

Table 1.
Energy Supply Technical Work Group
Summary List of Policy Options

#	Policy Name	GHG Savings (MMtCO ₂ e)				Cost Effectiveness (NPV \$/tCO ₂ e)	Quant. Status
		2010	2020	2030	Total		
ES-1	Mandate(s) for Renewable Energy (RPS, etc.)						Complete
ES-1a	10% in 2011, 0.5% increase p.a. to 2021	1.1	1.4	6.1	49.8	-10.5	
ES-1b	10% in 2011, 1% increase p.a. to 2021	1.1	3.7	9.1	76.7	-1.4	
ES-1c	10% in 2011, 2% increase p.a. to 2021	1.0	5.4	9.5	103.7	-5.9	
ES-2	Financial Incentives for Distributed Renewables						Pending
ES-3	Renewable Energy Transmission and Storage	0.5	6.4	8.6	98.5	11.5	Complete
ES-4	Financial Incentives for Centralized Renewables	-0.5	9.2	18.8	191.6	26.5	Complete
ES-5	R&D including Energy Storage						Pending
ES-6	Advanced Coal/Fossil Technologies (e.g., IGCC with carbon capture)	0.0	4.8	11.9	102.6	10.2	Pending
ES-7	Nuclear Relicensing & Upgrading						NQ
ES-8	Incentives and Barrier Reductions for Combined Heat & Power (CHP)	0.6	3.4	8.4	79.6	-22.8	Complete
ES-9	Demand-Side Management, Energy Efficiency, and Integrated Resource Planning (IRP)						RCI
ES-10	Transmission Capacity and Corridors						Pending
ES-11	CO ₂ Capture and Storage or Reuse (CCSR) in oil & gas and other operations; includes storage or reuse of power sector CO ₂ (see ES-6)						Pending

#	Policy Name	GHG Savings (MMtCO ₂ e)				Cost Effective-ness (NPV \$/tCO ₂ e)	Quant. Status
		2010	2020	2030	Total		
ES-12	Methane reduction in oil & gas operations – Best Management Practices (BMPs) & Partner Reduction Opportunities (PROs)						Pending
ES-13	CO2 reduction from fuel combustion in oil & gas operations						Pending
ES-14	GHG Cap & Trade						Draft
ES-14a	2.4% - 2.8% CI, \$6.16 - \$9.86 safety valve	-0.1	1.0	3.2	24.09	5	
ES-14b	2.6% - 3.0% CI, \$8.83 - \$14.13 safety valve	0.1	1.0	7.6	35.77	7	
ES-14c	2.8% - 3.5% CI, \$22.09 - \$35.34 safety valve	-0.1	8.1	23.1	186.3	16	
ES-15d	3.0% - 4.0% CI, \$30.92 - \$49.47 safety valve	0.1	9.1	26.7	211.0	20	
ES-15	Generation Performance Standard						Pending
ES-16	Regulatory reform for electric cooperatives						NQ

Description of Energy Supply Policy Options

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

Option Category:

Quantify for TWG review.

Policy Description:

CCAG Summary: 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 (MMTCO ₂ e)			NPV (2006–2020) \$ millions	Cost-Effectiveness \$/tCO ₂
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-1	Mandate(s) for Renewable Energy (RPS, etc.), ES-1a	0.5 % per year 2011-2021	x	x	x	x	x
ES-1	Mandate(s) for Renewable Energy (RPS, etc.), ES-1b	1% per year 2011-2021	x	x	x	x	x
ES-1	Mandate(s) for Renewable Energy (RPS, etc.), ES-1c	2% per year 2011-2021	x	x	x	x	x

Data Sources, Methods and Assumptions:

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review (jointly with RCI).

Policy Description:

CCAG Summary: 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

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.

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.

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 (2006–2020) \$ millions	Cost-Effectiveness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-2	Financial Incentives for Distributed Renewables, ES-2a	Payback = 25 years (PV only, PNM only)	x	x	x	x	x
ES-2	Financial Incentives for Distributed Renewables, ES-2b	Payback = 25 years (PV, wind and biomass; all utilities)	x	x	x	x	x
ES-2	Financial Incentives for Distributed Renewables, ES-2c	Payback = 10 years (PV, wind and biomass; all utilities)	x	x	x	x	x
ES-2	Financial Incentives for Distributed Renewables, ES-2d	Payback = 3 years (PV, wind and biomass; all utilities)	x	x	x	x	x

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review.

Policy Description:

CCAG Summary: 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 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.

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:

				Reductions (MMTCO2e)
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#	Policy	Scenario	2010	2020	Cumulative Reductions (2006 - 2020)	NPV (2006–2020) \$ millions	Cost-Effectiveness \$/tCO2
ES-3	Renewable Energy Transmission & Storage, ES-3a	An additional 4000 MW of wind power is built by 2020	x	x	x	x	x
ES-3	Financial Incentives for Distributed Renewables, ES-3b	An additional 2000 MW of wind power is built by 2020	x	x	x	x	x

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review.

