

# Analysis Of The City's Economic Case For Coal And Its Monte Carlo Risk Analysis

by  
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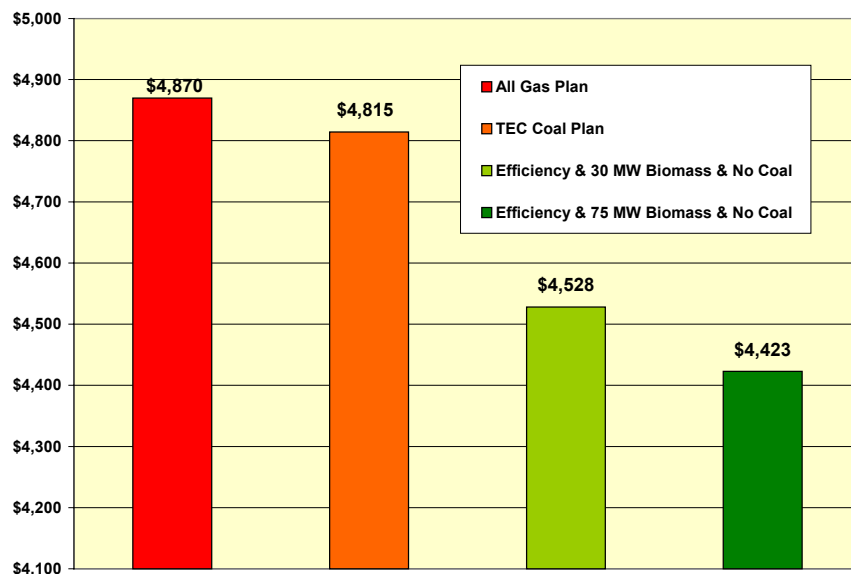
## *New information is available on the cost and benefits of alternatives to coal*

To reduce our reliance on natural gas and save money, in June 2005 the City Commission proposed to buy a 150-megawatt share of the Taylor Energy Center (TEC) coal plant. At the urging of the Big Bend Climate Action Team (BBCAT), the City Commission also agreed to evaluate clean energy alternatives before making a final decision on coal. The results are in, and they identify a sizable portfolio of clean energy options that adds more diversity and saves more money than the plan to add coal to our resource mix.

## *The real cost savings are from clean energy, not from coal*

We now know that a clean energy plan with 75 megawatts of biomass and no coal is the lowest cost option of any plan considered. We also know that clean energy can save much more than coal. The City now estimates that if we added just coal to our energy mix, without clean energy, it would cut total costs by \$55 million over 30 years (net present value), a fraction of the amount publicized last fall. The clean energy portfolio would cut costs by \$342 to \$447 million, six to eight times as much as the projected savings from coal, as shown in the following graph using the City's cost data.

## *The lowest cost plan is a plan with natural gas, efficiency, and 75 megawatts of biomass*



(Total 30-year cost of energy with coal only compared to clean energy only, in millions of \$)

Clearly, the plan that uses the most clean energy and no coal costs the least.

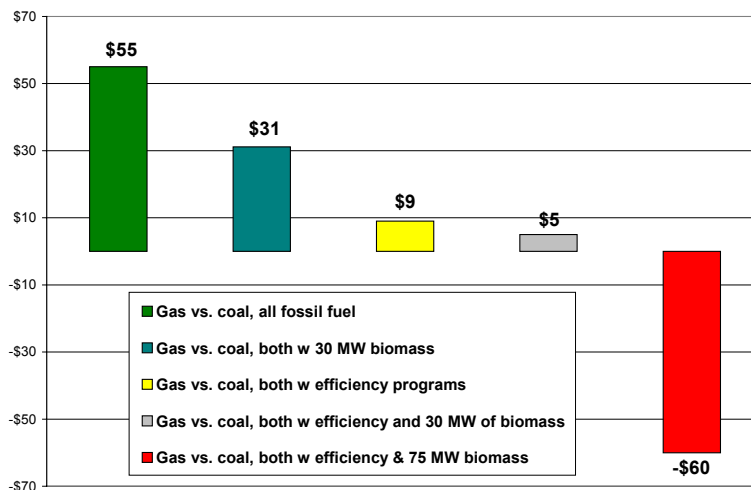
We also know that clean energy without coal reduces our reliance on natural gas more than the TEC coal plant. We can replace a chunk of natural gas with a clean energy portfolio that includes 162 megawatts of efficiency savings and at least 30 megawatts from clean biomass—192 megawatts in all. That’s 42 megawatts more diversity than we’d get from TEC.

