Comments of the STOP Coalition
on the Taylorville Energy Center Facility Cost Report

INTRODUCTION

In response to the information presented in Taylorville Energy Center's ("TEC") Facility Cost Report ("Cost Report"), a broad-based and diverse group of businesses, energy suppliers, and some of the most prominent trade associations in the State of Illinois have come together to form the Stop Tenaska's Overpriced Power ("STOP") Coalition. We respectfully submit these Comments to the Illinois Commerce Commission ("Commission") for consideration as the Commission and its experts prepare the analysis of the Cost Report as statutorily required by the Illinois General Assembly.

The companies and organizations that form the STOP Coalition include:

- The Building Owners and Managers Association of Chicago – BOMA Chicago
- The Chicagoland Chamber of Commerce
- The Chemical Industry Council of Illinois
- The Illinois Competitive Energy Association
- The Illinois Industrial Energy Consumers
- The Illinois Manufacturers' Association
- The Illinois Retail Merchants Association
- The Illinois State Chamber of Commerce
- Mid-American Energy Company's Unregulated Retail Services Division
- PROactive Strategies, Inc.

The STOP Coalition members have participated actively in the regulatory and legislative process in matters related to Illinois' competitive electric market. They represent alternative retail electric suppliers ("ARES") and their end-use customers who will be directly impacted by any decision of the Illinois General Assembly mandating ARES to enter into long-term, above-market contracts such as those proposed by the developers of TEC.

To independently assess the impact of approving Tenaska's proposal to mandate long-term purchases of energy from the TEC, the STOP Coalition commissioned Dr. Mat Morey of the nationally renowned economic and engineering consulting firm, Christensen Associates Energy Consulting ("Christensen Associates"), to prepare a comprehensive analysis and study of the TEC Cost Report. A copy of that detailed analysis is attached hereto as Exhibit A. As discussed below, Dr. Morey's analysis reveals serious and significant flaws in the TEC Cost Report, which underestimate the massive adverse electric rate impact of TEC on Illinois consumers, the Illinois economy, and the Illinois environment.

BACKGROUND

As the Commission is aware, the Illinois General Assembly has mandated that ARES and electric utilities enter into long-term power purchase agreements ("PPAs") of up to 30 years, to purchase the output of the proposed TEC if the General Assembly approves the plant. A mandate to require ARES to purchase power over a period of 30 years from a specific power plant is unprecedented. It runs contrary to market-based principles where retail electric suppliers procure power to secure the lowest possible costs for their customers

Because of its serious concerns about the adverse impact of the mandated PPAs on residential and small business customers, however, the General Assembly has also provided that the PPAs with the TEC will not take effect until it approves them in a new statute.[1]

Further, the Illinois statute caps the amount of TEC energy Illinois utilities must buy for their "eligible retail customers" (i.e., their residential and small commercial customers) at an amount that will increase their rates by no more than 2.015% per year.[2] Unfortunately, however, the statute provides no such cost cap protection for ARES' customers. On the contrary, all of the ARES must buy the entire remainder of the output under PPAs, no matter how much it would increase charges to their customers, such as schools, government agencies, hospitals, businesses, and manufacturers, and no matter how much above market those charges are. ARES provide more than half of all electricity consumed in Illinois and serve over 74 percent of non-residential electric load.[3] The state's largest commercial and industrial customers procure 97 percent of their electricity from ARES.[4] ARES provide more than half of all electricity consumed in Illinois and serve over 74 percent of non-residential electric load.[5] The state's largest commercial and industrial customers procure 97 percent of their electricity from ARES.[6]

The stark disparity between the TEC purchase obligations of the utilities and the ARES is significant, both in terms of its inequity and in actual dollar impact, resulting in both a disproportionate impact on ARES' customers and potentially irreparable harm to the competitive

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[1] 29 ILCS 3855/1-75(d)(4)(iii).
[2] The statute limits the average net increase for utility customers to "2.015% of the amount paid per kilowatthour by those customers during the year ending May 31, 2009. . ." 20 ILCS 3855/1-75(d)(2).
[3] Office of Retail Market Development, Illinois Commerce Commission, Annual Report, July 1, 2009 at 4-7.
[4] Retail and Wholesale Competition in the Illinois Electric Industry: Fourth Triennial Report, Illinois Commerce Commission, November 13, 2009 at 2-5, 16-17, 23-25.
[5] Office of Retail Market Development, Illinois Commerce Commission, Annual Report, July 1, 2009 at 4-7.
[6] Retail and Wholesale Competition in the Illinois Electric Industry: Fourth Triennial Report, Illinois Commerce Commission, November 13, 2009 at 2-5, 16-17, 23-25.

electric market in Illinois. These are the primary reasons that this diverse and broad-based group is devoting considerable resources towards this critical issue.

The inequality of the Illinois statute aside, it is necessary to understand the statute to see how the Illinois General Assembly will impact the ratemaking process.

EXPERT ANALYSIS FROM CHRISTENSEN ASSOCIATES

As discussed in detail in Dr. Morey's analysis, the relative impact of TEC on electric rates will be much greater than assumed in the TEC Cost Report. Flawed and unsupported assumptions in the report also make it very likely that the costs for TEC energy will likely be much higher than estimated. As a result, the eligible retail customer cap will be reached and a much larger proportion of TEC's overall above-market costs will be borne by manufacturers, retail establishments, small and medium-sized businesses, schools, hospitals, religious institutions, and units of government – the vital businesses and organizations that fuel Illinois' economy. Specifically, in his analysis, Dr. Morey identifies:

- TEC, as projected in its own Cost Report, will cost consumers **several hundreds of millions** of dollars more each year for electricity than what they would pay for electricity from other available sources.
- This terrible business burden could constrain new employment growth, resulting in a potential **annual average loss of 15,000 to 35,000 jobs for decades,** with devastating impacts to the Illinois economy through loss of earnings and income tax revenues.
- Far more realistic, yet still conservative, estimates of TEC's costs show consumers could **pay $100 million more annually in addition to the excessively high costs**

projected by the Cost Report, as noted above. And, this is before even considering the risk of failure to sequester the required CO_2.

- If TEC were unable to deliver its captured CO_2 through the yet-to-be-built and troubled Denbury pipeline project, or store it underground on-site, those **costs will increase yet an additional $137 million per year on average for 30 years**.
- The supposed **environmental benefits** of TEC are highly **speculative** at best. The proposed pipeline is in grave legislative trouble and underground storage of CO_2 is controversial and as yet unproven.

A. TEC Will Result in Significant Electric Rate Increases for Illinois' Electric Customers

According to Dr. Morey's analysis, the TEC project could increase Illinois customers' rates substantially more than estimated by the Cost Report. The Cost Report concludes that even if TEC were built on time and on budget (a highly unlikely scenario for an unproven technology) the project could still cost Illinois electricity customers an average of $386 million more per year, for the first thirty years of TEC's life, over power from other resources. However, in the far more likely scenario, if the costs of building and operating TEC are higher than expected, and if certain revenues are lower than the Cost Report forecasts, Illinois electricity customers could plausibly **pay an <u>additional</u> $100 million per year over the thirty years** above and beyond what the Cost Report projects under certain scenarios.

Incredibly, it could get significantly worse for Illinois consumers. The Cost Report itself states that in the event that TEC were unable to store its captured CO_2 either by delivering it through the proposed Denbury pipeline or by storing it in its own storage field, it could cost consumers an additional $137 million per year on average over 30 years, above and beyond what

Pace projected.[7] This is not an unlikely scenario as the Denbury pipeline has faced serious legislative challenges in Kentucky and Indiana and underground storage of CO_2 is controversial and its large-scale feasibility is as yet unproven.

So even if TEC were able to provide its promised CO_2-reduction benefits Illinois customers will pay $292 million to $396 million in extra costs per year over and above what they would otherwise pay for electricity. Of that above-market amount, residential and small commercial customers are guaranteed to pay an average of $152 million per year regardless of future uncertainties. The remaining $140 million to $244 million of this annual burden will be imposed on all others consumers -- businesses and other entities that provide jobs and services vital to the Illinois economy. This burden on business will result in a potential **annual average loss of about 15,000 to 16,000 jobs (and the earnings, and income tax revenues that go with them) for decades**.

Even using the Cost Report's conservative and self-serving assumptions, the electric rate impacts on Illinois consumers are significant. But the reality is the Cost Report's numerous flawed assumptions in fact mask the actual rate impacts on Illinois' consumers. The Cost Report not only relies on assumptions that are more favorable to TEC than they are realistic but also conveniently ignores uncertainties that have major impacts on Illinois rates, including core plant capital costs, interest rates, construction costs, fuel costs, and revenue offsets. When these uncertainties are appropriately considered, far worse rate impacts become highly plausible. For example, if TEC can neither deliver its CO_2 to the proposed Denbury pipeline (a project that appears to be near death or at best on "life support") nor sequester it "on-site", WorleyParsons, one of TEC's own consultants, finds that the average additional per-year costs are **$137 million**

[7] *See* Cost Report, pp. 81-82.

annually over the entire 30-year period – a whopping $4.1 billion increase over the life of the project.

Furthermore, the Cost Report has other flaws that undercut its conclusions, including incorrectly applying the benchmark 2009 rate for residential and small commercial customers to all load served by the utilities and ARES. This had the effect of significantly understating the rate impact on non-eligible customers (i.e., customers served by ARES such as hospitals, schools, government agencies, businesses and manufacturers).

B. TEC's "Green" Benefit Is Speculative At Best

There is no certainty at all about how the CO_2 will be sequestered. First, Illinois depends on the kindness of neighboring states to permit the proposed (and now what appears to be dead) Denbury pipeline to transport 50% of the CO_2 from TEC to somewhere in the Gulf of Mexico. Thus far, Kentucky has refused to adopt necessary legislation to allow the project to move forward and Indiana has likewise failed to enact similar, necessary legislation. The Commission may recall that in testimony before the Senate Energy Committee, TEC representatives said that such a pipeline project would only make sense if three projects of similar size were to be constructed in the region. Such projects are not on the horizon. Second, alternative mechanisms for sequestration of the CO_2 are just as uncertain. Geologic sequestration costs much more than the pipeline, and its feasibility is still unproven. Absent these two options, CO_2 disposal would cost billions of dollars and significantly increase the cost to Illinois' ratepayers.

C. Net Negative Impact on Jobs and the Illinois Economy

Tenaska promises TEC will create temporary and permanent jobs in the region as a result of construction and operation of TEC. It is undeniable that job creation is critical during these challenging times. Unfortunately, the jobs added to construct and operate the plant are not the relevant outcome that needs to be considered. Rather, the net impact to the Illinois economy from forcing consumers and businesses to purchase high cost, above market generation is the real issue that must be scrutinized. And the unavoidable reality is by significantly increasing electric rates, TEC would not add jobs to Illinois but instead would lead to a net job and income loss for Illinois.

