Kentucky's Energy Future...

...at the Crossroads

AN ENERGY PLAN FOR KENTUCKY

COMMONWEALTH INSTITUTE FOR POLICY ISSUES & CIVIC ENGAGEMENT

ENERGY COMMITTEE

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The Women's Network
Advocates For Democratic Principles

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Commonwealth Institute for Policy Issues and Civic Engagement

Energy Committee

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INTRODUCTION

The Commonwealth Policy Institute (CPI) proposes an energy plan for Kentucky that will move the state toward energy sustainability and economic growth. CPI suggests policy modifications that require modest investments by the General Assembly, some regulatory changes, and, most importantly, a shift in priorities.

Coal produces the bulk of Kentucky's electricity, although the quickly expanding natural gas industry is making inroads. Coal, while losing market share, and despite air and water concerns, will be important in Kentucky for decades. Natural gas emits half the greenhouse gases of coal and in the near-term can be a "bridge fuel" from old fossil fuels (i.e., coal and oil) to renewable energy sources. Plentiful and cheap natural gas is now making coal liquefaction and coal gasification cost prohibitive. However, natural gas is not expected to remain plentiful and cheap indefinitely. As reserves are depleted, we may see dramatic price increases in ten years or less, which would make it unsuitable for widespread electric generation.[1, 2] In light of these realities and reduced resources, all types of renewable energies need to be developed in Kentucky, because they are the only sustainable ones in the long run.

Another major factor influencing the future mix of Kentucky energy is pressure from the federal government. A proposed regulation from the U.S. Environmental Protection Agency (EPA) would require the state to decrease its output of greenhouse gases (mainly from coal burning) by 18 percent by 2030. Even further proposed decreases might be in the offing after this date. Kentucky could comply with federal regulations by following the guidelines in this report. However, plans for controlling carbon dioxide emissions from existing power plants will be more difficult for the Energy & Environment Cabinet due to HB 388, passed in the 2014 session, which sharply limits and micromanages the criteria by which the Energy and Environment Cabinet can establish performance standards for the regulation of CO_2 emissions from existing fossil-fired electric generating units. If the Cabinet cannot develop an approvable plan due to interference from the mandates of HB 388, the most likely outcome of the bill will be EPA's providing a federal implementation plan for Kentucky to comply with the CO_2 regulations.

Kentucky's electricity generation is unbalanced: 93 percent is from coal whereas the national average is 40 percent.[3] Kentucky is vulnerable to coal shortages and market pressure and needs to diversify energy sources. Nuclear-generated electricity is relevant nationally but not in Kentucky where nuclear plants are

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[1] The US has 13.6 years supply of natural gas according to this new British Petroleum report. http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-full-report.pdf , p. 20 accessed July, 2014

[2] The US has 12.4 years of natural gas reserves using 2012 EIA statistics in the BP calculation. http://www.eia.gov/dnav/ng/ng_enr_sum_dcu_NUS_a.htm, accessed July, 2014

[3] http://www.eia.gov/state/?sid=KY

barred by Kentucky statute. Furthermore, costs are prohibitive, and there is nowhere to dispose of radioactive waste.

This paper presents solutions for Kentucky to adapt to the changing energy market. There is not one simple solution; instead, Kentucky must address a variety of obstacles. The solutions have varied approaches: some require funding, and some require additional or modified legislation and regulation. The solutions are not always related, but they all contribute to the overall goal. This paper considers solutions in four areas that, when taken together, will provide Kentucky a cost-effective, diverse, and sustainable energy policy:

I. Energy Efficiency
II. Renewable Energy
III. Least Cost
IV. Economic Development in rural Kentucky

The fastest, most sustainable, and most cost-effective way to meet the state's future energy needs is a multi-strategy program of energy efficiency and renewable energy. Efficiency reduces energy demand. Renewable energies improve and diversify electrical-generation sources and reduce long-term costs. The best way to encourage increased energy efficiency and renewable energies is to enact a Renewable Energy and Efficiency Portfolio Standard (REEPS). This requires a certain percentage of energy to be produced from renewable sources. Within 14 years at least 18 percent of Kentucky's electricity production should be met by renewables and energy efficiency.

To meet this goal, the Kentucky Public Service Commission (PSC) must redefine “least cost” when approving utility projects. Utility-cost considerations should be broadened to include external costs to the public such as health impacts, air and water pollution, and longer-term economics.

In rural Kentucky, where the declining coal industry has had a major negative effect on the economy and the environment, a portion of coal severance tax should be diverted to a permanent endowment fund for economic development. An oversight organization should be formed to ensure this investment is used wisely for the long-term good of the region. There are many established organizations in rural Kentucky that can provide assistance and guidance.

I. ENERGY EFFICIENCY

The Commonwealth's stated strategy defines energy efficiency as "the fastest, cleanest, most cost-effective and most secure way to meet Kentucky's growing demands."[4] The state has one of the highest per capita energy usage rates in the nation.[5] Therefore energy efficiency holds tremendous conservation opportunities and should command the highest priority in both budget and effort.

Kentucky has already taken important steps with recent passage of an energy law in 2007[6] and energy plans in 2008[7] and 2013.[8] Kentucky's action plan, "Stimulating Energy Efficiency in Kentucky," is a guideline, not a law. The legislature and the Department of Energy Development and Independence (DEDI) can take steps to allocate more funds for projects and should reallocate funds from fossil-fuel-based programs to energy-efficiency programs, despite restrictions by HB 388. The governor's goal outlined in the 2008 energy plan is an 18 percent reduction in energy usage by 2025—12 percent reduction in the consumption of electricity alone—and is within reach if Kentucky follows the state plan.[9] With help from the legislature, utilities, and private sector the 18 percent goal is obtainable.

