Requirements.		1.00	
(Currently set at 1.0 so that no rennovated residential space is included--need to ask an NM building professional for an opinion on this value.)			
Adjustment for Inclusion of Rennovated Commercial Space as Well as New Under New Code Requirements.		2.00	
*(Currently set at 2.0 so that about 1 unit of renovated space is included per unit of new space (initial assumption--see **Note 4**). It may be useful to get further information regarding this value.*			
Adjustment for Inclusion of New Industrial Space in Estimated Savings due to New Code Requirements (applied to total residential plus commercial savings) (See ***Note 3***)		1.08	
Ratio of Electricity Savings to Gas Savings: Residential Sector	16	28	GWh/TBtu
Ratio of Electricity Savings to Gas Savings: Commercial Sector	958	1,083	GWh/TBtu
Estimated based on relative NM savings from Building Code and Beyond Code Measures as included in SWEEP Report (See Note 2). Ratios from the SWEEP "Modest Improvement" Scenario are used, since that scenario emphasizes efficiency improvements through more			

Results	2012	2020	Units
Electricity			
Recent Actions not included in forecast			
Reduction in Electricity Sales: Residential	29	67	GWh (sales)
Reduction in Electricity Sales: Commercial	83	204	GWh (sales)
Reduction in Electricity Sales: Industrial	9	21	GWh (sales)
TOTAL Reduction in Electricity Sales	120	292	GWh (sales)
Reduction in Generation Requirements	133	323	GWh (generation)
GHG Emission Savings	**0.12**	**0.24**	$MMtCO_2e$
Based on estimate for "Current Activities Case" in WGA CDEAC EE Report. (See Note 1, below.)			
Savings due to Additional Effort in RCI-7A			
Reduction in Electricity Sales: Residential	11	34	GWh (sales)
Reduction in Electricity Sales: Commercial	141	437	GWh (sales)
Reduction in Electricity Sales: Industrial	12	37	GWh (sales)
TOTAL Reduction in Electricity Sales	164	508	GWh (sales)
Reduction in Generation Requirements	181	561	GWh (generation)
GHG Emission Savings	**0.16**	**0.42**	$MMtCO_2e$
Economic Analysis (for Savings due to Additional Effort in RCI-7A)			
Net Present Value (2006-2020)		**-$2.4**	$million
Cumulative Emissions Reductions (2006-2020)		2.9	$MMtCO_2e$
Cost-Effectiveness		**-$0.83**	$/tCO_2e$
Natural Gas			
Recent Actions not included in forecast			
	1,632	2,620	Billion BTU
	0.09	0.14	$MMtCO_2e$
Savings due to Additional Effort in RCI-7A			
Reduction in Gas Use	755	1,649	Billion BTU
GHG Emission Savings	0.04	0.09	$MMtCO_2e$
Economic Analysis (for Savings due to Additional Effort in RCI-7A)			
Net Present Value (2007-2020)		**-$39.0**	$million
Cumulative Emissions Reductions (2007-2020)		0.7	$MMtCO_2e$
Cost-Effectiveness		**-$58.76**	$/tCO_2e$

Summary Results for RCI-7A	2012	2020	Units
Recent Actions Not Included in Forecast (Current/planned building code changes)			
GHG Emission Savings	**0.20**	**0.38**	$MMtCO_2e$
Total for Policy (Natural gas and electricity)			
GHG Emission Savings	**0.20**	**0.51**	$MMtCO_2e$
Net Present Value (2006-2020)		**-$41**	$million
Cumulative Emissions Reductions (2006-2020)		3.6	$MMtCO_2e$
Cost-Effectiveness		**-$11.57**	$/tCO_2e$

NOTES AND DATA FROM SOURCES

Note 1:

From The Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors Association.
The Potential for More Efficient Electricity Use in the Western United States, January, 2006. This report is referred to here as the "WGA CDEAC EE report" and can be found at:
http://www.westgov.org/wga/initiatives/cdeac/Energy%20Efficiency-full.pdf.

In the WGA CDEAC EE report, Building Code improvements were effectively modeled in two steps. The first, assumed to be effectively a baseline action, in the context of this (NM CCAG) study, but called the "Current Activities" case, brought codes up to recent IIEC levels as follows:

> "In particular, we assume adoption of a recent version of the IECC leads to 5% electricity savings on average in states in colder or moderate climates, and 13% savings in homes in very hot climates (AZ, TX, and NV). Regarding commercial buildings, we assume adoption of the code leads to 10% electricity savings in moderate and colder states, and 15% savings in very hot states (Kinney, Geller, and Ruzzin 2003). For California, we used estimates of the electricity savings from building code upgrades adopted in 2001 and 2005 (Mahone, et al. 2005). These savings levels are prior to the adjustment for savings realization mentioned in Table V.1" [Quote from footnote, page 40]

The second increase, to the CDEAC "Best Practices" Scenario, included the following improvements:

> "This [Best Practices] scenario assumes that the International Energy Conservation Code, 2004 version, is adopted in 2007 in all states except California, as California has its own more stringent standard. It is assumed that state and/or local building energy codes are upgraded in 2011 (3% improvement) and in 2015 (additional 6% improvement). This scenario also assumes that compliance and enforcement are improved and that a 90% savings realization rate is achieved. Finally, we assume that California's current building energy codes will be upgraded in 2009 (3%), 2013 (6%) and 2017 (3%)." [Quote from page 41]

The CDEAC report provides a cost of saved energy (electricity) of 4.74 cents/kWh, in 2005 dollars, based on an average 7-year payback for code improvements (page 42).

A set of background spreadsheets prepared by David Weitz of ASE includes estimates of the benefits of code improvements done for the CDEAC report by State and by sector (Residential and Commercial). Electricity savings by year (apparently for the year implemented only, not cummulative) and by scenario modeled are shown at right:
From workbooks: BCAP code savings estimator - WGA Scenario 2 (9-02-2005).xls and BCAP code savings estimator - WGA Scenario 3 (7-20-2005) v2.xls.

CASE
Current Activities Case--Residential
Current Activities Case--Commercial
Best Practices Case--Residential
Best Practices Case--Commercial

Note 2:

The Southwest Energy Efficiency Project's Report
Increasing Energy Efficiency in New Buildings in the Southwest: Energy Codes and Best Practices
includes state-by-state estimates of the potential savings from two scenarios of building code and "beyond code" efficiency improvements. For New Mexico, the results of this work are summarized in a "State Fact Sheet", available as http://www.swenergy.org/ieenb/fact_sheet_newmexico.pdf. Tables from this Fact Sheet are reproduced below.

