Table 2.
Energy Supply Technical Work Group
Summary List of Pending Policy Options

#	Policy Name	GHG Savings ($MMtCO_2e$)			NPV (2007–2020) $ Millions	Cost Effectiveness ($NPV \$/tCO_2e$)	Quant. Status
		2012	2020	Cum. Total 2007-2020			
ES-1	**Mandate(s) for Renewable Energy (RPS, etc.)**						Complete
	ES-1a: 10% in 2011, 0.5% increase/year to 2021	0.2	1.4	8.6	-280	-32.5	
	ES-1b: 10% in 2011, 1% increase/year to 2021	0.6	3.7	15.1	-498	-33.0	
	ES-1c: 10% in 2011, 2 % increase/year to 2021	1.2	5.4	23.3	-588	-25.3	
ES-2	**Financial Incentives for Distributed Renewables**						Complete

#	Policy Name	GHG Savings ($MMtCO_2e$)			NPV (2007–2020) $ Millions	Cost Effectiveness (NPV $/$tCO_2e$)	Quant. Status
		2012	2020	Cum. Total 2007-2020			
	ES-2a: Payback 25 years; PV only; PNM only	0.0	0.1	0.6	27	42.7	
	ES-2b: Payback 25 years; PV, wind & biomass; all utilities	0.1	0.4	2.7	103	37.4	
	ES-2c: Payback 10 years; PV, wind & biomass; all utilities	0.7	2.4	15.2	559	36.8	
	ES-2d: Payback 3 years; PV, wind & biomass; all utilities	1.7	5.5	35.2	1294	36.8	
ES-3	**Renewable Energy Transmission and Storage**						Complete
	ES-3a: 4000 MW additional wind generation by 2020	0.7	6.4	26.8	823	30.7	
	ES-3b: 2000 MW additional wind generation by 2020	0.3	3.2	13.4	412	30.7	
ES-4	**Financial Incentives for Centralized Renewables**	2.2	9.2	26.8	1213	45.3	Complete
ES-5	**R&D including Energy Storage**	0.3	5.2	13.1	236	18.0	Complete
ES-6	**Advanced Coal/Fossil Technologies (e.g., IGCC with carbon capture)**						Complete
	ES-6a: All new coal plants would be IGCC with 60% capture	0.0	3.2	8.0	168	21.2	

#	Policy Name	GHG Savings ($MMtCO_2e$)			NPV (2007–2020) $ Millions	Cost Effectiveness (NPV $/$tCO_2e$)	Quant. Status
		2012	2020	Cum. Total 2007-2020			
	ES-6b: All new coal plants would be IGCC with 90% capture	0.2	4.8	11.9	209	17.5	
ES-7	**Nuclear Relicensing & Uprating**	*Not Quantified*					
ES-8	**Incentives and Barrier Reductions for Combined Heat & Power (CHP)**						Complete
	ES-8a: CHP ramps up to 3% from 2008-2020	1.1	3.0	19.5	-620	-31.8	
	ES-8b: CHP ramps up to 1.5% from 2008-2020	0.5	1.5	9.8	-311	-31.9	
ES-9	**Demand-Side Management, Energy Efficiency, and Integrated Resource Planning (IRP)**						Being Quantified by RCI
ES-10	**Transmission Capacity and Corridors**						Pending
ES-11	**CO2 Capture and Storage or Reuse (CCSR)**						Pending
ES-12	**Methane Reduction in Oil & Gas Operations: BMPs & PROs**						Pending
	ES-12a: 40-60% reduction in vented methane by 2012						

#	Policy Name	GHG Savings ($MMtCO_2e$)			NPV (2007–2020) $ Millions	Cost Effectiveness (NPV $/$tCO_2e$)	Quant. Status
		2012	2020	Cum. Total 2007-2020			
	ES-12b: 90-95% reduction in vented methane by 2050						
ES-13	**CO2 Reduction from Fuel Combustion in Oil & Gas Operations**						Pending
ES-14	**GHG Cap & Trade**						Sample
	ES-14a: 2.4% - 2.8% CI, $6.16 - $9.86 safety valve	-0.1	1.0	3.6	25	7	
	ES-14b: 2.6% - 3.0% CI, $8.83 - $14.13 safety valve	0.1	1.0	4.2	42	10	
	ES-14c: 2.8% - 3.5% CI, $22.09 - $35.34 safety valve	-0.1	8.1	31.3	541	17	
	ES-14d: 3.0% - 4.0% CI, $30.92 - $49.47 safety valve	0.1	9.1	43.5	804	19	
ES-15	**Generation Performance Standard**	3.1	3.1	45	269	6	Complete
ES-16	**Regulatory Reform for Electric Cooperatives**	*This is a non-quantified enabling policy.*					

ES-1 Mandate(s) for Renewable Energy (RPS, etc.)

Policy Description:

<u>CCAG Summary:</u> A renewable portfolio standard (RPS) is a requirement that utilities must supply a certain percentage of electricity from renewable energy sources. Utilities can meet this requirement by purchasing or generating renewable-based electricity or by purchasing renewable energy credits (RECs). By providing this flexibility, a market in RECs is created, which incentivizes companies that are best able to generate renewable energy. A "safety valve" can be put in place that limits the price of RECs at a specified level by allowing utilities to purchase RECs from the state at the "safety valve" price.

A renewable portfolio standard (RPS) is a requirement that utilities must supply a certain percentage of electricity from renewable energy sources. For example, an RPS of 5% would mean that for every 100 kWh that a utility or a "load serving entity" (LSE) supplies to end users, 5 kWh must be generated from renewable resources. An RPS differs from an Environmental Portfolio Standard (EPS) in that an RPS is a requirement specifically for renewables, while an EPS can be broader (e.g., can include energy efficiency). Utilities can meet their requirements by purchasing or generating renewable-based electricity or by purchasing renewable energy credits (RECs). RECs are tradable credits that are typically part of an RPS policy. RECs are created for every kWh of eligible and verified renewable electricity produced.

Anyone can build an eligible renewable facility and earn RECs for the electricity that it generates. Anyone with RECs can sell them to a utility that needs to meet its RPS requirement. In this way, utilities themselves may not need to build and operate renewable generating facilities. By providing this flexibility, a market in these credits would be created, which would provide an incentive to companies able to generate renewable energy.

A "safety valve" can be put in place that limits the price of RECs at a specified level by allowing utilities to purchase RECs from the state at the "safety valve" price. The "safety valve" would provide a degree of cost certainty, but could make the penetration of renewables and corresponding GHG reductions uncertain if the actual price of RECs moves above the "safety valve" level.

Policy Designs:

Analyze three scenarios, ramping up the existing 10% RPS by increasing it annually during the period 2011-2021 by the amounts shown below:

- **Goal levels:**
  a. 0.5 % per year
  b. 1% per year

c. 2% per year

- **Timing:** As noted above.
- **Parties:** Utilities.

Implementation method(s):

- Codes and standards – An RPS is usually implemented through a regulatory requirement (mandate) on the applicable utilities.
- Market-based mechanisms – Most state RPS programs allow REC trading among states.

Related Policies/Programs in place:

New Mexico currently has a 5% renewables requirement by 2006, and a 10% requirement by 2011, wherein:

- One kilowatt-hour of electricity generated by wind or hydroelectric technologies is worth one kilowatt-hour toward compliance with the RPS;
- One kilowatt-hour of biomass, geothermal, landfill gas, or fuel cell power is worth two kilowatt-hours toward the RPS; and
- One kilowatt-hour of solar power is worth three kilowatt-hours toward the RPS,

Type(s) of GHG Benefit(s):

- CO2: By creating a substantial market in renewable generation, an RPS can reduce fossil fuel use in power generation and thus reduce CO2 emissions.
- Black Carbon: To the extent that generation from coal and oil would be displaced by renewables, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007 - 2020)		

ES-1a	Mandate(s) for Renewable Energy (RPS, etc.)	0.5 % per year 2011-2021	0.2	1.4	8.6	-280	-32.5
ES-1b	Mandate(s) for Renewable Energy (RPS, etc.)	1% per year 2011-2021	0.6	3.7	15.1	-498	-33.0
ES-1c	Mandate(s) for Renewable Energy (RPS, etc.)	2% per year 2011-2021	1.2	5.4	23.3	-588	-25.3

Data Sources, Methods and Assumptions:

- **Data Sources:** CDEAC, WECC, EIA, EPA, NREL.
- **Quantification Methods:** Total GWh requirements for renewables were developed based on the scenarios listed above. It was assumed that the RPS would be met with a combination of wind and concentrating solar power (CSP), beginning with 97% of annual renewable additions from wind in 2011 (3% from CSP) to 68% from wind in 2030 (32% from CSP). The required capacity to achieve that level of generation was then estimated and forced into the model. Because NEMS is configured to generate a reference case forecast, EIA constrains certain technologies like wind because, in terms of straight economic optimization, the model would build more wind than EIA analysts believe would occur in the reference case. But when a policy is targeted directly at building more renewables, like an RPS, these artificial constraints must be removed to get a more accurate policy assessment. Therefore, these constraints on renewables were removed for the policy runs. CO2 reductions were found by comparing emissions from the policy case to emissions from a reference case. Costs were estimated by comparing policy and reference case new generating capacity investments, operating and maintenance costs for all generation, fuel costs for all generation, transmission and distribution costs for all generation, and exports out of the region. The reported cost for the policy is the net present value of the difference in the above costs between the policy and reference cases. The costs reported are the direct social cost of the policy (not accounting for macroeconomic impacts), not the cost to utilities. The NEMS model is a national model with multi-state regions (New Mexico is within the Rocky Mountain Power Area). Renewable capacity equivalent to what would result in New Mexico was added, and it was assumed that the changes in the region are wholly attributable to the New Mexico policy.
- **Key Assumptions:** Any analysis of state-level policies using the National Energy Modeling System (NEMS) from the US Energy Information Administration should be weighed carefully. NEMS is a national model that consists of 13 regions. State policies cannot be implemented explicitly within NEMS, and the state-specific impacts cannot be known explicitly. Assumptions must be made about the impact of policies at the state level either by sharing out the results if the policy is modeled at a regional or national level policy (which is

the only modeling option for some policies) or by assuming all changes in the region are attributable to the policy if it is implemented as a marginal change sized specifically to the state level.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- Reductions in overall energy consumption and the shift from fossil fuel generation as a result of an RPS would lead to reductions in criteria air pollutants and, consequently, health costs associated with those pollutants.
- Renewables can provide a fuel price hedge effect against fossil fuel price volatility, particularly natural gas.
- The operating costs of renewable generation, primarily maintenance, are generally spent locally and can provide a direct boost to local and state economies.
- Water use may be reduced through renewable versus combustion technologies.

