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Residential, Commercial, and Industrial Technical Work Group

Summary List of Recommended ~~Draft~~ Priority Policy Options for Analysis

Option No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value 2008–2020 (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2012	2020	Total 2008–2020			
RCI -1	Improved Building Codes for Energy Efficiency						Pending
RCI -2	Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity and Natural Gas (including expansion of existing programs and peak load reduction)						Pending
RCI -3	Low-cost loans for energy efficiency						Pending
RCI -4	Improved design, construction, appliances, and lighting in new and existing state and local government buildings, "Government Lead-by-example"						Pending
RCI -5	Energy Efficiency and Environmental Impacts Awareness and Instruction in School Curricula (4.2)						Pending
RCI -6	Promotion and Incentives for Improved Design and Construction (e.g. LEED, green buildings, or minimum % improvement better than code) in the Private Sector (2.2)						Pending
RCI -7	More Stringent Appliance/Equipment Efficiency Standards *(state-level, or advocate for regional or federal-level standards)* (3.1)						Pending
RCI -8	Rate structures and Technologies to Promote Reduced GHG Emissions (including inverted block rates) (5.3)						Pending
RCI -9	GHG or Carbon Tax (7.2)						Pending

RCI -10	White Roofs, Rooftop Gardens, Landscaping (including Shade Tree Programs), and solar electric panels. (8.1)						N/A
RCI -11	Energy Efficiency Resource Standard (EERS)						Pending
RCI-12	Phase out incandescent light bulbs in state (3.3)						Pending
	Sector Total After Adjusting for Overlaps						
	Reductions From Recent Actions						
	Sector Total Plus Recent Actions						

~~Draft Option #~~	~~Draft Policy Option Name~~	~~Straw Proposal Volunteers~~	~~Possible Reference Policies~~
~~RCI-1~~	~~Improved Building Codes for Energy Efficiency (2.1)~~	~~Mike Mallinoff (L), Walt Auburn~~	~~AZ (RCI-4)~~ ~~CO (RCI-3)~~ ~~MT (RCI-4)~~ ~~NC (RCI-6)~~ ~~NM (RCI-7A)~~
~~RCI-2~~	~~Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity and Natural Gas (including expansion of existing programs and peak load reduction) (1.1, 1.2)~~	~~Matthias Ruth (L), Walt Auburn, Julian Levy~~	~~AZ (RCI-1)~~ ~~CO (RCI-1)~~ ~~MT (RCI-1)~~ ~~NC (RCI-1 and RCI-2)~~ ~~NM (RCI-1 and RCI-2)~~
~~RCI-3~~	~~Low-cost loans for energy efficiency (1.5)~~	~~Draft developed by CCS~~	~~CO (RCI-2, gov't buildings only)~~ ~~MT (RCII-11)~~
~~RCI-4~~	~~Improved design, construction, appliances, and lighting in new and existing state and local government buildings, "Government Lead-by-example" (2.3, 3.4)~~	~~Mike Mallinoff (L)~~	~~AZ (RCI-2, RCI-5)~~ ~~CO (RCI-4)~~ ~~MT (RCI-12)~~ ~~NC (RCI-3)~~ ~~NM (RCI-8A)~~
~~RCI-5~~	~~Energy Efficiency and Environmental Impacts Awareness and Instruction in School Curricula (4.2)~~	~~Dr. Michelle Harris Bondima (L), Dr. Paul Chan, John Kumm~~	~~AZ (CC-4, statewide, includes schools)~~ ~~NC (RCI-8, statewide, includes schools)~~ ~~NM (RCI-12)~~
~~RCI-6~~	~~Promotion and Incentives for Improved Design and Construction~~	~~John Kumm (L)~~	~~AZ (RCI-5)~~

Draft Option #	Draft Policy Option Name	Straw Proposal Volunteers	Possible Reference Policies
	(e.g. LEED, green buildings, or minimum % improvement better than code) in the Private Sector (2.2)		CO (RCI-4) MT (RCI-5) NC (RCI-7) NM (RCI-8B)
RCI-7	More Stringent Appliance/Equipment Efficiency Standards *(state-level, or advocate for regional or federal-level standards)* (3.1)	Draft developed by CCS	AZ (RCI-3) MT (RCI-1) NC (RCI-5) NM (RCI-4)
RCI-8	Rate structures and Technologies to Promote Reduced GHG Emissions (including inverted block rates) (5.3)	John Kumm (L), Brad Heavner	AZ (RCI-8) CO (RCI-11) MT (RCI-13) NM (RCI-6)
RCI-9	GHG or Carbon Tax (7.2)	Matthias Ruth (L), Brad Heavner, Julian Levy	MT (RCI-9)
RCI-10	White Roofs, Rooftop Gardens, Landscaping (including Shade Tree Programs), and solar electric panels. (8.1)	Scott Sklar (L)	
RCI-11	Energy Efficiency Resource Standard (EERS)	Walt Auburn, Brad Heavner (L)	See MD RCI-2.
RCI-12	Phase out incandescent light bulbs in state (3.3)	Brad Heavner (L)	

Note: The numbering used to denote the above policy options is for reference purpose only; it does not reflect prioritization among these important policy options. Numbering of recommended priority policy options for analysis has been changed to reflect MWG modifications (recommended priority policy options RCI-4 and RCI-5 were merged; RCI-8 moved to the TLU TWG, and the remaining policies moved up in number).

The following straw proposals reflect consensus positions of the RCI TWG and do not necessarily represent the views of the individual members.

RCI-1. Improved Building and Trade Codes for Energy Efficiency

Policy Description

High Performance Building codes for energy and efficiency specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing a major renovation and/or additions. According to the EPA, December 2004, in the United States buildings account for 39% of the total energy use, 12% of the water consumption, 68% of the electricity consumption and 38% of the total carbon dioxide emissions. Given the long lifetime of most buildings, amending state and/or local building codes to include minimum energy efficiency requirements and periodically updating energy efficiency codes could provide long-term GHG savings. Implementation of building energy codes, particularly when outside of urban centers, can require additional resources.

This policy involves increasing standards for the minimum performance of new and substantially renovated commercial and residential buildings. Other aspects of the policy design include:

- Undertaking a comprehensive review of existing State and local building and trades codes in Maryland to determine where increased energy efficiency can be achieved.
- Developing a training and certification program for code officials and contractors on energy efficiency and related Green building and trade codes, and in code enforcement.
- Providing tools to state and local governments for measurement and tracking of cost savings.
- Establishing specific goals for the size of building to be included, e.g. using Montgomery County Bill 17-06 as a model.
- Allowing compliance flexibility. New and substantially renovated buildings can utilize a combination of increased energy efficiency, switching to low and no carbon based fuels for previously carbon based end-uses, off-site purchases on grid supplied "green power" and/or installing on-site off-grid power generating equipment.
- Working with financial institutions to develop loan tools for these programs including non-traditional off-grid low and carbon neutral energy sources.

Other p~~P~~otential elements of this ~~a~~ policy ~~to~~ include ~~building codes include~~:

- Requiring~~e~~ high-efficiency appliances in new construction and retrofits.
- ~~Training and Certification of building and trades code and other officials in energy code enforcement.~~

- Strengthening regional partnerships like NEEP (Northeast Energy Efficiency Partnership) to assure consistency and economies of scale, or adopting CA or ASHRAE standards. Any rule considered by Maryland should include future incorporation by reference language in the statute or regulation to avoid having to re-open the rule each time the referenced body changes or improves its code.

Potential measures supporting this option can include consumer education, improved enforcement of building codes, training and certification for builders and contractors, and development of a clearinghouse for information on and to provide access to software tools to calculate the impact of energy efficiency and solar technologies on building energy performance.

Policy Design

Goals:

- ~~Undertaking a comprehensive review of existing State and local building and trades codes in Maryland to determine where increased energy efficiency can be achieved.~~

- Increasing standards such as the minimum performance of new and substantially renovated commercial and residential buildings of at least 15 % by 2010 and 50% by 2020 and 100%, carbon neutral, by 2030.

- ~~In order to assist State and local governments in the implementation of these programs, which may cost more up front, develop the matrix and establish the tools for the measurement and tracking of cost savings, so as to understand the life cycle cost savings through the utilization of energy and efficiency codes. A recent survey by the World Business Council for Sustainable Development *Energy Efficiency in Buildings: Business Realities and Opportunities*, August 5, 2007, found that green construction costs are overestimated by 300%, as key industries in development estimate green costs as 17% over traditional whereby the study estimated the cost at only 5% above.~~

- ~~Establish specific goals for the size of building to be included, such as: 1. a new building with a least 10,000 square feet gross floor area (GFA); 2. a renovation or reconstruction of an existing building with at least 10,000 square feet GFA that alters more then 50% of the buildings GFA; and 3. An addition that doubles the buildings footprint and adds at least 10,000 square feet of GFA. See Montgomery County Bill 17-06. (See also State of Washington using the threshold of 5,000 square feet).~~

- ~~The 2030 carbon neutral goal, based on Architecture 2030, can be reached for new and substantially renovated buildings by utilizing a combination of increased energy efficiency, switching to low and no carbon based fuels for previously carbon based end-uses, off-site purchases on grid supplied "green power" and/or installing on-site off-grid power generating equipment.~~

- ~~Establish in-door air quality standards, construction waste management and recycling plans and HVAC and lighting standards, including but not limited to energy efficiency and occupant health and safety.~~

- Mandating the periodic and regular (no less than every 3 years) review and adoption of State and local building and trades codes, particularly energy efficiency requirements, to ensure best management practices. At least every three years, the state will review (with opportunity for public comment) and adopt the more stringent of the ICC or ASHRAE standards for energy efficiency.

- Developing a training and certification program for code officials and contractors on energy efficiency and related Green building and trade codes.

- ~~Based on the State's (MDE) Sediment and Erosion Control "Green Card" training and certification program, development a training and certification program for code officials and contractors on energy efficiency and related Green building and trade codes. This should be designed in concert with LEED certification program but perhaps less an intensive program oriented towards a blue collar work force. Funding should be set aside for training and education of building inspectors.~~

- ~~Work with financial institutions to develop loan tools for these programs including non-traditional off-grid low and carbon neutral energy sources.~~

Timing: See above goals. The building and trade related code, permitting and enforcement changes to take place during calendar year 2008.

Parties Involved:

- The Maryland Department of Housing and Community Development (DHCD) and Municipal and County code officials.
- Maryland Municipal League and Maryland Association of Counties.
- Maryland Home Builders and Realtors Associations.
- Non-affiliated private builders, engineers and tradesman.
- Citizen, consumer and community organizations.
- Electric, water and sewer utilities.
- Environmental advocacy organizations.
- Public Service Commission.
- **Other:** Indoor air quality standards, construction waste management and recycling plans and HVAC and lighting standards, including but not limited to energy efficiency and occupant health and safety, would be developed to complement energy efficiency codes.

Implementation Mechanisms

- **Education, Training, Certification and Technical Assistance:** Education, training and certification is expected to be a major component of improving building and trade codes. It will be necessary to develop enhanced State mandated training, education and certification for code officials, builders and tradesmen. Education and outreach are important so that consumers and constituents understand the benefits and cost savings for

these programs. The training and certification program for code officials and contractors would be based on the State's (MDE) Sediment and Erosion Control "Green Card" training and certification program. It should be designed in concert with a LEED certification program but be less intensive and oriented towards a blue collar work force. Funding should be set aside for training and education of building inspectors.