The electricity price increases induced by the TEC project will make Illinois a less attractive place to do business, and will reduce business investment and jobs in Illinois. The extent of the job reductions will depend upon size of the increases in commercial and industrial electricity prices. However, even applying the unrealistically low cost increases estimated in the Cost Report itself, Dr. Morey estimates long-term job losses at 15,000 to 16,000 jobs annually for decades. More realistic assumptions would result in even greater job losses.

The WorleyParsons Study completely ignores the *total* impact of the TEC project on the Illinois economy. Instead, the WorleyParsons Study solely focuses on the fact that the TEC project will create a certain number of jobs. While job creation associated with the TEC project is important, it cannot be considered in a vacuum. It is significantly more important to understand that some of those jobs would be created elsewhere in Illinois if TEC were not built, and that the high costs of the TEC project will siphon dollars and jobs from other sectors of the Illinois economy. When all the resulting consequences, both positive and negative are considered, it becomes clear that the TEC project will result **in a net job and income loss** for Illinois.

Conclusion

The General Assembly has tasked the Commission with a major responsibility as it relates to the TEC Project – prepare an analysis of the TEC Cost Report so that the members of the General Assembly can determine whether or not Illinois' ratepayers -- individual homeowners, small businesses, retail establishments, schools, hospitals, units of government, and major manufacturers – should be required to finance the construction of the TEC project. We believe that the General Assembly will demonstrate a high degree of deference to and reliance upon the Commission's Analysis.

As summarized above, and detailed in the Dr. Morey's expert analysis, we believe that the TEC Cost Report profoundly misrepresents the true impact to our State. From rate impacts, to job creation benefits, to environmental outcomes, the Cost Report consistently offers flawed assumptions based on implausible scenarios, all clearly designed to put the project in the best possible light before the General Assembly deliberates the issue. This is why we believe it is so important that the Commission carefully review the TEC Cost Report, Other Expert reports, and the Comments of other interested parties as it prepares its Report and Analysis to the General Assembly.

The STOP Coalition knows that the Commission appreciates the gravity of the task at hand and appreciates this opportunity to submit these Comments and Expert Report.

Respectfully submitted,
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Dated: April 16, 2010

Exhibit A

TAYLORVILLE ENERGY CENTER PROJECT:
ECONOMIC IMPACTS ON
ILLINOIS RETAIL ELECTRICITY RATES AND ECONOMY

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prepared for

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April 16, 2010

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Executive Summary

At the request of the STOP Coalition, Christensen Associates Energy Consulting, LLC assessed the economic study prepared by Pace Global Energy Services (the Pace Study) for the Taylorville Energy Center (TEC) – a proposed hybrid integrated gasification combined cycle power plant. The objective of the assessment was to: a) determine the reasonableness of the retail electricity rate impact estimates provided by the Pace Study; and b) provide preliminary estimates of the impacts of TEC upon the Illinois economy over the period of the rate impact estimates.

Overview of Findings

Based upon our review of the Pace Study and of four companion TEC-sponsored studies, we conclude that the TEC project could increase Illinois customers' rates substantially more than claimed in the Pace Study, and will have a negative net impact on jobs and the Illinois economy.

The Pace Study analyzed the rate impacts of TEC under four distinct cases that varied in their projections for certain assumptions.[8] Under the Pace Study's worst case scenario, the TEC project could cost Illinois electricity customers an average of $386 million more every year, for thirty years, than if they obtained that electricity from other resources.[9] That is a total cost over the 30 years of approximately $11.6 billion. That extraordinary number, if taken on its face, is bad enough. But our analysis suggests that the outcome for Illinois electricity customers may be much worse that $386 million of extra costs every year. When taking into consideration plausible increases in the costs of building and operating the TEC, and plausibly lower revenues than Pace forecasts, the impact could be as much as $100 million **per year** greater than projected by Pace under some scenarios.[10]

Perhaps even more significant, however, is the fact that the Pace Study failed to consider the rate impact of TEC's possible failure to capture and sequester the required CO_2 emissions. According to the WorleyParsons Study, if the TEC plant fails to capture and sequester the required 50% of its CO_2 emissions, the increased cost to Illinois electricity customers would average $137 million per year over the first thirty years of TEC's operations. Thus, TEC's own consultants have identified $4.1 billion of potential costs that Pace did not consider in any of its four rate impact case scenarios. When factoring in the impact of that very real risk, Illinois customers could be required to pay well over $500 million per year for thirty years due to TEC.[11]

[8] *See* Table E-1, which identifies the four Pace case studies as Case Nos. 1-4
[9] See Table E-1, Case No. 4
[10] *See* Table E-1, Case No. 6 and 7
[11] *See* Table E-1 Case No. 8

Regardless of the scenario considered, it is irrefutable that the TEC will substantially increase electricity costs for Illinois customers: every one of Pace's scenarios shows that TEC will increase costs by at least $5 billion over thirty years. The Illinois Clean Coal Portfolio Standard Law (CCPSL) puts a major constraint on how these billions of dollars of extra costs may be recovered from customers. Specifically, CCPSL effectively limits the increases borne by residential and small commercial customers to $152 million per year. That means Illinois' hospitals, government agencies, schools, religious institutions, manufacturers, and businesses vital to the Illinois economy will be saddled with all the remaining above market costs of TEC, which could average as high as $366 million per year for thirty years for those customers.[12] The electricity rate increases induced by the TEC project will make Illinois a less attractive place to do business relative to other states, and will therefore reduce business investment and jobs in Illinois.

While the extent of the job reductions will depend upon the exact size of the increases in commercial and industrial electricity prices, under the Pace Study's own case scenarios – which do not consider the risk of failing to sequester the CO_2 emissions – the increases could result in an average annual loss of about 15,000 to 16,000 jobs for 30 years. Those job losses would bring with them devastating impacts to the Illinois economy through loss of earnings and income tax revenues.

When you add to that the risk that TEC fails to provide any of its promised CO_2-reduction benefits, those costs will increase substantially and could lead to an average loss of between 27,000 and 35,000 jobs a year (along with their associated earnings) over decades.

In short, CCPSL insulates the owner of the TEC plant from that plant's financial and environmental risks; so the worse the plant performs – in its construction, in its operation, and in its environmental benefits – the more that the people and businesses of Illinois will pay in dollars and in jobs.

Detailed Findings

Table E-1 summarizes the average annual dollar impact of TEC over the 30-year period as well as the cumulative dollar cost over that time of the TEC facility. Of the eight cases shown, the first four were developed and estimated by Pace, while the last four were developed and estimated by CA Energy Consulting, though these latter four cases are all based upon the Pace Reference Case.

All figures in Table E-1 are relative to the case in which there is no TEC facility. In Case No. 1 (the Pace Reference Case), for example, TEC will cost Illinois electricity consumers $8.76 billion extra over 30 years relative to what power would have cost without TEC. In Case No. 8 (the Pace Reference Case with higher TEC construction and operating costs and with a failure to sequester CO_2), TEC will cost Illinois electricity consumers $15.53 billion extra over 30 years relative to what power would have cost without TEC. From the table, it is apparent that the TEC plant will cost the people of Illinois at least $5 billion

[12] *See* Table E-1, Case No. 8 which sets forth a total cost of $518 annually, less the $152 attributable to eligible customers.

over and above what they would pay for electricity if the TEC plant were never built; and it may cost the people of Illinois as much as $15 billion over what they would otherwise pay for electricity.

Table E-1
Net Costs of the TEC Project Relative to Alternative Power Resources
(millions of dollars)

Case No.	Case Name	Annual	Total 30 Years
1	Pace Reference	292	8,760
2	Pace Environmental Policy	168	5,052
3	Pace Gas/Coal	249	7,464
4	Pace RPS/DSM	386	11,568
5	WorleyParsons - No CO_2 Capture + Pace Reference	429	12,870
6	Pace Reference + Cost Escalation	381	11,421
7	Pace Reference + Cost Escalation + Revenue Reductions	397	11,895
8	Pace Reference + Cost Escalation + No CO_2 Capture	518	15,534

Table E-2 summarizes the percentage rate impacts of various cases considered in the Pace Study and in this report. In analyzing its four cases, Pace did not consider the rate impacts on eligible customers (ECs) separately from non-eligible customers (Non ECs) and made an error in calculating the percentage rate impact on all customers; so the figures shown for Cases Nos. 1 through 4 are our corrections of Pace's calculation for all customers plus our split between the EC and Non EC groups.

The rate impacts of Table E-2 are all relative to the case in which there is no TEC facility. For all customers, the TEC facility will raise rates by an average of between 1.39% and 4.08% for thirty years or more. For the EC group, CCPSL effectively caps the rate increase at 2.02%. For the Non EC group, the TEC facility will raise rates by at least 1.50% and as much as 7.10%. For both customer groups, these rate increases will persist for thirty years or more.

Table E-2
30-Year Average Percentage Rate Impacts of the TEC Project on Customers

Case No.	Case Name	All Customers	EC Group	Non EC Group
1	Pace Reference	2.30%	2.02%	2.76%
2	Pace Environmental Policy	1.39%	1.31%	1.50%
3	Pace Gas/Coal	1.96%	1.72%	2.33%
4	Pace RPS/DSM	3.12%	2.02%	4.25%

5	WorleyParsons - No CO_2 Capture + Pace Reference	3.38%	2.02%	5.38%
6	Pace Reference + Cost Escalation	3.00%	2.02%	4.45%
7	Pace Reference + Cost Escalation + Revenue Reductions	3.13%	2.02%	4.75%
8	Pace Reference + Cost Escalation + No CO_2 Capture	4.08%	2.02%	7.10%

The question of whether the Illinois legislature should give the green light to TEC hinges on how the plant affects the state economy, including retail electricity rates. The Pace analysis of the rate impacts considered four "states of the world" that varied in their projections of U.S. economic growth rates, carbon control and carbon tax policies, NOx regulations, renewable portfolio standards, energy efficiency and demand-side management policy, and natural gas demand. These factors are entirely outside the control of TEC owners and operators.

Unfortunately, the four states of the world address only some of the uncertainties that impact Illinois' retail electricity rates and the Illinois economy. Pace does not analyze some of the uncertainties that pose significant risks to the people of Illinois, namely those about the ultimate costs to construct and operate the TEC plant as well as those associated with the process of extracting and sequestering CO_2. Our analysis shows that variations in these factors, about which there is substantial uncertainty, have significant impacts on Illinois rates and on the broader Illinois economy. When uncertainties in these factors are appropriately considered, the range of plausible rate impacts includes outcomes that are much more adverse than found by Pace. For example, in the event TEC can neither use its CO_2 for enhanced oil recovery nor sequester it "on-site," the added costs of mitigating the effects of the CO_2 will average $137 million *per year* over a 30-year period, which are costs that are not considered by the Pace analysis.