A. Housing and Building Standards

Manufactured Housing: Kentucky needs legislation and tax incentives that encourage energy efficiency for new manufactured homes built in the state. Traditional manufactured housing is very inefficient, and with 90,000 manufactured homes in Kentucky, this is a hurdle to reducing energy demand. In many counties, these homes make up 30 to 40 percent of the housing stock, and it is difficult and not always cost effective to make these homes more energy efficient. Therefore Kentucky must focus on new manufactured homes and replacement of the oldest mobile homes.[10]

In 1992 the U.S. Environmental Protection Agency and the Department of Energy created a voluntary program, known as Energy Star to help businesses and individuals improve energy efficiency; subsequently it was adopted by several other countries. Energy Star is a minimum standard, however requiring this minimum standard would vastly improve factory-built houses. Several

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[4] Kentucky's Action Plan for Energy Efficiency, p. 9, available online at http://energy.ky.gov/Programs/Documents/Action%20Plan%205-15-2013.pdf
[5] Ibid., p. 9
[6] House Bill 1, commonly known as the 2007 Energy Act, enacted during the 2007 Second Extraordinary Session of the Kentucky General Assembly
[7] Governor Steve Beshear's 2008 Statewide Energy Plan available online at http://energy.ky.gov/Documents/Final_Energy_Strategy.pdf
[8] "Stimulating Energy Efficiency in Kentucky" Plan prepared by the state Department for Energy Development and Independence (DEDI) 2013.
[9] Governor's Energy Strategy 2008; ibid.
[10] Ibid., p. 27.

organizations are working on the problem in Kentucky. TVA's efficiency program, which includes some southern Kentucky counties, and the Next Step nonprofit program based in Louisville are good models.[11]

"Net Zero" State Buildings: Richardsville Elementary School in Warren County, Kentucky, was the first "Net Zero" school in the United States. The school uses a combination of innovative energy efficiency based on state-of-the-art construction and photovoltaic solar energy production to generate more electricity than it uses. The school has a contract—unique in Kentucky—to sell surplus energy to the TVA. In 2012, TVA paid The Richardsville School $37,000 for its surplus electricity. The state should retrofit all existing state buildings and build new structures to a higher standard.

Recommendation:

- Legislate a Net Zero standard for all new Commonwealth schools and public buildings, and retrofit existing buildings to the best extent possible, including a provision to allow surplus electricity to be sold back to the utility provider.

Passive Houses: Passive houses lower the demand for energy to near zero through super-insulation techniques. They often use passive solar, but the concept is built around containment of heat already in the buildings (e.g., human bodies, refrigerators, and light bulbs), in the winter and heat exclusion in the summer. Homebuilder associations and utilities should cooperate to build model passive houses. Houses currently demand 30 percent of Kentucky's electricity production, but passive houses require little to no energy for climate control. The state should encourage passive house building by financing new passive house projects.

Building Code Considerations: Kentucky building codes should be improved in order to encourage passive house building. Financing options for new passive house projects should also be considered. Building codes are a jumbled mosaic of state, county, and city requirements, and in many rural counties there is no code or enforcement. Local jurisdictions need to be educated on state guidelines for low-energy buildings, and an efficient and uniform code that is applicable to all jurisdictions in the state needs to be established. Moreover, the current $500 tax credit to homeowners for energy efficiency is too low to be effective.[12]

[11] TVA bypasses retailers by offering a subsidy to manufacturers themselves. Added energy upgrade costs per housing unit (from $2,000 to $3,000) are paid by TVA before the house is brought to the homeowner. Next Step works with nonprofits to make energy efficient homes more affordable by using a scalable approach to manufacturing and distribution. http://www.nextstepus.org/aboutusoverview.htm

[12] Ibid., p. 29, 36

Recommendations:

- Legislate building codes for low-energy buildings, and establish an efficient and uniform code applicable to all jurisdictions.
- Legislate doubling the existing energy-efficiency tax credit.

Industry accounts for nearly half of Kentucky's electricity use.[13] One way to lower the need for additional power generation is demand-side management (DSM). Demand-side management refers to utility efficiency measures that reduce customer demand for electricity. The statute for Kentucky DSM programs allows large industries to opt out of participation. This has hindered funding and prevented collection of energy use information within the industry.[14]

Recommendation:

- Legislate industry participation in demand-side management and eliminate blanket opt out provisions.

Home retrofit programs, including energy audits and weatherization, modernize buildings to make them more energy efficient. There are established programs to accomplish this that need additional funding to be successful. Retrofit programs provide appliance and energy resource updates, such as conversion to geothermal heating.

Energy audits by utility personnel, private entrepreneurs, and nonprofit agencies are the best ways to locate energy weaknesses in buildings. Kentucky needs more trained field auditors.

Weatherization of single-family homes is a cost-effective program administered through community action agencies and other entities. After energy weaknesses are identified through audits, the appropriate efficiency measures, such as insulation and air sealing are done. “Residential efficiency programs offer the biggest bang for a utility ratepayers buck” according to the state’s action plan. For example, one of the most effective low cost programs to improve energy efficiency in old and new housing is weather-stripping. Extra insulation is just as important but is more expensive.[15]

Education, training, and marketing are necessary to improve energy efficiency. The most effective way to educate the public is through existing pathways: utility bills, social services agencies, home builders and housing associations, consumer groups, business trade and professional groups, contractors, the

[13] Kentucky’s Action Plan for Energy Efficiency at 38-43
[14] Ibid., p. 31
[15] Kentucky’s Action Plan for Energy Efficiency, p. 22

university system, and the Public Service Commission. Forums, training seminars, brochures, and school guidelines are all needed, but they must be coordinated and initiated by the state.[16] Additionally, property assessors, appraisers, and lenders need to be educated on the added value of home efficiency.

Recommendation:

- Legislate additional energy education funds to the Energy and Environmental Cabinet; hire additional personnel to organize outreach efforts.

B. Financing

Financing Building Upgrades: Community action agencies can increase weatherization programs on the local level if they have more funding. Utility companies can contribute funds to community action agencies and other nonprofit energy groups to implement the programs. The Kentucky Weatherization Assistance Program (KYWAP) was temporarily funded by the federal American Recovery and Reinvestment Act; it has now reverted to pre-2012 levels and needs additional funding. Increased funding to local community action agencies will augment weatherization programs.