Feasibility Issues, if applicable:

None yet cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus:

TBD.

ES-2 Financial Incentives for Distributed Renewables

Policy Description:

<u>CCAG Summary:</u> This policy option reflects a suite of financial incentives to encourage investment in distributed renewables. Financial incentives for distributed renewables could include: (1) direct subsidies for purchasing/selling distributed renewable technologies given to the buyer/seller; (2) tax credits or exemptions for purchasing/selling distributed renewable technologies given to the buyer/seller; (3) tax credits or exemptions for operating distributed renewable energy facilities; (4) feed-in tariffs, which provide direct payments to distributed renewable generators for each kWh of electricity generated from a qualifying renewable facility; (5) tax credits for each kWh generated from a qualifying renewable facility; (6) R&D funding to support development of distributed renewable technologies; (7) net metering; and (8) a clean energy grants program. New Mexico has been striving toward capital buy downs and production incentives such that there is full payback over 25-30 years to those who install distributed renewable options.

This policy option reflects a suite of financial incentives to encourage investment in distributed renewables. Financial incentives for distributed renewables could include: (1) direct subsidies for purchasing/selling distributed renewable technologies given to the buyer/seller;[1] (2) tax credits or exemptions for purchasing/selling distributed renewable technologies given to the buyer/seller; (3) tax credits or exemptions for operating distributed renewable energy facilities; (4) feed-in tariffs, which provide direct payments to distributed renewable generators for each kWh of electricity generated from a qualifying renewable facility; (5) tax credits for each kWh generated from a qualifying renewable facility; (6) R&D funding to support development of distributed renewable technologies; (7) net metering, and (8) a clean energy grants program.

R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state and/or to set the stage for adoption of the technology for use in the state. R&D funding can also be made available to any renewable or other advanced technology through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use.

New Mexico has been striving toward capital buy downs and production incentives such that there is full payback over 25-30 years to those who install distributed renewable options. Additionally, Albuquerque is considering tax incentives for distributed renewables.

[1] Any direct subsidies or incentives would need to be cleared through the New Mexico Attorney General's Office to ensure that they comport with the anti-donation clause of the New Mexico Constitution.

Policy Design:

Provide incentives for distributed renewable technologies such that the payback period would reflect the following scenarios:

- **Goal levels:**
    a. 25 years (PV only, PNM only)
    b. 25 years (PV, wind and biomass; all utilities)
    c. 10 years (PV, wind and biomass; all utilities)
    d. 3 years (PV, wind and biomass; all utilities)
- **Timing**: Adopted ASAP; accomplished per above.
- **Parties**: Financial incentives would be administered by a state agency and provided to individuals, commercial enterprises, and industrial enterprises.
- **Other**: A source of funds to cover these financial incentives would need to be determined. It may be possible to link incentives to (or condition them upon) the manufacture within New Mexico of associated equipment.

Implementation method(s):

- Funding mechanisms and or incentives.
- Pilots and demonstration projects.
- Research and development.

Related Policies/Programs in place:

- New Mexico has a personal income tax credit for photovoltaic (PV) and solar thermal systems amounting to 30% of the cost of installation up to a maximum of $9,000.
- PNM is beginning a program in which it will purchase RECs from customers with solar PV systems at a rate of 13 cents per kWh, which produces approximately a 25-year payback on such systems.

Type(s) of GHG Benefit(s):

- CO2: By providing a financial incentive for renewable generation, more renewable facilities would be installed and more electricity from renewables would be generated. This very-low-carbon generation would displace generation from fossil fuels and thus lower carbon emissions more than otherwise would be the case. By funding R&D, new or improved renewable technologies would be developed or commercialized, leading to even more installation of renewables and further reducing carbon emissions in the long term.

- Black Carbon: To the extent that generation from coal and oil would be displaced by renewables, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007 - 2020)		
ES-2a	Financial Incentives for Distributed Renewables	Payback = 25 years; PV only, PNM only	0.0	0.1	0.6	27	42.7
ES-2b	Financial Incentives for Distributed Renewables	Payback = 25 years; PV, wind and biomass; all utilities	0.1	0.4	2.7	103	37.4
ES-2c	Financial Incentives for Distributed Renewables	Payback = 10 years; PV, wind and biomass; all utilities	0.7	2.4	15.2	559	36.8
ES-2d	Financial Incentives for Distributed Renewables	Payback = 3 years; PV, wind and biomass; all utilities	1.7	5.5	35.2	1294	36.8

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: New Mexico "State Fact Sheet" from the Southwest Energy Efficiency Project's energy produced, report *Increasing Energy Efficiency in New Buildings in the Southwest: Energy Codes and Best Practices*; USDOE/EIA document *2003 Commercial Buildings Energy Consumption Survey Detailed Tables*; 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; *Arizona Consumer's Guide to Buying a Solar Electric System*, from the Arizona Solar Center; sources with information on photovoltaic costs.

- **Quantification Methods**: A technology diffusion model for distributed generation was developed that is driven by simple payback. The lower the payback time, the greater diffusion rate and ultimate penetration (or saturation) the technology will achieve. The model was calibrated not to exceed available resources or technical capacity within the state. Projection of the number of new and existing homes, and new and existing commercial floorspace, in New Mexico through 2020 determined the potential population through which solar PV could diffuse.
- **Key Assumptions**: Assumed technical capacity limits for wind, solar and biomass. Economic penetration of solar PV reaches 2226 MW with a 3-year payback and 159 MW with a 25-year payback. Distributed biomass technical potential was assumed to be 500 MW and reaches 192 MW of economic penetration with a 3-year payback and 14 MW with a 25-year payback. Distributed wind is assumed to have a technical potential of 600 MW and an economic penetration by 2020 of 230 MW with a 3-year payback and 28 MW with a 25-year payback.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- Reductions in overall electricity consumption and the shift from fossil fuel generation as a result of new renewables would lead to reductions in criteria air pollutants and, consequently, health costs associated with those pollutants.
- Renewables can provide a fuel price hedge effect against fossil fuel price volatility, particularly natural gas.
- The operating costs of renewable generation, primarily maintenance, are generally spent locally and can provide a direct boost to local and state economies.
- Distributed renewables can reduce the need for incremental transmission and distribution infrastructure and its associated costs.
- Water use may be reduced through renewable versus combustion technologies.

Feasibility Issues, if applicable:

- Any direct subsidies or incentives would need to be cleared through the New Mexico Attorney General's Office to ensure that they comport with the anti-donation clause of the New Mexico Constitution.

Status of Group Approval:

Pending.

Level of Group Support:

TBD

Barriers to consensus (if less than unanimous consent):

TBD

ES-3 Renewable Energy Transmission and Storage

Policy Description:

<u>CCAG Summary:</u> Renewable energy from wind and solar is intermittent by nature, while fossil fuel technologies can be called upon to meet demand as needed. A renewable energy transmission authority (RETA) could be created to assist in the development of energy storage technologies and to foster the development of transmission capacity necessary to take advantage of renewable resources.

Renewable energy from wind and solar is intermittent by nature, while fossil fuel technologies can be called upon to meet demand as needed. A maximum amount of intermittent renewable capacity can be added to an electricity system before reliability is compromised – unless energy storage technologies are developed and deployed that allow renewable energy to be dispatched as needed.

Also, the best renewable resources may not be near existing transmission lines. New transmission, as well as upgrades to existing transmission lines, may be needed to accommodate extensive deployment of renewable generation capacity. The National Renewable Energy Laboratory (NREL) estimates that wind resources in New Mexico would support between 4,000 and 8,000 MW of new wind capacity in the near future, provided that transmission lines were built to accommodate it.

A renewable energy transmission and storage authority (RETA) could be created to assist in the development of energy storage technologies and to foster the development of transmission capacity necessary to take advantage of renewable resources. The authority could, for example, fund energy storage research and development and demonstration projects.

HB111 was introduced in the New Mexico Legislature in 2006 to create a Renewable Energy Transmission Authority in order to: (1) diversify and expand the New Mexico economy through improvements in the electric transmission infrastructure and the development of energy storage technologies; (2) facilitate the transmission and use of New Mexico renewable energy by financing or planning, acquiring, maintaining and operating electric transmission facilities, storage facilities and related supporting infrastructure and interests therein; and (3) provide for the creation of the New Mexico renewable energy transmission authority to facilitate the financing, planning, acquiring, maintaining and operating of electric transmission and storage facilities.

Policy Design:

This recommendation is similar to HB-111 as introduced in the New Mexico Legislature in

2006.