***The cost benefit of coal shrinks and disappears as clean energy is added***

The clean energy advocates won their case for clean energy as an *alternative* to coal, only to have it pre-empted as an *afterthought* in a plan with coal. The City now advocates adding both clean energy and coal to our energy mix. The Big Bend Climate Action Team thinks clean energy should be an alternative, not an add-on, to a coal plan. Here’s why.

The City’s cost data shows that if we add clean energy to all plans, the economic benefit of adding coal shrinks and becomes negligible. If we maximize clean energy resources with 75 megawatts of biomass, adding coal actually costs \$60 million more than not adding it.

**The cost advantage of coal shrinks as efficiency and biomass resources are added**



(The difference between the total 30 year plan costs of natural gas and coal in million \$)

***Efficiency offers the consumer additional cost advantages***

Another point missed in the City’s analysis is the additional benefit to the consumer of incentives to promote energy efficiency. The analysis appropriately focuses on cost savings to the City from clean energy. However, for every megawatt gained from efficiency and demand reduction, businesses and households reap an additional benefit of reduced bills, since electricity costs less to the consumer who uses less.

***The City is presenting a biased case for coal***

Although they say they will add clean energy to all the plans with coal, the city is using cost figures for plans that minimize or remove clean energy to support their claim that “TEC is the least cost plan in all scenarios except one.” Four out of five “scenarios” that supposedly favor coal are 1) a plan without any clean energy 2) a plan with no biomass 3) a plan with only half of

gains from clean energy that experts say are achievable, and 4) a plan with efficiency and 30 megawatts of biomass that shows an insignificant difference of one-tenth of one percent in cost between coal and gas. The fifth “except one” option that puts coal in the red is the lowest cost plan, the Clean Energy plan supported by the Big Bend Climate Action Team, with 75 megawatts of biomass.

***The city is announcing the risk analysis results before the meaningful analysis is done***

After failing to show that coal **would** add appreciable savings, the city is now using risk analysis to claim that **maybe it could** save money (or maybe it could cost more).

In further evaluating the coal option, the City has conducted a risk analysis of the first four of the five “scenarios” described above. They haven’t yet completed the risk analysis for the lowest cost scenario, the Clean Energy plan, the one in which coal comes out more expensive than natural gas, but they are already declaring that the risk analysis shows that TEC is the best option.

***The decision should be based on the most likely case, not the risk analysis***

The risk analysis technique used is called a “Monte Carlo” risk analysis. After calculating the costs under future conditions considered most likely to occur, the Monte Carlo risk analysis is used to determine the costs under other conditions, factoring in the likelihood of each of those conditions occurring. It is a statistical analysis technique using random sampling and probability to estimate uncertainty and variation in cost projections.

In analyzing the scenario with efficiency and 30 megawatts of biomass, the analysis returns a result that says that there is a 5% probability that, over 30 years, the coal plant plus these clean energy resources could cost \$109 million more than the natural gas plus clean resources, and a 5% probability that it could cost \$186 million less, but that the most likely outcome is that it would cost an insignificant \$20 million less (0.4% of total costs).

Monte Carlo analysis is a sophisticated technique using multiple data sources and weighted probabilities, but the experts we have consulted agree that it is not “hard science.” The assumptions and probabilities assigned by the analysts largely determine the outcome. BBCAT has requested, but the City has not yet released, its assumptions and the data on which the probabilities of various outcomes are based.

The decision about what energy resources to use in Tallahassee’s future should be based on the most likely case, not the relative risks of outliers. It seems especially imprudent to make a decision with such largely environmental impacts and such small and uncertain fiscal impacts based on this kind of analysis.