Recommendation:

- Legislate funding for energy audits, weatherization, and home retrofit programs

Financing Partnerships: Increased spending by the legislature is required for these programs, however the legislature and DEDI must look to creative solutions and financing partners to meet these goals. Kentucky Home Performance (KHP), for example, an established program, used federal American Reinvestment and Recovery Act (ARRA) money to improve over 1,000 homes in 20 months. Although the program later lapsed, another $3 million award from the state Energy Department provided KHP support for three years. The funds come through a TVA settlement fund offering homeowners loans from $25,000-$41,000. Repayments will replenish the fund, but more capital is needed. The accomplishment of retrofitting 1,000 homes is a model pilot for a future project.[17]

How$martKY: Kentucky needs alternative financing for home and building owners for energy-efficiency upgrades. Customers of four Eastern Kentucky Power Cooperatives in a regional program, called How$martKY, for example, receive financing to retrofit their homes and repay the loan monthly through their

[16] Ibid., p. 16
[17] Ibid., p. 21

utility bill. The program is managed by the Mountain Association for Community Economic Development (MACED), which has improved 150 homes, saving an average of $600 per home each year. This successful program could be implemented by every utility. Additional seed capital was included in the 2014 Farm Bill, and is now available from the US Department of Agriculture.

Property Assessed Clean Energy (PACE): Building owners can receive financing through PACE programs, which provide upfront financing that is repaid through annual property tax assessments.[18] Although these programs need start-up capital from the state, municipal, or county government, that capital is replenished through repayments.[19] Rural Electric Cooperatives can get start-up capital from a provision in the 2014 Farm Bill.

Rural Energy for America Program (REAP): This program provides grants and loan guarantees for small businesses (under $7 million gross revenue) in communities with populations of less than 50,000. United States Department of Agriculture (USDA) grants are for 25 percent of energy efficiency and/or renewable energy projects; loan guarantees can be for a higher percentage of project cost.

Recommendation:

- Legislate a financing plan added to homeowners' utility bills, and legislate Property Assessed Clean Energy (PACE) to provide a financing model through annual property tax assessments.

Low-interest Loans: The Green Bank was originally capitalized by a $14 million Recovery Act grant to provide low-interest loans to fund an energy savings program. It was used for over 50 state buildings. The loans will be repaid over 12 years. However, greater recapitalization is needed for immediate demands. A similar revolving program for Kentucky industries is in need of upfront capital.[20] Recently, the state disbursed $68 million of American Reinvestment and Recovery Act (ARRA) funds through the Green Bank to 26 low-energy programs for state buildings.[21]

Recommendation:

- Legislate recapitalization of the Green Bank.

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[18] www.pacenow.org: PACE is a national nonprofit that works with state and local governments to establish these programs.
[19] Kentucky's Action Plan for Energy Efficiency, p. 25
[20] Ibid., p. 31
[21] Ibid., p. 33

II. RENEWABLE ENERGY

Renewable Energy and Efficiency Portfolio Standards (REEPS): Currently, thirty states require their electrical utilities to obtain a minimum percentage of energy from renewable sources and/or increased energy efficiency. A REEPS standard would require electric utilities to generate a small, specified amount of electric retail sales from renewable sources, such as wind, solar, biomass, hydroelectric, and geothermal, as well as reduce electricity consumption through energy efficiency. States that have adopted similar statutes have reported positive economic impact.[22, 23]

Passage of this standard by the Kentucky General Assembly in 2015 would require electric utilities to implement the standards on a specific schedule. Electric utilities would produce the following percentages of their retail sales through the combination of increased use of renewable energy sources and improved energy efficiency (REEPS):

2019 4 percent of 2018 Kentucky retail sales
2022 8 percent of 2021 Kentucky retail sales
2025 13 percent of 2024 Kentucky retail sales
2028 18 percent of 2027 Kentucky retail sales

To meet these goals, Kentucky must remove barriers to renewable energy and take active steps to encourage energy efficiency. Reducing energy consumption through energy efficiency may meet up to 25 percent of the 18 percent goal of this section through 2028. Compared to neighboring states this goal is modest and economically feasible.

Recommendation:

- *Legislate a Renewable Energy and Efficiency Portfolio Standard (REEPS) for Kentucky.*

Renewable energy development: Kentucky can foster renewable energy development. Increased use of renewable energy will diversify Kentucky's energy mix and stabilize energy costs in the long term. Since Kentucky currently gets 93

[22] http://www.e2.org/ext/doc/E2CleanEnergyJobs2013Q1.pdf
North Carolina and Maryland are among the top ten states in creating clean energy jobs. North Carolina has enacted almost exactly the law CPI is advocating.
[23] http://cleanenergyworksforus.org/wp-content/uploads/2014/03/Ohio-3.0.pdf : a reference to benefits of renewables in Ohio's economy.

percent of electricity from fossil fuels,[24] transitioning to cleaner and more diverse energy sources will reduce economic vulnerability in a time when all fossil fuel costs are expected to rise dramatically. The best coal seams in Eastern Kentucky are nearly mined out, and hydraulic fracturing for natural gas has an uncertain future. Additionally, clean energy sources will reduce air and water pollution, thus promoting better health for Kentuckians. Renewable energy resources include:

- Solar electric
- Solar thermal
- Wind
- Hydropower
- Geothermal
- Biomass, including:
    - Agricultural waste
    - Animal waste
    - Wood waste
    - Woody biomass crops
    - Landfill methane
- Waste heat used to produce electricity
- Thermal energy at a retail electrical customer's facility
- Hydrogen from a renewable resource.

Renewable energy resources do not include peat, fossil fuel, or nuclear energy resources.

Several issues slow renewable energy growth in Kentucky: 1) high initial equipment cost, usually borne by the user; 2) lack of policies that encourage renewable energy production; and 3) utility resistance to distributed generation.[25] Changes in current statutes in the areas discussed below would encourage renewable energy in Kentucky.