- **Review of existing building and trades codes:** The state should undertake a comprehensive review of existing State and local building and trades codes in Maryland to determine where increased energy efficiency can be achieved.
- **Size-specific goals:** Specific goals by building size can be developed. For example: 1. a new building with a least 10,000 square feet gross floor area (GFA); 2. a renovation or reconstruction of an existing building with at least 10,000 square feet GFA that alters more then 50% of the buildings GFA; and 3. An addition that doubles the buildings footprint and adds at least 10,000 square feet of GFA. See Montgomery County Bill 17-06. (See also State of Washington using the threshold of 5,000 square feet).
- **Compliance Flexibility:** The 2030 carbon neutral goal, based on Architecture 2030, can be reached for new and substantially renovated buildings by utilizing a combination of increased energy efficiency, switching to low and no carbon based fuels for previously carbon based end-uses, off-site purchases on grid supplied "green power" and/or installing on-site off-grid power generating equipment.
- **Statewide Code and Inspections Program.** Understanding the importance of local government adoption and control over code enforcement, there should be a minimum standard established statewide for related codes, permitting and inspection.
- **Utility Involvement and Assistance:** Consider using utility resources to help implement energy codes. This can include energy audits, reviewing and promoting energy codes, interconnection rules, tariffs and connection charges that encourage the construction and rehabilitation of buildings that incorporate energy efficiency.
- **Permitting and Fee Advantages.** Provide programs that speed the permit approval process and reduce the permit and impact fees related to construction to provide incentives to consumers and builders. This could include reduced building permit fees, reduced water and sewer fees and reduced impact fees.
- **Rewards Programs:** Develop systems and programs that reward "beyond code" energy efficiency and emissions reduction improvements, including "green mortgages," and additional floor area ratio and/or zoning density for construction that meets or exceeds energy efficiency programs. Work with financial institutions to develop loan tools for these programs, including non-traditional off-grid low and carbon neutral energy sources.
- **Property Tax Incentives:** Property tax adjustments that waive or decrease a portion or all of the taxes associated with new construction that meets or exceeds energy efficiency programs.

- **Increased Tax Incentives:** Develop incentives for building energy efficiency improvements.

Related Policies/Programs in Place

- **Building Codes:** Maryland has adopted the 2006 edition of the International Building Code. Many local governments, including the City of Annapolis, have adopted the 2006 edition of the International Energy Efficiency Code.
- **Legislative Action:** Local governments (see Montgomery County Bill 17-06 and Green Schools Focus, the City of Baltimore adopted, the City of Annapolis proposed) have proposed and adopted standards for building energy and efficiency.

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

Data Sources:

- BCAP Code Status Detail. Found at: http://www.bcap-energy.org/code_status.php?STATE_AB=MD.
- Maryland Additional State Info. Found at: http://www.energycodes.gov/implement/state_codes/state_stat_more.php?state_AB=MD
- World Business Council for Sustainable Development *Energy Efficiency in Buildings: Business Realities and Opportunities,* August 5, 2007

Quantification Methods:

- This analysis assumes that there are two goals: 1) to establish a 3-year cycle for building code updates and 2) to encourage voluntary participation in beyond code improvements to achieve the overall energy reduction goals.
- Energy use reductions from building code updates will be determined by increasing the percent energy reduction assumption for each building code improvement over time.
- The difference between the energy savings from building code updates and the energy savings needed to reach the overarching goal will be met with voluntary, beyond-code measures, consistent with programs like LEED or Architecture 2030. Energy reductions will then be multiplied by emissions factors to get greenhouse gas reductions.
- Costs will be calculated by developing a trend line showing incremental construction costs for different levels of energy reductions, based on data from actual experience. The appropriate incremental construction costs for each level of energy reduction achieved will be applied to determine overall costs.

Key Assumptions:

- Energy Savings from Future Energy Codes of 5% for both Residential and Commercial (based on input from SWEEP)
- Beyond code cost premiums: A recent survey by the World Business Council for Sustainable Development *Energy Efficiency in Buildings: Business Realities and Opportunities*, August 5, 2007, found that green construction costs are overestimated by 300%, as key industries in development estimate green costs as 17% over traditional whereby the study estimated the cost at only 5% above.
- The analysis of costs and GHG benefits are limited to energy efficiency measures. Alternative means of reaching the goals (switching to low and no carbon based fuels for previously carbon-based end-uses, off-site purchases on grid supplied "green power" and/or installing on-site off-grid power generating equipment) are not modeled.
- Analysis of GHG benefits and costs for implementing goals by size of building are not modeled.
- "Increasing standards such as the minimum performance of new and substantially renovated commercial and residential buildings of at least 15 % by 2010 and 50% by 2020 and 100%, carbon neutral, by 2030" is equivalent to "Decreasing energy use of new and substantially renovated commercial and residential buildings by 15% by 2010 and 50% by 2020."
- Specific programs, such as LEED or Architecture 2030, will not be modeled.

Key Uncertainties

- Cost of code implementation, cost of construction and life cycle cost and savings quantification.

Additional Benefits and Costs

- Resource conservation, including water
- Indoor comfort and air quality improvements, with related improvements in health and productivity.
- Savings to consumers and business on energy bills. Benefits to the low income by reducing utility costs.
- Electricity system benefits: reduced peak demand, reduced capital and operating costs, improved utilization and performance of electricity system, reduced pollutants from emissions, improved health from fewer pollutants and particulates and reduced water use for cooling.
- Green collar employment expansion and economic development.

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-2. Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity and Natural Gas (Including Expansion of Existing Programs and Peak Load Reduction)

Policy Description

This option focuses on increasing investment in electricity and natural gas demand-side management (DSM) programs through programs run by the Maryland Energy Administration, energy service companies (ESCOs), utilities, or others, in order to meet the goals of overall reduction in energy consumption as well as a reduction in peak load demands. Decreasing consumption will have immediate impacts on greenhouse gas emissions. DSM activities may be designed to work in tandem with other recommended strategies that can also encourage efficiency gains.

This policy involves the creation of a Public Benefit Fund (PBF) to use the proceeds of RGGI allowance auctions and Environmental Trust Funds, with the goal of increasing the funding and scope of existing energy efficiency programs. Implementation of energy efficiency programs could also include the following elements:

- Establishment of ongoing, high-level statewide resource planning in coordination with the Public Service Commission.
- Development of a detailed potential study for Maryland which would characterize the energy usage patterns and provide program strategies to meet the technical/economical achievable energy savings opportunities available.
- Aggressive marketing of and advertisement for energy efficiency programs.
- Scaling-up of training and education in energy efficiency measures.
- Use of tax policy to facilitate implementation of energy efficiency measures.
- Facilitation of the whole process of implementing energy efficiency measures by: overcoming information hurdles; subsidizing energy auditing and implementation costs; setting up recycling/scrapping programs of old appliances; reduction of overall transaction costs.

Policy Design

Goals:

- Together with RCI-11, achieve a 15% reduction in per capita electricity and natural gas use by 2015.
- 100% capture of achievable cost-effective energy efficiency by 2025. (need potential study to figure out this goal)

- Individual targets for different sectors to be defined in wedges, by how much each sector can potentially contribute to the overall goal.

Timing: Early action to begin with increased funding in current state programs in 2008

Parties Involved: Maryland Energy Administration, Public Service Commission, utility companies, generators and distributors, advocacy groups, Energy Service Companies, and local governments

Other: Supporting measures include providing training for contractors, builders, and other specialists in expectation of increased demand (see RCI-5) and encouraging local governments to adopt energy efficiency targets (see RCI-4).

Implementation Mechanisms

- Develop an administrative framework for coordination and oversight of energy efficiency programs. MEA could be the administrative entity for the implementation of the PBF. The administrative body would develop a transparent contracting and procurement process for the selection of a variety of implementation contractors including energy service companies, nonprofit agencies, utilities and other third parties.
- Scale-up current successful energy efficiency programs to increase coverage where appropriate rather than create redundant additional programs.
- Invest in consumer education and program marketing.
- Expand energy audit programs for all sectors and offer incentives and assistance for building and production facilities owners to follow up on audit recommendations. These incentives can be tax deductions for conducted audits, days off from work for employees attending their home energy audit, and other mechanisms that reduce transaction costs.
- Use of smart thermostats and other control systems to avoid needs for increased peak load capacities.
- Provide incentives to address potential "lost opportunities" in new construction, equipment and appliance replacement, and retrofits.
- Promote the purchase of ENERGY STAR® appliances and compact fluorescent lamps (CFLs) by sales tax exemptions.
- Implement energy labeling for new homes and encourage/mandate it for existing homes for further sales or leases.
- Review efficiency best practices for specific industries and conduct training on these practices.
- Provide incentives for investment in energy efficiency for owners of multi-family housing

Related Policies/Programs in Place

Empower Maryland sets statewide goal of reducing per capita energy use by 15% electricity use by 2015.

Regional Greenhouse Gas Initiative (RGGI) auction proceeds may be dedicated to Energy efficiency

Energy Service Companies (ESCOs) in Maryland offer Energy Performance Contracting to government agencies and the commercial sector. Performance contracting is a self-financing mechanism for improvements for energy efficiency. In the commercial sector, the money that businesses save through less energy consumption is leveraged to pay to the ESCO for financing, installing, operating, and maintaining the energy efficiency measures. After a predetermined period of time of paying the ESCO via the energy bill, all of the energy savings revert to the business owner. $395 million have been loaned since 1995. Maryland state agencies finance EPCs through a private sector financial institution and energy savings from the installed projects are paid from state agency operating budgets to the financial institution. ESCOs that implement state energy projects guarantee the energy savings to the state agency.

On the industry side, MEA has provided limited free energy assessments for Maryland industries through the Industrial Energy Assessment, in partnership with the University of Maryland and the US Department of Energy.

The Maryland Energy Administration has several programs in place to help finance energy efficiency improvements (see RCI-3).

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- *Energy efficiency potential:*
    - MaryPIRG Foundation 2005. Power Plants and Global Warming: Impacts on Maryland and Strategies for Reducing Emissions
    - ACEEE 2004. The Technical, Economic and Achievable Potential for Energy-Efficiency in the U.S. – A Meta-Analysis of Recent Studies, available at www.aceee.org/conf/04ss/rnemeta.pdf
- *Cost of energy efficiency measures in Maryland:*
- *Experience in other states on cost of energy efficiency:*

- Bill Prindle 2007. "Energy Efficiency: The First Fuel in the Race for Clean and Secure Energy," Presentation at the NAPEE Southeast Energy Efficiency Workshop on September 28, 2007, available at http://www.epa.gov/solar/pdf/southeast_28sep07/prindle_new_napee_presentation_atlanta_9_28_07.pdf
- ACEEE 2004. Five Years In: An Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies, April 2004
- Gene Fry, "Massachusetts Electric Utility Energy Efficiency Database", Massachusetts Department of Telecommunications and Energy, 2003 edition
- Heschong Mahone Group, Inc. 2005. New York Energy $martSM Program Cost-Effectiveness Assessment, prepared for NYSERDA, June 2005
- Western Governor's Association (WGA) 2006. The Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors Association, January, 2006
- GDS Associates, Inc. 2007. Electric Energy Efficiency Potential Study for Central Electric Power Cooperative, Inc. Final Report. Updated September 21, 2007

- *Cost of saved natural gas*
  - Southwest Energy Efficiency Project 2006. Natural Gas Demand-Side Management Programs: A National Survey, available at www.swenergy.org
- *Avoided cost of fuels*
  - US EIA 2007. Annual Energy Outlook 2007, Assumptions to the AEO, Electricity Market Module. Available at: http://www.eia.doe.gov/oiaf/aeo/assumption/index.html.
- *RGGI Allowance Auction Proceeds*
  -

Quantification Methods:

(1) Develop energy savings targets after 2015

(2) Develop a ramp-in rate of energy savings target each year until 2015 and after 2015 through 2020 (note the study period ends in 2020 while the policy goal states the final target year is 2025).