Building Stock and Projected Growth

	Housing units 2000	Housing units 2020	Growth 2000-2020 (%)	Commercial area in 2000 (ft^2 x 10^6)	Commercial area in 2020 (ft^2 x 10^6)	Growth 2000-2020 (%))
NM	780,579	1,131,449	45	345	467	35
Region	6,597,710	9,543,226	45	3,969	7,085	79
NM as % of Region	12	12	-	9	7	-

Source: U.S. Census; Tellus Institute

Energy Savings Potential – Residential Sector

Scenario	2010			2020		
	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)
Moderate Improvement	1.2	17.9	1.1	1.6	68.9	2.5
Strong Improvement	2.6	39.0	2.5	5.5	232.0	4.7

Energy Savings Potential – Commercial Sector

Scenario	2010			2020		
	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)
Moderate Improvement	0.2	38.3	0.04	0.6	130.0	0.12
Strong Improvement	0.5	116.0	0.06	2.0	522.0	0.18

Combined Residential and Commercial Costs and Savings (millions of constant 2003 dollars)

Scenario	2010			2020		
	Costs	Savings	Net Savings	Costs	Savings	Net Savings
Moderate Improvement	15.8	22.3	6.5	14.5	35.4	21.0
Strong Improvement	35.1	49.8	14.9	44.0	120.5	76.5

Net Economic Savings during 2001-2020 (billion dollars)

	SCENARIO	
	Moderate Improvement	Strong Improvement
NM	0.15	0.50
Region	2.85	8.36
NM as % of Region	5	6

From the above, the ratios of electric to gas savings for NM, by sector and by scenario, are as follows:

	2010	2020	
Residential, Moderate Improvement	16	28	GWh/TBtu
Residential, Strong Improvement	16	52	GWh/TBtu
Commercial, Moderate Improvement	958	1,083	GWh/TBtu
Commercial, Strong Improvement	1,933	2,900	GWh/TBtu

Note 3:

Based on results from Table 5.8 of the 2002 Energy Consumptions by Manufacturers--Data Tables published by the US Department of Energy's Energy Information Administration, and available as http://www.eia.doe.gov/emeu/mecs/mecs2002/data02/pdf/table5.8_02.pdf, approximately 18% of industrial electricity use in the West region is used for HVAC, lighting, and "other facility support", with 6.7% of natural gas used for HVAC and "other facility support".

In New Mexico, as of 2004, total electricity use by sector was as follows (from Retail Sales of Electricity by State by Sector by Provider, downloaded from http://www.eia.doe.gov/cneaf/electricity/epa/epat7p2.html).

	MWh	Fraction of Total
Residential	5,634,821	28%
Commercial	8,238,750	42%
Industrial	5,972,164	30%
Total	19,845,735	100%

Thus industrial use of electricity for non-process uses in New Mexico may be roughly 7.8% of total Residential and Commercial electricity use. This figure is used as an initial rule of thumb in estimating the contribution of savings from this policy from industrial sector measures.

Note 4:

The estimate of one unit of renovated space per unit of new construction in the commercial sector is based on an estimate by a RCI TWG member, who suggested that approximately 50 percent of commercial building was new space, and 50 percent was rennovated space.
It is likely that the ratio of commercial space undergoing major renovation to new commerial space will fluctuate year by year, and it may be necessary to get a more specific figure for this parameter. It is clear, however, that the renovation market represents a substantial opportunity for improving energy efficiency through code changes. A study of the non-residential renovation market in California (Remodeling and Renovation of Nonresidential Buildings in California, by Donald R. Dohrmann, John H. Reed, Sylvia Bender, Catherine Chappell, and Pierre Landry, available as http://www.energy.ca.gov/papers/2002-08-18_aceee_presentations/PANEL-10_DOHRMANN.PDF) suggests that by 1999 the value of renovations and additions to non-residential space was similar to that in new non-residential space, based on building permit data. As a market with older buildings, it is possible that California has more renovation per unit building activity than New Mexico.

RCI-7B--Solar Hot Water and Solar-PV-ready Codes for New Buildings

Date Last Modified: *7/19/2006 D. Von Hippel*

Key Data and Assumptions	2010	2020/all	Units
First Year Results Accrue		**2008**	
Electricity	**2010**	**2020/all**	**Units**
Avoided Electricity Cost		**$50**	$/MWh
Weighted average over total 2007-2020 electricity savings for this policy in each sector. See common assumptions ("Common Factors" worksheet in this workbook).			
Avoided Natural Gas Cost		**$7**	$/MMBtu
See common assumptions ("Common Factors" worksheet in this workbook)			
Avoided LPG Cost		**$10**	$/MMBtu
See common assumptions ("Common Factors" worksheet in this workbook)			

Other Data, Assumptions, Calculations	2010	2020/all	Units
Residential Sector			
Number of Total Housing Units in New Mexico (thousand)	**940**	**1,131**	
Based on housing growth data in SWEEP study--see Note 1			
Implied New Housing Units per Year in New Mexico (thousand)	**17.3**	**20.8**	
Adjustment for Inclusion of Rennovated Residential Space as Well as New Under New Code Requirements.		**1.00**	
(Currently set at 1.0 so that no rennovated residential space is included--need to ask an NM building professional for an opinion on this value.)			
Water Heating			
Fraction of New Housing Units Using Non-Solar Water Heat In Absence of Policy			
Fraction Using Electricity	**30.0%**	**30.0%**	
Fraction Using Natural Gas	**50.0%**	**45.0%**	
Fraction Using LPG	**5.0%**	**5.0%**	
Fraction Using Solar (alone or with back-up)	**15.0%**	**20.0%**	
Placeholder Estimates Pending Receipt of State-Specific Data			
Use of Electricity and Other (non-solar) Energy Sources per (non-solar) Household in Absence of Policy			
Electricity	**5,030**	**4,790**	kWh
Natural Gas	22.80	21.71	MMBtu
LPG	22.80	21.71	MMBtu
Value for 2010 assumes 228 therms per HH using natural gas for water heat, based on value on p. 19 of The Maximum Achievable Potential for Natural Gas Energy Efficiency in the Service Territory of PNM, as prepared for PNM by GDS Associates, Inc, and dated May, 2005. Estimates for Electricity calculated based on average EF of .93 for Electricity, .7 for Natural Gas/LPG. Value in 2020 assumes 5% reduction in water heating energy use between 2010 and 2020 due to reduction in number of people per household plus naturally occuring energy efficiency improvements.			
Additional Households Using Solar HW Under Policy (thousand)	10.4	13.5	
Fraction of New Housing Units Using Solar Water Heat In Presence of Policy	**75.0%**	**85.0%**	
Placeholder Assumption--Assumes that some housing will be exempt from requirement or otherwise unable to comply. Fuels used for water heating in housing units not adopting solar water heating in presence of Policy are distributed based on the pre-Policy fractions given above.			