***Biases against clean energy could influence the Monte Carlo analysis results***

The clean energy strategy of maximizing energy efficiency that has been shown to be highly-cost effective by Tallahassee’s clean energy consultants represents a radical departure from “business-as-usual” energy planning. Those who run utilities are more comfortable with the

certainties of building and running power plants. Efficiency programs don't fit as easily and predictably into engineering analyses, although such programs are being implemented and showing major cost savings not only in Austin and California cities, but in cities across the country, including Chicago, Seattle, San Francisco, Ithaca, Portland, New York, Boulder, Chattanooga, Minneapolis, and Salt Lake City. Many of them, such as the cities in California, have little or no coal in their energy mix.

Maximizing the use of resources from the burgeoning field of renewable energy similarly puts utility planners in relatively uncharted territory. The City hasn't yet released the assumptions and probabilities that underlie the Monte Carlo analysis, but it seems likely that they will reflect this conservative bias.

***The probability assigned to the risks associated with high carbon fees should be carefully scrutinized***

The City's own consultant, Synapse Energy Economics, has produced three estimates of the cost of future carbon offset fees for Tallahassee - low, medium, and high. Another low estimate from ICF Consulting, the low estimate from Synapse, and the high estimate from Synapse were included as variables in the City's risk analysis. The high Synapse estimate is one of three sensitivities or cost estimates showing that natural gas is cheaper than coal (the other two are low fuel costs and DSM or efficiency with 75 megawatts of biomass).

In the Monte Carlo analysis, probabilities are assigned to the likelihood of various sensitivities occurring by the Black & Veatch consultants and staff, and the costs under "random" conditions are weighted according to these probabilities. Although BBCAT has requested this information, the City hasn't yet released the assumptions and probabilities that underlie the analysis. Given the bias seen in the presentation of data to date, it seems likely that a low probability would have been assigned to the high estimate for carbon offset fees.

***Carbon offset fees are likely to be higher than estimated***

In its paper, Synapse stated that all of its estimates were based on U.S. policies for which cost studies had been done, and that they reasonably represent the range of U.S. policies that might be adopted in the next several years. Synapse noted, however, that projections of costs to comply with Kyoto Protocol targets were much higher, and that the higher cost projections associated with the Kyoto Protocol targets, which are somewhat more aggressive than U.S. policy proposals, "are consistent with the anticipated effect of a more carbon-constrained future."

Synapse also notes that scientists anticipate that much more significant emission reductions than those included in the Kyoto Protocol will be necessary, in the range of 80 percent below 1990 emission levels, to achieve stabilization targets that keep global temperature increases to a somewhat manageable level. To quote the report: "We believe there is a substantial likelihood that response to climate change impacts will require much more aggressive emission reductions than those contained in U.S. policy proposals, and in the Kyoto Protocol, to date. If the severity and certainty of climate change are such that emissions levels 70-80% below current rates are mandated, this could result in very high marginal emissions reduction costs, though the cost of

such deeper cuts has not been quantified on a per ton basis.” Carbon costs under this scenario would be higher than Synapse high cost projections for carbon offset fees.

***Carbon offset fees need to be updated given new policy proposals and cost estimates***

The City’s risk analysis doesn’t test the impact on cost savings from coal if the U.S and world community find themselves forced to take the level of action necessary to avoid the worst impacts of global warming. In fact, since Synapse completed its analysis, bills have been introduced into both the U.S. Senate, by Senator Jeffords, and the House of Representatives, by Rep. Waxman, to implement policies to achieve an 80% reduction in global warming emissions. The bill analyses accompanying those proposals will allow quantification of much higher marginal emission reduction costs than those in current policy proposals. These potential higher costs have not been incorporated into Tallahassee’s cost analysis or risk analysis.

***The coal plant may have little or no value after it is paid for***

Coal-generated electricity is one of the biggest threats to climate stability. What would happen to costs if the TEC became unusable before the end of the thirty year cost study period? NASA’s leading climate scientist Jim Hansen forecasts rapid coal phase-out and bulldozing of coal plants before mid-century as climate impacts become alarmingly clear. This is an economic risk not envisioned by those who think the TEC plant will be a valuable economic asset for the City after it is paid for in 30 years.