(3) Estimate energy reduction based on the percentage reduction goal in per capita electricity and natural gas each year until 2015

(4) Estimate the total cost of electricity and natural gas savings

(5) Estimate the GHG emissions reduction through the electric energy efficiency measures.

Key Assumptions: [TBD, as needed on TWG approval]

- *Discount Rate:*
- *Avoided cost:* avoided cost data for major utilities in Maryland
- *Target electricity and natural gas efficiency savings until 2015*: The following table provides a placeholder assumption on energy savings target each year until 2015.

Year	Target
2008	1%
2009	2%
2010	3.50%
2011	5%
2012	7%
2013	9%
2014	12%
2015	15%

- *Target electricity and natural gas efficiency savings after 2015:*
- *Achievable Electric Efficiency Potential:* "The state has sufficient efficiency potential to reduce power demand by 14 million megawatt-hours (MWh), or 16.5 percent of total electricity demand projected for 2018. This would return electricity demand in 2018 to 2006 levels." (Source: MaryPIRG Foundation 2005)
- *Achievable Natural Gas Potential:* ACEEE 2004.
- *Cost of Electric Efficiency Measures*: 3 cents per kWh of saved electricity based on experience in other states.

Experience in Other States on the Cost of Saved Energy

State/Utility	CSE ($kWh)	Program Year	Source
Western utilities	0.025	1978-2004	WGA 2006.
Northwest Energy	0.02	2006	Montana PSC Docket No.: D2005.5.88 07/12/06
New York	0.03	2004	Heschong Mahone Group, Inc. 2005.
MA IOUs	0.038	2002	Gene Fry 2003
California	0.03	n/a	ACEEE 20004
Connecticut	0.023	n/a	ACEEE 20004
New Jersey	0.03	n/a	ACEEE 20004
Vermont	0.03	n/a	ACEEE 20004
North Carolina	0.029	2006-2017	GDS Associates, Inc. 2006

- *Cost of saved natural gas:* Natural gas savings per $ of program investment is 72,700 MCF/yr per $ million based on the average cost of a number of gas DSM programs reported in SWEEP 2006. The levelized cost of saved natural gas per MMBtu will be estimated based on (1) natural gas savings per program investment above, (2) a 13 year average program lifetime, (3) a real discount rate
- *Efficiency Measure Lifetime:* 13 years on average
- *Displaced Emissions*: Energy efficiency measures are assumed to displace generation from existing facilities in the short-term and to contribute to postponing the construction of new conventional power plants in the long-term. For the sake of analysis for estimating GHG emissions reduction, we assume the mix of conventional power generation that would be displaced by new resources is xx % natural gas-fired power plants and X % coal-fired power plants. The emission factors would reflect this generation mix.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-3. Low-cost loans for energy efficiency

Policy Description

This option refers to potential financing mechanisms that could complement the programs being considered as part of RCI-2 and RCI-11. These mechanisms include:

- revolving low-interest loan fund(s) for energy efficiency investments in distribution service areas that are not covered by existing utility programs.
- Installation of energy efficiency measures by a contractor who would assume the full initial costs, recovering them over a defined time period through the electric bill associated with the meter where the measures are installed.~~The low interest and/or revolving loans could work in conjunction with other RCI measures that require building and appliance energy use to be reduced, and/or brought up to the latest code~~.

~~Energy efficiency programs are a key component of other RCI options, and energy efficiency programs typically yield significant economic benefits (as well as greenhouse gas emissions reductions) to consumers that participate.~~ The policy could help a variety of customer classes improve the energy performance of their building or residence. The action could also initially be targeted at residential customers, small businesses and low-income consumers, who often rent rather than own their property, and then. ~~The program could later be~~ expanded to other customer classes, including larger businesses and the industrial sector.

~~Low-income consumers, however, are frequently unable to participate in energy efficiency programs due to a lack of funds to pay for improvements or, in the case of renters, an inability to either make changes to their residences or fully benefit from any cost savings. Landlords have little incentive to improve the energy efficiency of their properties since they do not typically pay for the utility costs. In recognition of this barrier, this policy urges the implementation of programs specifically targeted to the needs of low-income residents for services such as home weatherization – *or replacement, for example, of manufactured homes for which weatherization is inappropriate*, updating or repairing inefficient appliances, and funding for renewable energy systems.~~ These programs could be designed so as to offer low-income residents and other underserved customer classes, energy efficiency services with a minimum of up-front costs, and could be marketed through an aggressive campaign of targeted outreach to these sectors. ~~low-income households and communities.~~ Programs can be designed to work with both landlords and tenants, including small businesses~~, could also be considered~~. The policy design could also complement measures or ordinances that require existing buildings to be brought up to the current code at the point of sale, and with new buildings, especially those built "on spec" and/or

that are "flipped" to another party at the time of their sale.

Policy Design

Goals:

- ~~Capture energy efficiency savings and link the savings to the meter to pay for them over time~~
- Starting in 2009, require building owners to update units at the time the unit occupant changes, to meet the most recent building and appliance codes.
- Starting in 2009, require new buildings to meet the most recent building and appliance codes at the point of their sale
- Together with RCI-2 and RCI-11 ~~Starting in 2009, complete a retrocommissioning program on rental properties whose occupants have or are expected to have long tenancies, such as housing for the elderly, low-income projects and small businesses, to bring these units up to the latest building and appliance codes by 2014~~
- ~~By 2014, rental properties should score 75 or better using the EnergyStar benchmarking program or equivalent~~
- ~~r~~Reduce energy consumption from low-income and rental properties by 15~~30~~% in Maryland by the year 2015. ~~The program could also be first targeted to eligible homes are those whose household income is below 150 percent of the federal poverty level, and to businesses with fewer than 25 employees. Other customer sectors can be reviewed for eligibility for program in the future.~~
-

Timing: Per above proposed schedule.

Parties involved:

- Government housing and other state and federal government agencies
- Weatherization and energy service providers
- Owners of rental property
- Local business associations
- Community Action Agencies/Human Resource Development Councils
- Non-governmental organizations such as Habitat for Humanity

- **Other:** New programs should build on the state's previous experience with weatherization programs. A review of past programs should be conducted.

Implementation Mechanisms

- Capture energy efficiency savings and link the savings to the meter to pay for them over time (consider PAYS and other on the bill financing mechanisms)
- Benchmark rental properties using the EnergyStar benchmarking program or equivalent. Target low performing buildings, using a combination of incentive payments from RCI-2 and financing to produce the highest possible improvements
- Complete a retrocommissioning program on rental properties whose occupants have or are expected to have long tenancies, such as housing for the elderly, low-income projects and small businesses, to bring these units up to the latest building and appliance codes by 2014
- The program could also be first targeted to eligible homes, including those whose household income is below 150 percent of the federal poverty level, and to businesses with fewer than 25 employees. Other customer sectors can be reviewed for eligibility for program in the future.
- Establish and enforce requirements that rental properties meet energy and appliance codes.
- Adopt the following standards for rental properties: ~~-~~at the time the rental occupancy changes, require landlords to meet EnergyStar standards, score 75 or higher on the EnergyStar benchmarking program and install appliances that meet the latest state and federal standards
- Income tax credits for rental property owners who weatherize rental properties to meet energy efficiency standards set by the program.
- Time of sale/rental disclosure of utility bills for a dwelling.
- Tenants' rights laws relating to energy efficiency, possibly including tenants' rights to request an energy audit of their rental.~~At least three possible tiers could be developed to address this sector. The most effective time to improve the efficiency of an existing building is when the unit or building occupancy changes. For example, requiring units to be updated to the latest building and appliance codes at the time the occupant changes. A second would be focused on retro-commissioning of existing buildings, whose tenants have or are expected to live in the building for a long time, such as housing for the elderly and low-income. A third would be to involve the landlords, by requiring them to assure that the unit meets EnergyStar standards, scores 75 or higher on the EnergyStar benchmarking program and installs appliances that meet the latest state and federal standards. Other possibilities include:~~

~~•Income tax credits for rental property owners who weatherize rental properties to meet energy efficiency standards set by the program.~~

~~•Time of sale/rental disclosure of utility bills for a dwelling.~~

- ~~Tenants' rights laws relating to energy efficiency, possibly including tenants' rights to request an energy audit of their rental.~~

Related Policies/Programs in Place

The State Agency Loan Program is a revolving loan program that provides approximately $1 million in no-interest loans to state agencies for energy efficient improvements.

The Community Energy Loan Program (CELP) funds the identification and implementation of energy efficiency improvements for local governments, schools and non-profit organizations. CELP permits borrowers to pay the loans with the cost savings generated by the improvements. CELP funds $1.5 million in new projects every year.

Home buyers in southern Maryland are eligible for an EnergyStar mortgage plan offered by the Southern Maryland Energy Cooperative if they purchase an EnergyStar home. Although the additional features of an Energy Star residence increase the sale price of the home, participating mortgage providers offer a reduction of loan origination fees, discounted interest rates, and may include cash back at closing. While this program focuses on home owners, it could be reviewed for its relevance, and considered for adoption/expansion for rental properties.

The New Hampshire "pay as you save" program and other on the bill financing mechanisms will be investigated.

California's Energy Efficiency Based Utility Allowance Schedule attempts to correct the split incentive problem on rental properties. Eligible projects must be 15% better than code for new projects, and 20% improvement, compared to previous baseline, for existing projects.

Energy Savings Insurance (used in Canada, concept developed by Evan Mills, Lawrence Berkeley Labs). Property owners whose buildings are some percentage (10-20%) better than code earn a rebate on their insurance. In another flavor, more focused on larger buildings, an insurance policy is written to underwrite the performance of EE and guarantee its persistence over time.

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- Relevant dockets from the New Hampshire Public Service Commission on PAYS
- PAYS paper written for NARUC in 1999
- GDS report prepared for Keyspan on PAYS
- United Illuminating (CT) on the bill financing program

- Hawaii Public Service Commission dockets on PAYS
- Existing and future Maryland building codes
- Examples of commissioning and retrocommissioning studies from PECI (Portland Energy Conservation, Inc.), Lawrence Berkeley Labs and from the National Conference on Building Commissioning.
- For the CA EE based allowance schedule, www.designedforcomfort.com has information on incentives and program details.

Quantification Methods:

For the low-income and rental sector, estimate the rate of penetration of the program over time (with eligible households reduced by the number of households participating in existing Maryland programs), and apply target savings rates and costs to estimate savings in electricity and heating fuel use, option total cost, and option cost net of avoided electricity and fuel costs.