Fraction of household hot water needs provided by solar HW units	**80.0%**	**85.0%**	
Placeholder Assumption--Back-up fuels used for water heating in housing units with solar water heating are assumed to be distributed based on the pre-Policy fractions given above.			
Savings of Electricity and Other (non-solar) Energy Sources Due to Policy			
Electricity	43.37	221.68	GWh
Natural Gas	0.328	1.597	TBtu
LPG	0.033	0.167	TBtu
Incremental Capital Cost of Solar Water Heater (relative to electric or gas unit)	**$3,500**	**$3,000**	
Placeholder Assumption. ***Source 3*** *notes a solar hot water heater cost in New Mexico of about $4,000.*			
Implied Cumulative Additional Annualized Capital Costs for Residential Solar Hot Waters Installed as a Result of Policy (thousand 2005 dollars)	**$ 7,264**	**$ 33,567**	
Solar PV Systems			
Fraction of Households Adopting Solar PV Systems in Absence of Policy	**2%**	**5%**	
Placeholder Assumption			
Fraction of Households Adopting Solar PV Systems in Presence of Policy	**10%**	**30%**	
Placeholder Assumption			
Fraction of New Housing Units Built as Solar PV Ready as a Result of Policy	**75.0%**	**85.0%**	
Placeholder Assumption--Assumes that some housing will be exempt from requirement or otherwise unable to comply. Excludes homes that would have been built with Solar PV (or solar PV-ready) even in the absence of policy.			
Additional New or Rennovated Housing Units Built as Solar PV Ready as a Result of Policy (thousands)	13.0	17.7	
Inputs to Cost Estimates for Residential Solar PV Systems (Data from Source in Note 2)			
Average Capacity of Solar PV System Installed on New Homes (kW)	**2.00**	**2.00**	
Assumption, consistent with capacity assumption used in Source in ***Note 2*** *.*			
Implied Cumulative Residential Solar PV Power Installed as a Result of Policy	**5.46**	**72.96**	MW
Capital Costs for PV Systems for New Homes			
Module	**$ 3,345**	**$ 2,003**	
BOS (Balance of System)	**$ 1,235**	**$ 739**	
Installation	**$ 409**	**$ 143**	
Total System - $/kW	**$ 4,989**	**$ 2,885**	
Total System - $	**$ 9,978**	**$ 5,769**	
Additional Cost Per Household for Solar-Ready Wiring/Meters/Roof Structures, Assuming 50% of BOS and Installation Costs	**$ 822**	**$ 441**	
Average full-capacity-equivalent hours of operation for Solar PV Systems:	**1,643**	**1,643**	
Based on data for New Mexico from New Mexico Solar Energy Association--See ***Note 3*** *.*			
Factors for Annualizing Capital Costs (Residential PV and Solar Hot Water Systems)			
Interest Rate (real)		7%	/yr
Economic Life of System		20	years
Implied Annualization Factor		9.44%	%/yr
Marginal Federal Tax Rate, Residential		28%	
Federal Solar Tax Credits: Residential Sector--See ***Note 4***	0%	0%	
Reduce Captial Costs for Solar Tax Credits and Federal Mortgage Deductions?		**YES**	
Used for both Residential and Commercial Sectors			
Solar PV Operating and Maintenance (O&M) Costs ($/MWh)	$ 5.88	$ 5.88	
Rough assumption--See ***Note 5*** *.*			
Implied Cumulative Additional Annualized Capital Costs to Make New (or Rennovated) Homes Solar PV-Ready as a Result of Policy (thousand 2005 dollars)	**$ 4,556**	**$ 16,772**	
Implied Cumulative Additional Annualized Capital and O&M Costs for Solar PV Installed on New (or Rennovated) Homes as a Result of Policy (thousand 2005 dollars)	**$ 1,657**	**$ 15,994**	

Commercial Sector

Total Commercial Floorspace in New Mexico (million square feet) *Based on commercial space growth data in SWEEP study--see Note 1*	401	467	
Implied Net Commercial Floorspace Added per Year (million square feet)	6.0	7.0	
Estimated Average Floorspace per Commercial Building (square feet) *Estimate,for the Mountain Region, see **Note 7***		13,313	
Adjustment for Inclusion of Rennovated Commercial Space as Well as New Under New Code Requirements. *Currently set at 2.0 so that about 1 unit of renovated space is included per unit of new space (initial assumption--see **Note 6**). It may be useful to get further information regarding this value.*		2.00	

Water Heating

Estimate of total Commercial Delivered Energy Intensity (kBtu/square ft.-yr) *National average estimate, all fuels, all end-uses, see **Note 7***	118	119	
Estimated Fraction of Delivered Energy Used for Water Heating *National average estimate, see **Note 7***		9.6%	
Estimated Average Required kBtu/yr Delivered Water Heating Energy Per Commercial Building	150,302	151,580	
Approximate Water Heating Capacity Required Relative to Residential Unit	9	9	

Fraction of New and Renovated Commercial Space Using Non-Solar Water Heat In Absence of Policy

Fraction Using Electricity	30.0%	30.0%	
Fraction Using Natural Gas	50.0%	45.0%	
Fraction Using LPG	5.0%	5.0%	
Fraction Using Solar (alone or with back-up) *Placeholder Estimates Pending Receipt of State-Specific Data*	15.0%	20.0%	

Use of Electricity and Other (non-solar) Energy Sources per (non-solar) Building in Absence of Policy

Electricity	44,051	44,426	kWh
Natural Gas	199.69	201.38	MMBtu
LPG	199.69	201.38	MMBtu

Values are Placeholder Estimates at Present. Estimates for Natural Gas and LPG calculated based on average EF of .93 for Electricity, .7 for Natural Gas/LPG

Annual New and Renovated Buildings Using Solar HW Under Policy (thousand)	0.54	0.69	
Fraction of New/Renovated Buildings Using Solar Water Heat under Policy *Placeholder Assumption--Assumes that some buildings will be exempt from requirement or otherwise unable to comply. Fuels used for water heating in housing units not adopting solar water heating in presence of Policy are distributed based on the pre-Policy fractions given above.*	75.0%	85.0%	
Fraction of commercial hot water needs provided by solar HW units *Placeholder Assumption--Back-up fuels used for water heating in buildings with solar water heating are assumed to be distributed based on the pre-Policy fractions given above.*	80.0%	85.0%	

Savings of Electricity and Other (non-solar) Energy Sources Due to Policy

Electricity	11.89	64.07	GWh
Natural Gas	0.090	0.461	TBtu
LPG	0.009	0.048	TBtu

Capital Cost per Unit Capacity of Residential Versus Commercial Solar HW Heaters *Placeholder Assumption. Assumes economies of scale for materials and installation for commercial units relative to (significantly smaller, on average) residential units.*		70%	
Incremental Capital Cost of Commercial Solar Water Heater (relative to electric or gas unit--average per building)	$ 21,458	$ 19,476	
Implied Cumulative Additional Annualized Capital Costs for Commercial Solar Hot Waters Installed as a Result of Policy (thousand 2005 dollars)	$ 3,134	$ 14,683	