- **Goal levels:** This policy option is difficult to quantify directly, so its analysis tests two scenarios:
    a. Under this policy, an additional 4,000 MW of wind generation would be built by 2020, along with the necessary transmission; and
    b. Under this policy, an additional 2,000 MW of wind generation would be built by 2020, along with the necessary transmission.
- **Timing:** As noted above.
- **Parties:** Legislation would create a RETA as an independent entity, which work with utilities to build new transmission capacity as well as with private companies to develop and deploy storage technologies.

Implementation method(s):

- Funding mechanisms and or incentives.
- Pilots and demonstration projects.
- Research and development.

Related Policies/Programs in place:

- Existing transmission lines can serve some new renewable energy capacity, but may not be sufficient for a full-scale deployment of renewable energy.
- No agency charged with developing and deploying renewable energy storage technologies is currently in place in New Mexico.

Type(s) of GHG Benefit(s):

- CO2: By providing transmission capacity and storage, renewable energy could be more fully exploited in New Mexico, resulting in the displacement of fossil fuel resources and, therefore, a reduction in CO2 emissions. In particular, energy storage would allow intermittent renewable resources to displace coal-fired generation, providing a greater reduction in CO2 emissions than renewables would otherwise provide.
- Black Carbon: To the extent that generation from coal and oil would be displaced by renewables, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007 - 2020)		
ES-3a	Renewable Energy Transmission & Storage	An additional 4000 MW of wind power is built by 2020	0.7	6.4	26.8	823	30.7
ES-3b	Renewable Energy Transmission & Storage	An additional 2000 MW of wind power is built by 2020	0.3	3.2	13.4	412	30.7

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: EIA.
- **Quantification Methods**: We assumed that new transmission lines would result in 4,000 MW of new wind capacity in New Mexico and forced this capacity into the model. We also added into the results ex-post estimates of transmission costs derived from the NEMS model. Because NEMS is configured to generate a reference case forecast, EIA constrains certain technologies like wind because, in terms of straight economic optimization, the model would build more wind than EIA analysts believe would occur in the reference case. But when a policy is targeted directly at building more renewables, like the RETS, these artificial constraints must be removed to get a more accurate policy assessment. Therefore, we removed these constraints on renewables for the policy runs. CO2 reductions were found by comparing emissions from the policy case to emissions from a reference case. Costs were estimated by comparing policy and reference case new generating capacity investments, operating and maintenance costs for all generation, fuel costs for all generation, transmission and distribution costs for all generation, and exports out of the region. The reported cost for the policy is the net present value of the difference in the above costs between the policy and reference cases. The costs reported are the direct social cost of the policy (not accounting for macroeconomic impacts), not the cost to utilities. The NEMS model is a national model with multi-state regions (New Mexico is within the Rocky Mountain Power Area). We added wind capacity equivalent to the scenario specified for New Mexico, and assumed that the changes in the region are wholly attributable to the New Mexico policy.
- **Key Assumptions**: Any analysis of state-level policies using the National Energy Modeling System (NEMS) from the US Energy Information Administration should be weighed carefully. NEMS is a national model that consists of 13 regions. State policies cannot be implemented explicitly within NEMS, and the state-specific impacts cannot be known

explicitly. We must make assumptions about the impact of policies at the state level either by sharing out the results if the policy is modeled as a regional or national level policy (which is the only modeling option for some policies) or by assuming all changes in the region are attributed to the policy if it is implemented as a marginal change sized specifically to the state level.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- Reductions in overall electricity consumption and the shift from fossil fuel generation as a result of new renewables would lead to reductions in criteria air pollutants and, consequently, reduce health costs associated with those pollutants.
- Renewables can provide a fuel price hedge effect against fossil fuel price volatility, particularly natural gas.
- The operating costs of renewable generation, primarily maintenance, are generally spent locally and can provide a direct boost to local and state economies.
- Water use may be reduced through renewable versus combustion technologies.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD

Barriers to consensus (if less than unanimous consent):

TBD

ES-4 Financial Incentives for Centralized Renewables

Policy Description:

<u>CCAG Summary:</u> This policy option reflects a suite of financial incentives to encourage investment in centralized renewables. Financial incentives for distributed renewables could include: (1) direct subsidies for purchasing/selling centralized renewable technologies given to the buyer/seller;[2] *(2) tax credits or exemptions for purchasing/selling centralized renewable technologies given to the buyer/seller; (3) tax credits or exemptions for operating centralized renewable energy facilities; (4) feed-in tariff, which is a direct payment to centralized renewable generators for each kWh of electricity generated from a qualifying renewable facility; (5) tax credits for each kWh generated from a qualifying renewable facility; (6) R&D funding to support development of centralized renewable technologies.*

This policy option reflects a suite of financial incentives to encourage investment in centralized renewables. Financial incentives for centralized renewables could include: (1) direct subsidies for purchasing/selling centralized renewable technologies given to the buyer/seller; (2) tax credits or exemptions for purchasing/selling centralized renewable technologies given to the buyer/seller; (3) tax credits or exemptions for operating centralized renewable energy facilities; (4) feed-in tariff, which is a direct payment to centralized renewable generators for each kWh of electricity generated from a qualifying renewable facility; (5) tax credits for each kWh generated from a qualifying renewable facility; (6) R&D funding to support development of centralized renewable technologies. Incentives could also be linked to or made conditional upon in-state manufacturing of equipment.

R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state as well as to set the stage for adoption of the technology for use in the state. R&D funding can also be available to any renewable or other advanced technology through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use.

Policy Design:

Implement the production tax incentives below. Also, eliminate the existing 2 million MWH/year overall cap; lower the facility size threshold from 10 MW to 1 MW, and extend the

[2] Any direct subsidies or incentives would need to be cleared through the New Mexico Attorney General's Office to ensure that they comport with the anti-donation clause of the New Mexico Constitution.

tax credit to apply to personal income taxes as well as corporate income taxes.

- **Goal levels:**
  - Solar (including PV and Concentrating Solar Power) = 4 cents per kWh
  - Biomass = 2 cents per kWh
  - Wind = 1 cent per kWh
- **Timing:** ASAP
- **Parties:** A state agency would administer or supervise the financial incentives, and utilities, commercial enterprises, industrial enterprises would receive them.
- **Other:** A source of funds to cover these financial incentives would need to be determined. It may be possible to link incentives to (or condition them upon) the manufacture within New Mexico of associated equipment.

Implementation method(s):

- Funding mechanisms and or incentives.
- Pilots and demonstration projects.
- Research and development.

Related Policies/Programs in place:

- New Mexico has a corporate tax credit of 1 cent per kWh for wind, solar or biomass facilities larger than 10 MW; available only for the first 400,000 MWHs of generation per year. Tax credits for total generation from all participants are available only for the first 2 million MWHs per year.

Type(s) of GHG Benefit(s):

- CO2: By providing a financial incentive for renewable generation, more renewable facilities would be installed and more electricity from renewables would be generated. This very-low-carbon generation would displace generation from fossil fuels and lower carbon emissions more than otherwise would be the case. By funding R&D, new or improved renewable technologies would be developed or commercialized, leading to even more installation of renewables and further reducing carbon emissions in the long term.
- Black Carbon: To the extent that generation from coal and oil would be displaced by renewables, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-4	Financial Incentives for Centralized Renewables	Eliminate 2 million MWH cap; drop from 10 MW to 1 MW; 4¢ PV PTC; 2¢ biomass PTC; 1¢ wind PTC.	2.2	9.2	26.8	1213	45.3

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: EIA.
- **Quantification Methods**: We added the production tax incentives outlined above to the NEMS model at a national level because it is not possible to do so at a regional or state level. Because NEMS is configured to generate a reference case forecast, EIA constrains certain technologies like wind because, in terms of straight economic optimization, the model would build more wind than EIA analysts believe would occur in the reference case. But when a policy is targeted directly at building more renewables, like renewable production tax credits, these artificial constraints must be removed to get a more accurate policy assessment. Therefore, we removed these constraints on renewables for the policy runs. CO2 reductions were found by comparing emissions from the policy case to emissions from a reference case. Costs were estimated by comparing policy and reference case new generating capacity investments, operating and maintenance costs for all generation, fuel costs for all generation, transmission and distribution costs for all generation, and exports out of the region. The reported cost for the policy is the net present value of the difference in the above costs between the policy and reference cases. The costs reported are the direct social cost of the policy (not accounting for macroeconomic impacts), not the cost to utilities. Because this policy was implemented within the NEMS model at the national level, the results for New Mexico were derived from results in the region (New Mexico is within the Rocky Mountain Power Area). We shared out the regional emission and cost results according to the share of New Mexico generation within the region. Because the absolute level of renewable capacity entering the region in this case (because the policy is implemented nationally) is far higher than other cases in which the policy is implemented as a marginal change in the region, the results are significantly different than, for example, the RPS policies.
- **Key Assumptions**: Any analysis of state-level policies using the National Energy Modeling System (NEMS) from the US Energy Information Administration should be weighed carefully. NEMS is a national model that consists of 13 regions. State policies cannot be

implemented explicitly within NEMS, and the state-specific impacts cannot be known explicitly. We must make assumptions about the impact of policies at the state level either by sharing out regional results if the policy is modeled as a regional level or national level policy, which is the only modeling option for some policies, or by assuming all changes in the region are attributed to the policy if it is implemented as a marginal change sized specifically to the state level.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- Reductions in overall electricity consumption and the shift from fossil fuel generation as a result of new renewables would lead to reductions in criteria air pollutants and, consequently, health costs associated with those pollutants.
- Renewables can provide a fuel price hedge effect against fossil fuel price volatility, particularly natural gas.
- The operating costs of renewable generation, primarily maintenance, are generally spent locally and can provide a direct boost to local and state economies.
- Water use may be reduced through renewable versus combustion technologies.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-5 Research & Development (R&D)

Policy Description:

<u>CCAG Summary:</u> R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state and/or to set the stage for adoption of the technology for use in the state. Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use.

