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A SUSTAINABLE DECISION FRAMEWORK FOR ENERGY
A Policy Proposal for Council Consideration

by
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I. OVERVIEW

Energy is the capacity to do work, to perform tasks. Most of the tasks in Columbia are done primarily with three energy forms, electricity, natural gas and the transportation fuels, gasoline and diesel with some ethanol. However, in spite of how much energy we purchase, no one wants to "own" a KW of electricity, 100CCF of natural gas or a gallon of gasoline. What we want is the work the energy does for us, the work that is accomplished. Examples of tasks include propelling our vehicles, heating and cooling our homes, running the many electric motors that drive our household appliances, powering our industries and businesses, providing light, and making our various technologies run. We don't concern ourselves with the type of energy as long as the work gets done at minimum cost, is available when we want it, and has minimum impact on our environment.

Historically, energy policy and decisions have been resolved by meeting supply requirements. Such policies and decisions, however, can also be addressed by concentrating on demand, focusing on conservation and efficiencies. While this has been successful in reducing peak demand, an energy management based on a comprehensive analysis, has gone wanting.

This decision model was quite adequate when energy supplies were abundant, predictable, and inexpensive. That is no longer the case. We are no in an era where there are multiple sources of energy with increasing and unpredictable costs, changes in the regulatory structures and rapid changes in a wide range of energy technologies.

The old paradigm is an inadequate basis for energy policy and decisions and may actually lead to decisions not in the best interest of the community. A new paradigm that is not dominated by the traditional supply notions is needed. Policy needs to allow for agility in decisions and a wide range of potential energy options to be included in the analysis.

It is the purpose of this paper to propose a sustainable decision model for energy that is based upon efficiency in work as the end product of energy supply systems.

II. A SUSTAINABLE DECISION MODEL FOR ENERGY

Energy use performs work. A community's energy pattern is set by the way energy is delivered to the place work is done. The purpose of energy policy and a sustainable decision model is to create the community's energy pattern so that the work is done in the most cost effective manner possible taking into consideration critical community values. Proposed here are four criteria or values:

1. Increasing energy productivity;
2. Reducing negative environmental impact;
3. Provide greater local control on impact decisions on energy patterns; and
4. Retaining more energy dollars in the local economy.

Energy productivity is the amount of work done per energy unit used. This value emphasizes the importance of energy efficiency. We concern ourselves constantly with productivity. Productivity is the value we get out of the energy we put in. "Getting more for less" is a statement about productivity and is a key component for businesses remaining competitive and profitable. This must include energy productivity as well as labor productivity.

The second value, reducing negative environmental impact, affirms the Community's commitment to good environmental behavior through both public and private energy decisions.

The next value highlights the importance of Columbia maintaining as much direct control of the energy supply systems as possible. Local control of energy systems and a diversity of sources enhance system stability, predictability, and resistance to unplanned upsets.

The final criteria or value is to ensure that Columbia's energy patterns minimize the cost to the Columbia economy. Leakage of energy dollars is a large source of economic loss in the Columbia economy. This is the loss of money from the Columbia economy to pay for imported products. Keeping energy dollars within the local economy is a potential source of economic development for Columbia. Of Columbia's approximate $69,700,000 electric bill, approximately $66,00,000 is leakage. It is the bill Columbia pays to its suppliers, dollars from our local economy to pay costs outside of the community, creating jobs and economic activity elsewhere.

Energy supply must ensure we have the energy available to meet the demand necessary to get the work done. A sustainable energy decision model recognizes data and analytical capability to make our energy decisions so that the work gets done in the most economical manner possible, minimizes the negative environmental impact, and enhances the well-being and quality of life of the community.

III. IMPLEMENTING THE MODEL

A sustainable decision model for energy would be the framework for a comprehensive energy plan that localizes energy sources, increases community economic and social benefits, reduces the contribution to pollution and increases the work performed for each unit of energy.

A. Analysis of Energy Productivity and Cost Efficiency.
   1. Basic Work Data.

a. The major types of work or tasks performed (what work is done).
b. The amount of work in each type (how much work is done).
c. The type of energy used for each type of task (how is the work done).

From these data, energy productivity and cost per unit of work can be calculated.

B. Energy Productivity and Cost per Unity of Work.

These work data can be used to determine for energy productivity and the cost per unit of work.

C. Strategies of Energy Management.

To develop strategies for energy management, the productivity indices and the work unit cost can be analyzed for potential for change. Three considerations are critical.

1. Are there opportunities for doing the work with higher energy productivity or cost reductions?
2. Would other forms of energy do the work with higher energy productivity or reduced cost?
3. Are there opportunities to eliminate work that doesn't need to be done?

D. Analysis of Energy Delivery Systems.

1. Evaluate current patterns of energy delivery systems.
2. Are other delivery systems technically available or under development.