Solar PV Systems

Fraction of New or Renovated Commercial Buildings Adopting Solar PV Systems in Absence of Policy *Placeholder Assumption*	**2%**	**5%**
Fraction of New or Renovated Commercial Buildings Adopting Solar PV Systems in Presence of Policy *Placeholder Assumption*	**10%**	**30%**
Fraction of New or Renovated Commercial Buildings Built as Solar PV Ready as a Result of Policy *Placeholder Assumption--Assumes that some buildings will be exempt from requirement or otherwise unable to comply. Excludes buildings that would have been built with Solar PV (or solar PV-ready) even in the absence of policy.*	**75.0%**	**85.0%**
Additional New or Renovated Commercial Buildings Built as Solar PV Ready as a Result of Policy (thousands)	0.680	0.896
Average Capacity of Solar PV System Installed on Commercial Buildings (all) kW *Assumption, roughly consistent, per square foot of floor area, with capacity assumptions for new and existing residential buildings used in Source in* ***Note 2*** *.*	**15.00**	**15.00**
Implied Cumulative Commercial Solar PV Power Installed as a Result of Policy MW	**2.15**	**28.12**
Commercial System Capital costs/kW Relative to New Residential *Rough assumption, but similar to values in literature--See* ***Note 8*** *.*	80%	80%
Federal Solar Tax Credits: Commercial Sector--See ***Note 4***	10%	10%

Factors for Annualizing Capital Costs (Commercial PV Systems)	
Interest Rate (real)	8% /yr
Economic Life of System	20 years
Implied Annualization Factor	10.19% %/yr

Implied Cumulative Additional Annualized Capital Costs to Make New (or Renovated) Commercial Buildings Solar PV-Ready as a Result of Policy (thousand 2005 dollars)	**$ 1,940**	**$ 7,031**
Implied Cumulative Additional Annualized Capital and O&M Costs for Solar PV Installed on New (or Rennovated) Commercial Buildings as a Result of Policy (thousand 2005 dollars)	**$ 703**	**$ 6,641**

Adjustment for Inclusion of New Industrial Space in Estimated Savings due to New Code Requirements (applied to total residential plus commercial savings) (See ***Note 9***)	**1.08**

Results	2012	2020	Units
Electricity			
Savings due to Implementation of RCI-7B Policies			
Reduction in Electricity Sales: Residential	96	342	GWh (sales)
Reduction in Electricity Sales: Commercial	29	110	GWh (sales)
Reduction in Electricity Sales: Industrial	10	35	GWh (sales)
TOTAL Reduction in Electricity Sales	134	487	GWh (sales)
Reduction in Generation Requirements	149	539	GWh (generation)
GHG Emission Savings	**0.13**	**0.40**	$MMtCO_2e$
Economic Analysis (for Electricity Savings due to Policy)			
Net Present Value (2007-2020)		**$174.4**	$million
Cumulative Emissions Reductions (2007-2020)		2.6	$MMtCO_2e$
Cost-Effectiveness		**$67.09**	$/tCO_2e$
Natural Gas			
Savings due to Implementation of RCI-7B Policies			
Reduction in Gas Use	713	2,058	Billion BTU
GHG Emission Savings	0.04	0.11	$MMtCO_2e$
Economic Analysis (for Electricity Savings due to Policy)			
Net Present Value (2007-2020)		**$57.7**	$million
Cumulative Emissions Reductions (2007-2020)		0.7	$MMtCO_2e$
Cost-Effectiveness		**$79.44**	$/tCO_2e$
LPG			
Savings due to Implementation of RCI-7B Policies			
Reduction in Gas Use	72	216	Billion BTU
GHG Emission Savings	0.00	0.01	$MMtCO_2e$
Economic Analysis (for Electricity Savings due to Policy)			
Net Present Value (2007-2020)		**$3.7**	$million
Cumulative Emissions Reductions (2007-2020)		0.1	$MMtCO_2e$
Cost-Effectiveness		**$42.17**	$/tCO_2e$

Summary Results for RCI-7B	2012	2020	Units
Total for Policy (Natural gas, LPG, and electricity)			
GHG Emission Savings	**0.17**	**0.53**	$MMtCO_2e$
Net Present Value (2006-2020)		**$236**	$million
Cumulative Emissions Reductions (2006-2020)		3.4	$MMtCO_2e$
Cost-Effectiveness		**$69.07**	$/tCO_2e$

NOTES AND DATA FROM SOURCES

Note 1:

The Southwest Energy Efficiency Project's Report
Increasing Energy Efficiency in New Buildings in the Southwest: Energy Codes and Best Practices
includes state-by-state estimates of the potential savings from two scenarios of building code and "beyond code" efficiency improvements. For New Mexico, the results of this work are summarized in a "State Fact Sheet", available as http://www.swenergy.org/ieenb/fact_sheet_newmexico.pdf. A tables from this Fact Sheet are reproduced below.

Building Stock and Projected Growth

	Housing units 2000	Housing units 2020	Growth 2000-2020 (%)	Commercial area in 2000 ($ft^2 \times 10^5$)	Commercial area in 2020 ($ft^2 \times 10^5$)	Growth 2000-2020 (%))
NM	780,579	1,131,449	45	345	467	35
Region	6,597,710	9,543,226	45	3,969	7,085	79
NM as % of Region	12	12	-	9	7	-

Source: U.S. Census; Tellus Institute

Note 2:

Source: Worksheet "Solar Homes Summary table.xls", with calculations in support of the California Million Solar Homes Initiative, authored by XENERGY, Inc., and provided by M. Lazarus. Selected annual data provided.

Note 3:

Based on midpoint of "4 to 5 kilowatt-hours (kWh) of usable electrical energy per day in New Mexico on average". From http://www.nmsea.org/Downloads/System_Sizing_Cost.pdf, "Buying Solar Energy Systems", New Mexico Solar Energy Association.

Note 4:

A description of the new Federal Solar Tax Credits for businesses and residences as contained in the Energy Policy Act of 2005 (EPAct 2005) (see, for example, http://www.seia.org/getpdf.php?iid=21) provides for 30% (of system cost) tax credits for solar PV investments by businesses in 2006 and 2007, reverting to 10% thereafter. For residences, the credit in 2006 and 2007 is 30% with a "cap" of $2000, reverting to zero after 2007. For the purpose of this analysis, we are modeling the federal tax credit at its long-term (10% business, 0% residential) level, as no systems are added in 2006 and 2007.
See also, for Example, http://www.sdenergy.org/uploads/PV-Federal%20Tax%20Credits%20Summary%206-01-04%20FINAL.pdf.

Note 5:

An older (1997) US DOE document OVERVIEW OF PHOTOVOLTAIC TECHNOLOGIES (available as http://www.eere.energy.gov/ba/pdfs/pv_overview.pdf) suggests that even early solar PV systems had O&M costs of under $ 0.005 per kWh, which in 2005 dollars would be: $ 0.0059 per kWh.

Note 6:

The estimate of one unit of renovated space per unit of new construction in the commercial sector is based on an estimate by a RCI TWG member, who suggested that approximately 50 percent of commercial building was new space, and 50 percent was rennovated space.

