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Residential, Commercial, and Industrial (RCI) Technical Work Group

Summary List of Pending Priority Policy Options for Analysis

Policy No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2020	2030	Total 2010–2030			
RCI-1	Improve Building Codes for Energy Efficiency, Coupled with Improved Energy Code Training and Enforcement	*Not Yet Quantified*					*Pending*
RCI-2	Promote, Encourage, and Incentivize "Beyond-Code" Efficiency in All Building Characteristics and Systems That Impact Energy Consumption	*Not Yet Quantified*					*Pending*
RCI-3	Expand Utility DSM Programs (Beyond EERS) for Electricity	*Not Yet Quantified*					*Pending*
RCI-4	Develop and Implement Comprehensive Education, Outreach, and Marketing, Including Consumer Awareness, School Curriculum, Truth-in-Advertising, Technical Information and Support (e.g., How to Do GHG Inventories), Rationales for Action, etc.	*Not Yet Quantified*					*Pending*
RCI-5	Financing Programs and Incentives for Energy Efficiency and CHP (PBF, Revolving Loans, etc.)	*Not Yet Quantified*					*Pending*
RCI-6	Financing Programs, Incentives, Policies, and Research for Conversion to RE or Low-Carbon Energy Sources	*Not Yet Quantified*					*Pending*
RCI-7	Government Lead by Example (GLE) in Highly Efficient State and Local Government Buildings	*Not Yet Quantified*					*Pending*
RCI-8	Training and Education for Builders, Contractors, and Building Operators	*Not Yet Quantified*					*Pending*

Policy No.	Policy Option	GHG Reductions ($MMtCO_2e$)			Net Present Value (Million $)	Cost-Effectiveness ($/tCO_2e$)	Level of Support
		2020	2030	Total 2010–2030			
RCI-9	Building Commissioning and Recommissioning, Including Energy Tracking and Benchmarking, and Implement a Building Energy Labeling Program	*Not Yet Quantified*					*Pending*
RCI-10	Implement Advanced Metering Technologies and Associated Policies for Greater Load Management, Customer Control, Awareness, Price Signaling, etc.	*Not Yet Quantified*					*Pending*
	Sector Total After Adjusting for Overlaps						
	Reductions From Recent Actions (EISA Title II requirements for new appliances and lighting)						
	Sector Total Plus Recent Actions						

$/tCO_2e$ = dollars per metric ton of carbon dioxide equivalent; CHP = combined heat and power; DSM = demand-side management; EERS = energy efficiency resource standard; EISA = Energy Independence and Security Act of 2007; GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; PBF = performance-based financing; RE = renewable energy.

Negative values in the Net Present Value and the Cost-Effectiveness columns represent net cost savings.

The numbering used to denote the above policy recommendations is for reference purposes only; it does not reflect prioritization among these important policy recommendations.

RCI-1. Improve Building Codes for Energy Efficiency, Coupled with Improved Energy Code Training and Enforcement

Policy Description

Building energy codes specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing a major renovation. Given the lifetime of buildings, amending state building codes to include minimum energy efficiency requirements and periodically updating energy efficiency codes could provide long-term greenhouse gas (GHG) savings. Kentucky can improve energy codes that go beyond heating, ventilating, and air conditioning (HVAC) systems to include efficiency gains, such as designs to reduce lighting needs, electric lighting design, building envelope design, and integrated building design strategies.

Building codes, such as fire, structural, and electrical codes, were originally developed to address building conditions and safeguard occupants; building officials have thought of themselves as protectors of the public. Energy codes are a relatively recent addition to the family of building codes and do not have the same immediate connection to public safety. Therefore, many jurisdictions have given them lower priority when allocating resources. Energy codes are increasingly being relied upon to address health issues, energy supply concerns, and climate change. Accordingly, officials will need to put building code enforcement on a par with that of traditional codes.

State and local governments must communicate that energy code enforcement is an equal partner in the family of building codes. They must also allocate sufficient resources to allow code officials to enforce the energy code requirements on a level playing field with fire, life, and safety codes. Building codes are generally funded and enforced by permit fees, which average less than 1% of construction costs.