R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state and/or to set the stage for adoption of the technology for use in the state. For example, an agency can be established with a mission to help develop and deploy energy storage technologies. R&D funding can also be made available to any renewable or other advanced technology through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use.

Policy Design:

Establish an R&D program tasked with the development and deployment of concentrating solar energy technologies, hydrogen-based energy storage technologies, and compressed air storage. To the extent possible, include molten salt storage, cavern storage, and/or other technologies as well. GHG reductions and costs (or cost savings) of R&D programs are generally difficult to quantify. However, adequate information may exist to quantify GHG reductions and costs associated with some of these technologies, e.g., compressed air storage. Therefore, evaluate this policy option by assuming that wind power and compressed air storage is constructed instead of new pulverized coal plants in meeting forecasted demand growth.

- **Goal levels:** As noted above.
- **Timing:** In parallel with forecasted electricity demand growth.
- **Parties:** The State of New Mexico would implement an R&D program in conjunction with private companies in a public-private partnership model.

Implementation method(s):

- Funding mechanisms and or incentives.

- Pilots and demonstration projects.
- Research and development.

Related Policies/Programs in place:

- No dedicated R&D program for developing and deploying solar energy and energy storage technologies is in place in New Mexico.

Type(s) of GHG Benefit(s):

- CO_2: By funding R&D for renewables, more renewable energy would eventually come on-line and displace fossil fuel resources and, thereby reduce CO_2 emissions.
- Black Carbon: To the extent that generation from coal and oil would be displaced by renewables, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-5	Research & Development	Wind and compressed air storage are constructed in place of new pulverized coal plants.	0.3	5.2	13.1	236	18.0

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: CDEAC, EIA, EPA, and report *The Economic Impact of CAES on Wind in TX, OK, and NM* by Ridge Energy Storage and Grid Services.
- **Quantification Methods**: We assumed that all new pulverized coal plants forecasted in the reference case would be wind power combined with compressed air storage instead. We calculated the incremental cost of wind with storage and the change in emissions using a simple spreadsheet analysis.
- **Key Assumptions**: Cost assumptions for compressed air storage cited in above document.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- Reductions in overall electricity consumption and the shift from fossil fuel generation as a result of new renewables would lead to reductions in criteria air pollutants and, consequently, reduce health costs associated with those pollutants.
- Renewables can provide a fuel price hedge effect against fossil fuel price volatility, particularly natural gas.
- The operating costs of renewable generation, primarily maintenance, are generally spent locally and can provide a direct boost to local and state economies.
- Water use may be reduced through renewable versus combustion technologies.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-6 Advanced Coal/Fossil Technologies (e.g., IGCC with carbon capture)

Policy Description:

CCAG Summary: *Advanced fossil technologies are more efficient than conventional fossil technologies and, therefore, have lower CO2 emission rates. Advanced fossil technologies combined with carbon capture and sequestration or reuse (CCSR) could enable significantly lower zero CO2 emissions. Policies to promote advanced fossil technologies for new coal plants may include mandates, incentives, or a combination of the two.*

Advanced fossil technologies are more efficient than conventional fossil technologies and, therefore, have lower CO2 emission rates. Advanced fossil technologies combined with carbon capture and sequestration or reuse (CCSR) could enable significantly lower CO2 emissions. Policies for advanced fossil technologies may include mandates or incentives to use advanced coal technologies for new coal plants. A mandate might require that new coal plants achieve a certain CO2 emission rate that is only achievable with advanced technology. Alternatively, a mandate might require that all new coal plants be of a certain type, e.g., Integrated Gasification Combined Cycle (IGCC). A mandate might also be a requirement that a certain percentage of new coal plants are IGCC or employ advanced fossil technologies. Incentives may be in the form of direct subsidies or assistance in securing financing and/or off-take agreements (e.g., agreements to purchase the power generated).[3] A combination of mandates and incentives is also possible.

Policy Design:

Identify the GHG reductions and costs that would result if all new coal plants in New Mexico (i.e., reflecting both new demand growth as well as the retirement of old fossil facilities) were to be IGCC with CCSR at: (1) 60% capture and storage,[4] and (2) 90% capture and storage. In this analysis, assume that redundant gasifiers would not be necessary because utilities could successfully manage reliability through other plants in the system rather than by building-in extra reliability for individual plants with redundant gasifiers.

- **Goal levels:**
  a. All new coal plants in New Mexico would be IGCC with CCSR at 60% capture and storage.
  b. All new coal plants in New Mexico would be IGCC with CCSR at 90% capture and

[3] Any direct subsidies or incentives would need to be cleared through the New Mexico Attorney General's Office to ensure that they comport with the anti-donation clause of the New Mexico Constitution.
[4] The 60% figure emanates from the California standard.

storage.

- **Timing:** As new fossil plants are built.
- **Parties:** Utilities would meet the IGCC requirement.

Implementation method(s):

Pending an evaluation of the costs, likely implementation methods could include:

- Funding mechanisms and or incentives
- Pilots and demos
- Research and development
- Codes and standards

Related Policies/Programs in place:

- No state program to encourage or require advanced coal/fossil technologies on new fossil plants is currently in place in New Mexico.

Type(s) of GHG Benefit(s):

- CO_2: By requiring that a certain percentage of coal be generated using IGCC with CCSR, a direct reduction in CO_2 emissions would occur. IGCC with CCSR would be a significantly lower emission technology and would be displacing conventional coal generation.
- Black Carbon: Because coal is not combusted directly in an IGCC plant, black carbon emissions from IGCC with CCSR are zero. To the extent that IGCC would displace existing generation from coal and oil, black carbon emissions would also decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-6a	Advanced Coal/Fossil Technologies	All new coal plants would be IGCC with CCSR at 60%	0.0	3.2	8.0	168	21.2

ES-6b	Advanced Coal/Fossil Technologies	All new coal plants would be IGCC with CCSR at 90%	0.2	4.8	11.9	209	17.5

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: EIA, EPA, EPRI, MIT.
- **Quantification Methods**: We assumed that all new pulverized coal plants forecasted in the reference case would be IGCC with CCSR instead. We calculated the incremental cost of IGCC with CCSR, relative to pulverized coal, and the change in emissions using a simple spreadsheet analysis. As part of the cost calculation, we estimated CO2 pipeline, storage, and monitoring costs assuming the use of depleted natural gas reservoirs. To err on the side of being conservative, we included the full cost of well drilling for storage purposes, even though existing wells may be used at potentially a lower cost.
- **Key Assumptions**: The cost of new IGCC with CCS plants is a key assumption for this analysis. Another important assumption is the number of miles of CO2 pipeline. We assumed that the 879 MW of new IGCC with CCS built as a result of this policy would need 311 miles of pipeline to reach the storage reservoir.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- IGCC with CCSR has significantly lower criteria air pollutant emissions than conventional coal, so this policy would lead to reductions in criteria air pollutants and, consequently, reduce health costs associated with these pollutants.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-7 Nuclear Relicensing & Uprating

Policy Description:

Nuclear relicensing extends the life of existing nuclear facilities. Uprating enables more power to be generated at an existing nuclear facility, typically by improvements on the steam side of the operation. These are important issues in states with nuclear power plants. New Mexico does not have any existing nuclear power plants, but the state may wish to become involved in discussions of relicensing and uprating in surrounding states if these activities affect the importation of nuclear power to New Mexico.

Some consideration was given to expanding this policy to include encouragement of new nuclear facilities in New Mexico. However, the CCAG voted not to pursue this expansion at its April 26, 2006 meeting.

Policy Design:

This policy is unquantified because New Mexico has no nuclear power plants, however the state may wish to encourage relicensing and uprating of nuclear plants in surrounding states to the extent that their output power would be imported to New Mexico.

- **Goal levels:** Not applicable.
- **Timing:** Not applicable.
- **Parties:** Utilities and other interested parties

Implementation method(s):

- Information and education

Related Policies/Programs in place:

- There is currently no concerted state involvement in nuclear uprate or relicensing proceedings in other states.

Type(s) of GHG Benefit(s):

- Not applicable.

Estimated GHG Savings and Costs Per Ton:

- Not quantified

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: Not applicable.
- **Quantification Methods**: Not applicable.
- **Key Assumptions**: Not applicable.

Key Uncertainties:

- Not applicable.

Contributing Issues, if applicable:

- Not applicable.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-8 Incentives and Barrier Reductions for Combined Heat & Power (CHP)

Policy Description:

CCAG Summary: *Financial incentives for combined heat & power (CHP) could include: (1) direct subsidies for purchasing/selling CHP systems given to the buyer/seller; (2) tax credits or exemptions for purchasing/selling CHP systems given to the buyer/seller; (3) tax credits or exemptions for operating CHP systems; (4) feed-in tariff, which is a direct payment to CHP owners for each kWh of electricity or BTU of heat generated from a qualifying CHP system; and (5) tax credits for each kWh or BTU generated from a qualifying CHP system. There are also numerous barriers to greater penetration of combined heat and power (CHP), including inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies like interconnection requirement, high standby rates, exit fees, etc. The lack of standard offer or long-term contracts, payment at avoided cost levels, and lack of recognition for emissions reduction value provided also creates obstacles.*

Financial incentives for combined heat and power (CHP) could include: (1) direct subsidies for purchasing/selling CHP systems given to the buyer/seller; (2) tax credits or exemptions for purchasing/selling CHP systems given to the buyer/seller; (3) tax credits or exemptions for operating CHP systems; (4) feed-in tariff, which is a direct payment to CHP owners for each kWh of electricity or BTU of heat generated from a qualifying CHP system; and (5) tax credits for each kWh or BTU generated from a qualifying CHP system.