It is likely that the ratio of commercial space undergoing major renovation to new commerial space will fluctuate year by year, and it may be necessary to get a more specific figure for this parameter. It is clear, however, that the renovation market represents a substantial opportunity for improving energy efficiency through code changes. A study of the non-residential renovation market in California (Remodeling and Renovation of Nonresidential Buildings in California, by Donald R. Dohrmann, John H. Reed, Sylvia Bender, Catherine Chappell, and Pierre Landry, available as http://www.energy.ca.gov/papers/2002-08-18_aceee_presentations/PANEL-10_DOHRMANN.PDF) suggests that by 1999 the value of renovations and additions to non-residential space was similar to that in new non-residential space, based on building permit data. As a market with older buildings, it is possible that California has more renovation per unit building activity than New Mexico.

Note 7:

Based on data in the 2003 Commercial Buildings Energy Consumption Survey Detailed Tables published by the US Department of Energy's Energy Information Administration, and available as http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/pdf2003/allbc.pdf, the average floorspace per building for all commercial buildings in the Mountain West (including malls) was 13,313 square feet (calculated from data in Tables A5 and A6).

The USDOE Office of Energy Efficiency and Renewable Energy's 2005 Building Energy Databook provides the following data, which were used to prepare a rough estimate of water heating requirements for commercial buildings in New Mexico. The table below is found on page 1-10 of the source document, which is available at http://buildingsdatabook.eren.doe.gov/docs/2005bedb-0805.pdf

1.3.3 2003 Commercial Energy End-Use Splits, by Fuel Type (quads)

	Natural Gas	Fuel Oil (1)	LPG	Other Fuel(2)	Renw. En.(3)	*Site* Electric	*Site* Total	*Site* Percent	Primary Electric (4)	Primary Total	Primary Percent
Lighting						1.34	1.34	16.1%	4.31	4.31	24.7%
Space Heating	1.36	0.30		0.12		0.21	1.98	23.9%	0.67	2.45	14.0%
Space Cooling	0.01					0.59	0.60	7.2%	1.89	1.90	10.9%
Water Heating	0.57	0.07			0.02	0.14	0.80	9.6%	0.45	1.11	6.3%
Refrigeration						0.34	0.34	4.1%	1.09	1.09	6.2%
Ventilation						0.31	0.31	3.8%	1.01	1.01	5.8%
Electronics						0.31	0.31	3.7%	1.00	1.00	5.7%
Computers						0.14	0.14	1.6%	0.44	0.44	2.5%
Cooking	0.26					0.03	0.29	3.5%	0.10	0.36	2.1%
Other (5)	0.30	0.03	0.10	0.04	0.09	0.32	0.86	10.4%	1.02	1.56	8.9%
Adjust to SEDS (6)	0.72	0.20				0.41	1.33	16.0%	1.32	2.25	12.8%
Total	3.22	0.59	0.10	0.16	0.11	4.13	8.31	100%	13.30	17.49	100%

Note(s): 1) Includes (0.52 quad) distillate fuel oil and (0.07 quad) residual fuel oil. 2) Kerosene (0.02 quad) and coal (0.10 quad) are assumed attributable to space heating. Motor gasoline (0.04 quad) assumed attributable to other end-uses. 3) Comprised of (0.10 quad) biomass, (0.02 quad) solar water heating, and (less than 0.01 quad) solar pv. 4)*Site* -to-source electricity conversion (due to generation and transmission losses) = 3.22. 5) Includes service station equipment, automated teller machines, telecommunications equipment, medical equipment, pumps, emergency electric generators, combined heat and power in commercial buildings, and manufacturing performed in commercial buildings. 6) Energy adjustment EIA uses to relieve discrepancies between data sources. Energy attributable to the commercial buildings sector, but not directly to specific end-uses.

Source(s): EIA, AEO 2005, Feb. 2005, Tables A2, p. 140-142, Table A5, p. 147-148, and Table A17, p. 163 for 2002; EIA, AEO 1999, Dec. 1998, Table A5, p. 120 for 1996 refrigeration; EIA, National Energy Modeling System for AEO 2005, Feb. 2005; BTS/A.D. Little, Energy Consumption Characteristics of Commercial Building HVAC Systems, Volume II: Thermal Distribution, Auxiliary Equipment, and Ventilation, Oct. 1999, p. 1-2 and 5-25 - 5-26; EIA, AEO 1998, Dec. 1997, Table A5, p. 108-109 for 1995 ventilation; BTP/Navigant Consulting, U.S. Lighting Market Characterization, Volume I, 1. Sept. 2002, Table 8-2, p. 63; and OBT/A.D. Little, Energy Savings Potential for Commercial Refrigeration Equipment, June 1995, Figure 1-1, p. 1-1.

1.3.4 Commercial *Delivered* and Primary Energy Consumption Intensities, by Year

		Floorspace (10^9 SF)	Percent Post-2000 Floorspace (1)	*Delivered* Energy Consumption Total (quads)	*Delivered* Energy Consumption Consumption per SF (10^3 Btu/SF)	Primary Energy Consumption Total (quads)	Primary Energy Consumption Consumption per SF (10^3 Btu/SF)
1980		50.9	N.A.	6.0	117.8	10.6	208.2
1990		64.3	N.A.	6.7	104.3	13.3	207.1
2000	(2)	68.5	N.A.	8.2	119.1	17.1	250.2
2003	**(2)**	**72.1**	**10%**	**8.3**	**115.2**	**17.5**	**242.4**
2005	(2)	74.7	16%	8.4	112.8	17.9	239.9
2010	(2)	81.2	28%	9.6	117.6	20.3	250.1
2020	(2)	96.2	50%	11.4	118.6	24.3	252.4
2025	(2)	104.8	59%	12.5	119.6	26.8	255.6

Note(s): 1) Percent built after Dec. 31, 2000. 2) Excludes parking garages and commercial buildings on multi-building manufacturing facilities.

Source(s): EIA, State Energy Data 2001, December 2004, Table 9, p. 19 for 1980-2000 energy consumption; DOE for 1980 floorspace; EIA, AEO 1994, Jan. 1994, Table A5, p. 62 for 1990 floorspace; EIA, AEO 2003, Jan. 2003, Table A5, p. 127 for 2000 floorspace; and EIA, AEO 2005, Feb. 2005, Table A2, p. 140-142, Table A5, p. 147-148, and Table A17, p.163 for 2003-2025.

Note 8:

Source: International Energy Agency (IEA), TRENDS IN PHOTOVOLTAIC APPLICATIONS Survey report of selected IEA countries between 1992 and 2004. Report #IEA-PVPS T1-14:2005. Page 18.

"Indicative costs" in 2004 in USD per kWp (assumedly DC output) for on-grid PV systems in the US:

<10 kW	7000 to 10,000
>10 kW	6300 to 8500

In EIA Projections of Renewable Energy Costs, presented in "Forum on the Economic Impact Analysis of NJ's Proposed 20% RPS" by Chris Namovicz of the USDOE EIA (Energy Information Administration), dated February 22, 2005, and available as http://www.eia.doe.gov/oiaf/pdf/rec.pdf, a wind power average cost of

6000 dollars/kW is provided for a 25 kW Commercial system, or

8200 dollars/kW for a 2 kW Residential system, with

"Large potential for cost reduction".