In addition, the Pace Study presents its rate impact conclusions in a misleading fashion. Specifically, Pace computed the percentage rate impacts by applying the 2009 rate for residential and small commercial customers to all load served by the utilities and alternative retail electric suppliers (ARES) even though CCPSL specifically mandates that eligible customers (e.g., residential and small commercial customers) will be treated differently than non-eligible customers (e.g., customers served by ARES such as hospitals, schools, government agencies, businesses and manufacturers). This has the effect of significantly understating the rate impact on non-eligible customers. When we use Pace's own assumptions to consider the separate rate impacts on eligible and non-eligible customers, it is evident that the latter will bear a significantly larger electricity rate impact relative to 2009 rates – ranging between 3% and 7% for the entire 30-year period.

Another TEC-sponsored study, authored by WorleyParsons, reaches implausible conclusions about the impacts of TEC on the Illinois economy. WorleyParsons finds that the TEC facility will create local jobs and increase local expenditures because it looks only at the jobs required to build and run the TEC plant. It fails to consider the fact that jobs would be created at some other power plant if TEC were not built; and more importantly, it overlooks the impacts of an increase in electricity rates on the broader Illinois economy. The billions of dollars that Illinois electricity customers will pay to the owners of the TEC plant, over and above what they would pay for electricity from other resources, will be billions of dollars that will be drained from the Illinois economy; and this drain will continue for decades. Illinois electricity consumers will have billions fewer dollars to spend on goods and services other than electricity, and so jobs will be destroyed in other sectors of the Illinois economy. Furthermore, the higher electricity rates induced by the TEC plant will dissuade some businesses from investing in Illinois, will induce some businesses to switch some operations and production to other jurisdictions, and will cost jobs. The key flaw of the WorleyParsons study is that it looks at the *gross* impacts of the TEC plant when what really matters to the Illinois economy, and to the people of Illinois, is the *net* impact of that project. The fact that the TEC project will create a certain number of jobs is important; but it is significantly more important to understand that some of those jobs would be created elsewhere if TEC is not built, and that the high costs of the TEC project will divert dollars and jobs from other sectors of the Illinois economy. Our research indicates that, when the Pace Study results are modified to account for these adverse economic impacts, it is very likely that the TEC project will result in a significant net job and income *loss* for Illinois.

Figures E-1 and E-2 summarize, for the 30-year period, the average percentage rate and average annual dollar impacts of TEC on All Customers, the EC Group and the Non EC Group. The scenarios considered includes the Pace Reference Case (Pace Reference), a Cost Escalation scenario (Cost Escalation), Cost Escalation plus Revenue Offset Adjustments (Cost Esc + Rev Adj), the Pace Reference Case with No Carbon Sequestration (Pace Ref + No Sequestration), and Cost Escalation with No Carbon Sequestration (Cost Esc + No Sequestration).

All five scenarios demonstrate that the impacts of TEC on Illinois electricity customers will be significant. The differences between the Pace Reference Case and the other cases show that the risks of TEC for the Illinois economy arise not only from the uncertainties considered by Pace but also from the uncertainties associated with TEC's costs and with CCPSL's explicitly acknowledged risk that TEC will be unable to deliver its promised CO_2 reductions. What is clear from these figures is that the TEC project will drain the Illinois economy an average of $292 million to $518 million *per year* for the next thirty or more years; and that in subsidizing the TEC plant, Illinois is betting its economic future on a "roll of the dice" that is sure to cost lots of money and many jobs.

Figure E-1
Average Annual Percentage Rate Increases for TEC Cost Scenarios

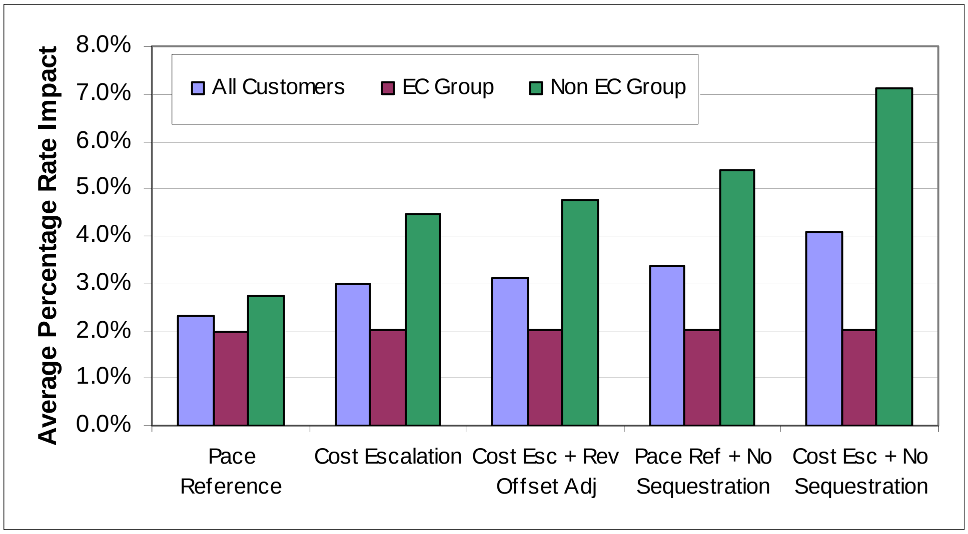
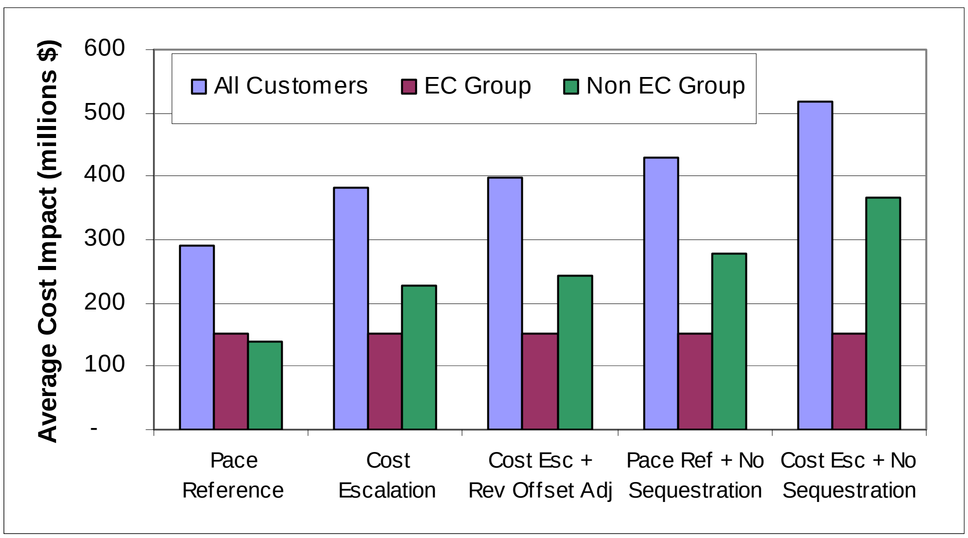


Figure E-2
Average Annual Total Dollar Impact for TEC Cost Scenarios



TAYLORVILLE ENERGY CENTER PROJECT:
ECONOMIC IMPACTS ON
ILLINOIS RETAIL ELECTRICITY RATES AND ECONOMY

Introduction

This report assesses a recent economic study prepared by and for the Taylorville Energy Center (TEC) – a proposed hybrid integrated gasification combined cycle power plant. This study is:

- Pace Global Energy Services, *Rate Impact Analysis for Taylorville Energy Center*, February 21, 2010 (the Pace Study).

To perform this assessment, five companion studies prepared by and for TEC were also reviewed. These studies are:

- KBMD Partners, *FEED Study Summary*, February 22, 2010 (the KBMD Study);[13]
- Nexant, Inc., *U.S. Sulfur/Sulfuric Acid Market Analysis: Supply/Demand and Pricing*, June 2009 (the Nexant Study);
- Schlumberger Carbon Services, *Cost Report for the Taylorville Energy Center*, (the Schlumberger Study), February 18, 2010;
- Wood MacKenzie, *The Delivered Price of Coal to the Taylorville Energy Center*, October 2009 (the Wood MacKenzie Study); and
- WorleyParsons Group, Inc., *Facility Cost Report*, February 26, 2010 (the WorleyParsons Study).

The objectives of the assessment are: a) to determine the reasonableness of the rate impact estimates provided by the Pace Study; and b) to provide preliminary estimates of the impacts of TEC upon the Illinois' economy over the period of the rate impact estimates.

This report is organized as follows. Section 2 provides brief descriptions of the TEC project's physical characteristics and of the Illinois law that provides substantial subsidies for the project. Section 3 summarizes the findings of the KBMD Study and the Pace Study with respect to the costs, revenues, and rate impacts of the TEC project. Section 4 presents our alternative assumptions and findings regarding rate impacts on electricity customers and economic impacts on the overall Illinois economy. Section 5 provides conclusions and recommendations. Additional supporting material is provided in an appendix.

Background

This section describes the TEC project, and then describes the law that provides substantial subsidies to the project.

[13] Three additional studies are appended to the KBMD Partners study. They are: KBMD Partners, *Basis of Estimate*, February 22, 2010; KBMD Partners and Christian County Generation, *Project Execution Plan*, February 2, 2010; and Bigge Crane and Rigging Company, *Transportation Survey*, September 18, 2009.

Physical Description of the Taylorville Energy Center[14]

TEC is designed to convert coal to substitute natural gas (SNG), and then to produce electricity from the SNG. TEC will therefore prospectively be comprised of two main operational "islands":

- *The SNG island* will use two Siemens dry feed quench gasifiers to convert coal to SNG. An acid gas and CO_2 removal unit will strip unwanted elements from the gas, particularly sulfur and CO_2. Table 1 summarizes SNG production and coal consumption by the SNG island.
- *The power island* will be a conventional 760-MW combined-cycle power plant that includes two combustion turbine generator sets, two heat recovery steam generators, and one steam turbine generator. Table 2 summarizes the power island's prospective characteristics. Unit 1 will be a must-run unit, while unit 2 will be discretionary.

When the SNG island produces more SNG than is required by the power island, TEC will compress and inject the excess SNG into the natural gas pipeline system for sale. When the power island requires more gas than can be provided by the SNG island, the power island will procure pipeline natural gas to make up for the shortfall. The sulfur and CO_2 byproducts will be available for sale if suitable buyers can be found.