Key Assumptions:

- Use ESCO values for discount rate and cost of capital
- Cost of saved electricity and natural gas: See RCI-2
- Program penetration rate or energy savings target for appropriate sectors: this assumption is crucial to quantify the impacts of this policy option, but is very uncertain.
- The average consumption of electricity, gas, and other heating fuels in low-income households is similar to the average consumption in all households in Maryland.
- Percentage of buildings meeting existing codes and standards
- Number of major renovation and new construction units per year
- Energy reduction achieved by retrofitting or rehabilitating existing buildings and new construction
- Energy reduction data associated with building codes and standards updated in accordance with RCI-1 and RCI-7

Key Uncertainties

Assumptions with respect to buildings meeting current codes and standards (or not): Analysis is more straightforward if the baseline is assumed to be known and fixed. However, electric load and emissions data are based on actual use, which includes buildings that meet code and those which do not. One could also assume that a certain percentage of buildings do not meet codes and that their average energy use is so many percent higher than it would have been had the buildings met code. For example, EPA's cover letter for the PECI retrocommissioning guide assumes that building energy use could be improved by at least 10%.

The amount of GHG reductions achieved through this measure will overlap with those from RCI-2 and -11.

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-4. Improved design, construction, appliances, and lighting in new and existing state and local government buildings, facilities and operations: "Government Lead-by-example"

Policy Description

The State of Maryland and Municipal and County Governments can provide leadership in moving the state forward by adopting policies that improve the energy efficiency of new and renovated public buildings, facilities and operations. Recognizing that governments should "lead by example" the option presented here provides energy use targets to improve the efficiency of energy use in new and existing State and local government buildings, facilities and operations. The proposed policy provides energy efficiency targets that are much higher than code standards for new state-funded and other government buildings, facilities and operations. This option sets energy-efficiency goals for the existing government building stock, as well as for new construction and major renovations of government buildings, facilities and operations.

Elements of this policy include:

- Government buildings, facilities and related operations (please note this to include wastewater and water utilities) will be in operation for many years and should be designed in a manner that meets or exceeds private sector mandated building and trade energy efficiency. Because these buildings and facilities will be in operation for many years, savings can pay for themselves in life cycle cost reductions in energy costs and improvements in workforce efficiency. All new State buildings and facilities, and renovations and additions shall be Leadership in Energy and Environmental Design (LEED) certified at the "silver" or equivalent level, and meet or exceed the energy efficiency and renewable energy goals below stated.
- Existing State and local government buildings shall be retrofitted for energy efficiency achieving 100% of cost-effective energy efficiency by the year 2015. To meet this goal, the State and local governments shall benchmark all buildings and facilities within the next 3 years.
- Evaluate and minimize GHG emissions along the entire supply chain, and incorporate consideration of comprehensive environmental impacts into state and local government~~.~~ ~~In~~ purchasing and contracting practices~~., state and local governments should consider comprehensive environmental impacts (including actions by suppliers to mitigate GHG emissions; products' embodied carbon; recycled content; materials that are compostable, recyclable, and reusable; products that are produced and available locally; thermal comfort; indoor air quality) as well as energy efficiency.~~

- Audits of energy performance and operations of State and other government buildings (in tandem with an audit program). Audit results could be used to target and prioritize investments in improving government building energy efficiency.
- Improvement and review of efficiency goals over time, and development of flexibility in contracting arrangements to encourage integrated energy-efficient design and construction.
- Recommendations that the infrastructure for implementation (meters, accounting systems, staff, etc.) be established as soon as possible.
- Establishing "retained savings" policies whereby government agencies are able to retain funds saved by reducing energy bills for further energy efficiency/renewable energy investments or other uses.
- Require carbon neutral bonding for new construction and renovations and additions. A carbon neutral performance standard will require architects and engineers to design buildings to meet a climate-neutral requirement and built to meet or exceed the state's existing sustainable building guidelines and will save the taxpayers money as life-cycle costs will yield lower operational costs.
- Focus incentives on specific technologies, including white roofs, rooftop gardens, and landscaping to lower electricity demand, and solar photovoltaics to provide electricity when demand in highest.

Potential supporting measures for this option include training and certification of building sector professionals, and performance contracting/shared savings, but could also include surveys of government energy and water use, energy benchmarking, measurement, and tracking programs for municipal and state buildings.

Policy Design

Goals:

- Reduce per-unit-floor-area consumption of carbon based electricity by 15% by 2010, 50% by 2020 and 100%, carbon neutral, by 2030, for government owned and leased buildings, as well as for construction utilizing state and local government funding. These goals can be made by a combination of demand reduction measures, on-site carbon neutral generation and grid based green power purchases. Green power purchases shall exceed the amount of green power purchases already provided by the utility.
- 15% reduction in State Agency energy consumption by 2015.
- Implement by 12/31/08 a requirement that state-owned or leased facilities use life-cycle costing, including full consideration of future energy costs, in the selection and implementation of building designs and components for both new and renovated space, or for the selection of replacement components, and require that the most cost-effective design/equipment/component options be chosen.

- ~~Mandate that of all new construction and major renovations of government-owned buildings, including schools and publicly-owned hospitals, 30% reduce energy consumption 37% consistent with LEED™ Gold and the other 70% reduce energy consumption 30% consistent with LEED™ Silver, for designs that begin after 6/30/08.~~

- **Timing:** See above.
- **Parties Involved:** State and local governments; Maryland Municipal League and Maryland Association of Counties; Public Service Commission; Maryland State Contractors association and related private contractor and materials and supply providers; Environmental Advocacy Organizations; and Maryland Energy Administration
- **Other:**

Implementation Mechanisms

- **Collect Data on State and Local Government Building and Facilities Energy Use.** A key implementation mechanism for this option will be to first provide a thorough assessment of the status and energy consumption of all existing State and local government buildings, including establishing a database of buildings and building attributes including floor area, insulation level, energy-using equipment, and history of energy consumption. This baseline, or "carbon footprint," will be used to assess program success.
- **Benchmark State Buildings:** Benchmarking is a process of using the data on building size, use, and energy use to quickly compare a building against others of similar size and use to get an idea of how efficiently the building is operating. It is an important step in identifying opportunities for savings and prioritizing work to be done.
- Mandate that all new construction and major renovations of government-owned buildings, including schools and publicly-owned hospitals, meet standards such as LEED™ Gold, for designs that begin after 6/30/08.
- **Commission State Buildings:** Building commissioning is a process of reviewing and tuning up the operation of building systems and controls much like the tune-up of a vehicle. Potential targets for commissioning might include commissioning of state buildings upon completion of construction or renovation and whenever the energy use in a building shows an unexpected and unexplained increase in energy use.
- **Purchase Green Power:** Enter into agreements to purchase green power for a portion of the states electricity needs. Increase purchases over time until 100% of power needs are met through direct use of renewable energy or green power purchased by 2030.
- **Energy Use Targets:** Set targets for energy use in the operation of state buildings, potentially including capping state and local building and facilities energy use per square foot. Motion sensors are a specific technology for reducing lighting energy use in government buildings that may have broad application in Maryland.
- **Renovate State and Local Buildings and Facilities through a Buildings and Facilities Energy Program:** Renovate all state and local buildings and facilities with more than 5,000 square feet and smaller buildings identified through energy benchmark process as

having a high potential for energy savings within 5 years. The State and locals buildings and facilities energy program will provide funds for energy audits, engineering analyses, and renovation costs.

- **Evaluate and Minimize GHG Emissions along the Entire Supply Chain, and increase the Efficiency of Operations Through Purchasing and End-of-Life Disposal or Recycling:** Establish state and local policies for purchasing only energy efficient products and services by specifying Energy Star–certified and other efficient equipment and appliances, stocking only energy efficient and environmentally preferable products in Central Stores, and planning for end of- life disposal of equipment and other goods when initial purchase is made. Purchase items that can be composted, recycled or reused rather than thrown away. Purchasing and contracting practices should consider comprehensive environmental impacts (including actions by suppliers to mitigate GHG emissions; products' embodied carbon; recycled content; products that are produced and available locally; thermal comfort; indoor air quality) as well as energy efficiency.
- **Develop and Use Renewable Energy Resources:** Evaluate the potential for direct use of solar, wind, biomass, geothermal, and hydro power to meet the needs of state government operations. Take advantage of these renewable resources whenever it is cost-effective to do so, and as a means to lead by example in investing in these systems when it is practical to do so.
- **Carbon-Neutral Bonding:** Climate-neutral bonding will require that any building projects financed with the issuance of state, county, or local/municipal bonds result in no net increase in GHG emissions. If a new construction project is projected to result in an emissions increase, there must be GHG emissions offsets within the state or particular jurisdiction. Offsets could include onsite renewable energy development, renewable energy purchases, energy efficiency (in existing state buildings), carbon sequestration (tree planting), and switching to cleaner or renewable fuels. Any GHGs emitted after the bond-financed project becomes operational will have to be offset. The new buildings could also offset their emissions by purchasing renewable electricity from their local utility. Paying a premium for what's known as "green pricing" electricity will usually be a more expensive offset option than energy efficiency. A community or state could install their own renewable energy project as a way to offset heir GHG emissions.
- Monitor building energy use over time.

Related Policies/Programs in Place

- Maryland State Buildings Council Program to set energy efficiency programs for State buildings.
- State buildings required to reduce energy use by 15% by 2015.
- Montgomery County Government and Board of Education, Bill 17-06 and Green School Focus.

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- *% Commercial floor space by building type (i.e., state and local government) and number of commercial buildings by building type in the South Atlantic Region:* 2003 Commercial Buildings Energy Consumption Survey (CBECS), Detailed Tables, dated October 2006 and published by EIA, www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/pdf2003/alltables.pdf
- *Commercial floor space projection for the South Atlantic Region:* EIA AEO 2006
- *Number of commercial buildings in the South Atlantic Region in 2003:* 2003 Commercial Buildings Energy Consumption Survey (CBECS), Detailed Tables, dated October 2006 and published by EIA, www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/pdf2003/alltables.pdf

Quantification Methods:

- Identify/project energy consumption or purchase by state and local buildings
- Establish annual energy saving goals (electricity and natural gas?) for new, renovated and existing state and local buildings and facilities
- Identify the cost of saved electricity and natural gas for state and local buildings including the cost of audits and estimate the cost of achieving the energy saving goal.
- Estimate avoided cost of energy efficiency measures and GHG emissions reductions through 2020. As we only plan to quantify costs and benefits through 2020, the cost and emissions impacts of going carbon neutral by 2030 will not be captured.

Key Assumptions:

- The TWG's assistance is requested on the following:
    - to further specify the goal: We suggest combining the first and second goal or further distinguishing the two since there is heavy overlap between the two as they are currently worded. The following wording is suggested for a single goal that would replace goals 1 and 2: "Reduce per-unit-floor-area consumption of carbon based **energy** by 15% by 2010 and 50% by 2020 ~~and 100%, carbon neutral, by 2030~~, for government owned and leased buildings, as well as for construction utilizing state and local government funding…"
    - to determine how to quantify the number or percentage of buildings that receive state or local government funding for construction.
- The analysis of costs and GHG benefits are limited to energy efficiency measures. Alternative means of reaching the goals (switching to low and no carbon based fuels for

previously carbon based end-uses, off-site purchases on grid supplied "green power" and/or installing on-site off-grid power generating equipment) will not be modeled.