There are also numerous barriers to combined heat and power (CHP), including inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies like interconnection requirement, high standby rates, exit fees, etc. The lack of standard offer or long-term contracts, payment at avoided cost levels, and lack of recognition for emissions reduction value provided also creates obstacles.

Policies to remove these barriers include: improved interconnection policies; improved rates and fees policies; streamlined permitting; recognition of the emission reduction value provided by CHP; financing packages and bonding programs; power procurement policies; education and outreach; etc.

Policy Design:

Establishing an empirical linkage between barrier removal and CHP penetration is complex and beyond the scope of the CCAG's effort. Accordingly, quantify GHG reductions and costs associated with the following scenarios:

- **Goal levels:**
    a. CHP penetration ramps up from 2008 to 2020 to equal 3% of total fossil generation.
    b. CHP penetration ramps up from 2008 to 2020 to equal 1.5% of total fossil generation.
- **Timing:** As noted above.
- **Parties:** Depends on specific barrier(s).

Implementation method(s):

- Information and education.
- Technical assistance.
- Financial incentives.
- Codes and standards.

Related Policies/Programs in place:

- No concerted state program to encourage CHP or reduce parries to CHP is in place in New Mexico.

Type(s) of GHG Benefit(s):

- CO2: By removing barriers to CHP, more clean generation can come into the energy supply mix and would displace less efficient fossil fuels, thereby reducing CO2 emissions.
- Black Carbon: To the extent that removing barriers to CHP would lead to displacement of generation from coal and oil, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		

ES-8a	Incentives and Barrier Reductions for CHP	CHP penetration ramps up from 2008 to 2020 to equal 3% of total fossil generation	1.1	3.0	19.5	-620	-31.8
ES-8b	Incentives and Barrier Reductions for CHP	CHP penetration ramps up from 2008 to 2020 to equal 1.5% of total fossil generation	0.5	1.5	9.8	-311	-31.9

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: The Combined Heat and Power White Paper, dated January 2006, to the Clean and Diversified Energy Initiative of the Western Governors Association; and the 2003 Commercial Buildings Energy Consumption Survey Detailed Tables, published by the US Department of Energy's Energy Information Administration.
- **Quantification Methods**: We started with an estimate for New Mexico's share of CHP potential in the West, as provided in the "CHP White Paper" referenced above, as a limit for new CHP in the State. We determined the level of penetration of new CHP based on the policy goals by converting KWhs of generation to equivalent BTUs (the electricity generation of the CHP in this analysis will be less than the generation referenced in the policy goal, but the total output, including heat, will be equivalent to the policy goal). Estimates of CHP cost and performance for different kinds of systems are then used to estimate the overall net GHG emissions reduction and net cost of the policy.
- **Key Assumptions**: The technical capacity to utilize this level of CHP in New Mexico. For the 3% scenario, 913 MW of capacity are installed by 2020.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- CHP reduces or eliminates the need to burn fuel to meet separate power and steam loads, which would significantly lower associated criteria air pollutant emissions and consequently reduce health costs associated with these pollutants.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-9 Demand-Side Management, Energy Efficiency, and Integrated Resource Planning

Policy Description:

<u>CCAG Summary:</u> This policy option involves increasing the efficiency of electricity use in New Mexico through programs, funds, and/or requirements. This option focuses on what are typically termed DSM activities, and is designed to work in tandem with other strategies under consideration by the RCI and ES TWGs that can also encourage efficiency gains. Many different policy configurations are possible,[5] including various combinations of energy savings targets, utility spending targets, public benefit charges,[6] tariff riders or enabling legislation (as recently enacted in New Mexico), and incorporation of energy efficiency in integrated resource planning (IRP) processes, among others.

Note: This policy option echoes RCI option RCI-1, Demand-Side Management and Energy Efficiency Progams, and is quantified thereunder.

This policy option involves increasing the efficiency of electricity use in New Mexico through programs, funds, and/or requirements. This option focuses on what are typically termed DSM activities, and is designed to work in tandem with other strategies under consideration by the RCI and ES TWGs that can also encourage efficiency gains.

The WGA CDEAC Energy Efficiency Task Force report provides several examples of "best practice" efficiency policies and programs across Western states, along with a number of specific policy recommendations:

- "Encourage or require that utilities integrate energy efficiency options into resource planning and procurement decisions and pursue energy efficiency whenever it is the least cost resource option. At a minimum, electricity distribution companies in western states should dedicate at least 2% of revenues for ratepayer-funded energy efficiency programs, as long as doing so is cost effective.
- Establish minimum energy savings requirements or targets. In particular, we recommend setting a goal of saving 3-5% of projected electricity sales in 2010 through DSM programs. By 2020, we recommend setting a goal of 10-15% savings from DSM programs, as long as doing so is cost effective.

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[5] For an overview of activity in other states, see USDOE/DSIRE summary tables http://www.dsireusa.org/summarytables/

[6] Public benefit charge funds are in place in about 15 states, typically adopted as part of electricity restructuring policy/legislation. These funds are collected as surcharge on utility bills, and are typically directed to a mix of energy efficiency, renewable energy, and low-income programs.

- Decouple electricity sales and revenues so that reduced electricity sales do not adversely affect utility revenues, in combination with the creation of performance incentives that reward utilities for implementing effective DSM programs." (p. xx)

Many different policy configurations are possible[7], including various combinations of energy savings targets, utility spending targets, public benefit charges[8], tariff riders or enabling legislation (recently enacted in NM), and incorporation of energy efficiency in integrated resource planning (IRP) processes, among others.

Integrated Resource Planning (IRP) is a process that diverges from traditional utility least-cost planning. Rather than simply focusing on supply-side options to meet a forecasted growth in emissions, IRP integrates technology and policy options on the demand side with supply side options to satisfy the anticipated demand for energy services. Demand-side measures include energy efficiency, distributed generation, and peak-shaving measures. IRP typically also takes into account a broader array of costs, including environmental and social costs. An IRP policy should mandate that utilities develop an Integrated Resource Plan using an approved methodology and implement it, and this methodology should ensure that utilities include carbon risk in their resource planning decisions.

Policy Design:

The ES TWG and RCI TWGs are working together to finalize the design of this policy option for analysis. The ES TWG notes that the analysis should assess the cost-effectiveness of underlying activities using an appropriate positive value for carbon (i.e., for avoided carbon emissions) rather than a value of zero.

In fleshing out the policy design parameters, there are two key and linked dimensions:

Achievable/desirable energy savings (total MW, MWh, % of load, etc. by specific years), which can be informed by analysis of energy efficiency potential and feasibility/desirability considerations; and

Policy and administrative mechanisms to achieve these savings (e.g., IRP, savings targets, public benefit charges, portfolio standards, "energy trusts", etc., per above).

Focusing initially on the first dimension, evaluate the following scenarios:[9]

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[7] For an overview of activity in other states, see USDOE/DSIRE summary tables http://www.dsireusa.org/summarytables/

[8] Public benefit charge funds are in place in about 15 states, typically adopted as part of electricity restructuring policy/legislation. These funds are collected as surcharge on utility bills, and are typically directed to a mix of energy efficiency, renewable energy, and low-income programs.

[9] In addition to these two scenarios, RCI will also estimate the current, more modest levels of efficiency program spending that are implicitly reflected in the reference scenario. The policy option will thus reflect the *increase* in efficiency activity over and above reference case levels.

- **Medium**: Under this scenario, spending on electricity efficiency programs rises to the level of 1.5% of utility revenues (i.e. customer bills), as allowed under the recent Efficient Use of Energy Act (see below).
- **High**: Under this scenario, spending on electricity efficiency programs increases to a level that that reflects the full, achievable cost-effective energy efficiency potential in New Mexico.

The second dimension (policy and administrative mechanisms) can be considered once the above scenarios have been fleshed out.

DSM/EE policies should go beyond what is currently cost-effective to include measures that would be cost-effective when an appropriate value for carbon (i.e., a "carbon adder") is included, which would presumably lead to larger GHG emission reductions.

- **Goal levels**: See RCI-1 Demand-Side Management and Energy Efficiency Programs.
- **Timing**: See RCI-1 Demand-Side Management and Energy Efficiency Programs.
- **Parties**: See RCI-1 Demand-Side Management and Energy Efficiency Programs.

Implementation method(s):

- See RCI-1, Demand-Side Management and Energy Efficiency Programs.

Related Policies/Programs in place:

- The Efficient Use of Energy Act (SB 644), signed into law in 2005, directs public electric and gas utilities to develop, fund and implement comprehensive, cost-effective energy efficiency programs to reduce utility-related expenditures for citizens and businesses; declares that utility expenditures on cost-effective energy efficiency measures are an acceptable use of ratepayer monies; requires a utility to obtain prior approval for its energy efficiency programs and expenditures; provides for a tariff rider (not to exceed the lesser of 1.5% of a customer's bill or $75,000/year) for a utility to recover its energy efficiency expenditures; provides for monitoring, verification, and periodic reporting by the utility on its energy efficiency expenditures and overall program effectiveness.

Type(s) of GHG Benefit(s):

- CO2: Significant reductions in GHG emissions (largely CO2) would result from avoided electricity production and avoided on-site fuel combustion.
- CH4: Less significant are the reduction in CH4 emissions from avoided fuel combustion and avoided pipeline leakage.
- N2O: Reductions are conceivable, but are likely to be small and/or very difficult to estimate (materials use, life cycle, market leakage, etc.)

- Black Carbon: Reductions are conceivable, but are likely to be small and/or very difficult to estimate (e.g., materials use, life cycle, market leakage, etc.)