Table 1
Summary of Expected SNG Production and Coal Consumption[15]

Category	MMBtu/Hour
Total Coal Consumption	4,433
Total SNG Production from Gasifier	2,592

Table 2
Summary of Operating Characteristics and Costs of the Power Island (2010$)[16]

Category	Units	Period	Unit 1	Unit 2
Net Capacity	MW	June-September	262	299
		November-February	304	333
		Other months	285	318
Net Heat Rate	Btu/kWh	June-September	7,583	6,649
		November-February	7,114	6,487
		Other months	7,225	6,476
CO_2 Emission Rate	lbs/MMBtu		115.4	115.4
Variable O&M	$/MWh	2010	2.82	2.82

[14] A more detailed description of the TEC facility and an assessment of the implications of the design in terms of operational issues are contained in KBMD Partners, *Basis of Estimate*, p. 7.
[15] Pace Study, Exhibit 2.
[16] *Ibid.*

For the analysis that follows, it is important to note that the KBMD Study implies that the power island cannot operate at a 75% or higher capacity factor without burning some natural gas purchased at market prices. This implication follows from the prospective TEC design by which the SNG island will be unable to produce sufficient SNG to fully serve the power island when the latter operates at a 75% capacity factor.[17]

Illinois' Clean Coal Portfolio Standard Law

SB 1987, the Clean Coal Portfolio Standard Law (CCPSL), was signed into law on January 12, 2009.[18] Among other things, this legislation defines a "clean coal facility" as

> "an electric generating facility that uses primarily coal as a feedstock and that captures and sequesters… at least 50% of the total carbon emissions that the facility would otherwise emit if, at the time construction commences, the facility is scheduled to commence operation before 2016, at least 70% of the total carbon emissions that the facility would otherwise emit if, at the time construction commences, the facility is scheduled to commence operation during 2016 or 2017, and at least 90% of the total carbon emissions that the facility would otherwise emit if, at the time construction commences, the facility is scheduled to commence operation after 2017."[19]

With the goal "that by January 1, 2025, 25% of the electricity used in the State shall be generated by cost-effective clean coal facilities,"[20] Illinois appears to be the first state to establish a goal for producing electricity from coal-fueled power plants with carbon capture and storage (CCS). To support the commercial development of CCS technology and the use of coal mined in Illinois, the legislation requires each utility and alternative retail electric supplier (ARES) in the state to procure at least 5% of its "eligible" retail load from the "initial clean coal facility" in 2015 and each year thereafter.[21] "Eligible" retail load is that of residential and small commercial customers with loads of 100 kW or less in the planning year immediately preceding the commencement of the sourcing contract. The "initial clean coal facility" is defined as a clean coal facility "that will have a nameplate capacity of at least 500 MW when commercial operation commences… [and] that has a final Clean Air Act permit on the effective date of this amendatory Act…"[22] Payments to the initial clean coal facility are to be based upon that facility's cost of service, subject to review by the Illinois Commerce Commission (ICC) and the Federal Energy Regulatory Commission (FERC). All miscellaneous revenue, favorable financing cost impacts, and tax credits earned by the initial clean coal facility, such as revenue from the sale of SNG, is required to reduce dollar-for-dollar payments by the utilities and ARES under the Sourcing Agreements. At the time of the passage of the legislation, as well as at the present, the common expectation was and is that the TEC facility will be the initial clean coal facility.

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[17] This result is implied by the fact that the Pace Study shows the TEC plant buying $149 million worth of natural gas per year over the 30-year period analyzed in the Reference Case scenario.

[18] Public Act 09-1027 (S.B. 1987 Enrolled).

[19] Illinois General Assembly, *Clean Coal Portfolio Standard Law*, SB1987 Enrolled, Public Act 095-1027, p. 4.

[20] *Ibid*., p. 20.

[21] *Ibid*., pp. 19-20.

[22] *Ibid*., pp. 23-24.

Notwithstanding the foregoing cost-of-service calculation, the amounts paid by "eligible retail customers" are subject to the following cap:

> "the total amount paid under sourcing agreements with clean coal facilities … for any single year shall be reduced by an amount necessary to limit the estimated average net increase due to the cost of these resources included in the amounts paid by eligible retail customers in connection with electric service to no more than the greater of (i) 2.015% of the amount paid per kilowatthour by those customers during the year ending May 31, 2009 or (ii) the incremental amount per kilowatthour paid for these resources in 2013."[23]

where "the total amount paid for electric service includes without limitation amounts paid for supply, transmission, distribution, surcharges, and add-on taxes."[24] The rate cap on eligible retail customers means that the costs of power from TEC that would be borne by Illinois utilities and their eligible customers will be limited in absolute amount. However, the remainder of the costs of the power supplied by TEC for eligible retail customers will be borne by ARES, according to CCPSL.[25]

Because 5% of total MWh sold by utilities and ARES will be approximately equal to the output of the TEC facility regardless of the capacity factor assumed, the CCPSL implicitly requires 100% of the TEC facility output to be purchased by Illinois utilities and ARES. Given that the 2.015% limit protects eligible retail customers (i.e., residential and small commercial customers) from even higher rate impacts, the remainder of any power purchase costs must be absorbed by the ARES (i.e., their shareholders) or passed on in rates to all other customers they serve (e.g., schools, hospitals, government agencies, businesses, and manufacturers).

Findings of the TEC Reports

This section begins by describing the key assumptions of the KBMD Study and the Pace Study, and then summarizes the rate impact and economic impact estimates provided by the Pace Study.

Key Assumptions

The TEC reports depend upon numerous assumptions pertinent to the cost, revenue, and other impacts of the TEC project. The key assumptions concern the following:

- TEC project availability and output;
- TEC project capital costs;
- TEC project operating costs;
- TEC project revenue offsets; and
- electricity market conditions.

[23] *Ibid*., pp. 22-23. As a practical matter, condition ii is irrelevant.
[24] *Ibid*., pp. 16-17.
[25] CCPSL, Section 16-115(d)(5)(iv).

Each of these is discussed below.

TEC Project Availability and Output

Table 3 summarizes the Pace Study presentation of the estimates of the availability of the SNG and power islands, which are "in accordance with parameters supplied by Tenaska."[26] As indicated in the table, the SNG island availability is projected to rise dramatically after an initial two-year "shakedown" period. Based on the historical performance and maintenance characteristics of natural gas combined-cycle power plants, the Pace Study, for purposes of estimating revenues from sales of energy from the plant and computing rate impacts, sets the expected availability of the power island at 92% from the outset.[27]

Table 3
Summary of Availability Estimates for TEC SNG Island and Power Island[28]

Availability	SNG Island	Power Island
Year 1	65%	92%
Year 2	80%	92%
Year 3 to Year 12	85%	92%

We note that for purposes of estimating the cost of TEC power, the Pace Study finds that the TEC plant will be dispatched at annual capacity factors of between 75% and 86% during all 30 years of the analysis for all four states of the world that it examined.[29] The Pace Study also estimates the cost of TEC power under an assumption of a 92% annual capacity factor. Given the plant characteristics presented in Table 2 and the capacity factors determined by the Pace Study, this translates into an average annual output of approximately 3,968 GWh of electricity, all of which would be purchased by Illinois utilities and ARES under the CCPSL requirements.

TEC Project Capital Costs

Table 4 presents the KBMD Study's estimated capital costs. Total construction costs are estimated to be $2.82 billion, of which $0.26 billion are a contingency for a 10% cost overrun. Various financing and other non-construction costs are estimated to be $0.70 billion, bringing the total cost to $3.52 billion.

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[26] Pace Study, p. 2. Tenaska is an Omaha-based independent power developer that is one of the joint developers of the TEC project.
[27] Pace Study, p. 3.
[28] Pace Study, Exhibit 2.
[29] The range of capacity factors is deduced from the results presented in the Pace Study, pp. 63-66.

Table 4
Capital Costs of TEC Plant (000's of 2010 $)[30]

Core Plant	$2,407,612	
Balance of Plant	154,300	
Owner's Contingency	257,000	
Total Construction Costs		$2,818,912
Process License and Fees	$ 21,418	
Catalysts	26,625	
Worker's Compensation Insurance	28,104	
Land and Mineral Rights	14,146	
Development Costs	106,272	
Owner's Project Management	55,000	
Financing Costs	353,192	
Builder's Risk Insurance	19,500	
Pre-Operation Cost	28,981	
Spare Parts	24,189	
Coal Inventory	2,447	
Sales Tax	22,864	
Financing, Startup and Owner's Costs		702,738
Total Capital Costs		$3,521,650

TEC Project Operating Costs

Table 5 summarizes the WorleyParsons Study's estimated average annual operating and maintenance costs for the TEC facility. Over 90% of the $67 million annual cost is comprised of the first four items in the table.

[30] WorleyParsons Study, p. 56, Exhibit 10.1.1a. Note that there are two $18,000,000 addition errors in the source that are corrected in the table that appears herein.

Table 5
Summary of Annual Average O&M Costs (000's of 2010 $)[31]

Maintenance	$28,551
Yard Contract Labor	14,449
Insurance	9,950
Consumables	8,640
Capital Improvement Allowance	1,500
Plant Management	1,374
Slag & Sludge Disposal	860
Administrative & Facility Support	752
Utilities	638
Plant Materials	443
345 kV Switch Yard	117
Total	$67,274

Neither Table 4 nor Table 5 includes the costs of the air separation unit that the TEC-sponsored studies assume will be provided through a third-party contract. Neither Table 4 nor Table 5 includes the capital and operating costs of CO_2 sequestration by means of well injection, the costs of which would be incurred in the event that CO_2 cannot be sold to Denbury for EOR.[32]

Delivered Coal Prices

The Pace Study determined the total delivered cost of coal used according to the Wood MacKenzie Study's 30-year forecast of delivered coal. The delivered price estimated by Wood MacKenzie represents the lowest average delivered price of coal to TEC from "one of six subdivisions that represent the geographical mining areas of the State of Illinois."[33] Table 6 presents that forecast for the first ten years of TEC's operation as well as the total cost of delivered coal.[34]

[31] WorleyParsons Study, p. 41, Table 5.6.
[32] Nonetheless, the value of the capital recovery requirement used in the Pace Study was set at $439.5 million in 2015, which is 46% higher than the amortized capital cost of $300 million to recover $3.5 billion at a WACC of 7.53% over 30 years. This higher level of capital recovery requirement would be adequate to recover both the capital and fixed operating costs of the air separation unit and the CO_2 well sequestration system.
[33] Wood MacKenzie, p. 8.
[34] The Wood MacKenzie Study, at p. 9, states that the Btu content of the coal used at the TEC plant is 10,450 Btu/lb. From this, the delivered price of coal ($/MMBtu), and the total cost of delivered coal presented by Pace, we infer that the total coal use during the 30-year period ranges from 1.3 million short tons in 2015 to about 3.0 million tons in 2044.