- Estimates of government floor space and electricity and natural gas consumption will be used to determine average consumption levels per square foot.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

Will require state to provide resources.

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-5. Energy Efficiency and Environmental Impacts Awareness and Instruction

Policy Description

Public education and outreach stimulate citizen voluntary actions. The following draft policy for public education and outreach includes very aggressive schedules. Due to the positive-feedback nature of climate change, early actions are much more effective than later ones. A ton of carbon dioxide emission reduction this year is more effective in curbing warming than the same reduction the next year, and is much more effective than the same amount five years later. For this reason, this policy focuses on conservation and energy efficiency (which have immediate effects) and ~~purposely~~ leaves out renewable energies and new climate-friendly technologies~~, many of which require substantial investments and may not be economically viable at present~~. These technologies should be considered when the policies are updated in the future. The TWG recommends that this measure build upon successful pilots, learn from and apply that experience, and replicate what has worked in larger-scale implementation. ~~The TWG recommends that we plan a little, do a little, and let actions, results, and mistakes help stimulate further and more widespread actions.~~

This policy is intended to produce change by disseminating both general and technical information. In addition to increasing awareness of, and stimulating voluntary action on, climate change, conservation, and energy efficiency, it seeks to build human capital in technical "green collar" fields.

Specific elements of this policy include:

- Conduct a preliminary assessment of climate change, conservation, and energy efficiency education in the state.
- Educate and coordinate legislatures and government agencies on climate change, conservation, and energy efficiency. Energy conservation and efficiency apply to facilities, operations, and transportation.
- Public schools at all levels include climate change, conservation, and energy efficiency in curriculum at all levels. These school age instructions may influence behaviors for a life time and stimulate climate friendly behavior in peers and families.
- Educate faith communities, environmental non-profits, social/civic groups (Scouts, Lions Club, Rotary Club, 4-H) on climate change and coordinate them to educate the larger populations for widespread community actions in conservation, energy efficiencies, and growing trees.

- Higher education institutions
  - Include climate science and climate-friendly technologies such as renewable energy development in their curricula
  - Partner with industries to transfer green technologies from research to industries
  - Adopt measurable climate-friendly measures as much as possible in institution facilities
- Educate and stimulate Chamber of Commerce, building industry, building owners/tenants, building operators, trades people, inspectors, and home owners associations to adopt climate friendly measures in commercial buildings and homes and promote climate friendly products.

Policy Design

Goals:

- Legislatures and government agencies reinforce and further the state goals and serve as role models for citizens in conservation and energy efficiency
- High awareness in climate change and climate friendly behavior by
  - students of public schools and higher education institutions, and their families
  - Faith, environmental, social, and civic groups and citizens
  - Higher education institutions
  - Chamber of Commerce, building industry, building owners/tenants, building operators, trades people, inspectors, and home owners associations
- Widespread community actions on conservation and energy conservation
- Widespread institutional and student actions on conservation, energy efficiency, and planting trees
- Measurable GHG emission reduction and carbon dioxide sequestration

- **Timing:**
  - For state/county legislature and agencies; faith, environmental, social, and civic groups; higher education institutions; and Chamber of Commerce, building industry, building owners/tenants, building operators, trades people, inspectors, and home owners associations: Complete a plan in 1 month and start implementation in 3 months
  - For public schools: Complete the plan in 2 months, issue grants in 4 months, and start delivering teaching in the 2009 school year
- **Parties Involved:**
  - State and county departments of environment

- Public schools, MDE, Maryland State Department of Education, County School Boards
- Faith, environmental, social, and civic groups; state and county departments of environment
- Higher education institutions (4-year and 2-year institutions)
- Chamber of Commerce, building industry, building owners/tenants, building operators, trades people, inspectors, and home owners associations
- State and county departments of environment

~~•**Other:** Cost~~

~~•State/county legislature and agencies: Salaries for 2 state coordinators (about $250K/year)~~

~~•Public schools: $400K start up and $100K/year after; issue a $10K grant to develop each of these modules in 3 months. (Working Group members, together with educators, may serve to validate these modules); spend $100K to develop and host the website. Supporting the website and updating the teaching modules may cost $100K/year.~~

~~•Faith, environmental, social, and civic groups: Salaries for 2 state coordinators (about $250K/year)~~

~~•Higher education institutions: Salaries for 1 state coordinators (about $125K/year)~~

~~•Chamber of Commerce, building industry, building owners/tenants, building operators, trades people, inspectors, and home owners associations: Salaries for 2 state coordinators (about $250K/year)~~

- **Other:** Grant opportunities are available for several of these policy elements.

Implementation Mechanisms

- State/county legislature and agencies: Deliver information (e.g., short lectures) on the climate crisis and call for actions in conservation and energy efficiency. Recommend climate friendly measures like
  - Lighting, indoor temperature, and hot water temperature with measurable GHG reduction goals
  - Reducing paper consumption (e.g., by printing multiple slides on a page and using both sides)
  - Reducing consumption of single use containers (e.g., drinks in plastic bottles and cans)
  - Growing trees in place of lawns

- Public schools: Develop a set of state-wide teaching modules (each to be used in a one-hour lecture, includes slides and teaching notes) on different climate change subjects (all modules should include a call for actions in conservation and energy efficiency) to be worked into curriculum (not added on top of existing requirements):
    - Science of climate change (elementary school level)
    - Science of climate change (middle school)
    - Social and political impacts of climate change (high school)
    - Public health impacts of climate change (high school)
    - Renewable energies and climate friendly technologies (high school)

    Set up a website to host voluntary experts on these subjects to answer questions from teachers (and students) in order to reduce training cost for teachers
- Faith, environmental, social, and civic groups: Form county chapters of a new Maryland Climate Leadership Corps to coordinate community actions (public education, growing trees, energy-conservation demonstration). Attract and train voluntary members from
    - Faith communities, social and civic groups (e.g., Scouts, Lions Club, Rotary, 4-H)
    - High school student in fulfilling community services
    - College interns (unpaid)
    - Adult volunteers

    Use volunteers from environmental non-profits (e.g., Sierra Club, Audubon Society, Greater Washington Interfaith Power and Light) as trainers and coordinators. Require 2 traveling state coordinators for all the counties. Working Group members may serve as advisors.
- Higher education institutions
    - Educate administrators on climate change and recommend climate friendly measures on campuses
    - Form student chapters of the Maryland Climate Leadership Corps in institutions to coordinate actions (public education, growing trees, energy-conservation demonstration). Use student members to further public education and outreach in surrounding communities.
- Chamber of Commerce, building industry, building owners/tenants, building operators, trades people, inspectors, and home owners associations: Deliver information (e.g., short lectures) on the climate crisis and call for citizen actions in conservation and energy efficiency. Recommend climate friendly measures such as
    - Lighting, indoor temperature, and hot water temperature with measurable GHG reduction goals
    - Reducing paper consumption (e.g., by printing multiple slides a page and using both sides)

- Reducing consumption of single use containers (e.g., drinks in plastic bottles and cans)
- Growing trees in place of lawns

May use the Maryland Climate Leadership Corps to deliver these educational lectures.

Related Policies/Programs in Place

Alliance to Save Energy program in Howard and Montgomery counties to build human infrastructure

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

The potential for GHG reductions varies to such an extent that this option will not be quantified. While GHG reductions are difficult to directly attribute to this policy option, it acts as a supporting action for other quantified options, particularly RCI-4, RCI-6, and RCI-7.

Direct costs would include salaries for state coordinators (roughly 7, at about $125,000/year each), grant(s) for development of teaching modules, website development and hosting costs (estimated at $100,000), other startup costs, website support costs, and costs to update the teaching modules.

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

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-6. Promotion and Incentives for Improved Design and Construction (e.g. LEED, green buildings, or minimum % improvement better than code) in the Private Sector

Policy Description

Buildings are significant consumers of energy and other resources, and can contribute to local microclimates. Implementation of advanced/next generation building designs is an important avenue for reducing green-house gas emissions and other resource demands associated with construction, operation and maintenance of buildings. This policy provides for incentives and targets to induce the owners and developers of new and existing private sector buildings to improve the efficiency with which energy and other resources are used in those buildings, along with provisions for raising targets periodically and providing resources to building industry professionals to help achieve the desired building performance. This policy can include elements to encourage the improvement and review of energy use goals over time, and to encourage flexibility in contracting arrangements to encourage integrated energy- and resource efficient design and construction. This policy would build upon the existing Empower Maryland program (applicable to state buildings) by encouraging private sector facilities to meet the same building design and performance standards.

Additional potential elements of this option include:

- Provide incentives for new and existing residential and commercial buildings to incorporate design, construction, commissioning, operation, and maintenance features and practices that meet minimum and advanced LEED requirements.
- Provide incentives based upon performance superior by a substantial percentage over LEED. (While LEED is a well-known and familiar standard, merely requiring LEED may not lead to the most efficient buildings.)
- Target new, renovated, and/or existing buildings (retrofits).
- Set a cap on consumption of energy per unit area of floorspace for new buildings.
- Encourage building commissioning and recommissioning, including energy tracking and benchmarking.
- Set up a “feebate” program to encourage energy efficiency in building design.

- Provide incentives, in the form of tax credits, DSM program support, financing incentives (such as "green mortgages"), or other inducements for retrofit of existing residential and commercial buildings.
- Encourage the use of alternative and local building materials and practices.
- Focus incentives on specific technologies, including white roofs, rooftop gardens, and landscaping to lower electricity demand, and solar photovoltaics to provide electricity when demand in highest.

Potential supporting measures for this option include training and certification of building professionals, consumer and primary/secondary education, performance contracting/shared savings arrangements, and setting up of a clearinghouse for information on and access to software tools to calculate the impacts of energy efficiency and solar technologies for buildings.

Policy Design

The Policy will include financial incentives, outreach and public education, public recognition programs, and technical support resources for implementation of advanced building designs for both new and existing construction in the residential, commercial, and industrial sectors in the next two decades. These advances will enable buildings in Maryland to be "carbon neutral" in the aggregate by 2030, meaning that any energy needs in a building, net of efficiency gains through building design to reduce energy use and net of on-site renewable energy use, should be supplied by renewable energy sources.

- **Goals**:
    - Reduce per-unit-floor-area consumption of grid electricity and natural gas by 20% by 2020 in existing buildings, and by 50% in new buildings by 2020, excluding industrial process facilities. Up to 10% of the targeted reduction for new homes can come from use of off-site electricity generation from renewable energy
    - For the residential sector: Voluntary efforts will result in attainment of a 15% reduction in energy consumption by 70% of new homes consistent with the EnergyStar "high performing" standard (see HPH100.org for definition) by 2015.
    - For the commercial sector: Voluntary efforts will result in attainment of a 50% to 70% reduction in energy consumption by 70% of new buildings by 2015 consistent with the Architecture 2030 standards, which increase in stringency over time.
    - For the industrial sector, Maryland should look at additional tools and opportunities for technology transfer if existing tools are found to be inadequate.
- **Timing:** See above.