The idea that renewable energy sources are cost prohibitive is a myth. The Lazard Study shows that renewables are cost competitive and often cheaper than fossil fuel.[26] Utility-scale solar installations cost about $2.50/watt to construct (and costs are falling)[27] while new coal facilities cost over $5/watt to construct

[24] 2012 Energy Profile, Department of Energy Development and Independence, KY Energy and Environment Cabinet, available at http://energy.ky.gov/Documents/2012%20Kentucky%20Energypercent20Profile.pdf

[25] Distributed generation refers to energy sources, such as solar or wind installations at locations separate from the central utility

[26] The Lazard Study is an economic analysis of the relative cost of fossil fuels compared to renewable resources. *Lazard's Levelized Cost of Energy Analysis 7.0,* Lazard Freres & Co., New York, 2013. Includes production tax credit

[27] What Does Solar Electricity Cost? http://solarcellcentral.com/cost_page.html

(accounting for pollution controls and carbon capture adds more).[28] The average levelized cost[29] of wind ($54/megawatt hour [MWh]) is now less per megawatt hour than the average cost figure for gas-fired combined cycle ($69/MWh).[30] Hydroelectric generation has always been among the lowest-cost forms of energy generation.[31] The cost of renewable energy, especially solar, is going down, while the cost of fossil fuel generation continues to rise.

Wind and solar are attacked as too variable; however, they are predictable and can easily be integrated into the electric grid. The Midwest Independent System Operator incorporates roughly 12,000 MWh of wind generation into its regional transmission operation every day.[32] California has large-scale solar generation incorporated in its electric supply.[33] Pairing wind and solar with gas generation levels the systems because gas generation can be increased or decreased rapidly in response to demand. Many utilities oppose distributed generation (typically rooftop solar or small wind physically separate from a utility), fearing that it threatens the existing centralized model, but it greatly benefits society and can also benefit utilities. Distributed energy reduces high-cost peak generation during hot weather, the load on transmission and distribution networks, and the need for new, more expensive transmission.

Feed-in Tariff: A feed-in tariff is a payment from a utility to renewable energy developers for the energy they produce. To encourage development, renewable energy developers need the security that they will receive an adequate return on their investment and that the utilities will not unilaterally reduce the price they pay for renewables once established. A feed-in tariff is an energy supply policy that offers a payment guarantee to renewable energy developers for the energy they produce. Well-designed feed-in tariffs foster rapid development of renewable energy, and therefore benefit consumers. TVA's feed-in tariff, for example, provides 12 cents above the retail rate per Kwh from solar PV systems for the first 10 years, then drops to the retail rate. A feed-in tariff in Kentucky would encourage local economic development and diversification of the state's energy portfolio.

Recommendation:

- Legislate a feed-in tariff for utilities for renewable energy.

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[28] *Updated Capital Cost Estimates for Electricity Generation Plants*, Us Energy Information Administration, April, 2013

[29] Levelized cost is the net cost to install a renewable energy system divided by its expected lifetime energy output.

[30] Lazard, ibid.

[31] Worldwatch Institute (January 2012). "*Use and Capacity of Global Hydropower Increases*".

[32] *Grid Integration of Wind and Solar Is Cheap*, 2014 Greentech Media, http://www.greentechmedia.com/articles/read/Grid-Integration-of-Wind-and-Solar-is-Cheap

[33] *Solar power in California*, Wikipedia, http://en.wikipedia.org/wiki/Solar_power_in_California

Net Metering: Net metering is a billing mechanism that credits renewable energy system owners for the electricity they add to the grid. Net metering laws limit the energy an individual energy producer can sell to utilities. Kentucky's current net metering law limits an individual renewable energy system to 30 KW, with the aggregate capacity limit per utility of 1percent of maximum retail sales. These limits discourage commercial solar PV (photovoltaic) installations.

Recommendation:

- Amend Kentucky's net metering law; raise the system limit to 1MW and the aggregate capacity limit per utility to 5 percent of maximum retail sales.

Renewable Energy Equipment Leasing: One barrier to expanded renewable energy production is the high up-front equipment cost. Allowing third parties to lease solar equipment to users would enable homeowners and commercial electric customers to benefit from renewable energy generation without the large up-front cost. In states where third-party leasing is allowed, such as Arizona and Colorado, such arrangements have accounted for up to 90 percent of new solar installations.[34] Allowing third-party leasing would open a market that will increase renewable energy growth at no cost to the state.

Recommendation:

- Legislate third-party renewable energy equipment leasing.

[34] *2013 Year End Solar Market Insight Report,* Solar Energy Industry Association, 2014. Available at http://www.seia.org/research-resources/solar-market-insight-report-2013-year-review.

III. LEAST COST

Kentucky has traditionally regulated energy generation under a "least cost" or "lowest possible cost" standard, which has not allowed consideration of "externalities" in the rate-setting process. Externalities represent a variety of "outside" costs to rate-setting decisions—for example, health and environmental impacts and jobs and local revenues lost from the closing of a generating plant. This section reviews Public Service Commission (PSC) policy and how regulatory policy can be improved.

The Kentucky PSC has a least-cost approach to utility rate regulation, based solely on fuel sources, generation plant, and distribution systems. When considering utility proposals, the PSC determines whether they represent the least cost or the lowest possible cost to consumers for the attainment of the desired end(s).

The least-cost standard is not set out in statute. It is derived from the "fair, just, and reasonable rate" standard in KRS 278.030(1). The PSC has long recognized that least cost is one of the fundamental principles used when setting rates.[35] The statute has been amended to allow recovery of costs associated with Federal Clean Air Act compliance and with federal, state, and local environmental requirements that apply to coal combustion wastes and by-products from facilities used for production of energy from coal.[36] Water resources management and regulation incorporate environmental compliance to prevent water pollution.[37]

In 2013, the General Assembly adopted a bill authorizing recovery of costs for purchasing electric power from a biomass energy facility that were not covered in existing utility rates.[38] In the Energy Independence Act the General Assembly finds that "it is in the best interest of the Commonwealth to induce the location of innovative energy-related businesses in the Commonwealth in order to advance

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[35] See *Application of Kentucky Power Company for Approval of Renewable Energy Purchase Agreement for Wind Energy Resources between Kentucky Power Company and FPL Illinois Wind, LLC,* Kentucky PSC Case No. 2009-00545, p. 5 (2010), citing *Public Service Commission. v. Continental Tel. Co.*, 692 S.W.2d 794, 799 (Ky. 1985) (" … one of the important objectives considered by the commission, that is, providing the lowest possible cost to the ratepayers"). A more detailed description of the PSC's analysis of electric utilities' "integrated resource planning" ("IRP") submissions for rate-setting purposes is set out in regulation in KAR 807 5:058.