Table 6
Forecast Delivered Price and Estimated Total Cost of Coal (2010 $)

Year	Delivered Coal Price (2010$ per MMBtu)[35]	Total Cost of Delivered Coal (000s of 2010$)[36]
2015	2.21	60,470
2016	2.24	77,015
2017	2.24	83,147
2018	2.17	82,156
2019	2.15	83,122
2020	2.17	85,431
2021	2.18	87,524
2022	2.20	90,207
2023	2.16	90,178
2024	2.16	92,250

Pace used the coal price forecast prepared by Wood MacKenzie for the 30-year rate impact analysis.

Variable O&M Costs

The Pace Study of retail rate impacts uses the variable operations and maintenance (VOM) costs of $2.82 (2010 dollars) per MWh.[37]

Carbon Sequestration Costs

If the sale of CO_2 to Denbury for EOR does not materialize, the TEC project's CO_2 will have to be sequestered by injection into wells in Illinois. The Pace Study appears to have used a capital recovery requirement to account for the costs of carbon sequestration by a well injection system. According to the Schlumberger Study, the costs of carbon sequestration for TEC will average between $5 and $10 per metric ton.[38]

Table 7 summarizes the Schlumberger Study's estimates of the costs of developing a three-injection well system locally for the TEC. According to Schlumberger, $63.4 million will be spent building the system during the construction phase of the project (i.e., before 2015). Refurbishing (i.e., seismic and well workovers) will cost $19.2 million and will occur at ten-year intervals, in 2024 and 2034. Aside from refurbishing, O&M will cost either $182,090 per year (in six years) or $112,000 per year (in twenty-three years) after 2014, for an annual average of $126,501 over the years 2015-2043 inclusive. Decommissioning will run a total of $30.3 million over the years 2044-2054.

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[35] WorleyParsons Study, p. 45, Table 6.0. The Pace Study used the full 30-year forecast of delivered coal prices that is presented in the Wood MacKenzie Study, p. 8, Exhibit 1.
[36] Pace Study, p. 63. The total delivered cost of coal does not vary across the four states of the world analyzed by Pace.
[37] Pace Study, p. 3, Exhibit 2.
[38] Schlumberger Study, p. 1.

Table 7
CO_2 Sequestration – Three-Injection Well Case[39]

	Initial Capital Costs	Seismic & Well Workovers	O&M	Decommissioning	Total
Development	1,100,000				1,100,000
Capital	54,351,980				54,351,980
Seismic Work		19,198,650		15,030,480	34,229,130
Water Sampling + Wellhead O&M			3,799,540	106,090	3,905,630
Contingency	7,994,369			15,136,570	23,130,939
	63,446,349	19,198,650	3,799,540	30,273,140	116,717,679

Commercial Operation Date

Both the KBMD Study and the Pace Study assume that TEC's commercial operations will commence in 2015. The KBMD Study acknowledges significant obstacles in construction, but assumes that all bridge, barge, electrical wire, and road upgrades will be permitted and accomplished on time.

TEC Project Revenue Offsets

The KBMD Study and the Pace Study both assume that the TEC facility will be able to sell certain commodities other than electricity, the revenues from which will offset some of the costs of the TEC facility. Table 8 presents the average annual revenues that the studies forecast for each revenue source for each of the first ten years of TEC's operation.

Although Table 8 includes six items, it appears that the Pace Study's rate impact analysis considers only the revenues from the last two of those items: the sale of capacity in the PJM capacity market; and the Q45 CO_2 tax credits.

[39] Schlumberger Study, Table C-3, p. 4.

Table 8
Average Annual Revenues Reported in the KBMD Study and Pace Study (2010 $)[40]

Commodity	Revenues
SNG	$15,200,000
CO_2 (for Enhanced Oil Recovery)	9,000,000
Sulfur	3,600,000
NOx Allowances	18,100,000
Electric Generating Capacity (for PJM)	21,900,000
IRS Q45 CO_2 Tax Credits	18,300,000

SNG Sales

It is not clear whether the Pace Study includes a revenue offset from SNG sales in its rate impact analysis, as no explicit revenue stream associated with SNG sales is reported in Pace's state of the world analysis. It is clear, however, the gasifier facility alone will not provide sufficient SNG to enable the power plant to run at a 75% (or higher) capacity factor, so that the TEC project will very likely be a net purchaser, rather than a net seller, of gas. The Pace Study accounts for natural gas purchase costs in its rate impact analysis.

CO_2 Sales for Enhanced Oil Recovery

The WorleyParsons Study expects "that the TEC will capture and permanently store geologically more than 50% of the CO_2 that otherwise would have been emitted from the Facility, totaling approximately 1.9 million MT per year… [T]he primary plan for geologic storage is the sale of CO_2 to Denbury for transmission through a pipeline to be used in EOR in Mississippi or other Gulf Coast states. On average, over the first 10 years of operation, CO_2 purchase payments from Denbury are projected to be approximately $8.9 million annually in 2010$."[41]

Sulfur Sales

Sulfur will be removed from coal in the process of its conversion to SNG. The KBMD Study and the Pace Study both state that revenue will arise from the sale of molten sulfur; but, this revenue is not considered in any of the rate impact states of the world analyzed by Pace that we can see.

NOx Allowance Sales

The WorleyParsons Study claims that "TEC's low emissions profile will enable it to be eligible for additional Clean Air Set-Aside and Early Adopter nitrogen oxides (NOx) allowances as set forth in Illinois regulations implementing the Clean Air Interstate Rule. Based on Pace's projected prices for NOx allowances and on CCG's estimate of surplus NOx allowances… as shown in Table 10.1.8, CCG estimates, on average, over the first 10 years of operation, revenues from the sale of surplus NOx allowances will

[40] The first five figures are from the WorleyParsons Study, pp. 10-11. The $18,312,000 figure is a CA Energy computation for the first ten years of operations.
[41] WorleyParsons Study, p. 59.

be approximately $18.1 million annually in 2010$."[42] It appears that the Pace Study does not use this revenue stream in its rate impact analysis.

Electricity Market Conditions

The KBMD Study and the Pace Study anticipate revenues from the sale of the TEC's capacity into PJM's three-year forward capacity market. According to the KBMD Study, "Capacity revenues are estimated based on Pace's projection of capacity market clearing prices multiplied by the TEC summer capacity rating. On average, over the first 10 years of operation, revenues from electric capacity sales are projected to be $21.9 million annually in 2010$."[43]

PJM capacity market prices are very volatile and difficult to forecast. In the ComEd zone of PJM, these prices recently fell sharply as a result of the significant increase in the participation by demand response resources in the 2012/2013 Base Residual Auction (BRA).[44] The participation of demand response is expected to continue to grow in the PJM market, with the effect that capacity prices will be kept down for the foreseeable future.

Other Savings and Credits

Table 9 lists additional potential savings and credits mentioned in the KBMD Study and Pace Study.[45]

[42] WorleyParsons Study, p. 60. "CCG" is Christian County Generation, which is the developer of TEC.
[43] WorleyParsons Study, p. 11. The WorleyParsons Study estimate of revenues from the PJM capacity market are based on the Pace Study projects of capacity market prices in the Northern Illinois zone of PJM (i.e., the ComEd zone) as presented in the Pace Study, p. 21, Exhibit 17.
[44] The elimination of Interruptible Load for Reliability (ILR) category of demand response for the 2012/2013 Delivery Year, and reclassification of that load as Demand Response increased the participation of that category from 1,365 MW in the 2011/2012 BRA to 7,047 MW in the 2012/2013 BRA. The ILR category had not been included in the determination of capacity market clearing prices prior to the 2012/2013 BRA. Consequently, the capacity market clearing prices were driven lower.
[45] These credits do not appear to have been taken into consideration by Pace in determining rate impacts.

Table 9
Additional Revenue Credits Mentioned in the KBMD Study and Pace Study
(millions of nominal dollars per year)

Item	Amount
Interest cost savings from U.S. DOE loan guarantee	$ 60
45Q Tax Credits	22
Cap & Trade Incentives	156
PJM Market Savings for reduction in PJM market prices	120

Interest Cost Savings

The KBMD Study states that it expects the U.S. DOE loan guarantee to save $60 million on interest costs associated with borrowing to cover the capital costs of the TEC. The interest cost savings will be realized only if the forecast interest rate differentials (between conventional and guaranteed bonds) are realized. With interest rates now on the rise, these differentials may change.

IRS 45Q CO_2 Tax Credits

The CO_2 revenues presented in Table 8 reflect a CO_2 tax credit of $10 per ton as per Section 45Q of the Internal Revenue Code, which "serves as the basis of Pace's Reference Case CO_2 tax credit estimate for the TEC."[46] This tax credit reduces Pace's estimated costs of emissions from the TEC plant.

The KBMD Study and Pace Study also mention the potential of CO_2 revenues associated with the implementation of some kind of cap-and-trade system (e.g., as defined under the Waxman-Markey draft legislation). However, the Pace Study does not appear to take the CO_2 revenues associated with a cap-and-trade system into account in its analysis of the rate impacts.

Levelized Cost Analysis

The Pace Study reports the levelized costs of various technologies that could compete with the technology employed for the TEC facility. Table 10 summarizes these costs for Pace's Reference Case, with technologies listed in descending order of costs. Natural gas combustion turbines (CTs) have the highest cost due to their low load factors, while solar photovoltaics (PV) have the second highest cost due to their high capital costs. Pace claims that TEC will be cheaper than natural gas combined cycle (CC) units. Two coal technologies, nuclear, and wind are all significantly cheaper than TEC. Pace indicates that Coal with CCS will have a per-MWh cost essentially identical to that of Pulverized Coal, which implausibly implies that CCS will be costless.

[46] Pace Study, p. 57. Pace adjusts this value by its assumed general inflation rate of 2% per annum for the reference case.