Note 9:

Based on results from Table 5.8 of the 2002 Energy Consumptions by Manufacturers--Data Tables published by the US Department of Energy's Energy Information Administration, and available as http://www.eia.doe.gov/emeu/mecs/mecs2002/data02/pdf/table5.8_02.pdf, approximately 18% of industrial electricity use in the West region is used for HVAC, lighting, and "other facility support", with 6.7% of natural gas used for HVAC and "other facility support".

In New Mexico, as of 2004, total electricity use by sector was as follows (from Retail Sales of Electricity by State by Sector by Provider, downloaded from http://www.eia.doe.gov/cneaf/electricity/epa/epat7p2.html).

	MWh	Fraction of Total
Residential	5,634,821	28%
Commercial	8,238,750	42%
Industrial	5,972,164	30%
Total	19,845,735	100%

Thus industrial use of electricity for non-process uses in New Mexico may be roughly 7.8% of total Residential and Commercial electricity use. This figure is used as an initial rule of thumb in estimating the contribution of savings from this policy from industrial sector measures.

RCI-8A: Building Energy Performance Requirements for State-funded and Other Government Buildings ("Reach Codes")

Date Last Modified: *7/27/2006 D. Von Hippel*

Key Data and Assumptions	2010	2020/all	Units
First Year Results Accrue		2008	
Electricity	2010	2020/all	Units
Levelized Cost of Electricity Savings		$47	$/MWh
Based on estimate in WGA CDEAC EE Report. (See Note 1, below.) Although this estimate is based on building efficiency improvements driven by code changes, it is on the order of estimates for the costs of efficiency improvements for "beyond code" changes included in a recent report by the Southwest Energy Efficiency Project (SWEEP--see Note 2)			
Levelized Cost of Natural Gas Savings		$2.1	$/MMBtu
Based on an average for Gas DSM programs as used in evaluation of RCI-2, and derived from data in Tegen, S. and Geller, H., 2006. Natural Gas Demand-Side Management Programs: A National Survey, Southwest Energy Efficiency Project, www.swenergy.org.			
Avoided Electricity Cost		$52	$/MWh
Weighted average over total 2006-2010 electricity savings for this policy in each sector.			
Avoided Natural Gas Cost		$7	$/MMBtu

Other Data, Assumptions, Calculations	2010	2020/all	Units
Inputs to/Intermediate Results of Calculation of Electricity and Gas Savings			
Average Electricity and Gas Savings Beyond Code Levels (all buildings)	47%	67%	
The description for this policy currently includes a requirement of using "at least an 50% reduction in energy use on a weather-normalized per square-foot basis relative to average buildings of the same type in the US, as determined by modeling . Additionally, requirements for the minimum delivered fossil fuel energy consumption performance standard shall be increased to 60% in 2010; 70% in 2015; 80% in 2020; 90% in 2025 and to 'carbon neutral' in 2030". Carbon neutral in this context means that "any energy needs in a building, net of efficiency gains through building design to reduce energy use and of on-site renewable energy use, should be supplied by renewable energy sources ('green power')". The description also notes "Further, by 2030, to achieve the goal of being carbon neutral, no more than 25% of the building's energy needs...may be met through the use of off-site green power, thus emphasizing energy efficiency improvements and use of on-site renewable energy." The values shown above for these parameters are calculated based on the following data/assumptions.			
Total Commercial Floorspace in New Mexico (million square feet)	401	467	
Based on commercial space growth data in SWEEP study--see Note 2			
Est. area of new commercial space per year based on (million square feet)	6.0	7.0	
Based on commercial space growth data in SWEEP study--see Note 2			
Implied Average Electricity Consumption per Square Foot Commercial Space in New Mexico as of 2004 (see ***Note 4***)		22.48	kWh/yr
Implied Average Natural Gas Consumption per Square Foot Commercial Space in New Mexico as of 2005 (see ***Note 4***)		66.55	kBtu/yr
Electricity Use per New/Renovated Commercial Sq. Ft. After 7A-RCI Application	19.6	19.5	kWh/yr
Based on interpretation of commercial code improvements included in the WGA study for both scenario 2 (current activities case) and scenario 3 (best practices case)--see Note 2, below. Factors included in the annual estimates are derived from those used in the BCAP workbooks described in Note 2, and imply a net of about 7.2 percent improvement, relative to average buildings in the building stock as of 2005, for "current activities" in code improvement, starting in 2005, a further improvement of about 5.4 percent starting in 2008 from application of "best practices" codes, with modest further improvements in 2011 and 2015. The calculation of this factor is the first step in estimating the net improvement in energy use needed to achieve the 8A-RCI goals.			
Nat. Gas Use per New/Renovated Commercial Sq. Ft. After 7A-RCI Application	58.0	57.8	kBtu/yr
Assumes the same pattern of code improvement as for electricity use, as described above.			
Implied Electricity Use per New/Renovated Commercial Square Foot After 7A-RCI Application, Relative to Average in New Mexico as of 2004	87%	87%	
Implied Natural Gas Use per New/Renovated Commercial Square Foot After 7A-RCI Application, Relative to Average in New Mexico as of 2005	87%	87%	
Required Net Elect/Gas Use per Square Foot Commercial Space After 8A-RCI Policy Relative to Average in New Mexico in 2004/2005	40%	20%	
Based on pattern of improvement specified in RCI-8A Policy Description			

Average Fraction of Improvement in Electric Energy Intensities from:		
Energy Efficiency Improvement	59%	53%
Solar Thermal Energy (hot water/space heat/space cooling)	5%	5%
On-site Solar PV	5%	15%
On-site Biomass/Biogas/Landfill Gas Energy Use	1%	2%
Green Power Purchase (from off-site, beyond electricity supply RPS)	30%	25%

All "placeholder" assumptions, except on-site biomass/biogas/landfill gas energy use calculated so that values sum to 100%.

Average Fraction of Improvement in Gas Energy Intensities from:		
Energy Efficiency Improvement	80%	70%
Solar Thermal Energy (hot water/space heat/space cooling)	15%	20%
On-site Solar PV	0%	0%
On-site Biomass/Biogas/Landfill Gas Energy Use	5%	10%
Green Power Purchase (from off-site, beyond electricity supply RPS)	0%	0%

All "placeholder" assumptions, except on-site biomass/biogas/landfill gas energy use calculated so that values sum to 100%.

Adjustment for Inclusion of Rennovated Commercial Space as Well as New Under New Code Requirements. **2.00**

*Currently set at 2.0 so that about 1 unit of renovated space is included per unit of new space (initial assumption--see **Note 5**). It may be useful to get further information regarding this value.*

Adjustment of Energy Use per Unit Floor Area for State/State-funded Buildings Relative to Average Commercial Building in New Mexico	1.00	1.00

Placeholder assumption.