Policy Description:

CCAG Summary: 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

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.

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 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 (MMTCO ₂ e)			NPV (2006–2020) \$ millions	Cost-Effectiveness \$/tCO ₂
			2010	2020	Cumulative Reductions (2006 - 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.	x	x	x	x	x

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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)

Option Category:

Quantify for TWG review.

Policy Description:

CCAG Summary: 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.

- **Goal levels:** GHG reductions and costs (or cost savings) of R&D programs are generally difficult to quantify. Adequate information may exist to quantify costs and reductions associated with compressed air storage, however.
- **Timing:** TBD.
- **Parties:** The State of New Mexico would implement a 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):

- CO2: By funding R&D for renewables, more renewable energy would eventually come on-line and displace fossil fuel resources and, thereby 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 (2006–2020) \$ millions	Cost-Effectiveness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-5	Research & Development	TBD	x	x	x	x	x

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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)

Option Category:

Quantify for TWG review.

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 be 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

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.

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 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):

- **CO₂:** By requiring that a certain percentage of coal be generated using IGCC with CCSR, a direct reduction in CO₂ 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 (MMTCO ₂ e)			NPV (2006–2020) \$ millions	Cost- Effective- ness \$/tCO ₂
			2010	2020	Cumulative Reductions (2006 - 2020)		

ES-6	Advanced Coal/Fossil Technologies, ES-6a	All new coal plants would be IGCC with CCSR at 60%	X	X	X	X	X
ES-6	Advanced Coal/Fossil Technologies, ES-6b	All new coal plants would be IGCC with CCSR at 90%	X	X	X	X	X

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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 & Upgrading

Option Category:

Draft recommendation without quantification.

Policy Description:

Nuclear relicensing extends the life of existing nuclear facilities. Upgrading 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 upgrading 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 upgrading 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 upgrade 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.

Additional Benefits and Costs, 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)

Option Category:

Quantify for TWG review jointly with RCI.

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 & 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:** See 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 barriers 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:

			Reductions (MMTCO2e)		
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#	Policy	Scenario	2010	2020	Cumulative Reductions (2006 - 2020)	NPV (2006–2020) \$ millions	Cost-Effectiveness \$/tCO2
ES-8	Incentives and Barrier Reductions for CHP, ES-8a	CHP penetration ramps up from 2008 to 2020 to equal 3% of total fossil generation	X	X	X	X	X
ES-8	Incentives and Barrier Reductions for CHP, ES-8b	CHP penetration ramps up from 2008 to 2020 to equal 1.5% of total fossil generation	X	X	X	X	X

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review jointly with RCI.

Policy Description:

CCAG Summary: 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 almost completely RCI option RCI-1, Demand-Side Management and Energy Efficiency Programs.

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,⁷ along with a

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.

⁷ “Leading utilities such as California’s investor-owned utilities, Austin Energy, Puget Sound Energy, and Seattle City Light are spending at least 2% of their revenues on energy efficiency and load management programs. These programs are cutting electricity use by 0.8-1.0% per year, from efficiency measures installed each year (i.e., the programs would reduce electricity use by 8-10% from cumulative efforts over ten years). California and Texas have set energy savings targets for their electric utilities. In

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.
- 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 possible⁸, including various combinations of energy savings targets, utility spending targets, public benefit charges⁹, 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.

addition, utilities in Hawaii and Nevada may use energy savings from efficiency measures to meet at least a portion of their clean energy requirements. Funding for these programs is typically provided through utility rates and/or tariff riders. Some states, including California, Montana, and Oregon, have created a funding mechanism via a separate surcharge known as a public benefits fund. Most of the programs are saving electricity at a total cost of 2-3 cents per kWh saved.” Page xx.

⁸ For an overview of activity in other states, see USDOE/DSIRE summary tables <http://www.dsireusa.org/summarytables/>

⁹ 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.

Policy Design:

The ES TWG and RCI TWG 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:¹⁰

- **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:** TBD.
- **Timing:** TBD.
- **Parties:** TBD.

Implementation method(s):

¹⁰ 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.

- TBD.

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.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review.

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 and bottlenecks and enhance throughput. Entirely new transmission capacity may also be necessary, though 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 that may become available to increase transmission line carrying capacity as much as threefold. The group 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 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 demos
- Research and development
- Codes and standards

Related Policies/Programs in place:

- None cited.

Type(s) of GHG Benefit(s):

- CO2: To the extent that generation from coal and oil would be reduced by avoiding line losses, CO2 emissions would decrease.
- Black Carbon: To the extent that generation from coal and oil would be reduced by avoiding line losses, black carbon emissions would decrease.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2006– 2020) \$ millions	Cost- Effective- ness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-10	Transmission Capacity and Corridors	All new & retrofit transmission upgrades use new, higher capacity technologies	x	x	x	x	x

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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)

Option Category:

Quantify for TWG review.