Table 10
Levelized Cost Results by Technology (2010$/MWh)[47]

Technology	Cost		
	Average	**High**	**Low**
Natural Gas CT	690	981	417
Solar PV	351	443	205
Natural Gas CC	163	203	125
Taylorville (TEC)	*150*		
Pulverized Coal	119	152	102
Coal with CCS	119	140	101
Nuclear	115	188	73
Wind	71	100	54

Estimated Impacts on Illinois Electricity Rates

States of the World

To estimate the impacts of the TEC facility operations on Illinois retail rates, the Pace Study developed four states of the world representing different sets of assumptions about macroeconomic drivers and public policy initiatives that could affect the electricity markets over the period 2015 to 2044. The four states are as follows:

- *The Reference Case state* assumes that future environmental and economic policies continue present trends.
- *The Gas/Coal Future state* assumes that future environmental and economic policies are oriented more toward economic growth and less toward environmental protection than is assumed by the Reference Case.
- *The Environmental Policy state* assumes that future environmental and economic policies are oriented less toward economic growth and more toward environmental protection than is assumed by the Reference Case.
- *The RPM/DSM Case state* assumes an even more aggressive pro-environmental policy than is assumed by the Environmental Policy state.

Table 11 summarizes the assumptions underlying each of the four states.

[47] Pace Study, p. 28, Exhibit 23.

Table 11
Pace Study Assumptions Driving Four States of the World[48]

Assumption Category	State of the World			
	Reference Case	**Gas/Coal Future**	**Environmental Policy**	**RPS/DSM**
GDP Growth	Moderate recession; recovery by 2010	Longer deeper recession, but stronger recovery	Quick recovery from current recession	Relatively short recession; strong recovery by 2010
Carbon Control	Widespread carbon control measures	Lax CO_2 requirements; economic growth policies trump environmental protection	Strict CO_2 cap-and-trade policy; no new conventional coal plants; closure of many existing coal plants.	Widespread CO_2 control measures
CO_2 Tax Policy	CO_2 sequestration tax credit of $10/ton			
NOx Regulations	NOx market regulations similar to CAIR			
Renewable Portfolio Standards	Federal RPS: 17% by 2020. Rapid development of zero-emission resources	Lower RPS		Aggressive Federal/State RPS
Energy Efficiency/Demand Side Management	Moderate deployment EE/DSM			Aggressive federal/state DSM reduces load
Natural Gas Demand	North America is largely self-sufficient natural gas supply	Gas-fired capacity dominates as the fuel of choice, nationwide increasing gas demand		

Pace's analysis thus focuses on: a) variations in the main economic and public policy drivers that might impact market prices for power and capacity; b) fuel prices (i.e., natural gas, coal and oil prices); c) load growth; and d) various revenue sources (e.g., NOx allowance prices). Pace's analysis of the four states shows that rate impacts over the 30-year projected life of TEC do not vary significantly across the states. In other words, Pace has focused on variables that generally have little impact on Illinois retail rates. The exceptions are the energy and capacity market prices applied to sales in the PJM market.

Table 12 summarizes the values that Pace has given to key drivers of the four states of the world.

[48] Pace Study, pp. 11-13.

Table 12
Summary of Key Electricity Market Drivers Across States of the World[49]

Market Driver	State of the World			
	Reference Case	Gas/Coal Future	Environmental Policy	RPS/DSM
Gas Price in 2030 (2010$/MMBtu)	11.95	16.77	9.90	6.03
Annual MWh Demand Growth Rate (2015-2030)	0.20%	0.70%	0.30%	-0.30%
CO_2 Price in 2030 (2010$/ton)	59	32	80	59

Rate Impact Estimates

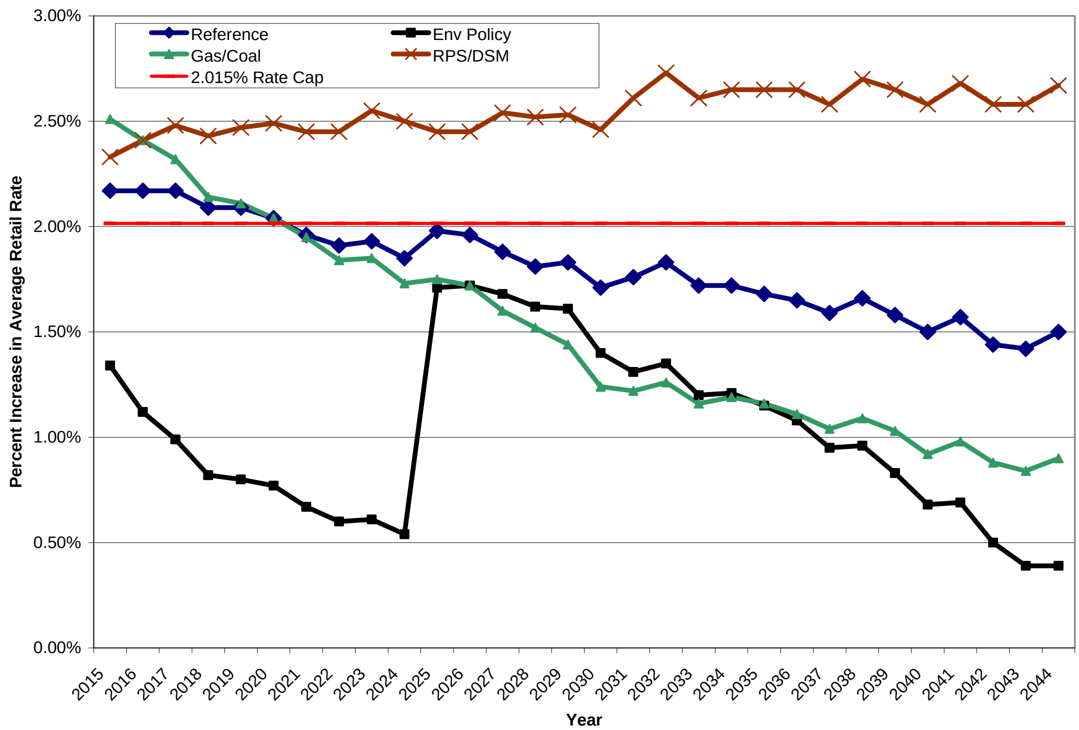
Figure 1 shows Pace's estimated percentage increases in average retail rates under each of the four states of the world relative to what retail rates would have been in the absence of the TEC project. From Figure 1, it would appear that the rate impacts under the Reference, Gas/Coal and RPS/DSM states will violate the 2.015% rate impact cap in the first six years of TEC's operations (i.e., from 2015 to 2020) unless payments to the TEC project owners are reduced below cost-of-service levels or, as the CCPSL requires, the ARES pick up the excess costs and pass those costs on to the non-eligible retail customers (i.e., hospitals, schools, government agencies, businesses, and manufacturers). Beyond 2020, the percentage rate impacts under the Reference and Gas/Coal states fall below the cap, while the RPS/DSM state remains above the cap for the entire 30-year period. The Environmental Policy state falls below the cap for the entire 30-year forecast period.[50]

The retail rate impacts on "eligible" customers in Illinois will be significant, even when the rate impact is held to only 2.015% relative to 2009 levels. The average annual cost of TEC to residential and small commercial customers in Illinois will be about $152 million (nominal), not a trivial sum of money. In other words, to support the TEC facility's reducing carbon output by 1.9 million tons per year, residential and small commercial customers will be paying $80 per ton of CO_2 sequestered, which is significantly higher than the likely cost of carbon reduction that is available and will be available through other means.[51] For the sake of spending inefficiently large amounts of money on CO_2 reduction, Illinois consumers will have $152 million per year less in discretionary income to spend on other goods and services in the state, which will be a drag on the state economy. In addition, the net incremental cost of TEC that is not borne by "eligible" customers will be borne by all other customers, including commercial

[49] Pace Study, p. 13, Exhibit 10.
[50] The significant jump in the percentage impact under the Environmental Policy scenario in 2025 is due to the assumption that the IRS Section 45Q CO_2 tax credits end in 2024.
[51] Official U.S. government projections of CO_2 allowance prices appear in Energy Information Administration, *Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009*, Report No. SR-OIAF/2009-05, August 4, 2009, http://www.eia.doe.gov/oiaf/servicerpt/hr2454/execsummary.html, Figure ES-3. In 2007 dollars per metric ton, prices for the "basic" scenario are $22 in 2015 and $65 in 2030.

and industrial customers as well as small- and medium-sized customers taking competitive supply such as condominium associations, churches, small retail businesses, and small office buildings. According to our correction of the error in the Pace Reference Case, the average annual burden of TEC on these customers under is about $140 million.

Figure 1
Pace's Estimated Percentage Increases in Average Illinois Retail Rates from TEC, 2015 – 2044



The Pace Study's presentation of the overall rate impacts of the TEC is misleading for two reasons.

First, the percentage rate impact is computed by dividing the annual net cost of the TEC facility by the sum of the projected total revenue collected from all Illinois retail customers served by ComEd, Ameren, and ARES at 2009 average rates, which Pace reports as $0.11492 per kWh.[52] This spreads the net cost over sales of all MWh, which is inconsistent with what the law requires. The rate Pace uses may be reasonable for residential and small commercial customers (similar to the "eligible" retail customer designation in the CCPSL), but it is not reasonably applied to large commercial, industrial, and other customers served by Illinois utilities and ARES because such classes of customers do not fall under the CCPSL's definition of an "eligible" retail customer. Consequently, when the rate impact of the TEC

[52] Pace Study, Reference Case spreadsheet screen shot, p. 63.

facility for non-eligible customers is computed, the appropriate 2009 reference price is about $0.0684 per kWh, and the resulting percentage impact of the excess cost is significantly higher than 2.015%.

Second, in estimating the revenues that TEC will receive from the PJM capacity markets, Pace did not consider the institutional implications of TEC's sales to Illinois utilities and ARES that are located in the footprint of the Midwest Independent Transmission System Operator (MISO). It will be difficult or impossible for TEC to commit to sell into the PJM market the capacity that is used to support energy sales in MISO. Under the CCPSL's mandated sourcing contracts to sell to ComEd and ARES, such capacity will implicitly be committed to the MISO market. Thus, given PJM's capacity market requirements, TEC will be able to commit only a part of its capacity to the PJM capacity market.

Estimated Impacts on the Illinois Economy

The WorleyParsons Study estimates that, during the construction period, 2,470 workers will be employed on site, with an estimated 9.6 million man hours required over the four-year construction period.[53] That study also projects that, after construction, TEC will employ 155 persons full-time on site, and the purchase of Illinois coal will sustain 175 mining jobs and 75 trucking jobs (for hauling the coal).[54] The study does not estimate the dollar impact of these employment levels.

The WorleyParsons Study indicated that once the TEC facility became operational, total local (i.e., Illinois) expenditures were estimated to be $126 million per year.[55] This estimate includes the cost of coal purchased, which according to the Wood MacKenzie forecast of coal prices over the 30-year life of TEC, would average $111 million per year. Thus, not counting coal purchases, the TEC facility is expected to add $15 million per year in local expenditures.