Adequate training of building plan reviewers and building inspectors is key to the success of building codes, as is appropriate enforcement capability. Unless these functions are adequately funded and staffed with qualified personnel, the full value of building codes will not be realized. Accordingly, the state's building code efforts should include an education and outreach program for building inspectors to encourage incorporation in inspection protocols of energy efficiency and GHG emission reduction considerations.

Policy Design

Goals/Levels:

- Expand enforcement of building energy codes.
- Adopt national codes with amendments as appropriate.
- Achieve targeted improvements in energy efficiency through educational programs for building inspectors and code enforcement officials to ensure that the existing codes are implemented and enforced.
- As a longer-term goal (e.g., ~2030), consider the benefits and shortcomings of basing the state's energy codes on units of carbon emitted rather than units of energy consumed.

Timing:

- Expand adoption and enforcement efforts of building energy code requirements immediately.
- Update Kentucky energy codes within one year to coincide with the most recent version of the national codes, and keep them updated to the latest standards.
- Coordinate training of building code officials with the adoption and enforcement of the new codes.

Parties Involved:

The Kentucky Department of Housing, Building & Construction (DHBC) and local jurisdictions as applicable, with input from Kentucky's Energy & Environment Cabinet and Finance & Administration Cabinet; building designers; builders and contractors; building inspectors; mortgage lenders.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-2. Promote, Encourage, and Incentivize "Beyond-Code" Efficiency in All Building Characteristics and Systems That Impact Energy Consumption

Policy Description

This policy provides incentives and targets to induce the owners and developers of new buildings to improve the efficiency of the use of energy and other resources in those buildings, along with provisions for raising target levels 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. Additionally, it can support flexibility in contracting arrangements to encourage integrated energy- and resource-efficient design, construction, and renovation. Incentives could include low-cost loans for investments in energy efficiency, tax credits, expedited plan review permits, and feebates for design professionals. Improving the energy efficiency design of buildings will have an immediate and ongoing impact in reducing GHG emissions.

For the remainder of RCI-2, we will use the base energy use intensities from American National Standards Institute (ANSI)/ASHRAE/Illuminating Engineering Society of North America (IESNA) Standard 90.1-2004 for various building types in climate zone 4A as defined by DOE Executive Order 430.2B.

Policy Design

Goals:

- Provide tiered incentives for energy efficiency in new buildings that achieve a reduction in energy use relative to the base established per the DOE Executive Order 430.2B energy standard for commercial buildings and the 2009 IECC for residential buildings through certification by a design professional or a nationally recognized third-party-verified green building certification system for commercial or residential buildings (e.g., Leadership in Energy and Environmental Design (LEED), ASHRAE/U.S. Green Building Council (USGBC)/IESNA Standard 189, or Green Globes New Construction). [*Need to characterize the incentives in order to calculate the costs of the policy.*]
- Reward projects where minimum energy efficiency exceeds ANSI/ASHRAE/IESNA 90.1-2004 benchmark levels[1] by the amounts shown in Table 4-1.

[1] This benchmark applies base energy use intensities from ANSI/ASHRAE/IESNA Standard 90.1-2004 for various building types in climate zone 4A as defined by U.S. DOE Executive Order 430.2B.

Table 4-1. Reductions from Benchmark Energy Use Intensity

Year	New Construction	Existing Building Retrofits
2010	30%	20%
2015	50%	35%
2020	70%	50%
2025	85%	65%
2030	100%	75%

- Provide projects and project teams one of the aforementioned incentives for achieving the appropriate levels above. Give projects and project teams that surpass the above goals an additional incentive for every 5% greater efficiency achieved beyond the above goals. In 2025 and 2030, once the team has made the project as energy efficient as possible (i.e., 100%), give the project and project team all aforementioned incentives.
- Require participating organizations or individuals to calculate, monitor, and report the costs and actual performance of energy efficiency improvements, as well as annual GHG emissions. Compare the performance of energy efficiency improvements in existing buildings against a regional average of similar building types.

Timing: Legislation may be required for implementation. Develop any necessary legislation in 2011, and implement the incentives policy in 2012.

Parties Involved: Legislative Research Commission (LRC), Commonwealth of Kentucky Finance Cabinet, DHBC, developers, builders and contractors, building owners, building material suppliers, recycled building material sellers, design professionals, and home improvement stores.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-3. Expand Utility DSM Programs (Beyond EERS) for Electricity

Policy Description

Note: This policy option was developed jointly with the Energy Supply TWG as ES-2.