- **Parties Involved:** Maryland Department of General Services, Maryland Energy Administration; Maryland Department of the Environment; Maryland Department of Labor, Licensing, and Regulation; Maryland Department of Business and Economic Development, Maryland Public Service Commission; Maryland Green Building Council
- **Other:** [As needed]

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Related Policies/Programs in Place

- US Green Buildings Council's LEED™ New Construction (NC), LEED™ Existing Buildings (EB), LEED™ Core and Shell (C&S), and LEED™ Homes (H) (expected launch of LEED for Homes in Fall 2007)
- EPA Energy Star and HPH100
- Architecture 2030
- State of Maryland:
    - Legislature has shown interest in "standard 189" code.
    - Empower Maryland Program
    - Maryland Energy Administration grant incentives for installation of certain renewable energy technologies.
    - Maryland Public Service Commission rules allowing net-metering from qualifying self-generators of renewable energy, including: PV, wind, and biomass, up to 200 kilowatts.
    - Maryland Public Service Commission's Renewable Portfolio Standard which requires that a minimum percentage of retail energy sales be derived from renewable sources. EXECUTIVE ORDER 01.01.2001.02 Sustaining Maryland's Future with Clean Power, Green Buildings and Energy Efficiency
    - Montgomery County Bill 1706: 10,000 ft^2 threshold

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- Maryland Energy Efficiency Potential Study. ACEEE.
- Residential, Commercial, and Industrial floor space projections for the South Atlantic Region: EIA AEO 2006
- Beyond code cost premiums: A recent survey by the World Business Council for Sustainable Development Energy Efficiency in Buildings: Business Realities and Opportunities, August 5, 2007, found that green construction costs are overestimated by 300%, as key industries in development estimate green costs as 17% over traditional whereby the study estimated the cost at only 5% above.

Quantification Methods:

- *Energy Efficiency*
    - Energy reduction goals will be multiplied by the average consumption per square foot and by the number of buildings reached by the policy to determine the overall energy reductions that will be achieved. Then, these reductions will be multiplied by emissions factors to calculate the greenhouse gas reductions.
    - The cost per unit of electricity and natural gas saved will be used to calculate overall costs of the program.
- *Renewable Energy Purchases*
    - Identify a resource mix of renewable energy that will be developed under this policy option
    - Determine ramp-in rates for the renewable goals
    - Identify/project energy consumption or purchase
    - Estimate energy production for each of the renewable resources.
    - Estimate the costs of renewable energy generation for each resource type
    - Estimate avoided cost of renewable energy generation and GHG emissions reductions through 2020.

Key Assumptions:

- The TWG's assistance is requested with further specifying the goal. We suggest keeping the first goal and omitting the following three as there is heavy overlap between the first and the next three as they are currently worded.
- Reach: 70% of existing, renovated homes and buildings by 2020, and 70% of new homes and buildings by 2020
- 10% of the targeted reduction for new homes and buildings will come from use of electricity generation from renewable energy.

- Estimates of floor space and electricity and natural gas consumption will be used to determine average consumption levels per square foot.
- The Energy Star Homes Cost Premium of 0.5% for a 15% reduction in energy use from Energy Star Homes.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-7. More Stringent Appliance/Equipment Efficiency Standards (state-level, or advocate for regional or federal-level standards)

Policy Description

Appliance efficiency standards reduce the market cost of energy efficiency improvements by incorporating technological advances into base appliance models, thereby creating economies of scale. Appliance efficiency standards can be implemented at the state level for appliances not covered by federal standards, or where higher-than-federal standard efficiency requirements are appropriate. Regional coordination for state appliance standards can be used to avoid concerns that retailers or manufacturers may (1) resist supplying equipment to one state that has advanced standards or (2) focus sales of lower efficiency models on a state with less stringent efficiency standards.

There are existing federal standards for 17 residential products and 11 pieces of commercial equipment. Laws require the U.S. Department of Energy (DOE) to set minimum appliance efficiency standards that are technologically feasible and economically justified. However, there are many appliances not covered by federal standards for which state standards can play a role.

This policy option includes:

- Lobbying for more stringent appliance standards at the federal level.
- Establishment and enforcement of higher-than-federal state-level appliance and equipment standards (or standards for devices not covered by federal standards).
- Joining with other states in adopting higher standards.

Consumer education is an important supporting measure for this option.

Policy Design

- **Goals:** State minimum efficiency standards for appliances not covered by federal standards as recommended by Appliance Standards Awareness Program[1] by 2009.

[1] See http://www.standardsasap.org/documents/a062_sc.pdf. The analysis recommends standards for the following products: bottle-type water dispensers, commercial boilers, commercial hot food holding containers, compact audio products, DVD players and recorders, liquid immersion distribution transformers, medium voltage dry-type distribution transformers, metal halide lamp fixtures, pool heaters, portable electric spas, residential furnaces and boilers, residential pool pumps, single voltage external AC to DC power supplies, state regulated incandescent reflector lamps, walk-in refrigerators and freezers.

- **Timing:** As noted above.
- **Parties Involved:** As noted above.
- **Other:**

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Related Policies/Programs in Place

- Maryland Energy Efficiency Standards Act (became law per Maryland Constitution, Chapter 2 of 2004 on January 20, 2004):

  Maryland standards apply to 9 appliances: Torchiere lighting fixtures; unit heaters; low-voltage, dry-type distribution transformers; ceiling fans and ceiling fan light kits; red and green traffic signal modules; illuminated exit signs; commercial refrigeration cabinets; large packaged air conditioning equipment; and commercial clothes washers. Standards become effective in March 2005. The exceptions to this general rule relate to commercial clothes washers, and ceiling fan light kits. Commercial clothes washers and ceiling fan light kits do not have to meet the new efficiency standards until March 1, 2007. Commercial clothes washers and ceiling fan light kits not meeting the standards may be installed until January 1, 2008. There is no overlap between the appliances covered by this Act and the appliances recommended by the Appliance Standards Awareness Program.

- Maryland Energy Efficiency Standards Act of 2007:

  Before January 1, 2008 the Maryland Energy Administration shall adopt regulations establishing minimum efficiency standards for the following types of new products: Bottle-type water dispensers; commercial hot food holding cabinets; metal halide lamp fixtures; residential furnaces; AC to DC power supplies; state-regulated incandescent reflector lamps; walk-in refrigerators and freezers. Seven appliances from this act overlap the appliances recommended by the Appliance Standards Awareness Program.

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- Maryland Energy Efficiency Standards Act, Annotated Code of Maryland, sec. 9-2006.

- Maryland Energy Efficiency Standards Act of 2007, Annotated Code of Maryland, sec. 9-2006.
- Nadel, Steven, Andrew deLaski, Maggie Eldridge, and Jim Kleisch. Leading the Way: Continued Opportunities for New State Appliance and Equipment Efficiency Standards, ASAP and ACEEE, Report Number ASAP-6/ACEEE-A062, March 2006.
- Nadel, Steven, Andrew deLaski, Maggie Eldridge, and Jim Kleisch. Energy Efficiency Standards Benefits – 2006 Model Bill: Maryland, ASAP and ACEEE, http://www.standardsasap.org/documents/a062_md.pdf (accessed December 7, 2007).
- Prindle, Bill. Energy Efficiency in Maryland's Electricity Future. American Council for an Energy-Efficient Economy, ACEEE Report Number E077, September 2007.

Quantification Methods:

- Projected electricity and natural gas savings are taken from the 2006 Appliance Standards Awareness Program data for Maryland for the appropriate appliances not already covered by the Maryland Energy Efficiency Standards Act.
- These annual energy savings are adjusted to fit the analysis period, per ramp rate of appliances and target implementation year.
- The appropriate GHG emissions factors, energy prices, and discount rate are applied.

Key Assumptions:

- Costs and savings from efficiency improvement via standards are similar in Maryland to those indicated in the ASAP/ACEEE report.
- It is assumed that development and manufacturing lead time for bringing appliances that meet ASAP standards to market is minimal, because most of the appliances identified by ASAP are subject efficiency standards in other states (http://www.standardsasap.org/state.htm). Consistent with ASAP assumptions, appliances are assumed to be available starting in 2009, except for commercial boilers, pool heaters, and residential furnaces and residential boilers, which will be introduced in 2012.

Key Uncertainties

It is unknown the degree to which other states in the region will join with Maryland in setting higher-than-federal standards so as to increase effectiveness and practical application of standards.

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

- Reduction in water use for some appliance upgrades.

Feasibility Issues

The feasibility of this policy option is enhanced by ongoing efforts in nearby states.

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-8. Rate structures and Technologies to Promote Reduced GHG Emissions (Including Peak Pricing and Inverted Block Rates)

Policy Description

This option could include various elements of utility rate design that are geared toward reducing greenhouse gas emissions, often with other benefits as well, such as reducing peak power demand. The overall goal is to revise rate structures so as to better reflect the actual economic and environmental costs of producing and delivering electricity as those costs vary by time of day, day of the week, season, or from year to year. In this way, rates provide consumers with information reflecting the impacts of their consumption choices.

Potential elements of this option include:

- Time-of-use rates, which typically price electricity higher at times of higher power demand, and thus better reflect the actual cost of generation. Time-of-use rates may or may not have a significant impact on total GHG emissions, but do affect on-peak power demand and thus both the need for peaking capacity and fuel for peaking plants.
- Tiered (increasing/inverted block/peak) rates for electricity and natural gas use, which provide affordable base usage rates for consumers, but which increase with increasing consumption.
- "Smart metering"—implementation of consumer meters showing real-time pricing, and the level of GHG emissions related to consumption at any given time.

Policy Design

Goals:

- Implement a 3-tiered pricing system for Standard Offer Service (SOS) electricity customers. The cheapest tier should apply to a percentage of average consumption and be priced below average rates. The most expensive tier should apply to electricity use above average consumption and be priced high enough to encourage conservation. California may offer a good example of percentages and rates. The need for a low income exclusion from the program should be investigated.
- Replace traditional electricity meters with "smart meters" as meters otherwise need to be replaced. Time of use rates should be implemented in conjunction with the replacement of existing meters with smart meters.

- **Timing:** The three-tiered pricing system should be implemented for all utilities within 12 months. Conversion to smart meters should begin immediately but proceed slowly for many years. Once more cost-effective energy efficiency measures have been taken, proactive replacement of meters with smart meters should begin and expand.
- **Parties Involved:** SOS electricity customers, utilities, OPC, PSC, MEA
- **Other:**

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Focus initially on residential and small commercial sectors

Related Policies/Programs in Place

TBD – [as needed and approved by the TWGs]

The Southern California Edison program, which included a low-income component, should be investigated.