[36] These costs shall include a reasonable return on construction and other capital expenditures and reasonable operating expenses for any plant, equipment, property, facility, or other action to be used to comply with applicable environmental requirements set forth in this section. KRS 278.183 (1).

[37] KRS 224.10-100 (5) states that the Energy and Environment Cabinet "shall have the authority, power, and duty to: ... (5) [p]rovide for the prevention, abatement, and control of all water, land, and air pollution, including but not limited to particulates, pesticides, gases, dust, vapors, noise, radiation, odor, nutrients, heated liquid, or other contaminants;…."

[38] KRS 154.27-020.

the public purposes of achieving energy independence and creating new jobs, investment, and sources of tax revenue."[39]

Aside from these provisions the General Assembly has not provided for consideration or recovery of costs for "externalities." The PSC has consistently taken the position that without such approval, it does not have authority to approve consideration of such factors.[40]

Several precedents in Kentucky law address this judgment. In a Kentucky Power case the PSC determined that under the "least cost" standard it could not approve a long-term wind power contract proposed by the utility.[41] One commissioner dissented, however, expressing a willingness to undertake a broader factual analysis than the PSC's traditional approach.[42]

A recent case involving Kentucky Power's attempt to comply with new clean air standards by 2015 illustrates the continuing power of the traditional analysis. The Commission ruled that the lower cost for electricity generation from a shared contract with a West Virginia plant met Kentucky's least cost requirement, as opposed to more expensive generation at its Big Sandy plant in Kentucky, in spite of economic benefits to Kentucky of the Big Sandy location.[43] The Commission held that arguments regarding the economic benefits of maintaining the Big Sandy plant were beyond the scope of its jurisdiction.[44]

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[39] Ibid.

[40] See *Application of Kentucky Power Company for Approval of Renewable Energy Purchase Agreement for Wind Energy Resources between Kentucky Power Company and FPL Illinois Wind, LLC* Supra, Note 1.

[41] Ibid., p. 4. The Commission cited KRS 278.300(3), which provides that it "shall not approve any issue or assumption unless, after investigation … [it] finds that the issue or assumption is for some lawful object within the corporate purposes of the utility, is necessary or appropriate for or consistent with the proper performance by the utility of its service to the public and will not impair its ability to perform that service, and is reasonably necessary and appropriate for such purpose."

[42] See, Dissenting Opinion of James W. Gardner, pp. 9-11.

[43] Public Service Commission Case No. 2012-00578, Order entered October 7, 2013, p. 33. Kentucky Power requested approval from the PSC to retrofit with scrubbers the Big Sandy unit at Louisa, Kentucky, at a cost of $980 million. Kentucky Power later withdrew that request and replaced it with a request to purchase a 50% interest in the Mitchell Power Plant in Moundsville, West Virginia, another coal-burning plant that had already been fitted with scrubbers, at a cost of $536 million, and to shut down its Big Sandy plant. The Moundsville plant is owned by the Ohio Power Company. Both Kentucky Power and Ohio Power are subsidiaries of American Electric Power. Various state and local officials and others intervened and objected to the second request, citing the loss of jobs and tax revenue for the Lawrence County schools as well as lost coal sales. The PSC determined that the lowest cost standard required it to approve the second request, noting that the Mitchell acquisition would eventually increase Kentucky Power's rates by 14 percent while the Big Sandy upgrade would increase rates by 26%.

[44] Ibid., p 26.

Least-Cost Health Impacts: Health-related impacts of energy production generally are not taken into consideration in rate setting. In recent years attention regarding the impacts of coal-fired energy production on human health has increased. In a 2008 administrative hearing,[45] the PSC was given testimony concerning pollutants generated by coal-fired energy plants and their specific health impacts on vulnerable populations.[46] The testimony cited a wide range of pollutants generated, including sulfur dioxide; nitrogen oxides; numerous fine particulates, such as arsenic, lead, and chromium compounds; hydrogen fluoride; hydrochloric acid; and mercury.[47] These pollutants result in increased asthma attacks, lung cancer, heart attacks, emergency room visits, and deaths.[48] One study estimated that every year in Kentucky emissions from power plants cause nearly 1000 deaths, over 600 hospitalizations, and 19,000 asthma attacks.[49] More recent studies confirm and amplify these findings.[50] This analysis demonstrates that the only avenue by which consideration of nondirect cost impacts can be incorporated into PSC least-cost analysis is through statutory reform.

There are clear precedents in consideration of environmental compliance costs and economic benefits associated with biomass energy generation. These precedents suggest the legislature could consider economic factors, such as jobs and tax revenue, in additional situations.

Notwithstanding these precedents, however, there are difficult questions that must be addressed in proposing that external economic and health-based circumstances be appropriate for consideration in rate setting and energy-generation cases. What outcomes are desired? And who will pay for them? These kinds of questions underscore the PSC's unwillingness to consider externalities without legislative approval. They involve balancing interests that are, in the PSC's judgment, beyond its jurisdiction.