Demand side management (DSM), energy efficiency education, and programs, pilots, or goals for reduced electricity consumption call for actions that influence the quantity and/or patterns of use of energy consumed by end users. This option focuses on increasing investment in electricity DSM/energy efficiency through innovative actions developed and implemented by utilities, community partners, and customers. The ultimate goal is to provide tools, information, assistance, and knowledge that will help customers more efficiently manage and reduce their energy consumption.

Policy Design

Given the current cost of electricity in Kentucky and the lack of consensus in the U.S. House and Senate on increasing the costs of electricity through the establishment of a price on carbon, renewable portfolio standards, efficiency standards, or clean energy standards, the most cost-effective method of preparing the Commonwealth for increased energy efficiency and DSM is to increase education and the number of efficiency/DSM programs and pilot projects that provide customers with the tools and information they need to better manage their energy consumption.

Also, the current rate structure for utilities in Kentucky creates a business environment where additional energy efficiency and conservation measures may have a negative financial impact for utilities. Historically, utility rate structures encourage the sale of power. To align energy efficiency and conservation incentives with the utilities' business model, Kentucky should examine alternative rate structures that equalize the incentive for utilities to invest in cost-effective energy efficiency with the incentive to invest in new supply resources.

Goals:

1. On a collaborative basis, by June 2011, develop a consortium of investor owned utilities (IOUs), electric cooperatives, and municipal utilities to work with the Kentucky DEDI and the Public Service Commission (PSC) to develop rate mechanisms and remove regulatory barriers so that utilities are better able to invest in DSM and energy efficiency programs.

   Considerations for this option could include, but are not limited to, corporate tax incentives, sustainable building tax credits, green building incentives, green building standards for state facilities, energy efficiency bond programs, personal tax incentives, sales tax incentives, lease purchase programs, grant programs, and loan programs.

2. By January 2012 have in place a regulatory environment that provides a mechanism and procedure for investment in DSM and energy efficiency.

3. Investment in DSM and energy efficiency may include, but is not limited to:

   a. Consumer and member education

b. Consumer and member focus groups
c. Pilot programs to explore and test creative and innovative opportunities
    i. SCADA (supervisory control and data acquisition) systems
    ii. Communication systems
    iii. Advanced Volt/Var control
    iv. Smart feeder switching systems (self-healing grid)
    v. Direct-load control systems
    vi. Smart Home systems, including, but not limited to:
        1. In home displays
        2. Smart meters (See RCI-10)
        3. Home energy networks and gateways
        4. Smart thermostats
        5. Smart appliances
        6. Load management systems
        7. Energy Web portals displaying energy usage data and comparisons
        8. Integrated utility home network, communication, and data transfer
    vii. Distributed generation pilots, where consumers work collaboratively to implement economic alternative power supply systems, such as:
        1. Solar water-heating systems
        2. Heat pump water-heating systems
        3. Geothermal HVAC and water-heating systems
        4. Wind power systems
        5. Biomass power supply systems
        6. Solar power supply systems
        7. Net-zero-energy homes
        8. Electric vehicle/utility interconnection systems
    viii. Energy storage systems
    ix. Weatherization, HVAC upgrades, and Energy Star appliance upgrade pilot programs in collaboration with finance and community networks to provide innovative funding mechanisms to assist customers to finance their energy efficiency efforts.

4. By June 2011, have DEDI in a collaborative effort with the PSC and the state's utilities. Based on empirical studies of nationwide energy efficiency and DSM programs, determine the costs of electricity where participation in energy efficiency and DSM has become

commonplace. In addition, determine the impact of DSM on energy consumption in Kentucky as well as nationwide. Charts identifying the aggregated DSM energy savings from filed programs from 1995 through 2015 would provide a good historical basis to assist in determining a reasonable policy going forward.