Estimated GHG Savings and Costs Per Ton:

- This option is quantified under RCI-1, Demand-Side Management and Energy Efficiency Programs.

Data Sources, Methods and Assumptions (for quantified actions):

- See RCI-1, Demand-Side Management and Energy Efficiency Programs.

Key Uncertainties:

- See RCI-1, Demand-Side Management and Energy Efficiency Programs.

Contributing Issues, if applicable:

- The WGA CDEAC EE report cites the following benefits (p. 2):
    - Saving consumers and businesses money on their energy bills;
    - Reducing dependence on imported fuel sources;
    - Reducing vulnerability to energy price spikes;
    - Reducing peak demand and improving the utilization of the electricity system;
    - Reducing the risk of power shortages;
    - Supporting local businesses and stimulating economic development;
    - Enabling avoidance of the most controversial energy supply projects;
    - Reducing water consumption by power plants; and
    - Reducing pollutant emissions by power plants and improving public health.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-10 Transmission Capacity and Corridors

Policy Description:

Satisfying the long-term demand for electricity requires not only new generating capacity, along with demand-side measures, but also measures to improve transmission to reduce line losses, diminish bottlenecks, and enhance throughput. Advanced composite conductor technologies, capacitance technologies, grid management software, and other technologies may soon become available to increase transmission line carrying capacity as much as threefold. Entirely new transmission lines may also be necessary, although siting new transmission lines can be difficult due to their cost and their actual or perceived impact on health, environment, and the use, enjoyment, and value of property.

Policy Design:

The TWG suggested that all new construction and retrofit efforts on the transmission grid incorporate advanced composite conductor technologies, capacitance technologies, grid management software, and other technologies to increase throughput capacity. The TWG suggested a simple analysis accounting for the cost of new and retrofit transmission lines with this technology, and calculating resulting lower line losses and the accompanying reductions in GHG emissions that would result.

- **Goal levels**: As noted above.
- **Timing**: Paralleling forecast load growth.
- **Parties**: Transmission and distribution utilities.

Implementation method(s):

- Funding mechanisms and or incentives.
- Pilots and demonstration projects.
- Research and development.
- Codes and standards.

Related Policies/Programs in place:

- None cited.

Type(s) of GHG Benefit(s):

- CO_2: To the extent that avoiding line losses would reduce generation from coal and oil, CO_2 emissions would decrease.
- Black Carbon: To the extent that avoiding line losses would reduce generation from coal and oil, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-10	Transmission Capacity and Corridors	All new & retrofit transmission upgrades use new, higher capacity technologies	TBD	TBD	TBD	TBD	TBD

Data Sources, Methods and Assumptions (for quantified actions):

- Data Sources: TBD.
- Quantification Methods: TBD.
- Key Assumptions: TBD.

Key Uncertainties:

- TBD.

Contributing Issues, if applicable:

- Reductions in overall electricity generation through avoided line losses would lead to reductions in criteria air pollutants and, consequently, reduce health costs associated with those pollutants.

- Water use would also be lowered as a result of lower line losses, either through the avoidance of the need to construct new power plants or the reduction of generation demand at existing power plants.
- Increased efficiency in existing transmission lines may avoid the need to construct additional lines and their associated impacts.
- Increased line capacity could also benefit homeland security.

Feasibility Issues, if applicable:

None cited.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-11 CO2 Capture and Storage or Reuse (CCSR)

Policy Description:

CCAG Summary: Carbon capture and storage or reuse (CCSR) involves capturing carbon and either (1) sequestering it in a geologically sound reservoir or (2) reusing the carbon to aid in natural gas extraction or as a feedstock for industrial processes, and perhaps eventually as a feedstock that when combined with water can be reformed into liquid fuels. Carbon can and is captured in natural gas extraction; natural gas can have only up to 2.5% CO2, and some gas fields have a much higher concentration. Excess CO2 is removed and is currently typically emitted to the atmosphere. Carbon can also be captured in the process of gasifying coal to liquid fuels. This process is well established in the chemical industry and forms the basis for Integrated Gasification Combined Cycle electricity generating plants. Potentially, carbon could also be captured directly from the atmosphere.

Policies to encourage CCSR could include a state agency or department within an existing agency tasked with promoting CCSR, evaluation studies to identify geologically sound reservoirs, R&D funding to improve CCSR technologies, financial incentives to capture and store carbon or to capture and reuse it, and/or mandates to capture and store carbon or capture and reuse it.

Policy Design:

The TWG proposes to task a state agency (e.g., OCD, which has this regulatory authority) to provide technical resources for carbon sequestration, including an evaluation of suitable storage sites, and possibly the administration of financial incentives. The group has not decided whether implementation should include financial incentives, mandatory measures, or both. Further work is needed to identify regulatory, technical, and economic factors affecting the use of acid gas injection in New Mexico.

The group recommended separate analyses of CCSR for power plants and the oil and gas industry. With respect to the oil and gas industry, the group suggested focusing on capturing the CO2 currently being vented at natural gas processing plants and on acid gas reinjection at natural gas processing plants. In addition, carbon emissions from fluid catalytic cracking units at oil refineries should be evaluated. With respect to the electrical utility industry, the group recommended focusing on carbon sequestration from IGCC and advanced pulverized coal plants. The TWG did not offer any specific recommendations for quantification.

- **Goal levels**: TBD.
- **Timing**: TBD.

- **Parties**: As noted above.

Implementation method(s):

Likely mechanisms that could be used include:

- Education and information.
- Funding mechanisms and or incentives.
- Pilots and demonstration projects.
- Research and development.
- Codes and standards – Identification and elimination of regulatory obstacles; and/or development of regulatory mandates.

Related Policies/Programs in place:

New Mexico currently does not have any written policy encouraging the use of CCSR. However, New Mexico does have a regulation authorizing acid gas injection for the oil and gas industry, and has permitted acid gas injection wells in the Permian Basin. Moreover, New Mexico does have a policy, implemented through the air quality permitting process, requiring the consideration of IGCC as the best available control technology for new electrical generating units.

Type(s) of GHG Benefit(s):

- CO_2: If carbon were successfully stored in appropriate geological reservoirs, the net emission of carbon would be effectively zero. If carbon were reused to make liquid fuels, then when those fuels were combusted, there would be carbon emissions at a rate comparable to natural gas.
- Black Carbon: To the extent that coal would be gasified rather than combusted directly (as in the case of IGCC), black carbon emissions from the coal that would otherwise be combusted would be reduced or eliminated.

Estimated GHG Savings and Costs Per Ton:

			Reductions (MMTCO2e)		

#	Policy	Scenario	2012	2020	Cumulative Reductions (2007-2020)	NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
ES-11	CO2 Capture and Storage or Reuse (CCSR)	TBD	TBD	TBD	TBD	TBD	TBD

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: TBD.
- **Quantification Methods**: TBD.
- **Key Assumptions**: TBD

Key Uncertainties:

- TBD

Contributing Issues, if applicable:

- Implementing CCSR technology could lead to economic development within New Mexico, especially if New Mexico were to become a leader in these technologies and could export this expertise to other states and countries.
- Reusing carbon by reforming it into liquid fuels could provide New Mexico with an alternative industry to natural gas extraction as gas fields are depleted.
- During the process of gasification, many of the criteria air pollutants that would have resulted from direct combustion of coal could be eliminated, lowering health impacts and associated health costs.
- Acid gas injection can entirely eliminates the emission of sulfur dioxide and hydrogen sulfide removed from field gas.
- Acid gas injection can replace or reduce the capital and O&M costs associated with sulfur control equipment at natural gas processing plants.
- Storing carbon in geological reservoirs carries with it a risk that the carbon would eventually leak out. If this were to happen, carbon storage would serve only to delay carbon emissions. There is also a risk, though perhaps small, of a sudden release of carbon from reservoirs. If near populated areas, a sudden substantial release could be dangerous.

- If carbon dioxide could eventually be cost-effectively captured from the atmosphere for reuse as a fuel feedstock, in the very long term, this process could free all countries from the threat of fossil carbon resource depletion. This carbon recycling process would, of course, require an external non-carbon energy source.

Feasibility Issues, if applicable:

- TBD.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-12 Methane Reduction in Oil & Gas Operations (BMPs & PROs)

Policy Description:

CCAG Summary: *There are a number of ways in which methane emissions in the oil and gas industry can be reduced. Natural gas consists primarily of methane, so any leaks during production, processing, and transportation/distribution should be addressed. In addition to reducing potent GHG emissions, stopping these leaks is economically beneficial because it prevents the waste of valuable product. The EPA Natural Gas STAR program offers numerous methods of preventing leaks. These methods, called Best Management Practices (BMPs) and Partnership Reduction Opportunities (PROs), are divided by industry sub sector (production, processing, and transportation/distribution).*[10]

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The EPA Natural Gas STAR program offers numerous methods of preventing leaks. These methods, called Best Management Practices (BMPs) and Partnership Reduction Opportunities (PROs), are divided by industry sub sector: production, processing, and transportation/ distribution. Among the practices recommended are:

Preventive maintenance: Reduces emissions by improving the overall efficiency of the gas production and distribution system; minimizes the chance of leaks.

Reduce flashing losses: As the pressure on the liquid natural gas in a storage tank, well, compressor station, or gas plant drops, some of the lighter compounds dissolved in the liquid are released or "flashed." Some of the compounds that are liquids at the initial pressure/temperature transform from a liquid into a gas/vapor and are also released or "flashed" from the liquid. The flashed gas can be captured rather than vented to the atmosphere.

Replace wet seals with dry seals: Dry seals lead to fewer leaks than wet seals. Dry seals use high-pressure gas to seal the compressor and emit less methane, have lower power requirements, improve compressor and pipeline operating efficiency and performance, enhance compressor reliability, and require significantly less maintenance.