It should be noted that the WorleyParsons Study describes the *gross* impacts of the TEC project, not the *net* impacts. For example, if a conventional power plant were built instead of TEC, that conventional power plant would also create jobs: the net job benefit of the TEC project is the difference between the job impacts without the TEC plant less the job impacts without the conventional plant. As another example, the TEC plant will have substantially higher costs than electricity from other sources; and those higher costs will be paid by Illinois consumers who will then have less to spend on other goods and services. The effect of TEC's high costs will be to destroy jobs, reduce incomes, and reduce tax receipts elsewhere in the Illinois economy.

Alternative Projections of TEC Project Impacts

To develop alterative projections of TEC rate impacts, we created a spreadsheet model that replicates the results of the Pace Study, and then we modified some of the key assumptions to see how the rate impact results change with different assumptions. This allows us to determine how uncertainties in project outcomes and future economic conditions can affect rate impacts, and to provide alternative

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53 WorleyParsons Study, p. 4.
54 *Ibid.*, p. 5.
55 *Ibid.*

estimates of rate impacts under plausible conditions that are not as favorable to the TEC facility as assumed under Pace's Reference Case scenario.

Based upon the rate impacts, we then estimate some specific impacts on the Illinois economy. The increases in retail rates, especially significant for Illinois' non-eligible customers, translate into reductions in employment and earnings, which lead to lower tax revenues for the state.

We begin by discussing alternatives to the assumptions that underlie the Pace Study. We then discuss both the plausibility of the assumptions made by Pace in its Reference Case and the plausibility of claims made in the KBMD Study about potential revenue offsets that do not appear to be considered in the Pace analysis. Finally, we quantify rate impacts for assumptions that we believe are plausible alternatives to those that appear the Pace Reference Case. While we do not claim that our rate impact estimates are *better* than those presented by Pace, we do claim that there is a significant possibility that the rate impacts will be worse than those found by Pace and that the adverse impacts on Illinois electricity consumers and on the Illinois economy may be worse than implied by the Pace Study. Based upon our estimated rate impacts, we infer impacts for the overall state economy.

Alternative Assumptions

The alternative assumptions that we make in conducting our analysis of the rate impacts of the TEC facility center on two issues: the fundamental cost drivers of the TEC facility and the appropriate 2009 benchmark prices for eligible and non-eligible customers.

Regarding the fundamental cost drivers, we note Pace's rate impact results do not vary widely across its four states of the world. The reason that Pace did not find much variation among states is that it did not analyze the rate impacts of changes in the fundamental drivers of the TEC costs. These fundamental drivers are core plant capital costs, interest rates, construction costs, fuel costs, and revenue offsets. Pace did not consider higher plant costs in any of the scenarios it examined. Although we use Pace's assumptions and scenarios as the starting point for our analysis, we make alternative assumptions about the values of these fundamental cost drivers.

Regarding the 2009 benchmark prices, we note that when Pace computed the percentage rate impacts, it incorrectly applied the 2009 rate for residential and small commercial customers to all load served by the utilities and ARES. This had the effect of significantly understating the rate impact on non-eligible customers served by ARES. Therefore, we correct this error when we compute the rate impacts for eligible and non-eligible customers.

Table 13 summarizes the alternative scenarios that we consider. In brief, we allow construction costs to be 15% higher than assumed by Pace, and operating costs and Illinois coal costs to each be 10% higher.

We limit the number of years that CO_2 tax credits will be available, and consider the effects of lower capacity prices in the PJM capacity market. [56]

Table 13
Alternative Scenarios Considered
(Relative to KBMD Study/Pace Study Analysis)

	Case 1: Cost Escalation Case	Case 2: Case 1 + Revenue Offsets
Plant Costs		
Core + Balance of Plant Costs	15% higher	15% higher
Operating & Maintenance Costs	10% higher	10% higher
Illinois Coal Costs	10% higher	10% higher
Revenue Offsets		
IRS Q45 CO_2 tax credits	same as Pace	first 5 years only
Electric Capacity Prices	same as Pace	50% Lower

Section 0 discusses the bases for our alternative assumptions about plant costs. Section 0 discusses the bases for our alternative assumptions about revenue offsets. Section 0 discusses other issues that seem to be excluded from the Pace Study, and which we also exclude, but which we discuss for the sake of completeness.

Plant Cost Assumptions

If plant costs turn out to be higher than assumed by the Pace Study, the rate impacts of the TEC project will be worse than estimated by that study. Because electric generating plant construction is often subject to serious cost overruns, because electric generating plants often have unforeseen operating problems, and because fuel markets are volatile, the risks of higher-than-expected costs should be seriously considered.

Core Plant Costs

For Cases 1 and 2, we assume that Core Plant Costs and Balance of Plant Costs are 15% higher than assumed in the Pace Reference Case.[57] An increase of 15% in Core Plant Costs and Balance of Plant Costs is within reason. We note that the total annual revenue requirement of the TEC facility was estimated at approximately $540 million in the filing Tenaska made to FERC in December 2009. The KBMD Study and Pace Study filed just three months later, in March 2010, places the annual revenue requirement at about $640 million, which is an increase of 18.5%. It is quite possible that between

[56] We do not assume that the TEC capacity bid into the PJM capacity market will be less than that assumed by Pace in its Reference Case scenario, but it is likely that TEC will not succeed in bidding all of its rated capacity into that market.
[57] Since Pace did not consider higher plant costs in any of the scenarios it examined, our Case 1 assumptions also depart from the plant cost assumptions used in Pace's three other scenarios.

March 2010 and December 2015, costs could increase another 15%. Consistent with such concerns, the WorleyParsons Study indicates that its estimate of core plant capital costs could be low by 15%.[58]

Pace itself has acknowledged – even emphasized – that generation cost forecasts can change very significantly over time. In a discussion of the future of IGCC made back in 2007, Pace stated the following:

> "Project proposals as recently as 5 years ago were estimated to cost as little as $1100-$1300 per kW for engineering, procurement, and construction ('ECP') without CCS. Owners' costs (land, engineering services, insurance, facilities, fuel inventory, spare parts and others) would add about 10%-20% to the cost. But capital cost projections have risen dramatically in recent years, with recent estimates for total costs ranging from $1700 to $3550 per kW, depending on technical and fuel specifications and without carbon capture or sequestration… The increase in IGCC construction costs is no surprise, [because] U.S. prices for various construction and industrial materials have risen rapidly from 2001 to 2006… These underlying increases in input costs affect the entire industry, but appear to have a strong impact on IGCC. The unknown factor is whether these price increases are cyclical or permanent. Clearly, power plants to be built within the next few years will be markedly more expensive than expected when first proposed, and the cost of IGCC, even without CCS, is not competitive at this time with pulverized coal-based technologies…
>
> "Perhaps more significant is that the early public excitement about IGCC was often missing an important element… the additional cost of CCS. Notwithstanding questions about where the CO_2 would be pumped and whether that form of storage would be 'permanent', CCS raises the overall capital cost of a power project. Further, its associated internal demand for energy decreases the generating plant's overall fuel efficiency by significant amounts, whether the CCS is added to a coal IGCC, a pulverized coal plant, or a natural gas combined cycle plant. For example, reports that were recently released by EPRI and by the (NETL) estimate that CCS will increase the installed costs of IGCC by about 32% to 50%, depending on the technology selection and type of coal burned. Also, the fuel utilization efficiency will decline by about 15% to 30%. Non-fuel O&M costs are also higher when capture and sequestration are added. In short, capture and sequestration inflate both the fixed costs and the short-run marginal cost."[59]

This discussion by Pace illustrates how tenuous the estimates of capital and operating costs can be for technology such as IGCC with CCS, particularly when such technology does not have a track record. The lesson is to be cautious in formulating projections of the costs of IGCC with CCS, and to allow significant margins for cost escalation in both capital and O&M costs.

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[58] WorleyParsons Study, p. 25.
[59] Pace Global Energy Services, *IGCC Outlook, Second Quarter 2007*, pp. 2-3.

Operating and Maintenance Costs

For Cases 1 and 2, we assume that operating and maintenance (O&M) costs could be 10% higher than assumed in the Pace Reference Case due to the possibility of higher rates of escalation in various cost categories, such as labor and materials. In the Pace Study, the escalation rate for variable O&M costs was assumed to equal the inflation rate of 2% per annum. No sensitivity analysis was conducted with regard to O&M costs.

In its Annual Energy Outlook 2009, the Energy Information Administration projected that, for IGCC with CCS, variable O&M costs would be $4.54 per MWh in 2008 dollars, which is $5.01 per MWh in 2015 dollars assuming an annual inflation rate of 2%. The Pace Study, by contrast, starts its variable O&M cost series at $3.06 per MWh in 2015 (in 2015 dollars). Consequently, EIA has projected variable O&M costs to be 64% higher than assumed by the Pace Study, leaving considerable room to examine the sensitivity of rate impacts to differences in the variable O&M costs of the TEC plant. Our 10% increase in variable O&M is therefore conservative.

Fuel Costs

For Cases 1 and 2, we assume that Illinois coal costs are 10% higher than assumed in the Pace Reference Case. This contrasts with Pace's procedure, which used in all of its states of the world a single 30-year coal price series projection developed by Wood MacKenzie.

The price of Illinois coal is uncertain for several reasons. First, as the history of the past few decades demonstrates, fuel prices, including coal prices, are volatile. Second, Illinois coal prices can be subject to their own uncertainties. The CCPSL partially decouples Illinois coal from the larger national coal market: because CCPSL mandates that TEC must purchase Illinois coal, there is a possibility that TEC, as a captive coal customer, will be subject to price-gouging by Illinois coal producers. Third, there are uncertainties in the coal delivery costs that TEC will face. According to the KBMD Study, "Illinois bituminous coal will be delivered to the Facility by truck" although the Facility's site layout will allow space for the receipt of coal by rail "in the event that competitive conditions make it advantageous to deliver coal by rail."[60] Coal delivery costs are thus subject to uncertainties in trucking and rail shipping rates.

Revenue Offset Assumptions

Pace's rate impact estimates are reduced by its assumptions that the TEC facility will be able to obtain certain credits and revenues. If those credits and revenues are smaller than assumed, then the rate impacts will be higher than those found by the Pace Study.

IRS Q45 CO_2 Tax Credits

The Pace Study includes IRS Section 45Q CO_2 tax credits as an offset to emissions costs in the rate impact analysis. From society's perspective, this is not a benefit at all: it is merely a transfer of income from federal taxpayers to Illinois electricity customers; and Illinois taxpayers pay a part of that bill. But Pace is correct in recognizing that Illinois electricity customers will benefit from this tax subsidy (at the expense of other states' taxpayers).

[60] KBMD Study, p. 17-18.