5. By January 2012, have pilot programs and consumer education in place at all utilities in the Commonwealth.

6. By January 2014, have advanced the pilot programs to make energy efficiency/DSM opportunities available to all consumers in the Commonwealth. Beginning in 2014 and running to 2030, consider targets for DSM GHG reductions, pending additional research on experience in other states with comparable demographics and energy price points. *[Sample assumptions need to be identified in order to calculate illustrative GHG reductions and costs.]*

7. As the cost of electricity increases to the level that causes significant energy efficiency/DSM results, have a strong, viable consumer education program and an energy efficiency/DSM plan in place at all utilities in the Commonwealth.

Timing: See above.

Parties Involved: IOUs, municipals, cooperatives, DEDI, PSC, community action groups, financial organizations, environmental groups, and DSM equipment manufacturers.

It is the intent to work in a collaborative process, to properly align the roles of the parties identified above.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-4. Develop and Implement Comprehensive Education, Outreach, and Marketing, Including Consumer Awareness, School Curriculum, Truth-in-Advertising, Technical Information and Support (e.g., How to Do GHG Inventories), Rationales for Action, etc.

Policy Description

Education in this policy recommendation falls under three categories:

- Consumer awareness and education
- School curriculum
- Truth-in-advertising campaigns

The ultimate effectiveness of emission reduction activities depends in many cases on providing information and education to consumers regarding the energy and GHG emission implications of consumer choices. Public education and outreach is vital to fostering a broad awareness of climate change issues and effects (including co-benefits, such as clean air and public health) among the state's citizens. Such awareness is necessary to engage citizens in actions to reduce GHG emissions in their personal and professional lives. Public education and outreach efforts should integrate with and build upon existing outreach efforts involving climate change and related issues in the state. Ultimately, education and outreach will be the foundation for the long-term success of all of the mitigation actions proposed, as well as those that may evolve in the future.

Policy Design

Goals:

- Develop consumer education courses and outreach programs for GHG emission reductions.
- Provide information and education to present and future consumers in all levels of education—elementary, secondary, college, university, and community colleges.
- Develop guidelines to ensure that factual and accurate information regarding GHG emission implications are provided to consumers through a truth-in-advertising campaign targeting advertising of energy-consuming products.
- Develop consumer product programs that may include education, incentives, retailer trainer, marketing, and promotion.
- Utilize tools such as Web-based calculators to assist residents, businesses, and communities to develop GHG inventories and to evaluate and act upon their GHG inventory results.

Timing: By 2011, put the education awareness programs in place, begin outreach programs, and evaluate school curriculum areas to make sure they include GHG awareness.

Parties Involved: Consumers, retailers, manufacturers, technicians, teachers, professionals in building and related trades, trade schools, community colleges, universities, utility companies, Kentucky Energy Education Development project, DEDI, Kentucky Energy Efficiency Program

for Schools, Kentucky School Plant Management Association, Kentucky Green and Healthy Schools, Kentucky Department of Education, and Kentucky Environmental Education Association.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-5. Financing Programs and Incentives for Energy Efficiency and CHP (PBF, Revolving Loans, etc.)

Policy Description

A number of programs and incentives could be designed and implemented as part of this policy option; for the purposes of the Kentucky Climate Plan Action Council (KCAPC), this option focuses on Property Assessment for Clean Energy (PACE) financing (and any necessary enabling legislation). PACE is a program designed to eliminate a major barrier to private investment in energy efficiency, conservation, or combined heat and power (CHP) measures installed on buildings: the large up-front investment. By removing this barrier, building owners are more likely to pursue building-scale energy efficiency retrofits and/or CHP installations. The program works through the creation of a public loan fund at the municipal level that is directed solely to financing qualifying energy efficiency and CHP measures.

The improvements are those prescribed by a third-party energy professional. A building owner applies to the municipality for project funding, and if awarded, the funds are transferred and spent and the improvements are verified. Repayments are calibrated to be less than the expected energy savings of the funded improvements. The repayment of the funds takes place annually along with the building owner's property tax bill, giving PACE payments the same treatment as taxes for lien priority purposes. In the event of a sale, payment obligation remains with the property, continuing on the same basis in the same way taxes are collected and prorated in the event of a sale. There is no "balance due on sale" trigger that would discourage building owners from taking part in the program.

This policy pairs with RCI-6, which provides for a similar PACE program to encourage investments in renewable energy by building owners.