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- *Price elasticity of electricity:* EIA, Price Responsiveness in the AEO2003 NEMS Residential and Commercial Buildings Sector Models, available at www.eia.doe.gov/oiaf/analysispaper/elasticity/index.html and www.eia.doe.gov/oiaf/analysispaper/elasticity/table1.html
- *Electricity prices:*
- *Inverted block rates in California:*
    - The California Public Utilities Commission requires IOUs to establish inverted block rates for residential energy service. In this rate structure, the baseline consumption or threshold that covers basic needs of residential customers, which largely differ by geographic location, season, and power

source. The baseline consumption allocation typically covers 60-70% of the average residential energy use in each region.[2]

SCE Baseline Allocation Chart

Tier	Baseline Allocation	Cost per kWh
5	More than 300% of baseline (or more than 201% **over** baseline)	Most Expensive
4	kWh usage from 201% to 300% of baseline (or 101% to 200% **over** your baseline allocation)	
3	kWh usage from 131% to 200% of baseline (or 31% to 100% **over** your baseline allocation)	
2	kWh usage from 101% to 130% of baseline (or 1% to 30% **over** your baseline allocation)	
1	Baseline (kWh usage **up to** your baseline allocation)	Least Expensive

Source: Southern California Edison. "Residential Baseline Allocation," available at http://www.sce.com/NR/rdonlyres/DF137120-E263-459E-96F4-0B4F4BA60520/0/597R0906ResidentialBaseline.pdf

Generation Charge for Residential Customers ($/kWh)

Consumption level	Rate
Baseline Service	0.02634
101%-130% of Baseline	0.05357
131%-200% of Baseline	0.17351
201% - 300% of Baseline	0.22162
Over 300% of Baseline	0.26973

Source: SCE Schedule D: Domestic Service, available at http://www.sce.com/AboutSCE/Regulatory/tariffbooks/ratespricing/residentialrates.htm

- *Impacts of Different Types of Smart Metering:*
  - "Smart Metering Study Summary" (smart-metering-append.pdf) compiled by CU Denver for the City and County of Denver
  - Primen, Inc. 2004. California Information Display Pilot Technology Assessment, www.ucop.edu/ciee/dretd/documents/idp_tech_assess_final1221.pdf

[2] SCE. Residential Baseline Allocation, available at http://www.sce.com/NR/rdonlyres/DF137120-E263-459E-96F4-0B4F4BA60520/0/597R0906ResidentialBaseline.pdf

- Summit Blue Consulting, Inc. 2006. Evaluation of the 2005 Energy-Smart Pricing PlanSM, prepared for Community Energy Cooperative, August 2006, available at www.energycooperative.org/pdf/ESPP-Evaluation-Executive-Summary-2005.pdf and www.energycooperative.org/energy-smart-pricing-plan.php

- *Cost of Metering*
  - Primen, Inc. 2004. California Information Display Pilot Technology Assessment, www.ucop.edu/ciee/dretd/documents/idp_tech_assess_final1221.pdf
  - Idaho Power 2005. Phase One AMR Implementation Status Report under IPC-E-02-12, December 30, 2005
  - CA PUC 2006. Advanced Metering Infrastructure (AMI) Update, available at www.cpuc.ca.gov/Static/hottopics/1energy/ami_update+june+2006.pdf
  - Demand Response and Advanced Metering Coalition (DRAM) 2004. White Paper: Overview of Advanced Metering Technologies and Costs, available at http://www.dramcoalition.org/id66.htm
  - Booz Allen Hamilton 2007. "Smart Grid – Opportunity Meets necessity," presented at the EEI Strategic Issues Forum in Miami, FL on February 7, 2007.

Quantification Methods: This analysis consists of two major components: impact of inverted block rates and smart meters. The steps that would be required to estimate the impact of inverted block rates are as follows:

- Determine the focus of customer groups within SOS service (i.e., residential only or all customers).
- Estimate the average electricity consumption of customer group(s) to be analyzed
- Estimate the total or average consumption of low-income customers. This information will be used to exclude low-income customers from this analysis.
- Determine three levels of electricity rates based on consumption levels
- Allocate projected total electricity consumption by customer group among the three tier rates
- Project change in electricity consumption based on price elasticity
- Estimate energy savings and the associated economic benefit based on price elasticity
- Estimate GHG emissions reduction from energy savings

The second piece of this analysis for smart metering involves the following:

- Identify the status of the # and type of existing meters
- Develop a time schedule for replacing existing meters with smart meters
- Estimate the cost and energy savings from deployment of smart meters through 2020
- Estimate GHG emissions reduction from energy savings

Key Assumptions:

- *Rate Design*: customers who install smart meters will opt out from inverted block rates.
- *Average electric consumption of standard offer service customers*: Only residential SOS customers will be covered. (California IOUs have inverted block rates only for residential customers. Establishing inverted block rates for commercial and industrial customers under SOS may make a lot of those customers leave SOS service)
- *Three levels of electric rates based on consumption level*: to be based on an investigation of CA's case on rates and consumption level
- *Total electric consumption by low income customers*: low income customers are excluded from this analysis and policy.
- *Status of the # and type of existing meters*: it would be very helpful if MD utilities could provide us with this information.
- *Schedule for replacing existing meters*: it would be very helpful if MD utilities could provide us with this information.
- *Cost of smart meters (that are capable of having at least critical peak pricing) and in-home display*: The cost of smart metering infrastructure for full deployment appears to range from $200 to $300 per meter. This range is based on the following studies:
    - The Primen, Inc. 2004. California Information Display Pilot Technology Assessment, www.ucop.edu/ciee/dretd/documents/idp_tech_assess_final1221.pdf
    - Idaho Power 2005. Phase One AMR Implementation Status Report under IPC-E-02-12, December 30, 2005
    - CA PUC 2006. Advanced Metering Infrastructure (AMI) Update, available at www.cpuc.ca.gov/Static/hottopics/1energy/ami_update+june+2006.pdf
- *Demand reduction from deployment of smart meters:*
- *Assumed cost of implementation of inverted-block tariffs:* $0 (placeholder assumption)
- *Avoided electricity cost:*
- *Retail electric rates:*
- *Emission factors:*

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-9. GHG or Carbon Tax

Note: requires coordination with ES TWG

Policy Description

A carbon or GHG tax is typically a tax on each ton of CO_2 purchased directly or emitted from an emissions source. A GHG tax could be imposed upstream based on the carbon content of fuels (e.g., imposed at the level of fossil fuel or electricity suppliers) or at the point of combustion and emission (this would typically be applied for large point source emitters such as large industrial plants). This program would supplement that of RGGI and expand into other sectors. A tax should be evaluated for application into sectors not covered by RGGI to stimulate efficiencies in these other sectors.

Taxed entities may pass some or all of the cost on to consumers, change production processes to lower emissions, or a combination of the two. As the suppliers respond to the tax, consumers would see the implicit cost of GHG emissions in products and services, and could adjust their behavior to purchase substitute goods and services that result in lower GHG emissions. This price signal is an essential element of a market-based policy, leaving the choice of specific emissions reduction strategies to households and firms.

A GHG tax may be imposed in conjunction with other market-based climate change policies. Theoretically, a GHG tax and a cap-and-trade system can have the same outcomes with respect to emissions and the cost of carbon: either the tax rate is set to achieve a desired emission level or a cap is defined, and permit auction prices assign value to carbon emissions. In the optimum, both are equivalent with respect to emissions outcomes, assuming the permits are periodically re-issued and traded. But since a cap-and-trade system defines an emissions goal and mechanisms to reach it, it is unlikely that the goal will be surpassed. Combining a GHG tax with cap-and-trade may provide added benefits to compel emitters to continue to reduce emissions and even move beyond compliance.

GHG tax revenue could be used in a number of ways, from income tax reduction to policies and programs to support GHG reductions or technology innovation. GHG tax revenue could also be directed to helping the competitiveness of industries or assisting communities or groups most affected by the tax. There are additional opportunities to promote policy flexibility and equality through time-of-use tax rates (i.e., when is electricity consumed and generated), energy variable rates (tax based on carbon amount in energy source), or through industry variable tax rates, which help less able industries cope with the GHG tax. Carbon taxes have been in place in a number of European countries since the early 1990s and have recently caught on in U.S. cities, Australia and Quebec.

Policy Design

Design Elements:

- Tax either suppliers or consumers of fossil fuels (based on amount sold) and/or emitters of GHG (possibly based on electricity usage).
- Consider all parties and exogenous factors when placing a tax to ensure significant mitigation, efficiency, and equality. This could include:
  - Availability of viable substitutes to different consumers and industries.
  - The impact of a tax on market compliments of fossil fuels.
- Promote policy flexibility and equality through industry variable tax rates, time-of-use rates, variable energy source rates (contrast natural gas, oil, coal), and/or subsidies to parties most adversely affected by the tax.
- Potential to implement in phases with an initial tax phase focusing on industry and a secondary phase focusing on the residential and commercial sectors; phases should be evaluated and updated prior to phase advancement.
- Return revenue to those adversely affected by the tax (e.g., income tax cuts) and/or create a Green Fund that can further mitigate GHG.

- **Goals:** Consider and evaluate design elements for a state tax on GHG emissions, with special attention to impacts on different industries. Any GHG tax would first need to mitigate GHG emissions and second, do so in an equitable and efficient manner. Additionally, compatibility with other GHG mitigation policies is critical; policy synergies should be sought after and policy redundancies avoided.
- **Timing:** Initial tax rates must be adequate to achieve desired emissions reductions and the tax should occur in synchronization with other policies.
- **Parties Involved:** Utility companies, non-renewable (fossil fuel) energy suppliers and retailers, energy-dependent sectors and industries, consumers and homeowners, and government agencies (federal, state, local).
- **Other:** The focus has been on carbon, but other GHG could be considered.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

Related Policies/Programs in Place

Despite the widespread support of market-based mechanisms, GHG taxes have been rarely in the US to achieve a desired emissions level. Below are examples of GHG tax programs applied in four jurisdictions. The information shown may represent only part of that jurisdiction's total GHG tax program.

Jurisdiction	Where Tax Applied	Tax Rate – Applicability	Use of Revenue
Finland	Fuels	1993, $3/ton of CO2 in fuel	Reimbursement via lower payroll taxes
Sweden	Residential and commercial electricity	2004, $.002/kWh	Offset by income tax relief
UK	Electricity; renewable energy exempt	2001, $.0084/kWh	Fund established, and National Insurance rate cuts
City of Boulder, CO	Electricity	2006, (per kWh): Residential, $.0022 Commercial, $.0004 Industrial, $.0002	Funding for the City's Climate Action Plan

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

- **Data Sources:** [TBD by CCS on TWG approval]
- **Quantification Methods:** [e.g. Full life-cycle analysis with supply/demand equilibrium adjustments on TWG approval]
- **Key Assumptions:** [TBD, as needed on TWG approval]

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-10. White Roofs, Rooftop Gardens, Landscaping (including Shade Tree Programs), and solar electric panels

Note: The components of this straw proposal are included in RCI-4 and RCI-6.

RCI-11. Energy Efficiency Resource Standard (EERS)

Policy Description

An Energy Efficiency Resource Standard (EERS) is a market-based mechanism to require more efficient use of electricity and natural gas. State public utility commissions or other regulatory bodies set electric and/or gas energy savings targets for utilities. All EERS include end-use energy savings improvements; in some cases, distribution system efficiency improvements and combined heat and power (CHP) systems and other high-efficiency distributed generation systems are included as well.

The EERS is intended to achieve the incremental difference between the energy efficiency gains from RCI-2 (RGGI-funded) and the EmPOWER Maryland goals.

Policy Design

Goals: Require the utilities to achieve energy savings equal to 15 percent of per capita demand by 2015.