Compressor rod & ring replacement: Replacing worn compressor rod packing rings and rods results in operational benefits, reduced methane emissions, and cost savings. Gas leaks from

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[10] For a complete list, see http://www.epa.gov/gasstar/techprac.htm#tabnav

compressor rods represent one of the largest sources of emissions at natural gas compressor stations.

Low-bleed, air-based pneumatic devices: Replacing high-bleed devices with low-bleed devices, retrofitting, and improving the maintenance of high-bleed pneumatic devices are proven approaches to profitably reducing methane emissions. Natural gas emissions from pneumatic control devices are one of the largest sources of methane emissions in the natural gas industry.

Pump-down techniques prior to maintenance: Using fixed and portable compressors to lower pipeline pressure prior to maintenance and repair significantly reduces methane emissions and saves money. Pipeline pump-down techniques remove product from the section of pipeline under repair, thereby reducing the volume of natural gas vented to the atmosphere.

Venting deliquification: Venting deliquification occurs when natural gas is decompressed from liquid to gas. Some gas escapes to the atmosphere.

Policy Design:

The proposed policy action would implement all BMPs and PROs to achieve the following:

- **Goal levels:** As noted above.
    a. A 40-60% improvement in capturing vented methane is achieved by 2012.
    b. A 90-95% improvement in capturing vented methane is achieved by 2050.
- **Timing:** As noted above.
- **Parties:** Oil and gas production, processing, and transportation/distribution companies

Implementation method(s):

Policies to implement these practices could include:

- Information and education.
- Technical assistance.
- Funding mechanisms and/or incentives.
- Voluntary and or negotiated agreements.
- Codes and standards

Related Policies/Programs in place:

- Some companies practice the measures outlined above, but currently there is no state or federal requirement for any company to implement any of these practices.

Type(s) of GHG Benefit(s):

- CH_4: This policy could result in substantial reductions of methane emissions in the oil and gas industry.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-12a	Methane reductions in oil and gas operations through BMPs and PROs	40-60% reduction in vented methane by 2012	TBD	TBD	TBD	TBD	TBD
ES-12b	Methane reductions in oil and gas operations through BMPs and PROs	90-95% reduction in vented methane by 2050	TBD	TBD	TBD	TBD	TBD

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources:** TBD.
- **Quantification Methods:** TBD.
- **Key Assumptions:** TBD.

Key Uncertainties:

- TBD.

Contributing Issues, if applicable:

- Proportionally more natural gas would get to market rather than being consumed or lost in the production and distribution process.

- Companies could increase their sales, and possibly their profits, by selling rather than wasting valuable product.

Feasibility Issues, if applicable:

- TBD.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-13 CO2 Reduction from Fuel Combustion in Oil & Gas Operations

Policy Description:

<u>CCAG Summary:</u> There are a number of ways in which CO2 emissions in the oil and gas industry can be reduced, including (1) new efficient compressors, (2) optimize gas flow to improve compressor efficiency, (3) improve performance of compressor cylinder ends, (4) capture compressor waste heat, (5) replace compressor driver engines, and (6) waste heat recovery boilers. Policies to encourage these practices include education and information exchange, financial incentives, and mandates or standards that require certain practices.

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Given the wide range of costs and technologies involved the CCAG identified three key categories: (1) compressor efficiency improvements, (2) waste heat recovery for compressors and boilers, and (3) replacement of gas-driven compressors with electrical generators. Of these three categories, the focus should be efficiency improvements and waste heat recovery. Compressor replacement was considered a less fruitful area for analysis because of the high cost of new compressors relative to the GHG reduction potential (in part because switching the compressor fuel from gas to electricity simply moves the GHG production to another locale).

Policy Design:

Given the wide range of technologies and costs involved, analysis for this policy option focuses on three categories: (1) compressor efficiency improvements, (2) waste heat recovery for compressors and boilers, and (3) replacement of gas-driven compressors with electrical generators. Of these three, greatest focus should be on improving the efficiency of compressors, including the deployment of CHP systems that could sell excess power back to the grid.

- **Goal levels:** TBD.
- **Timing:** TBD.
- **Parties:** Oil and gas production, processing, and transportation/distribution companies

Implementation method(s):

Policies to implement these practices could include:

- Information and education.
- Technical assistance.
- Funding mechanisms and/or incentives.
- Voluntary and or negotiated agreements.
- Codes and standards

Related Policies/Programs in place:

- Some companies practice the measures outlined above, but there is currently no state or federal requirement for any company to implement any of these measures.

Type(s) of GHG Benefit(s):

- CO_2: CO_2 emissions would be reduced directly through the implementation of these measures

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-13	CO2 reduction from fuel combustion in oil & gas operations	TBD	TBD	TBD	TBD	TBD	TBD

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: TBD.
- **Quantification Methods**: TBD.
- **Key Assumptions**: TBD

Key Uncertainties:

- TBD.

Contributing Issues, if applicable:

- Proportionally more natural gas would get to market rather than being consumed or lost in the production and distribution process.
- Some of the criteria air pollutant emissions that would have resulted from less efficient compressors would be eliminated, lowering health impacts and associated health costs

Feasibility Issues, if applicable:

- TBD.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-14 GHG Cap & Trade

Policy Description:

CCAG Summary: *A cap and trade system is a market mechanism in which GHG emissions are limited or capped at a specified level, and those participating in the system can trade permits (a permit is an allowance to emit one ton of CO2). By allowing trading, participants with lower costs of compliance can over comply and sell their additional reductions to participants for whom compliance costs are higher. In this fashion, overall costs of compliance are lower than they would otherwise be.*[11] *Among the important considerations for New Mexico with respect to a cap and trade program are the sources and sectors to which it would apply, the level of the cap, how allocations would be distributed, what offsets would be allowed, and over what region the program would be implemented (e.g., nationally, regionally, etc.), and whether tribally-operated facilities would be included.*

A cap and trade system is a market mechanism in which GHG emissions are limited or capped at a specified level, and those participating in the system can trade permits (a permit is an allowance to emit one ton of CO2). By allowing trading, participants with lower costs of compliance can over comply and sell their additional reductions to participants for whom compliance costs are higher. In this fashion, overall costs of compliance are lower than they would otherwise be.

For every ton of CO2 released, an emitter must hold a permit. Therefore, the number of permits issued or allocated is, in effect, the cap. The government can give permits away for free according to any one of many different criteria to those participating in the cap and trade system (or even to those who are not), auction them, or some combination of the two. Participants can range from a small group within a single sector to the entire economy, and the compliance obligation can be implemented "upstream" (at the fuel extraction or import level) or "downstream" at points of fuel consumption.

Among the important considerations for New Mexico with respect to a cap and trade program are: the sources and sectors to which it would apply; the level and timing of the cap; how allocations would be distributed (e.g., whether load-based or generation-based, how new market entrants are accommodated, how leakage is addressed, etc.); what if any offsets would be allowed; over what region the program would be implemented (e.g., nationally, regionally, etc.); and whether tribally-operated facilities would be included. Other issues to consider include: which GHGs are covered; whether there is linkage to other trading programs; banking and

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[11] The Climate Action Team in California recently assembled a good discussion of cap and trade design issues. It can be referenced at: http://www.climatechange.ca.gov/climate_action_team/reports/2005-12-08_CAP+TRADE_REPORT.PDF

borrowing; early reduction credit; and what if any incentive opportunities (e.g., interaction with other pollution regulations like Pennsylvania's EDGE program) may be included.

Policy Design:

The TWG recommends that any cap and trade program be preferentially implemented on a national or regional (i.e., multi-state) basis. Analysis of this policy option should: (a) incorporate the Governor's targets as the cap; (b) evaluate such a cap on a national basis, over the Western Electric Coordinating Council (WECC) states (subject to minor variations as needed to facilitate analysis), and a sub region of the WECC states selected so as to minimize leakage; and if possible, (c) consider how California's new power procurement requirements would factor into the program. With respect to (b), this evaluation consider alternative programs which cover: (1) all sectors (i.e., an economy-wide approach), and (2) the power sector alone. It is important to note that the purpose of analyzing a cap and trade program within the scope of the CCAG process is to assess the GHG reductions and costs (or cost savings) of such a policy, not to define the details of a prospective regulatory program.

- **Goal levels:** As noted above.
- **Timing:** Assess the cap and trade program as starting in 2010.
- **Parties:** As noted above.

Implementation method(s):

- Market based mechanism with underlying regulatory obligation.

Related Policies/Programs in place:

- No GHG cap and trade program is currently in place in New Mexico or the WECC region.