Policy Design

Goals: Address the significant demand in Kentucky for increased energy efficiency measures and CHP generation. Market penetration will depend on funding levels and decisions concerning what kind of improvements qualify for funding. *[Sample assumptions need to be made in order to quantify illustrative GHG reductions and costs.]*

Timing:

Parties Involved: Building owners, mortgage lenders, local governments, state and local building officials.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-6. Financing Programs, Incentives, Policies, and Research for Conversion to RE or Low-Carbon Energy Sources

Policy Description

There are a number of programs and incentives that could be designed and implemented as part of this policy option; for the purposes of the KCAPC, this option focuses on PACE financing (and any necessary enabling legislation). PACE is a program designed to eliminate a major barrier to private investment in low-carbon and renewable energy installations on buildings: the large up-front investment. By removing this barrier, building owners are more likely to pursue building-scale low-carbon and renewable energy installations. The program works through the creation of a public loan fund at the municipal level that is directed solely to financing qualifying low-carbon and renewable energy installations.

The improvements are those prescribed by a third-party energy professional. A building owner applies to the municipality for project funding, and if awarded, the funds are transferred and spent, and the improvements are verified. Repayments are calibrated to be less than the expected energy savings of the funded improvements. The repayment of the funds takes place annually along with the building owner's property tax bill, giving PACE payments the same treatment as taxes for lien priority purposes. In the event of a sale, payment obligation remains with the property, continuing on the same basis in the same way taxes are collected and prorated in the event of a sale. There is no "balance due on sale" trigger that would discourage building owners from taking part in the program in the first place.

This policy pairs with RCI-5, which provides for a similar PACE program to encourage investments in energy efficiency measures and CHP installations by building owners.

Policy Design

Goals: Address the significant demand in Kentucky for increased energy efficiency measures and CHP generation. Market penetration will depend on funding levels and decisions concerning what kind of improvements qualify for funding. *[Sample assumptions need to be made in order to quantify illustrative GHG reductions and costs.]*

Timing:

Parties Involved: Building owners, mortgage lenders, local governments, state and local building officials.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-7. Government Lead by Example (GLE) in Highly Efficient State and Local Government Buildings

Policy Description

This policy provides energy efficiency targets for new construction of state and local government buildings and renovation of existing state and local government buildings that are much higher than code standards.

The Kentucky state government is a significant consumer of energy. The state owns about _____ million square feet of building space and leases approximately _____ million square feet more. Further, local government buildings, such as courthouses, city halls, K-12 schools and other facilities, are not included in this figure.

The Kentucky General Assembly has made great strides in the maintenance of public buildings. However, the potential for significant improvements and upgrades remains, reflecting opportunities for more energy savings through more energy-efficient equipment and practices.

This policy requires the Commonwealth of Kentucky Finance Cabinet to improve the efficiency with which energy and other resources are used in public buildings that receive 50% or more of their construction funding from the Commonwealth. Improving the energy efficiency of buildings will provide immediate and ongoing energy savings and reduce GHG emissions.

For the remainder of RCI-7, we will use the base energy use intensities from ANSI/ASHRAE/IESNA Standard 90.1-2004 for various building types in climate zone 4A, as defined by DOE Executive Order 430.2B.

Policy Design

Goals:

- Require new buildings to achieve a reduction in energy use relative to the base established per the DOE Executive Order 430.2B energy standard for commercial buildings and the 2009 IECC for residential buildings through certification by a design professional or a nationally recognized third-party-verified green building certification system for commercial or residential buildings (e.g., LEED, ASHRAE/USGBC/IESNA Standard 189, or Green Globes New Construction).
- Increase the minimum energy efficiency standard beyond ASHRAE 90.1-2004 benchmark levels[2] by the amounts shown in Table 4-2.

[2] This benchmark applies base energy use intensities from ANSI/ASHRAE/IESNA Standard 90.1-2004 for various building types in climate zone 4A as defined by DOE Executive Order 430.2B.

Table 4-2. Reductions from Benchmark Energy Use Intensity

Year	New Construction	Existing Building Retrofits
2010	30%	20%
2015	50%	35%
2020	70%	50%
2025	85%	65%
2030	100%	75%

- Require participating organizations or individuals to calculate, monitor, and report the costs and actual performance of energy efficiency improvements, as well as annual GHG emissions. Compare the performance of energy efficiency improvements in existing buildings against a regional average of similar building types.
- This policy option closely parallels RCI-2, but unlike that option, it does not provide for incentives to government, thereby raising the bar and establishing government leadership by example.