Adjustment to Exclude Floor Area of New/Renovated State/State-funded Buildings of Less than "5000 square feet and/or less than 50 kW electrical demand"	0.90	0.90

Placeholder assumption.

Fraction of New/Renovated Commercial Space in Government Buildings 25.3%

*Estimated based on regional survey data. Includes all government buildings, of which local buildings are about two-thirds. See **Note 3**. It may be useful to get further, NM-specific information regarding this value.*

Fraction of New/Renovated Government Buildings Space (of over 5000 square feet) covered by Policy	50%	90%

Placeholder assumption.

Implied Annual Square Feet Building Space Covered by Policy (million)	**1.37**	**2.87**	
Implied Cumulative Impacts of Policy (Electricity savings)			
Energy Efficiency Improvement	**13.89**	**151.95**	GWh
Solar Thermal Energy (hot water/space heat/space cooling)	**1.18**	**13.68**	GWh
On-site Solar PV	**1.18**	**29.54**	GWh
On-site Biomass/Biogas/Landfill Gas Energy Use	**0.24**	**4.32**	GWh
Green Power Purchase (from off-site, beyond electricity supply RPS)	**7.07**	**74.17**	GWh
Implied Cumulative Impacts of Policy (Natural Gas savings)			
Energy Efficiency Improvement	**55.78**	**601.28**	GBtu/yr
Solar Thermal Energy (hot water/space heat/space cooling)	**10.46**	**145.01**	GBtu/yr
On-site Solar PV	**-**	**-**	GBtu/yr
On-site Biomass/Biogas/Landfill Gas Energy Use	**3.49**	**63.98**	GBtu/yr
Green Power Purchase (from off-site, beyond electricity supply RPS)	**-**	**-**	GBtu/yr

Additional Inputs to/Intermediate Results of Costs

Estimated annual levelized cost of solar hot water per unit output	**20.77**	**18.70**	$/MMBtu
Based on inputs to/results of solar hot water heating analysis included in RCI-7B.			
Adjustment to solar thermal costs for inclusion of space heat/cooling measures	1.00	1.00	
Placeholder assumption--Value of 1.0 implies that solar space heat and cooling will cost the same per unit output as solar water heating.			
Implied Per Unit Cost Electricity Avoided by Solar WH/SH/Cooling	**65.91**	**59.32**	$/MWh
Implied Per Unit Cost Natural Gas Avoided by Solar WH/SH/Cooling	**14.54**	**13.09**	$/MMBtu
Assumes delivered solar WH/SH/Cooling replaces electric with EF of 0.93, gas with EF of 0.70 (and therefore one MMBtu of delivered solar heat is the equivalent of more than one MMBtu of each fuel).			
Estimated annual levelized cost of on-site Solar PV	**223**	**129**	$/MWh
Based on inputs to/results of solar PV analysis included in 7B-RCI.			
Fuel Cost for On-site Biomass/Biogas/Landfill Gas Energy Use		2.55	$/MMBtu
Based on costs for Biomass fuel, which will likely dominate this category of fuel inputs. See "Common Assumptions" worksheet in this workbook. If significantly processed biomass fuels (such as pelletized fuels) are required, this cost may need to be increased.			
Relative Efficiency of On-site Biomass/Biogas/Landfill Gas displacing electricity		0.75	
Placeholder assumption.			
Factor to reflect probable higher costs of on-site Biomass/Biogas/Landfill Gas Equipment Relative to Electric Equipment		2.00	
Placeholder assumption--In most cases, heating/water heating equipment designed to use biomass-derived fuels will be more expensive than equipment designed to use electricity. This factor loads these incremental capital costs into estimated fuel costs.			
Implied Per Unit Cost Electricity Avoided by Biomass/Biogas/Landfill Gas	**23.14**	**23.14**	$/MWh
Incremental Cost for Green Power Purchase (from off-site, beyond supply RPS)	9.00	9.00	$/MWh
Placeholder assumption, but as assumed in RCI-5, based roughly on Pacificorp BlueSky			

Results	2012	2020	Units
Electricity (Conventional)			
Reduction in Electricity Sales: Residential (not yet included here)	0	0	GWh (sales)
Reduction in Electricity Sales: Commercial	55	274	GWh (sales)
TOTAL Reduction in Electricity Sales	55	274	GWh (sales)
Reduction in Generation Requirements	60	303	GWh (generation)
GHG Emission Savings	**0.05**	**0.23**	$MMtCO_2e$
Economic Analysis			
Net Present Value (2007-2020)		**$16**	$million
Cumulative Emissions Reductions (2007-2020)		1.3	$MMtCO_2e$
Cost-Effectiveness		**$12.41**	$/tCO_2e$
Natural Gas			
Reduction in Gas Use	161	810	Billion BTU
GHG Emission Savings	**0.01**	**0.04**	$MMtCO_2e$
Economic Analysis			
Net Present Value (2007-2020)		**-$7**	$million
Cumulative Emissions Reductions (2007-2020)		0.2	$MMtCO_2e$
Cost-Effectiveness		**-$32.82**	$/tCO_2e$
Biomass/Biogas/Landfill Gas Fuel Use			
Added GHG Emissions from Biomass Fuels Use	**0.00**	**0.00**	$MMtCO_2e$
Cumulative added Emissions from Biomass Fuels (2007-2020)		0.003	$MMtCO_2e$

Summary Results for 8A-RCI	2012	2020	Units
Total for Policy (Natural gas and electricity less biomass)			
GHG Emission Savings	**0.06**	**0.27**	$MMtCO_2e$
Net Present Value (2006-2020)		**$8**	$million
Cumulative Emissions Reductions (2006-2020)		1.5	$MMtCO_2e$
Cost-Effectiveness		**$5.60**	$/tCO_2e$

NOTES AND DATA FROM SOURCES

Note 1:

From The Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors Association.
The Potential for More Efficient Electricity Use in the Western United States, January, 2006. This report is referred to here as the "WGA CDEAC EE report" and can be found at: http://www.westgov.org/wga/initiatives/cdeac/Energy%20Efficiency-full.pdf.

In the WGA CDEAC EE report, Building Code improvements were effectively modeled in two steps. The first, assumed to be effectively a baseline action, in the context of this (AZ CCAG) study, but called the "Current Activities" case, brought codes up to recent IIEC levels as follows:

> "In particular, we assume adoption of a recent version of the IECC leads to 5% electricity savings on average in states in colder or moderate climates, and 13% savings in homes in very hot climates (AZ, TX, and NV). Regarding commercial buildings, we assume adoption of the code leads to 10% electricity savings in moderate and colder states, and 15% savings in very hot states (Kinney, Geller, and Ruzzin 2003). For California, we used estimates of the electricity savings from building code upgrades adopted in 2001 and 2005 (Mahone, et al. 2005). These savings levels are prior to the adjustment for savings realization mentioned in Table V.1" [Quote from footnote, page 40]

The second increase, to the CDEAC "Best Practices" Scenario, included the following improvements:

> "This [Best Practices] scenario assumes that the International Energy Conservation Code, 2004 version, is adopted in 2007 in all states except California, as California has its own more stringent standard. It is assumed that state and/or local building energy codes are upgraded in 2011 (3% improvement) and in 2015 (additional 6% improvement). This scenario also assumes that compliance and enforcement are improved and that a 90% savings realization rate is achieved. Finally, we assume that California's current building energy codes will be upgraded in 2009 (3%), 2013 (6%) and 2017 (3%)." [Quote from page 41]

The CDEAC report provides a cost of saved energy (electricity) of 4.74 cents/kWh, in 2005 dollars, based on an average 7-year payback for code improvements (page 42).