For all electric energy systems, the analysis should include location and type of generation, energy productivity of each system, pollution impact, cost per unit of energy delivered, 30 year cost projections, technically ready to deploy, impact on local economy with special attention to economic leakage, and potential for local control.

It is important that the cost analysis allow easy comparison of alternative sources of energy to show opportunities to increase energy productivity.

IV. STRATEGIC ACTION PLAN

With the data and analysis in place, a strategic action plan can be developed. The emphasis must be on increasing productivity, reducing pollution, economic efficiency, and local control.

A strategic action plan should include broad outcomes with timelines and goals within each category. Recommendations for action will compare energy productivity in each category of work with cost estimates.

Questions that should be answered are:

1. What additional activities should the electric utility offer?

2. Which existing programs should be expanded, just continued or dropped?
3. What policy changes or new policies are necessary?
4. Are there changes in City Codes and State and Federal Regulations to be considered?

Every program of the utility should have projected timelines. Rather than an accumulation of programs, the city will have a comprehensive plan with strategic actions that are achieved by purposeful definition of each program's measurable results. The artificial distinction between energy supply and demand should disappear. They are both part of the strategic plan to get work accomplished. The sustainable decision model for energy puts the full range of possible energy actions together to allow for the best decisions based on key principles. The data and analyses in the plan must be continually updated as economic factors and technologies will continue to change.

V. CONCLUDING OBSERVATIONS

A. Making the changes.

Given the rapid changes affecting energy generation (technological advances, increased efficiencies, etc.), the traditional decision model fails. A new model that anticipates these changes and which provides greater flexibility to engage a wide range of options, a model that goes beyond traditional supply and demand, should be developed.

Often, when a new model is proposed, the tendency in organizations is to simply redefine what is already being done, a reshuffling of the deck so to speak. Although the data base is not available, there is enough data to launch a new decision model.

B. Resources.

There are a growing number of examples of communities and utility companies changing the way they make and implement energy decisions. A few of those are cited below.

The Snohomish Public Utility has launched a major conservation effort. The General Manager stated, "We plan to address growth first and foremost by working with customers to achieve all cost-effective measures" (Public Power Weekly, No. 28, July 14, 2008, p. 7).

A recent study, "Energy Efficiency, Innovation and Job creation," documents California's efforts to meet future energy needs through energy efficiency (Public Power Weekly, No. 44, October 27, 2008).

The New York Power Authority will install 4.8 MW of generating capacity with fuel cells at the redeveloped World Trade Center. The first fuel cell was to be delivered January, 2009 (Public Power Weekly, No. 28, July 14, 2008, p. 6).

One of the more intriguing projects comes from the Tennessee Valley Authority. They determined they needed 1,400 MW additional capability. Instead of moving toward new generation capacity, they committed to build a 1,400 MW plant by 2012 from saved energy through increasing energy efficiency. They went to their customers to engage them in designing the programs to collaboratively build the plant. The 1,400 MW plant represents 4% of TVA's current load (Public Power Weekly, No. 46, November 10, 2008, p. 3).

C. Moving forward.

The IRP (Integrated Resource Plan) provides an enormous amount of data. Because of the IRP and other information within Water and Light Department, much of the data base and initial analyses suggested here can be done now. The IRP is based on traditional models and does not provide the sustainable energy decision model. The future demands the ability to respond to rapidly changing national political conditions, environmental restrictions, energy technologies, and economic dynamics.

Using the TVA model that built an "energy efficient" power plant representing 4% of system load in 3 – 4 years, can Columbia build a 33 MW "energy efficiency" power plant representing 10% of system load in 10 years, not the 20 years suggested in the IRP? When that plant is finished, hopefully ahead of schedule, then lets build another one, maybe 35 or 40 MV by 2028. Along side this "power plant," lets add 75 – 100 MW of local generation capacity, using fuel cells, biomass and other decentralized technologies as they become cost competitive.

How much local supply can be built using a variety of technologies that are expected to become cost effective over the next several years. Will there be and biomass available to meet expected demand? How much of the projected increased demand can be met by increased energy productivity and local supply systems cost effectively? Will we be ready to take advantage of the changes we know are coming?

VI. SUMMARY

A decision model builds on a data base, analyzes the data and assesses the impact of any recommendations on the agreed upon criteria or values. The sustainable decision model for energy presented here begins with the concept of work. It builds a data base covering the energy used to do the work done in Columbia. Actions to change the energy use and supply system would be identified and analyzed to determine cost effectiveness and return on investment for each possible action. The actions would be assessed for the impact on the criteria or values discussed in Section II. The results will be a series of energy actions from which a selection can be made for Columbian's future that are cost effective, a wise use of both public and private energy investments, and move Columbia to its desired sustainable energy future.