Timing: Legislation may be required for implementation. Develop any necessary legislation in 2011, and implement the incentives policy in 2012.

Parties Involved: LRC, Commonwealth of Kentucky Finance Cabinet, DHBC, developers, builders and contractors, building owners, building material suppliers, recycled building material sellers, design professionals, and home improvement stores.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-8. Training and Education for Builders, Contractors, and Building Operators

Policy Description

Providing training, education, and outreach for builders, contractors, building operators, and code officials encourages these building professionals to incorporate of energy efficiency and GHG emission reduction considerations in the conduct of their work. Education and training should be mandatory and available to builders, contractors, and others involved in the construction of new buildings and the retrofitting and renovation of existing buildings.

Policy Design

Goals:

- Develop technical/professional education courses and outreach programs for GHG emission reductions to increase the number of professionals trained in energy efficiency.
- Achieve targeted improvements in energy efficiency through educational programs for builders, building inspectors, and other building industry professionals to help ensure that the existing codes are implemented and enforced.

This option is not anticipated to be quantified.

Timing: By 2012, put the education/training recommendation in place and begin outreach programs.

Parties Involved: Consumers, retailers, manufacturers, technicians, and professionals in building and related trades, code enforcement agencies, trade schools, and community colleges.

Other: None.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-9. Building Commissioning and Recommissioning, Including Energy Tracking and Benchmarking, and Implement a Building Energy Labeling Program

Policy Description

Building commissioning is the process of verifying that systems perform as required for such areas as energy consumption, system function, system operations, and systems maintenance. Commissioning is the process applied to new construction projects or major renovations involving capital expenditures. Existing building commissioning is the process applied to facilities in operation to ensure proper operation and mitigate the impact of system degradation. Ongoing commissioning is the continued implementation of preventive maintenance and performance reviews in order to keep building systems operating efficiently involving energy tracking and benchmarking, system tune-ups, equipment and sensor calibrations, and staff retraining, among other program elements.

The benefit of commissioning is to not only identify, but also address, operational issues that impact energy consumption and system performance. The effort goes beyond energy analysis to assess parameters, such as indoor environmental quality, equipment longevity, and system maintenance, among others, as needed for the use and occupants of a given facility.

This option would initiate commissioning efforts for publicly owned buildings. The efforts would extend the scope of facilities to not only include capital construction, but also systematically address existing buildings and facility management processes. The option would look at possible incentives for private facility owners who implement commissioning efforts for new construction and renovations, existing buildings, and/or facility management processes.

The option would require that findings related to commissioning identified in new construction and renovation projects be addressed within the construction contract. For existing building commissioning, the option will require no- and low-cost findings to be addressed within the project, while developing a plan to implement recommendations requiring capital expenditure within a reasonable time period.

The integrity of the process will be defined by one of the following: the Building Commissioning Association, ASHRAE, the Associated Air Balance Council Commissioning Group, the National Environmental Balancing Bureau, or equivalent. Commissioning will be implemented by an independent third-party commissioning authority certified by the associations listed above.

The minimum systems that will be commissioned include those that impact the energy consumption of the facility, namely: HVAC, domestic hot water, lighting, renewable energy, building envelope, all controls associated with listed systems, and additional systems as desired by the facility owner.

This option would also initiate a program to inform building owners and operators, tenants, and prospective buyers on the energy use of buildings, similar to a nutrition label on food or miles-per-gallon ratings on cars. Examples include the Building Energy Quotient (or “Building EQ”)

program administered by ASHRAE[3] and Seattle's Energy Use Benchmarking ordinance #123226.[4]

Energy Tracking and Benchmarking

Tracking and benchmarking the energy used in a building provides valuable information not only for comparative purposes between buildings of similar use classification, but also for identification of buildings that have high and/or low performance, in order to determine efficient utilization of energy and where resources need to be spent to reduce the energy costs. Benchmarking is commonly used to identify the minimally acceptable performance of buildings.