A set of background spreadsheets prepared by the Building Code Assistance Project (BCAP) for the WGA, includes estimates of the benefits of code improvements as calculated for the CDEAC report by State and by sector (Residential and Commercial). Electricity savings by year (apparently for the year implemented only, not cummulative) and by scenario modeled are shown at right:
From workbooks: BCAP code savings estimator - WGA Scenario 2 (9-02-2005).xls and BCAP code savings estimator - WGA Scenario 3 (7-20-2005) v2.xls.

CASE
Current Activities Case--Residential
Current Activities Case--Commercial
Best Practices Case--Residential
Best Practices Case--Commercial

Note 2:

The Southwest Energy Efficiency Project's Report

Increasing Energy Efficiency in New Buildings in the Southwest: Energy Codes and Best Practices

includes state-by-state estimates of the potential savings from two scenarios of building code and "beyond code" efficiency improvements. For New Mexico, the results of this work are summarized in a "State Fact Sheet", available as http://www.swenergy.org/ieenb/fact_sheet_newmexico.pdf. A tables from this Fact Sheet are reproduced below.

Building Stock and Projected Growth

	Housing units 2000	Housing units 2020	Growth 2000-2020 (%)	Commercial area in 2000 ($ft^2 \times 10^6$)	Commercial area in 2020 ($ft^2 \times 10^6$)	Growth 2000-2020 (%))
NM	780,579	1,131,449	45	345	467	35
Region	6,597,710	9,543,226	45	3,969	7,085	79
NM as % of Region	12	12	-	9	7	-

Source: U.S. Census; Tellus Institute

Energy Savings Potential – Residential Sector

	2010			2020		
Scenario	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)
Moderate Improvement	1.2	17.9	1.1	1.6	68.9	2.5
Strong Improvement	2.6	39.0	2.5	5.5	232.0	4.7

Energy Savings Potential – Commercial Sector

	2010			2020		
Scenario	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)	Total Savings (TBtu)	Total Elec Savings (GWh)	Total Gas Savings (TBtu)
Moderate Improvement	0.2	38.3	0.04	0.6	130.0	0.12
Strong Improvement	0.5	116.0	0.06	2.0	522.0	0.18

Combined Residential and Commercial Costs and Savings (millions of constant 2003 dollars)

	2010			2020		
Scenario	Costs	Savings	Net Savings	Costs	Savings	Net Savings
Moderate Improvement	15.8	22.3	6.5	14.5	35.4	21.0
Strong Improvement	35.1	49.8	14.9	44.0	120.5	76.5

Net Economic Savings during 2001-2020 (billion dollars)

	SCENARIO	
	Moderate Improvement	Strong Improvement
NM	0.15	0.50
Region	2.85	8.36
NM as % of Region	5	6

From the above, the ratios of electric to gas savings for NM, by sector and by scenario, are as follows:

	2010	2020	
Residential, Moderate Improvement	16	28	GWh/TBtu
Residential, Strong Improvement	16	52	GWh/TBtu
Commercial, Moderate Improvement	958	1,083	GWh/TBtu
Commercial, Strong Improvement	1,933	2,900	GWh/TBtu

The cost and energy savings figures shown above suggest the following for the "Strong Improvement" scenario:

	2010	2020	
Costs (million)	35.1	44	Constant 2003 dollars
TBtu Saved	3.1	7.5	Electric plus Gas
Implied $/MMBtu	11.32	5.87	
Implied $/MWh	38.63	20.02	

Note 3:

Based on data in the 2003 Commercial Buildings Energy Consumption Survey Detailed Tables published by the US Department of Energy's Energy Information Administration, and available as http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/pdf2003/allbc.pdf, government-owned buildings in the Mountain West accounted for about 25.3% of total building floorspace as of 2003. Total floorspace here includes malls, but government-owned floorspace is not reported, so if government agencies do own space in malls, this figure could be higher. Also, the figure does not appear to count government-leased facilities. Approximately 64% of total government-owned building floorspace in the Mountain West was owned by local governments. Data to calculate fractions above are taken from pages 5 and 44 of the source document. The initial assumption for the fraction of new commecial floorspace covered by a government "reach code" policy is that the equivalent of all new (non-mall) government buildings are covered by 2020, phasing in from half of the potential "market" in 2010.

Note 4:

Based on results from Table 5.8 of the 2002 Energy Consumptions by Manufacturers--Data Tables published by the US Department of Energy's Energy Information Administration, and available as http://www.eia.doe.gov/emeu/mecs/mecs2002/data02/pdf/table5.8_02.pdf, approximately 18% of industrial electricity use is used for HVAC, lighting, and "other facility support", with 6.7% of natural gas used for HVAC and "other facility support".

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Total	19,845,735	100%

Thus industrial use of electricity for non-process uses in New Mexico may be roughly 7.8% of total Residential and Commercial electricity use. This figure is used as an initial rule of thumb in estimating the contribution of savings from this policy from industrial sector measures.

For natural gas consumpation, consumption data from the USDOE EIA (downloaded as separate Excel files for the residential, commercial, and industrial sectors) are are follows:

	Sales (Million Cubic Feet of Natural Gas)			
	Residential	Commercial	Industrial	Total
2003	31,619	23,745	24,381	79,745
2004	34,152	25,335	22,048	81,535
2005	32,977	24,045	21,419	78,441
Fraction of 2004 Total	42%	31%	27%	100%

http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/natural_gas_monthly/ngm.html

Note 5:

The estimate of one unit of renovated space per unit of new construction in the commercial sector is based on an estimate by a RCI TWG member, who suggested that approximately 50 percent of commercial building was new space, and 50 percent was rennovated space.

It is likely that the ratio of commercial space undergoing major renovation to new commerial space will fluctuate year by year, and it may be necessary to get a more specific figure for this parameter. It is clear, however, that the renovation market represents a substantial opportunity for improving energy efficiency through code changes. A study of the non-residential renovation market in California (Remodeling and Renovation of Nonresidential Buildings in California, by Donald R. Dohrmann, John H. Reed, Sylvia Bender, Catherine Chappell, and Pierre Landry, available as http://www.energy.ca.gov/papers/2002-08-18_aceee_presentations/PANEL-10_DOHRMANN.PDF) suggests that by 1999 the value of renovations and additions to non-residential space was similar to that in new non-residential space, based on building permit data. As a market with older buildings, it is possible that California has more renovation per unit building activity than New Mexico.