Ironically, the Kentucky Energy and Environment Cabinet has recently proposed an alternative approach to compliance with US EPA increased clean air

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[45] An Investigation of the Energy and Regulatory Issues in Section 50 of Kentucky's 2007 energy Act, Administrative Case No. 2007-00477.
[46] Testimony of Wallace McMullen, PSC Administrative Case No. 2007-00477, pp. 2–3, and sources cited therein. Coal plants provide 59 percent of the nation's sulfur dioxide, 18 percent of total nitrous oxide, and 50 percent of particulates, and are the largest contributors of mercury.
[47] Ibid., p. 2.
[48] Ibid., p. 3.
[49] Ibid. See Clean Air Task Force, *Death, Disease & Dirty Power, Mortality and Health Damage Due to Air Pollution from Power Plants*, October 2000, p. 6.
[50]See Victor Furman, "Cancer Cluster Linked to Coal?" Op-Ed, Victor Furman, *Press & Sun Bulletin*, Jan. 2, 2011, http://clusteralliance.org/2011/01/02/cancer-cluster-linked-to-coal/; and a 2011 Physicians for Social Responsibility report, *Coal's Assault on Human Health*, Physicians for Social Responsibility, November 18, 2011, http://www.psr.org/resources/coal/assault-on-human-health.html.

standards, relating to CO_2 emissions, than would be mandated under traditional least-cost analysis.[51] The cabinet proposes a so-called mass-emissions approach, which reduces total average emissions.[52] The cabinet maintains that the EPA standard would mandate an "all out replacement of coal-fired generation with natural gas generation …"[53] The cabinet argues that the short-run benefit to consumers should be secondary to maintenance of coal-fired generation because of Kentucky's deep investment in a coal-based generation system and the potential disruption of Kentucky's economy.[54]

Real Cost of Energy: The Mountain Association for Community Economic Development (MACED, see section IV) has analyzed the impact of the coal industry on Kentucky's budget.[55] By including both regulatory and public infrastructure costs, for example, impact on coal haul roads, coal worker training, research and development, worker's compensation rates, public education, black lung, regulation of health and safety, environmental impacts, and the like, MACED estimates that for Fiscal Year 2006 Kentucky provided a net subsidy of almost $115 million to the coal industry. This analysis illustrates how consideration of external costs can change perception of the costs and benefits of specific modes of energy production.

Redefining Least Cost: Consideration of external costs yields a more realistic and accurate picture of the true costs of energy production than that yielded by the traditional focus on the narrower range of immediate production-related costs, especially coal-based production, which is associated with many and varied external costs.

Recommendations:

- Legislate for all forms of Commonwealth energy production the broader economic cost review presently applicable only to biomass energy generation.

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[51] Letter from Leonard K. Peters, Secretary, Kentucky Energy and Environment Cabinet, to Gina McCarthy, Administrator, U.S. Environmental Protection Agency, October 22, 2013.
[52] Ibid., p. 1.
[53] Ibid. In an accompanying report, *Greenhouse Gas Policy Implications for Kentucky under Section 111(d) of the Clean Air Act*, Commonwealth of Kentucky, Energy and Environment Cabinet, October 2013, it is argued that the proposed alternative approach would maintain electric generation resource diversity, rather than shift reliance completely to natural gas. Secretary Peters argues that such reliance on natural gas would not protect Kentucky consumers over the longer run.
[54] This argument reflects Kentucky's interdependent economy wherein much of its manufacturing sector is dependent on cheap electricity, made available through historical and current reliance on coal-fired generation. A sudden disruption to this arrangement could have catastrophic economic consequences.
[55] Melissa Fry Konty, PhD, and Jason Bailey, *The Impact of Coal on the Kentucky State Budget*, MACED, June 25, 2009, at www.maced.org/coal.

- Legislate expanded cost-benefit analysis to include additional economic considerations, such as jobs created, tax revenues generated, and demonstrated health-related impacts not already covered by current environmental regulation.
- Legislate a 30-year time period to establish least cost in the cost-benefit analysis.

IV. Economic Development in Rural Kentucky

Permanent Coal Severance Tax Fund: Kentucky has extremely limited state financial resources, an antiquated tax system, an unfunded pension liability in excess of $140 billion, and local governments teetering on bankruptcy. For generations, the economy of rural Kentucky has been plagued with challenges and cycles of poverty in large part because of the resource-dependent economy of the region. Between 1972 and 1992 Kentucky's coal severance tax generated $2.7 billion dollars for the General Fund, yet only 7.6 percent of that came back to the coal-producing counties.[56] Since 1992 the severance tax revenue has been split 50/50 between the General Fund and the counties. From 2001 through 2011, one half of $2.312 billion dollars ($1.156 billion) was returned to coal-producing counties. Despite expenditure of over a billion dollars from the coal severance tax a clear regional strategy to diversify and to sustain rural Kentucky's economy has not come about.

Since 2011 Kentucky has lost 6,000 coal jobs, a 40 percent reduction in the industry workforce; for every coal job lost an estimated three additional jobs disappear. Kentucky coal production decreased in 2013 by more than 11.8 percent from 2012, to 80.5 million tons, the lowest level since 1963.[57] Coal production will continue to drop leading to serious and potentially catastrophic job loss and significant reductions (estimated 41 percent) in coal severance tax collections that help fund local government services. Millions of dollars have been spent on building industrial parks with offers for customized modifications, free rent, and tax incentives to attract business, but this strategy has had limited success. There are better ways for the state to encourage a sustainable economy. Possible sources for the permanent fund could be to match West Virginia's 5 percent coal severance tax (Kentucky's is 4.5 percent), or to evaluate current taxation of the Commonwealth's other natural resources.

Nationally, there are many examples of dedicated funds that Kentucky can model Alaska, Montana ($870 million), Wyoming ($2.3 billion), New Mexico, Utah, and North Dakota ($1.3 billion) have established permanent funds.[58]

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[56] http://kypolicy.us/sites/kcep/files/Coal%20severenace%20presentation.pd.

[57] http://energy.ky.gov/Coal%20Facts%20Library/Kentucky%20Coal%20Facts%20-%2014th%20Edition%20(2014) pdf. Published by the Kentucky Department of Energy Development and Independence. Accessed July 2014.

[58] "(1) Island Coastal Economic Trust (ICET) was established in 2004 from a $50 million Canadian government grant. (2) Foundation for a Healthy Kentucky makes grants to non-profit organizations engaged in statewide health projects for underserved Kentuckians, particularly children. It was established with funds from a settlement between the Kentucky Attorney General and Anthem Blue Cross/Blue Shield. (3) The Agricultural Development Fund was established using tobacco settlement money with the goal of helping Kentucky's tobacco farmers diversify and enter into new agricultural markets. (4) The Kentucky Appalachian Commission investigated the use of Appalachian Regional Commission funds in Kentucky. an example of how democratic strategic planning can work in eastern Kentucky."