Building Energy Labeling

Building energy labels provide information on the potential and actual energy usage of buildings, give feedback to building owners and operators on how their building is performing, provide insight into the value and potential long-term costs of a building and market-based forces to influence energy efficiency investment opportunities, and can serve as a tool to provide for differentiation in the marketplace.

Building energy disclosure benefits the Commonwealth by providing a mechanism for uniformly measuring all building consumption, assists in the enforcement of building energy codes, demonstrates responsible use of taxpayer funds when used in public buildings, protects consumers from unknown future energy costs, and reduces energy use while allowing building owners to make decisions about their property. One analysis[5] identified building energy disclosure as a more cost-effective means for reducing energy use than codes. Mandatory labeling requirements are already in place in the European Union, California, and Washington, DC.

Policy Design

Goals:

- Commissioning:
  - Commence implementation of commissioning for new construction and major renovations immediately for all publicly owned facilities.
- Existing Building Commissioning and Ongoing Commissioning:
  - Require publicly owned existing building inventory subject to the 2009 *Intelligent Energy Choices for Kentucky's Future*[6] to incorporate existing building commissioning

[3] See http://www.ashrae.org/pressroom/detail/17380.

[4] See http://clerk.ci.seattle.wa.us/~scripts/nph-brs.exe?s1=energy&s3=&s4=&s2=&s5=&Sect4=AND&l=20&Sect2=THESON&Sect3=PLURON&Sect5=CBORY&Sect6=HITOFF&d=ORDF&p=1&u=%2F~public%2Fcbory.htm&r=2&f=G.

[5] Interlaboratory Working Group on Energy-Efficient and Clean Energy Technologies. November 2000. *Scenarios for a Clean Energy Future*. ORNL/CON-476 and LBNL-44029. Oak Ridge, TN, and Berkeley, CA: Oak Ridge National Laboratory and Lawrence Berkeley National Laboratory. Available at: http://www.ornl.gov/sci/eere/cef/.

[6] See http://www.energy.ky.gov/energyplan2008/.

and ongoing commissioning measures to achieve the plan's energy efficiency reduction targets.

- Require existing building inventory owned by local governments to incorporate existing building commissioning and ongoing commissioning measures in the same time frame as established in the 2009 *Intelligent Energy Choices for Kentucky's Future* plus three years.
- Require privately owned facilities to have incentives in place as soon as funding and mechanisms are feasibly available.

- Energy Tracking and Benchmarking:
  - Create a uniform method of reporting the energy use of a building, to enable comparable evaluations of the building's energy performance.
  - Aggregate sufficient building energy and operational data to determine values that would identify buildings in the upper (low performers) and lower (high performers) quartiles of energy use.
- Building Energy Labeling:
  - Require all buildings to have a comparable metric or an estimate of the energy required to operate the building.
  - Require all new state-owned buildings and buildings rented by the state government to include the building label as part of the design documents.
  - Require all existing buildings to collect information needed to produce an "In Operation" rating.
  - Develop the tools and resources necessary to support utilization of the program.
  - Require all new buildings designed under the 2013 code and later to have a building label.

Timing:

- Commissioning:
  - Commissioning for Publicly Owned Capital Projects: Immediate implementation.
  - Existing Building Commissioning and Ongoing Commissioning: Publicly owned subject to the 2009 *Intelligent Energy Choices for Kentucky's Future*:
    - 2015—Incorporated into measures to achieve 15% reduction in energy per square foot reduction over 2004 baseline.
    - 2025—Incorporated into measure to achieve 25% reduction in energy per square foot reduction over 2004 baseline.
  - Existing Building Commissioning and Ongoing Commissioning and Facilities Owned by Local Governments:
    - 2018—Incorporated into measures to achieve 15% reduction in energy per square foot reduction over 2004 baseline.

    - 2028—Incorporated into measure to achieve 25% reduction in energy per square foot reduction over 2004 baseline.
  - Privately Owned Facilities Commissioning:
    - 2011–2012—Implementation of incentive programs for owners engaging in commissioning, existing building commissioning, and ongoing commissioning programs.
- Building Energy Tracking, Benchmarking, and Labeling:
  - Develop energy tracking metric: Fourth quarter (4th Q) of 2011.
  - Develop benchmarks for the 15 building types in Kentucky climates: 4th Q of 2011.
  - Develop building labeling requirements: 4th Q of 2011.
  - Implement energy tracking and building labeling for state buildings: 4th Q of 2013
  - Require energy tracking and building labeling for all new construction: 4th Q of 2014.
  - Require energy tracking and building labeling for all building transfers: 2015.