Type(s) of GHG Benefit(s):

- CO_2: A cap and trade system is likely to be implemented – at least initially – as a direct limit on CO_2 emissions. The level at which the cap is set and how effectively the program addresses leakage risks would determine CO_2 reductions.
- CH_4, N_2O, HFC's, and SFC's could also be reduced under a cap and trade program, which covers multiple GHGs.
- Black Carbon: To the extent that generation from coal and oil would decline under a cap and trade system, black carbon emissions would also decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-14a	GHG Cap and Trade Program	2.4% - 2.8% CI, $6.16 - $9.86 safety valve	-0.1	1.0	3.6	25	7
ES-14b	GHG Cap and Trade Program	2.6% - 3.0% CI, $8.83 - $14.13 safety valve	0.1	1.0	4.2	42	10
ES-14c	GHG Cap and Trade Program	2.8% - 3.5% CI, $22.09 - $35.34 safety valve	-0.1	8.1	31.3	541	17
ES-14d	GHG Cap and Trade Program	3.0% - 4.0% CI, $30.92 - $49.47 safety valve	0.1	9.1	43.5	804	19

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: Data for the electricity modeling done in this analysis comes from the US Energy Information Administration (EIA) and can be found within the National Energy Modeling System (NEMS). Data in NEMS includes representation of the existing generation, transmission and distribution system down to the unit level. NEMS also includes data that characterizes new plants that the model can choose to build to meet projected demand growth. EIA publishes Assumptions to the Annual Energy Outlook that details key assumptions in the current version of the model. EIA also publishes NEMS model documentation.
- **Quantification Methods**: The modeling presented here was done by the Energy Information Administration in a Congressional Service Report from March 2006 entitled “Energy Market Impacts of Alternative Greenhouse Gas Intensity Reduction Goals.” The scenarios are listed above and are for national cap and trade policies. We scaled the impacts to approximate results in New Mexico for the four scenarios presented here in the same way that we analyzed the NEMS modeling done specifically for this process. For the cap and trade scenarios, we approximated the cost of the policies by multiplying CO2 reductions by one-half of the market price for CO2 allowances. (The allowance price is the marginal price of allowances needed to produce the reported emission reductions; the actual cost of each ton of reductions ranges from zero up to the price of allowances. For simplicity, we assume that the

actual cost is an average of the high (market clearing price) and low (zero) cost of reductions, which equals one-half of the market clearing price). We report costs as a net present value of the stream of costs from 2006 – 2020. We found the number of tons reduced by taking the difference between the emissions in the policy case and a reference case NEMS run. Because the NEMS model is a national model with multi-state regions (New Mexico is within the Rocky Mountain Power Area), the results for New Mexico were derived from results in the region. We shared out the regional emission and cost results according to the share of New Mexico generation within the region.

- **Key Assumptions**: Any analysis of state-level policies using the National Energy Modeling System (NEMS) from the US Energy Information Administration should be weighed carefully. NEMS is a national model that consists of 13 regions. State policies cannot be implemented explicitly within NEMS, and the state-specific impacts cannot be known explicitly. We must make assumptions about the impact of policies at the state level by sharing out regional results.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- The shift from fossil fuel generation which could result from a GHG cap and trade program would lead to reductions in criteria air pollutants and, consequently, reduce health impacts and associated health costs.
- Allowing “offsets” from outside the capped sector(s) would create an incentive to quantify and reduce GHG emissions from sources in other sectors.

Feasibility Issues, if applicable:

- The TWG has consistently expressed grave feasibility concerns about a cap and trade program implemented solely within New Mexico.
- Any cap and trade program for New Mexico should account for and incorporate sources that are currently subject to substantially different regulatory regimes (e.g., traditional, tribal, and co-ops).

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-15 Generation Performance Standard

Policy Description:

<u>CCAG Summary:</u> A generation performance standard (GPS) is typically a requirement that electricity utilities or load serving entities (LSE) sell electricity with an average emission rate below a specified mandatory standard. Utilities must take action to ensure that their generation mix meets the standard.

A generation performance standard (GPS) is typically a requirement that electricity utilities or load serving entities (LSE) sell electricity with an average emission rate below a specified mandatory standard. Utilities must take action to ensure that their generation mix meets the standard.

A variation of a GPS would be to allow generators with emission rates lower than the GPS to sell their extra "credits" to with generators with emission rates higher than the GPS.

A third variation of a GPS is to establish the standard and allocate allowances based on that standard every year. In this variation, as electricity generation increases, plants would receive more permits. Utilities could trade permits in order to achieve the standard, but there would be no fixed cap on emissions. This variation provides a financial incentive (via the trading) for generators to reduce emissions so that they can sell unneeded permits to generators who have high emissions.

Policy Design:

Develop a GPS applicable only to new generation (both to meet demand growth as well as to replace retiring generation capacity). As new capacity comes on-line, those plants would receive an allocation based on the GPS standard. Utilities could trade permits in order to achieve the standard, but there would be no fixed cap on emissions. The GPS level would be equivalent to GHG emissions from a new natural gas combined cycle plant. Assessment of this option should consider that new electricity demand might be served, at least in part, by out-of-state resources. Accordingly, analysis of this option should consider how a GPS policy might affect decisions to build new capacity inside or outside of New Mexico.

- **Goal levels:** Set a GPS equivalent to a new natural gas combined cycle plant applicable to new supply, whether generated in New Mexico or imported.
- **Timing:** As new generation capacity is built or power is imported.
- **Parties:** Utilities (electricity generators).

Implementation method(s):

- Codes and standards.
- Market based mechanisms with underlying regulatory obligation.

Related Policies/Programs in place:

- No GPS system is in place in New Mexico.

Type(s) of GHG Benefit(s):

- CO2: A GPS program is typically a direct limit on CO2 emissions. The level of the standard would determine CO2 reductions.
- CH4, N2O, HFC's, and SFC's could also be reduced under a GPS program, which covers multiple GHGs.
- Black Carbon: To the extent that generation from coal and oil would decline under a GPS program, black carbon emissions would also decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2007–2020) $ Millions	Cost-Effective-ness $/tCO2
			2012	2020	Cumulative Reductions (2007-2020)		
ES-15	Generation Performance Standard	All new supply (generated or imported) must be as clean as NGCC	3.1	3.1	45	269	6

Data Sources, Methods and Assumptions (for quantified actions):

- **Data Sources**: CDEAC, WECC, EIA, EPA, "*Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts*" by Sargent & Lundy.
- **Quantification Methods**: A simple capacity expansion model was developed in Excel specifically for this policy option. Renewable and fossil technologies were characterized in terms of cost and operating profiles, and available resources in the state were also defined. Technologies include three classes of wind, concentrating solar power, geothermal, biomass,

landfill gas, conventional coal, integrated gasification combined cycle with carbon capture and storage (IGCC with CCS), and natural gas combined cycle (NGCC). The reference case forecast of electricity generation was the starting point for this analysis. We assumed that existing resources would continue to operate in the state over the analysis period. We subtracted generation from existing resources from the reference forecast of total generation to find a new generation forecast. The model then found the least-cost mix of new generation needed, subject to the constraint that all new generation must have an equal or lower emission rate than new natural gas combined cycle plants. The model tracks cost and CO_2 emissions associated with new generation. We also ran the model without constraints to develop a reference case. We then calculate the difference in CO_2 emissions and total cost of generation between the policy case and the reference case. Those results are reported above.

- **Key Assumptions**: Cost and performance characteristics of generating technologies now and in the future; resource availability; no demand response as a result of policy; no transmission and distribution modeled.

Key Uncertainties:

- As with any assessment of the future, this analysis has many uncertainties. Key uncertainties are those related directly to the assumptions and quantification methods noted above. If those assumptions are incorrect, then the results would change. Other uncertainties include the forecast of the price of fossil fuels and the growth in the demand for electricity.

Contributing Issues, if applicable:

- TBD

Feasibility Issues, if applicable:

- TBD

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-16 Regulatory Reform for Electric Cooperatives

Policy Description:

As member-owned entities, electric cooperatives are often not considered to be bound by the same regulatory bargain as investor-owned utilities (IOUs). The latter enjoy monopoly status in the marketplace along with a guaranteed rate of return in exchange for close regulatory oversight to protect customers from undue market power. Electric cooperatives are not perceived as requiring similar regulatory oversight because their customers (coop members) are also owners and thus have an alternative regulatory mechanism available, i.e., election of their Boards of Directors.

As a result of this key regulatory difference, electric cooperatives are often not subject to the same regulations as IOUs, including state environmental regulations. (They are subject to federal environmental regulations.) Accordingly, the CCAG believes that it is worth considering limited reform of these provisions so that electric cooperatives face equivalent GHG reduction requirements as IOUs.

Policy Design:

Unless otherwise indicated, the analysis of all ES policy options addresses generation statewide, thus including electricity generated at tribally owned or operated facilities and electric cooperatives. This approach enables consideration of policy options to apply equally across the board; remaining cognizant that final implementation of such options is likely to vary among IOUs, tribal facilities, and cooperatives. Accordingly, this policy option should be considered a non-quantified *enabling policy* for the electric cooperative-related GHG emission reductions and costs that are already quantified within other ES policy options. Including such quantification here is less appropriate than under a specific policy option itself, even though both the policy option and the enabling dynamic would indeed be necessary for implementation. To include GHG reductions and costs in both places would double-count those reductions and costs.

- **Goal levels:** Not applicable to an enabling policy.
- **Timing:** Efforts to implement this enabling policy should proceed as rapidly as possible.
- **Parties:** Electric cooperatives.

Implementation method(s):

- Legislation – Regulatory reform of electric cooperatives with respect to environmental issues is likely to require statutory change.

Related Policies/Programs in place:

- Electric cooperatives in New Mexico are currently subject to less or no PRC oversight as compared to investor-owned utilities.

Type(s) of GHG Benefit(s):

- CO_2: To the extent that generation from coal and oil would decline as a result of regulatory reform of electric cooperatives, CO_2 emissions would decrease.
- Black Carbon: To the extent that generation from coal and oil would decline as a result of regulatory reform of electric cooperatives, black carbon emissions would also decrease.

Estimated GHG Savings and Costs Per Ton:

Not applicable.

Data Sources, Methods and Assumptions (for quantified actions):

Not applicable.

Key Uncertainties:

- Specific reforms necessary to enable full implementation of the CCAG's selected policies will require a thorough legal review and investigation after the CCAG's policy recommendations are finalized.

Contributing Issues, if applicable:

- Any shift from fossil fuel generation that would result from regulatory reform of electric cooperatives would lead to reductions in criteria air pollutants and, consequently, health impacts and costs associated with those pollutants.

Feasibility Issues, if applicable:

Not applicable.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.