With the decline in coal supply, leaders and entrepreneurs must focus on a sustainable economy. There is growing interest in agriculture feedstock for biofuels, manufacturing high-energy-efficient housing, building solar panels, using municipal solid waste and wood waste for energy, ecotourism, and agritourism focused on the cultural heritage of the people.

Severance taxes apply to limited resources; it is thus important to develop a permanent fund to establish an ongoing revenue stream. Either a percentage of the current severance tax going to the General Fund or a direct line from the General Fund should be dedicated to a permanent endowed fund.

Recommendation:

- Legislate a dedicated revenue stream from the General Fund or a percentage of the coal severance tax for an endowed economic and energy development fund for rural Kentucky.

Rural Kentucky Economic Development Infrastructure: An independent board of directors will be essential to manage the fund, including regional economic development organizations and leaders. Monies allocated to a community-based endowment for Kentucky's coal-producing regions will bring long-term success and investment in the regions if established community organizations and programs are included in planning.

The Mountain Association for Community Economic Development (MACED):[59] is an organization in central Appalachia. MACED uses three primary strategies to build sustainable development: (1) community investment, (2) demonstration initiatives, and (3) research and communications for policy change. MACED estimates that approximately $2.2 billion (2010 dollars) will be collected from coal severance taxes between 2013 and 2035. A permanent coal severance tax fund would ensure that some coal revenue is a permanent financial asset for the region. If one percent were applied to Kentucky coal production beginning now, the permanent fund could generate more than $700 million by 2035 (2010 dollars), and the annual dividend from the fund could be more than $30 million.[60] The Commonwealth can develop a thoughtful, sustainable plan for the endowment to ensure it is spent in a way that will benefit Kentuckians for years to come.

Recommendation:

- Dedicate an independent board of directors to manage the fund.

[59] http://www.maced.org/

[60] www.maced.org/files/MACED_Coal_Severance_Tax_Brief.pdf Promoting Long-term Investment in Appalachian Kentucky: A Permanent coal severance tax Fund by MACED. See 2013 MACED report for some facts about coal severance history.

Promise Zones: In an experimental national program, eight southeast Kentucky counties were recently grouped into a federal "Promise Zone," a regional development area under the umbrella of the Kentucky Highlands Investment Corporation and several community partners. The counties include Bell, Harlan, Letcher, Perry, Leslie, Clay, Knox and part of Whitley.[61] They make up one of five Promise Zones in the country, a regional economic development approach that provides for federal support, including competitive advantage when applying for federal aid, technical assistance, and five AmeriCorps VISTA members to assist with program implementation.

In rural Kentucky most jobs are with schools, farms, and coal mines. There is not enough manufacturing. Established community organizations exist in rural Kentucky with which the state can partner to develop a new energy economy. Kentucky Highlands Investment Corporation (KHIC),[62] for example, is a nonprofit organization that provides low-rate and market-rate financing to Kentucky start-ups in a process known as "development venture capital." KHIC has created more than 18,000 jobs since 1968 and attracted over $261 million in public and private investment. KHIC is managing the Kentucky Promise Zone.

Another community organization is the Kentucky Science and Technology Corporation (KSTC)**,** a nonprofit corporation that works for advancement of science, technology, and innovative economic development.[63] KSTC partners with Kentucky universities to create long-term connections to local and regional economic development groups and provides free business development consultation and access to capital for Kentucky start-ups.

Saving Our Appalachian Region (SOAR) is a 2013 initiative that holds promise for Eastern Kentucky energy policies. Results from the fifty-citizen SOAR planning committee can be the basis for region-wide economic development. Funded projects will cross county boundary lines. At SOAR, the governor and Kentucky's fifth-district congressman discussed collaboration across political party lines to assess challenges and innovations to encourage emergent regional development. They hope to create a neutral venue for the region. In the short term SOAR requires a coordinating committee or other interim governance until sustaining resources are secured and a regional governance structure is agreed upon.

[61] http://www.whitehouse.gov/the-press-office/2014/01/08/fact-sheet-president-obama-s-promise-zones-initiative
[62] http://www.khic.org/
[63] http://kstc.com/.

CONCLUSION

This Commonwealth Policy Institute report is the result of two years of study and consultation with Kentucky energy policy leaders and thinkers. There are 16 recommendations. Some involve educating our citizenry; others require bipartisan legislative action and changes within regulatory agencies. The most cost effective way to implement a Kentucky energy strategy is through energy conservation: conserving energy use rather than producing more. All types of renewable energies need to be developed, because they are the only sustainable ones in the long run. This involves a significant shift in priorities.

Kentucky's least cost definition needs to be redefined to apply the true costs of energy production: effects on air and water quality, health, jobs, and economics.

A portion of the coal severance tax should be the basis for economic development for coal-producing regions as fossil fuels are extracted. Proposed legislation that requires new money is a short-term investment, not an expense, and will create long-term gains. State government actions in the first part of this century can make the Commonwealth a healthier and wealthier place to live before mid-century.

GLOSSARY

American Recovery and Reinvestment Act (ARRA): commonly known as the "Stimulus" Act, passed in 2009. Provided funding for a number of efficiency and renewable energy projects.

biomass generation of energy: an application of burning plant or animal matter to obtain energy. May include waste digestion to obtain methane for combustion.

bridge fuel: a fuel that can provide energy and which can assist in making a transition away from heavy dependence on coal.

climate change: a "significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years.

coal liquefaction: see **coal gasification** below.

coal gasification: the process of producing syngas from coal, water, and oxygen. The syngas may be burned for electricity generation, or used as synthetic natural gas. Alternatively, coal-derived syngas can be further converted into transportation fuels such as gasoline and diesel via the Fischer-Tropsch process.

coal severance tax: a tax on coal mined in Kentucky.

demand-side management (DSM): a label for efficiency measures that reduce customer demand for electricity. Contrast with supply side management, which is a label for the efficiency measures that a utility can do on the utility side of the electric meter.

distributed generation: provides electricity from many small energy sources, usually renewable. This provides lower environmental impacts and improves the security of supply, due to the multiple sources.

energy audit: an inspection, survey and analysis of energy flows in a building, or system, usually with the goal of reducing the amount of energy needed by the building or system. An energy audit for a residence should include a blower door test to measure the air leakage of the structure.

energy efficiency: may refer to efficient energy use, the ratio between the output and input of an energy-using system, or efforts made to reduce energy consumption (should not be confused with energy conservation, although this occurs).