Develop mandatory utility electricity reduction targets of 0.5% of demand in 2009, 1.0% in 2010, 1.5% in 2011-2013, and 2% in 2014-2015. *[Note: these annual targets do not reach 15% by 2015. Ramp up to 15% by 2015 to be suggested by MEA]*

Develop mandatory utility natural gas reduction targets of 0.5% of demand in 2009, 1.0% in 2010, 1.5% in 2011-2013, and 2% in 2014-2015. The targets apply to natural gas to be used for energy purposes only; natural gas for use as feedstock is excluded. *[Note: ramp up to 15% by 2015 to be suggested by MEA]*

- **Timing:** As above.
- **Parties Involved:** All load-serving electricity and natural gas entities.
- **Other:**

Implementation Mechanisms

Utilities submit plans for efficiency programs to the Public Service Commission for approval. The plan must include a diverse portfolio of programs, including home energy assessments, energy efficiency rebates, commercial and industrial programs, training for contractors and facility managers, and demand response programs. The plan should evaluate programs in terms of cost-effectiveness, ability to capture opportunities for energy efficiency that would otherwise

be lost, and fair distribution of programs geographically, relative to the source of the funds, and within sectors.

After the plan is approved, utilities issue RFPs for each type of energy service. Energy service companies of all shapes and sizes would be encouraged to submit bids and do the work.

Related Policies/Programs in Place

TBD – [as needed and approved by the TWGs]

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- *General:* MEA modeling completed by Exeter (electric only, not natural gas)
- *Energy efficiency potential study*: See RCI-2
- *Cost of energy efficiency measures in Maryland:* See RCI-2
- *Experience in other states on cost of energy efficiency:* See RCI-2
- *Cost of saved natural gas*: See RCI-2
- *Avoided cost of fuels*

Quantification Methods:

- Estimate energy reduction based on the recommended energy reduction targets electricity and natural gas consumption
- Estimate the total cost of electricity and natural gas savings
- Estimate the GHG emissions reduction through the electric energy efficiency measures.

Key Assumptions:

- *Discount Rate:*
- *Avoided cost*: avoided cost data for major utilities in Maryland

- *Cost of Electric Efficiency Measures:*

State/Utility	CSE ($kWh)	Program Year	Source
Western utilities	0.025	1978-2004	WGA 2006.
Northwest Energy	0.02	2006	Montana PSC Docket No.: D2005.5.88 07/12/06
New York	0.03	2004	Heschong Mahone Group, Inc. 2005.
MA IOUs	0.038	2002	Gene Fry 2003
California	0.03	n/a	ACEEE 20004
Connecticut	0.023	n/a	ACEEE 20004
New Jersey	0.03	n/a	ACEEE 20004
Vermont	0.03	n/a	ACEEE 20004
North Carolina	0.029	2006-2017	GDS Associates, Inc. 2006

- *Cost of saved natural gas:* Natural gas savings per $ of program investment is 72,700 MCF/yr per $ million based on the average cost of a number of gas DSM programs reported in SWEEP 2006. We will estimate the levelized cost of saved natural gas per MMBtu based on (1) natural gas savings per program investment above, (2) a 13 year average program lifetime, (3) a real discount rate
- *Efficiency Measure Lifetime:* 13 years on average
- *Displaced Emissions*: Energy efficiency measures are assumed to displace generation from existing facilities in the short-term and to contribute to postponing the construction of new conventional power plants in the long-term. For the sake of analysis for estimating GHG emissions reduction, we assume the mix of conventional power generation that would be displaced by new resources is xx % natural gas-fired power plants and X % coal-fired power plants and the emission factors would reflect this generation mix.

Key Uncertainties

TBD – [as needed and approved by the TWGs]

Additional Benefits and Costs

TBD – [as needed and approved by the TWGs]

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]

RCI-12. Phase out incandescent light bulbs in state

Policy Description

This policy option involves phasing out the sale or use of energy-inefficient incandescent light bulbs in the state. California has announced its plan to phase out the use of incandescent light bulbs by 2018, Nevada adopted a lighting efficiency standard for light bulbs sold beginning in 2012, and a number of other states are considering similar policies, including Connecticut, Rhode Island, and New Jersey. Australia and Ontario, Canada, have announced similar bans.

Incandescent bulbs waste roughly 95 percent of the electricity they consume—emitting heat rather than light. In contrast, efficient light bulbs emit more light (lumens) while consuming less electricity (watts). The typical incandescent bulb produces 14 lumens per watt, whereas a compact fluorescent bulb produces 63 lumens per watt. Compact fluorescent bulbs have the additional advantage of lasting up to ten times as long without burning out.

Policy Design

Goals: Improve the minimum efficiency of lighting to at least 25 lumens per watt by 2012 and have the Maryland Energy Administration propose higher efficiency standards beginning in 2016.

- **Timing:** As above.
- **Parties Involved:** All retailers.
- **Other:** If use of a type of incandescent bulb is required pursuant to federal, state or local statute or regulation, the phase out will exclude that type of incandescent bulb.

Implementation Mechanisms

TBD – [CCS drafts based on TWG inputs; this can be developed as they go along, and can start early or late as they prefer; the level of detail can vary on TWG approval]

The state should consider whether mercury from disposal of compact fluorescent bulbs may present a concern to human health or the environment. A recycling program for residential and commercial bulbs may be developed to address disposal.

Related Policies/Programs in Place

TBD – [as needed and approved by the TWGs]

Types(s) of GHG Reductions

TBD – [CCS to list GHG reductions with input / approval from TWG]

Estimated GHG Reductions and Net Costs or Cost Savings

TBD – [CCS should provide a worksheet and other reference material as needed for transparency]

Data Sources:

- U.S. Department of Energy. U.S. Lighting Market Characterization, Volume I: National Lighting Inventory and Energy Consumption Estimate. Prepared by Navigant Consulting, Washington, D.C.: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, September 2002.
- One Billion Bulbs. Summary Statistics for Maryland. http://www.onebillionbulbs.com/Stats/State/MD (accessed December 11, 2007).
- 2004-2005 Database for Energy Efficiency Resources Update Study. California Public Utilities Commission and California Energy Commission, prepared by Itron, Inc., December 2005.

Quantification Methods:

- Estimate the average number of incandescent bulbs in use per residential, commercial, and industrial buildings from DOE data on the average number of lamps per building.
- Estimate the per watt consumption of each bulb from DOE data on the average lamp wattage by sector.
- Use the average bulb wattage and assumption regarding the quantity and frequency of incandescent bulbs use to find average incandescent lighting load per building.
- Use the average incandescent lighting load per building and the assumed efficiency of using a CFL over an incandescent, to find total energy savings.
- Multiply the energy savings per bulb and the total number of bulbs in each building, times the number of buildings in Maryland. This should be building sector-specific.
- Multiply the incremental installed cost of each bulb times the number of bulbs to be replaced and subtract the avoided energy costs to find the net cost of bulb replacement.

Key Assumptions:

- Average number of bulbs in use by type per building sector (DOE 2002):

Technologies	Residential	Commercial	Industrial
Incandescent	**37**	**91**	**33**
Standard - General Service	34	53	7
Standard – Reflector	2	17	6
Halogen - General Service	0.2	0.2	-
Quartz Halogen	0.1	4	1
Halogen - refl. - low volt	-	9	0.0
Low wattage (less than 25W)	-	9	20
Misc incandescent	-	-	-
Fluorescent	**6**	**324**	**1,340**
T5	-	1	0.1
T8 – less than 4'	-	7	28
T8 – 4'	-	83	631
T8 – More than 4'	-	0.4	0.1
T8 – U-bent	-	2	12
T12 – less than 4'	-	6	5
T12 – 4'	-	152	354
T12 – More than 4'	-	25	281
T12 – U-bent	-	7	7
Compact – Pin-base	-	21	6
Compact – Screw base	1	10	6
Compact – Pin-base – reflector	-	-	-
Compact – Screw base – reflector	0.0	1	1
Circline	-	5	8
Induction discharge	-	-	-
Miscellaneous fluorescent	5	1	2
HID	**0.0**	**7**	**67**
Mercury vapor	0.0	1	8
Metal halide	-	4	47
High pressure sodium	0.0	1	12
Low pressure sodium	-	0.1	0.3
Xenon	-	-	-
Electrodeless (e.g. mercury)	-	-	-
Solid State	**-**	**0.4**	**0.3**
LED	-	0.3	0.2
Electroluminescent	-	0.1	0.1
Total	**43**	**422**	**1,440**

Note: Individual values may not sum identically to the totals due to rounding

- Average bulb wattage by type and building sector (DOE 2002):

Lamp Type	Residential (watts)	Commercial (watts)	Industrial (watts)	Outdoor (watts)	Weighted Avg. (watts)
Incandescent	67	83	64	138	69
Fluorescent	38	41	48	150	41
HID	151	404	425	227	304
Solid State	-	5	5	15	6

- Average operating hours per day by sector and source (DOE 2002):

Lamp Type	Residential (hours/day)	Commercial (hours/day)	Industrial (hours/day)	Outdoor (hours/day)	National Avg. (hours/day)
Incandescent	1.9	10.2	16.7	7.9	2.8
Fluorescent	2.2	9.7	13.4	10.8	8.2
HID	2.8	10.1	13.9	11.3	11.0
Solid State	0.0	23.0	23.4	7.0	22.2
Sectoral Average	2.0	9.9	13.5	10.5	4.8

- A CFL reduces required lighting power by about 80% as compared to an incandescent.
- At least 77% of light bulbs sold by 2012 should have the minimum efficiency of a compact fluorescent bulb that produces 63 lumens per watt. This CFL penetration level will be assumed for the years 2012 to 2020.
- Number of buildings in each sector in Maryland
- Average energy price
- Incremental installed cost (including equipment and labor costs) of a 13 Watt CFL, with the equivalent of 62 lumens per watt or greater, is $8.03 (DEER 2005).
- Ramp rate for introducing CFLs into the market: ?

Table 8-7. Percentage of Electricity Consumption by Sector and Source, 2001

Lamp Type	Residential (% electricity)	Commercial (% electricity)	Industrial (% electricity)	Outdoor (% electricity)	National Avg. (% electricity)
Incandescent	90%	32%	2%	11%	42%
Fluorescent	10%	56%	67%	2%	41%
HID	0.3%	12%	31%	87%	17%
Solid State	0%	0.02%	0.00%	0.01%	0.01%
Totals	100%	100%	100%	100%	100%

Table 8-8. Percentage of Source Lumen Output by Sector and Source, 2001

Lamp Type	Residential (% lmhr/yr)	Commercial (% lmhr/yr)	Industrial (% lmhr/yr)	Outdoor (% lmhr/yr)	National Avg. (% lmhr/yr)
Incandescent	69%	8%	0%	2%	12%
Fluorescent	30%	78%	71%	1%	62%
HID	1%	14%	29%	96%	26%
Solid State	0%	0%	0%	0%	0%
Totals	100%	100%	100%	100%	100%

Key Uncertainties

Collection and disposal of compact fluorescent bulbs should be addressed to avoid mercury contamination.

Additional Benefits and Costs

There may be additional costs associated with the collection and disposal of compact fluorescent bulbs.

Feasibility Issues

TBD – [as needed and approved by the TWGs]

Status of Group Approval

Pending – [until MWG moves to final agreement at Meeting #5 or #6]

Level of Group Support

TBD – [blank until MWG Meeting #5]

Barriers to Consensus

TBD – [blank until final vote by the MWG/MCCC]