***With uncertain economic benefits, moral issues assume greater importance***

The debate over Tallahassee’s energy future turns on a moral issue as well as an economic one, especially given the insignificant size of potential economic benefits and the potential for greater economic risk in a carbon-constrained future. By investing in coal-fired electricity, we are essentially betting on the side of failure, not only locally in failing to implement clean energy, but globally in terms of the world taking effective action to avert complete and irreversible meltdown of the Greenland and Antarctic ice sheets. If that occurs, humanity will be allowing a course to be set in motion for decades of irreversible sea level rise, displacing 50 million people in this country and 500 million worldwide. Betting on the side of clean energy reflects a more positive assessment of our global future.

Data compiled by LucyAnn Walker-Fraser  
Source for cost data in the graphs and text:

**Graph 1: Total costs adding TEC only compared to total costs adding DSM and biomass only**

Costs for TEC & All Gas, Base Case, IRP Study Update, City Commission Meeting, 7/12/06, Slide 4, Column 1; costs for “All Gas” with DSM + BG&E (30 megawatts biomass), Column 3, cost for “All Gas” with DSM + Max Biomass (75 megawatts biomass), Column 4.

**Savings from TEC compared to savings from clean energy:**

Cost for TEC plan subtracted from cost for base “all gas” plan. \$4,870 million - \$4,812 million = \$55 million.  
Cost for clean energy with 30 MW of biomass subtracted from cost for base “all gas” plan. \$4,870 million - \$4,528 million = \$342 million.  
Cost for clean energy with 75 MW of biomass subtracted from cost for base “all gas” plan. \$4,870 million - \$4,423 million = \$447 million.  
Ratio of savings from clean energy with 30 MW of biomass to savings from coal: \$342 million divided by \$55 million = 6 + times.  
Ratio of savings from clean energy with 75 MW of biomass to savings from coal: \$447 million divided by \$55 million = 8 + times.

**Graph 2: Cost impact of coal with increasing amounts of clean energy**

Cost for TEC plan subtracted from cost for base “all gas” plan. \$4,870 million - \$4,814.5 million = \$55.5 million. Source: IRP Study Update, City Commission Meeting, 7/12/06, Slide 4 (see Graph 1).

Cost for TEC plan with 30 MW of biomass subtracted from cost for “All gas” plan with 30 MW of biomass: \$4,811 million - \$4,780 million = \$31 million. Source: IRP Study Update, City Commission Meeting, 6/28/06, Slide 24.

Cost for TEC plan with DSM subtracted from cost for “All gas” plan with DSM: \$ million - \$4,541 million - \$4,532 = \$9 million. Source: IRP Study Update, City Commission Meeting, 7/12/06, Slide 4.

Cost for TEC plan with DSM & 30 MW of biomass subtracted from cost for “All gas” plan with DSM & 30 MW of biomass: \$4,528 million - \$4,523 million = \$5 million. Source: IRP Study Update, City Commission Meeting, 7/12/06, Slide 4.

**Graph 2, continued:**

Cost for TEC plan with DSM & 30 MW of biomass subtracted from cost for “All gas” plan with DSM & 30 MW of biomass: \$4,483 million - \$4,423 million = **-\$60 million**. Source: IRP Study Update, City Commission Meeting, 7/12/06, Slide 4.

**Source for City’s claim that “TEC is the least cost plan in all scenarios except one”** (*City is presenting a biased case for coal*): Open House Presentation Boards, 8/10/06. [http://www.talgov.com/you/electric/pdf/openhouse\\_presentation.pdf](http://www.talgov.com/you/electric/pdf/openhouse_presentation.pdf), Slide 11.

**Source for 162 megawatts of efficiency:** Handout from BBCAT meeting with Gary Brinkworth, 7/18/06, showing DSM Peak Demand Reduction by 2025.

**Source for analysis of Synapse study and carbon costs:** Synapse Energy Economics, Climate Change and Power, Carbon Dioxide Emission Costs and Electricity Resource Planning, May 18, 2006, with input from the Natural Resources Defense Council, Tim Greef and Dan Lashoff.