Energy Star: a standard for energy efficient consumer products created in 1992 by the Environmental Protection Agency and the US Department of Energy. (Trademarked *ENERGY STAR*)

feed-in tariff: An energy-supply policy that offers a payment guarantee for a period of time to renewable energy developers for the energy they produce.

fossil fuel: fuels formed by decomposition of buried organisms. The age of the organisms and their resulting fossil fuels is typically millions of years. Fossil fuels contain high percentages of carbon and include coal, petroleum, and natural gas.

geothermal energy: thermal energy stored in the earth. The hot temperatures in the core of the planet can provide useful energy for producing industrial steam in some locations of the USA.

geothermal heat pump: also known as a **ground source heat pump,** is a piece of equipment that transfers heat into or from the ground, normally through a circulating liquid transfer medium. It uses the earth as a heat source (in the winter) or as a heat sink (in the summer, when cooling is desired). The engineering and scientific communities prefer the term "ground source heat pump" to avoid confusion with traditional geothermal power, which uses a high temperature heat source in the earth to generate electricity.

Green Bank: A revolving loan fund for energy efficiency projects in state facilities.

greenhouse gas: (sometimes abbreviated **GHG**) is a gas in the earth's atmosphere that absorbs and emits heat radiation. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Greenhouse gases greatly affect the temperature of the Earth. [Wikipedia]

international residential code: one of the codes developed by the International Code Council, covering residences**.**

landfill methane: gas created by fermentation in a landfill.

levelized cost: net cost to build or install an energy system, plus all the operating and fuel costs, divided by its expected lifetime energy output. Units are cents per kilowatt hour for electric generating equipment.

manufactured housing: formerly known as mobile homes. Also can be factory-made structures on a foundation that look much like site-built residences.

MWh (megawatt hour): unit of electrical energy defined as the delivery of a megawatt (million watts) of current for the time period of 1 hour

net metering law: a law that specifies the framework policies and standards for net metering in the relevant jurisdiction.

Net Zero: Shorthand for a structure that generates as much energy as it consumes, thereby having "net zero" energy consumption.

on-bill financing: a financing structure for energy-efficiency measures that allows customers to make payments on their utility bill for loan provided for the improvements.

Property Access Clean Energy (PACE): a means of financing energy efficiency upgrades or renewable energy installations for buildings. In areas with PACE legislation, municipal or other local governments make loans to consumers and businesses to put towards an energy efficiency retrofit. The loans are repaid over

the assigned term (typically 15 or 20 years) via an additional annual assessment on their property tax bill. One of the most notable characteristics of PACE programs is that the loan is attached to the property rather than to an individual.

passive house: refers to a rigorous, voluntary standard for energy efficiency in a residential building, resulting in buildings that require little energy for space heating or cooling.

Public Service Commission: typical name for a state agency with the task of regulating monopoly utilities within the state. Public Utility Commission is a generic variant.

renewable energy: generally defined as energy that comes from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, and waves. Can be used to replace fossil fuel energy for electricity generation and heating hot water.

Renewable Energy and Energy Efficiency Portfolio Standard: combines a renewable portfolio standard with a specified efficiency standard.

renewable energy standard: see **renewable portfolio standard** below.

renewable portfolio standard: a regulation or law that requires the production of a specified level of energy, usually electricity, from specified renewable energy sources, such as wind, solar, hydro, and biomass. Another common name for the same concept is **renewable electricity standard** (RES) in the United States.

retrofit programs: programs to finance and administer energy efficiency retrofit measures to existing buildings.

supply-side management (SSM): a label for the efficiency measures which a utility can do on the utility side, the “supply side” of electric meters to manage the amount of generation needed to maintain reliable electric flow to the customers.

solar PV (photovoltaic): arrangement of components designed to supply usable electric power for a variety of purposes, using the sun as the power source. A photovoltaic system for residential, commercial, or industrial energy supply normally contains an array of photovoltaic (PV) modules, one or more inverters to convert direct current to alternating current, a racking system that supports the solar modules, electrical wiring, and mounting for other components.

thermal energy: the part of the total potential energy and kinetic energy of an object that results in the system temperature (typically hot), measured in joules. It is represented by the variable Q in calculations.

third-party leasing: practice of using a company to provide financing and leased equipment to consumers who want solar electricity without the up-front expense and challenges of purchasing a photovoltaic solar system themselves.

weatherization: Modifying a building’s thermal properties to reduce energy consumption and optimize energy efficiency. Typically used in reference to residential dwellings. Will include additional insulation, air sealing, and addressing the efficiency of the heating and cooling systems.

ACRONYMS/ABBREVIATIONS

CAC	Community action corporations, nonprofit agencies that administer the Weatherization Assistance Program in most jurisdictions.
DSM	Demand side management
DEDI	KY Department of Energy Development and Independence, part of the KY Energy and Environment Cabinet
KRS	Kentucky Revised Statues
MACED	Mountain Association for Community Economic Development
MISO	The Midcontinent Independent System Operator, Inc. (MISO) operates the electric grid in mid-western United States. It is a not-for-profit, member-based organization administering wholesale electricity markets and transmission in the Midwest region systems. MISO also provides pricing mechanisms, reliability structures, and long-term planning for the transmission grid.
PSC	Public Service Commission
REEPS	Renewable Energy and Efficiency Portfolio Standard
RPS	Renewable Portfolio Standard
SSM	Supply-side management
TVA	Tennessee Valley Authority, a multi-state quasi-public electric utility
U.S. EPA	U.S. Environmental Protection Agency, a federal agency.

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