Parties Involved:

- Commissioning: Facility owners, facility managers, architecture and engineering community, commissioning professional community, contracting community.
- Building Energy Tracking, Benchmarking, and Labeling: Building owners and operators, designers, construction industry, utilities, building sales, energy managers.

Implementation Mechanisms

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Costs or Cost Savings

Data Sources:

Quantification Methods

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus

RCI-10. Implement Advanced Metering Technologies and Associated Policies for Greater Load Management, Customer Control, Awareness, Price Signaling, etc.

Policy Description

Note: This policy option was developed jointly with the Energy Supply TWG as ES-11.

The term "smart grid" has taken on wide range of meanings. The smart grid concept can be divided into two functional areas: customer load and use management, and transmission and distribution monitoring and control. Application of each can result in increased electrical efficiency, utilization, operational efficiency, reliability, or electricity load management. Each of the functional areas relies on advanced monitoring, controls, data analysis, and communications.

Kentucky's electric utilities are in various stages of deploying Automated Meter Infrastructure (AMI) or electric meters that are able to record consumption and other data hourly or more frequently, and are capable of two-way communication with a central location. The meters are also capable of communicating with equipment within the customer premises. In addition to allowing the customers to control their own usage more effectively, AMI enables various pricing strategies designed to reduce GHG emissions.

Transmission and distribution (T&D) monitoring and control are other areas where energy losses and service improvements can be gained. Enhanced voltage monitoring and control, real-time ambient condition monitoring, and automated switching are examples of "smart technologies." Installation of higher-efficiency transformers and conductors can also reduce energy losses in the delivery systems. T&D losses are typically around 5%, so a 10 % reduction in these losses would reflect a 0.5% reduction in the net generation.

Installation of smart grid technologies will enable other technologies, such as integration of intermittent or distributed generation.

This policy is designed to accelerate the deployment of smart grid technologies and T&D efficiency improvements.

Policy Design

Goals:

- Achieve 100% coverage for AMI by 2015.
- Reduce consumer demand by 5% by 2020.
- Reduce transmission losses by 10% by 2015.
- Reduce distribution losses by 10% by 2015.

Timing: See above.

Parties Involved: These policies would apply to all electric utilities and will require enabling legislation, in the form of funding mechanisms and/or PSC authority for special rate treatment.

Affected parties include: electric utilities (PSC regulated, Tennessee Valley Authority distributors, and municipally owned) and ratepayers.

Other: Pricing signals will be necessary for end-use reduction. A renewable and efficiency standard would encourage smart grid and transmission enhancements as a means to meet the efficiency standard.

Implementation Mechanisms

- Provide financial incentives for AMI deployment.
- Allow cost recovery (favorable rate treatment) for AMI deployment.
- Provide financial incentives for installation of smart appliances.
- Provide financial incentives for installation of home automation.
- Provide funding to research consumer reaction to price signals.
- Provide financial incentives for T&D monitoring and control equipment.
- Allow cost recovery (favorable rate treatment) for T&D monitoring and control equipment.
- Provide financial incentives for T&D efficiency improvements.
- Allow cost recovery (favorable rate treatment) for T&D efficiency improvements.
- The legislature should find that a minimum level of AMI is in the public interest, so that the PSC could allow AMI investment in rate base without a cost-benefit analysis.
- The legislature should find that a minimum level of AMI is in the public interest so that the PSC could allow AMI investment in rate base without a cost-benefit analysis.
- The legislature should enact a tax credit and rebate program for the installation of smart appliances.

Related Policies/Programs in Place

Type(s) of GHG Reductions

Estimated GHG Reductions and Net Costs or Cost Savings

Data Sources:

Quantification Methods:

Key Assumptions:

Key Uncertainties

Additional Benefits and Costs

Feasibility Issues

Status of Group Approval

Level of Group Support

Barriers to Consensus