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 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):

- CO2: 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:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2006– 2020) \$ millions	Cost- Effective- ness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		

ES-11	CO2 Capture and Storage or Reuse (CCSR)	TBD	x	x	x	x	x
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Data Sources, Methods and Assumptions (for quantified actions):

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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)

Option Category:

Quantify for TWG review.

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 subsector (production, processing, and transportation/distribution).¹¹

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; therefore, any leaks during production, processing, and transportation/ distribution should be addressed. In addition to reducing 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 subsector: 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.

¹¹ For a complete list, see <http://www.epa.gov/gasstar/techprac.htm#tabnav>

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 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):

- CH4: 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 (2006–2020) \$ millions	Cost-Effectiveness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-12	Methane reductions in oil and gas operations through BMPs and PROs, ES-12a	40-60% reduction in vented methane by 2012	X	X	X	X	X
ES-12	Methane reductions in oil and gas operations through BMPs and PROs, ES-12b	90-95% reduction in vented methane by 2050	X	X	X	X	X

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review.

Policy Description:

CCAG Summary: 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.

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.

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):

- CO2: CO2 emissions would be reduced directly through the implementation of these measures.

Estimated GHG Savings and Costs Per Ton:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2006– 2020) \$ millions	Cost- Effective- ness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-13	CO2 reduction from fuel combustion in oil & gas operations	X	X	X	X	X	X

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review (jointly with RCI).

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.¹² 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 overcomply 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.

¹² 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

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 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 CCAG 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 subregion of the WECC states selected so as to minimize leakage; and if possible, (c) see 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:** TBD.
- **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):

- CO₂: A cap and trade system is likely to be implemented – at least initially – as a direct limit on CO₂ emissions. CO₂ reductions would be determined by the level at which the cap is set and how effectively leakage risks are addressed by the program.
- CH₄, N₂O, 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 (2006–2020) \$ millions	Cost-Effective-ness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-14	GHG Cap and Trade Program	TBD (multiple scenario rows are likely...)	X	X	X	X	X

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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:

- TBD.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.

ES-15 Generation Performance Standard

Option Category:

Quantify for TWG review.

Policy Description:

CCAG Summary: 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 is to incorporate the standard within a cap and trade system in which permits are allocated by dividing the total cap by the total number of MWhs generated to arrive at the generation performance standard. Permits are then given to each participant based on its own generation (i.e., output) multiplied by the performance standard. Generators with emission rates lower than the GPS would receive more allowances than they need. Generators with emission rates higher than the GPS would receive fewer allowances than they need. As electricity generation increases, everything else being equal, the number of permits per MWh would decline because of the cap.

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. CO2 reductions would be determined by the level of the standard.
- **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 (2006–2020) \$ millions	Cost-Effectiveness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-15	Generation Performance Standard	All new supply (generated or imported) must be as clean as NGCC	X	X	V	2980	29

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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

Option Category:

Quantify for TWG review.

Policy Description:

CCAG Summary: Electric cooperatives in New Mexico currently ...

Regulation of electric cooperatives in New Mexico currently... Regulatory reform to make electric cooperatives subject to PRC regulations (or otherwise be required to reduce GHG emissions to a degree equal to PRC-regulated utilities) would ...

Policy Design:

Assume that regulatory reform occurs whereby New Mexico's electric cooperatives would either be subject to PRC requirements for GHG reductions from utilities or would otherwise be compelled to accomplish equivalent GHG reductions.

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

Implementation method(s):

- Information and education
- Technical assistance
- Funding mechanisms and/or incentives
- Voluntary and/or negotiated agreements
- Codes and standards
- Market based mechanisms
- Pilots and demos
- Research and development
- Reporting

- Registry
- Other?

Related Policies/Programs in place:

- Electric cooperatives in New Mexico are currently regulated differently than investor-owned utilities.
- **XX<<< Are NM electric coops subject to ANY PRC oversight? >>>XX**

Type(s) of GHG Benefit(s):

- CO2: To the extent that generation from coal and oil would decline as a result of regulatory reform of electric cooperatives, CO2 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:

#	Policy	Scenario	Reductions (MMTCO2e)			NPV (2006– 2020) \$ millions	Cost- Effective- ness \$/tCO2
			2010	2020	Cumulative Reductions (2006 - 2020)		
ES-16	Regulatory reform for electric cooperatives	X	X	X	X	X	X

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

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

Key Uncertainties:

- TBD.

Additional Benefits and Costs, 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:

- TBD.

Status of Group Approval:

Pending.

Level of Group Support:

TBD.

Barriers to consensus (if less than unanimous consent):

TBD.