As Pace also recognizes, however, the credits are capped at 75 million tons and could be exhausted before the end of ten years. Thus, there is some doubt about the total value of the Section 45Q credits assumed as offsets to emissions costs in the Pace analysis. The development of several integrated gasification combined cycle generation facilities around the country that will include CCS technology suggests that a plausible scenario could have these credits exhausted within five years, rather than the full ten assumed by Pace. This is the scenario that we consider in our Case 2.

Electric Capacity Prices

There are four reasons to doubt that TEC will be able to earn revenues in the PJM capacity market at the level projected by the KBMD and Pace Studies.

First, TEC must comply with PJM rules that will make the quantity of capacity salable in the PJM market substantially smaller than the net physical capacity of TEC. These rules impose specific obligations on generators offering capacity into the PJM capacity market. The obligations include: 1) offering the energy of the unit into the Day-Ahead Market; 2) permitting PJM to recall the energy from the unit under emergency procedures; 3) providing outage data to PJM; 4) providing energy during the defined high-demand hours each year; and 5) assuring that the energy output from the resource is deliverable to PJM load. Because the CCPSL requires the Illinois utilities and ARES to enter 30-year Sourcing Agreements with TEC, and because TEC must therefore sell a significant part of its energy to utilities and ARES that are serving loads within the Midwest ISO market (e.g., Ameren and ARES supplying in the Ameren service territories), the TEC cannot offer its entire net capacity into the PJM capacity market. Selling capacity into the PJM market would require TEC to develop complex arrangements to deal with the inevitability that its capacity will sometimes be called by PJM during emergencies or high-demand hours. At the very least, TEC would have to substantially derate its capacity offered to PJM to account for its contractual commitments to non-PJM Illinois utilities and ARES.

Second, Pace's capacity price projections are far above the most recent results of the capacity market auction, for the 2012/2013 delivery year.[61] For this auction, RTO-wide prices were $16.46 per MW-day.[62] If such prices prevailed for the first ten years of the TEC's operations, capacity revenue would be roughly half what Pace has predicted even if TEC offered its entire capacity into the PJM market, which it cannot do.

Third, for the TEC facility to secure any revenues from the PJM capacity market in the first couple of years of operation (2015 and 2016), it would have to satisfy all of the resource requirements to qualify as a capacity resource prior to and be able to commit its capacity in the auction held in May 2011 for the 2014-2015 delivery year and in May 2012 for the 2015-2016 delivery year. In May 2011, assuming the TEC project was to get the green light from the Illinois legislature in late 2010, construction would have only just begun on the facility. It would be extremely risky to commit any capacity in the PJM market from the facility that early in the construction phase of the project. Likewise, 2012 will be two and a half years away from completion, if the project is on schedule. Furthermore, it would be risky to commit

[61] The PJM capacity market delivery year is defined as the period starting June 1 and ending May 31.
[62] For the auction results, see PJM Interconnection, *2012/2013 Base Residual Auction Results*, http://www.pjm.com/markets-and-operations/rpm/rpm-auction-user-info.aspx#Item06.

capacity for the 2015-2016 delivery year when the facility will only just be "warming" up in 2015. Because of these risks, Pace's capacity revenues for the earliest years of TEC's life are doubtful.

Fourth, Pace's forecast of PJM capacity prices is too high because of expected growth in demand-side participation. The recent history of PJM's capacity market indicates that demand-side provision of capacity can drastically reduce capacity prices.

Other Issues

The KBMD Study and the Pace Study identify several benefits of the TEC project that do not appear to enter Pace's estimates of rate impacts. If, in particular, revenues from SNG sales, sulfur sales, and NOx allowance credit sales were taken into consideration in the Pace analysis, the revenue offsets from these would lower the overall rate impact of TEC and the economic impact on the Non EC group would be reduced accordingly. Because these benefits are a part of the public discussion of the TEC project, a brief examination of these benefits is warranted in spite of their apparent exclusion from Pace's rate impact analysis.

SNG Sales

In considering the possibility that the TEC project may sometimes sell gas to other entities, neither the KBMD Study nor the Pace Study seems to have explored the availability of firm pipeline transportation capacity. The Panhandle Eastern Pipeline (PEPL) website[63] suggests that there is limited firm capacity available at the present time. In addition, PEPL has limited storage capability. Consequently, it is not clear how TEC will be able to get the market price for SNG in peak periods if it cannot get it to market. The utilities served by PEPL will have their peak-period supplies lined up ahead of time, so firm transportation service on behalf of TEC's SNG sales likely will be limited.

CO_2 Sales for Enhanced Oil Recovery

The $8.9 million of annual CO_2 revenues identified by the WorleyParsons Study are very speculative. The CO_2 sales would supposedly be made to Denbury Onshore, L.L.C., which has entered into a "conditional offtake agreement" that is subject to Denbury determining it is financially feasible to construct a 700-mile pipeline to transport the CO_2 captured at TEC to the Gulf Coast. This determination may depend upon whether Denbury finds other CO_2 sources in the Midwest that it could transport via this possible new pipeline. For a variety of reasons, Denbury may determine that it is not economically viable to build the pipeline infrastructure necessary to buy the CO_2 captured by TEC. In fact, both the Kentucky and Indiana legislatures have this year have failed to give Denbury the condemnation power that it needs to site its pipeline: the Indiana bill died in early March; and the Kentucky legislature adjourned its spring session without acting on its bill.

Furthermore, the potential use of CO_2 for enhanced oil recovery (EOR) is subject to at least two uncertainties. First, lower oil prices would make the use of CO_2 for EOR less viable. Second, the use of CO_2 for EOR may not meet federal rules for use of best available control technologies as specified by EPA.

[63] http://infopost.panhandleenergy.com/InfoPost/jsp/frameSet.jsp?pipe=pepl

Sulfur Sales

Sulfur is a byproduct of the gasification process. The KBMD Study mentions that it may be possible to obtain revenues from the sale of this sulfur. It seems doubtful that the TEC facility would be able to generate significant revenue flows from the sale of sulfur, however, because, as noted by the Nexant Study, "the marketing of sulfuric acid is complicated due to the highly fragmented nature of the market. Tenaska would need to retain an experienced sulfuric acid marketer to perform this task."[64] The Nexant Study also notes that the area in which TEC is located is a net exporter of sulfur, both currently and for the foreseeable future. This suggests that TEC would find itself in a competitive market if it attempts to sell the molten sulfur to local sulfuric acid producers. The speculative nature of these sulfur revenues may explain why they were apparently not considered as part of the rate impact study, and suggests that they should not be considered in any future analysis. It is possible that, instead of enjoying revenues from sulfur sales, TEC will have to pay to have sulfur removed from its site.

NOx Allowance Sales

The WorleyParsons Study identifies revenues from NOx allowance credit sales as one of the revenues that could be expected for the TEC facility. Although the Pace Study does not use the NOx allowance sales revenue stream in its rate impact analysis, it does project NOx allowance prices based on an assumption that the NOx rules in place for the first ten years of TEC operations are equivalent to what was in place prior to the introduction of the NOx Budget Trading Program under the NOx SIP call in 2003.[65,66] As Pace apparently recognizes, however, the current and future NOx allowance market has little resemblance to the earlier market. With increasing compliance and a significant downward trend in NOx emissions, NOx allowance prices are expected to continue to decline from their present levels. Projections of NOx annual allowance prices are in the neighborhood of $1000, compared to $4000 range predicted by Pace.[67] The revenue from the NOx allowance market would at best be a fraction of the $18.1 million annual figure claimed by WorleyParsons.

Commercial Operation Date

Commercial operation is supposed to begin in early 2015; but many things can go wrong between here and there. Plant construction will require coordination among numerous independent firms, which may or may not go smoothly. The delivery of major components of the plant require widening roads, reinforcing bridges, raising various utility wires, modifying barge landings, and other measures that could be delayed and thereby add months to the completion of various phases of the construction process. Responsibility for resolving problems may not always be clear, thus delaying resolution. Some of the TEC project's technologies are new and unproven, testing and synchronization may also take longer than projected.

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[64] Nextant Study, p. 29, Exhibit 10.1.7.
[65] Pace Study, p. 57, Exhibit 47.
[66] The very high NOx allowance prices that occurred in the 2003 to 2004 period were attributable (among other factors) to market participants adjusting to meet new, tougher requirements and to new fundamentals affecting the expected marginal costs of abatement. The temporarily higher prices reflected market uncertainties as firms evaluated information on control installations, energy demand, and other factors that would affect compliance decisions and overall cost of control under the NOx Budget Trading Program.
[67] ICAP Energy, *Environmental Markets Brief*, Volume 1, Issue 3, March 2009.

Estimated Impacts on Illinois Electricity Rates

In contrast to Pace's approach, we present rate impact estimates that distinguish between "eligible" retail customers (ECs) (i.e., residential and small commercial customers with demand of 100 kW or less) that are served by the utilities and non-eligible customers (Non ECs) (i.e., all other customers, including commercial customers, industrial customers, churches, and condominium associations) that are mostly served by ARES. This distinction is important because the annual incremental cost of the TEC facility must be allocated between these two groups of customers (and their respective suppliers) in such a way as to limit the increase in costs to the EC group to 2.015%, while there is no limit to the increase in cost to the Non EC group served by the ARES. It is also important because the initial retail rates for the EC group and the Non EC group differ significantly, with the rates for the latter being sharply lower. Pace makes no such distinctions in its analysis.

Figure 2 shows the percentage rate impacts for Pace's Reference Case when the TEC-induced electricity cost increase is appropriately parsed between the EC and Non EC groups. The figure plots three series:

- The "Pct Change for All Customers" shows the overall rate impact of TEC on all customers relative to 2009 prices.
- The "Pct Change EC Group" series shows the rate impact on the EC group (i.e., small residential and commercial customers) given that this group has the benefit of a 2.015% cap on the rate impact.
- The "Pct Change Non EC Group" series represents the rate impact on Non EC customers, again considering that EC customers enjoy a 2.015% cap.

Figure 2 shows that, under the Pace Reference Case, the overall rate impact on all Illinois customers is about 2.75% in the early years of the TEC project's life and gradually falls to the 2% level over the course of a quarter of a century. The EC group is partly insulated from this rate impact by the 2.015% cap, which is binding until about 2040, when the overall rate impact finally falls below the cap level. The Non EC group ends up picking up the costs that the cap helps the EC group avoid. In the early years of TEC's life, the Non EC group suffers of 4% rate impact, which gradually falls to the 2% level over the next quarter century. In summary, the EC group faces an average rate impact of 2% over the first 30 years of the TEC project life, while the Non EC group faces an average 3% impact over those years.

Figure 2
Pace Reference Case – Percentage Impacts

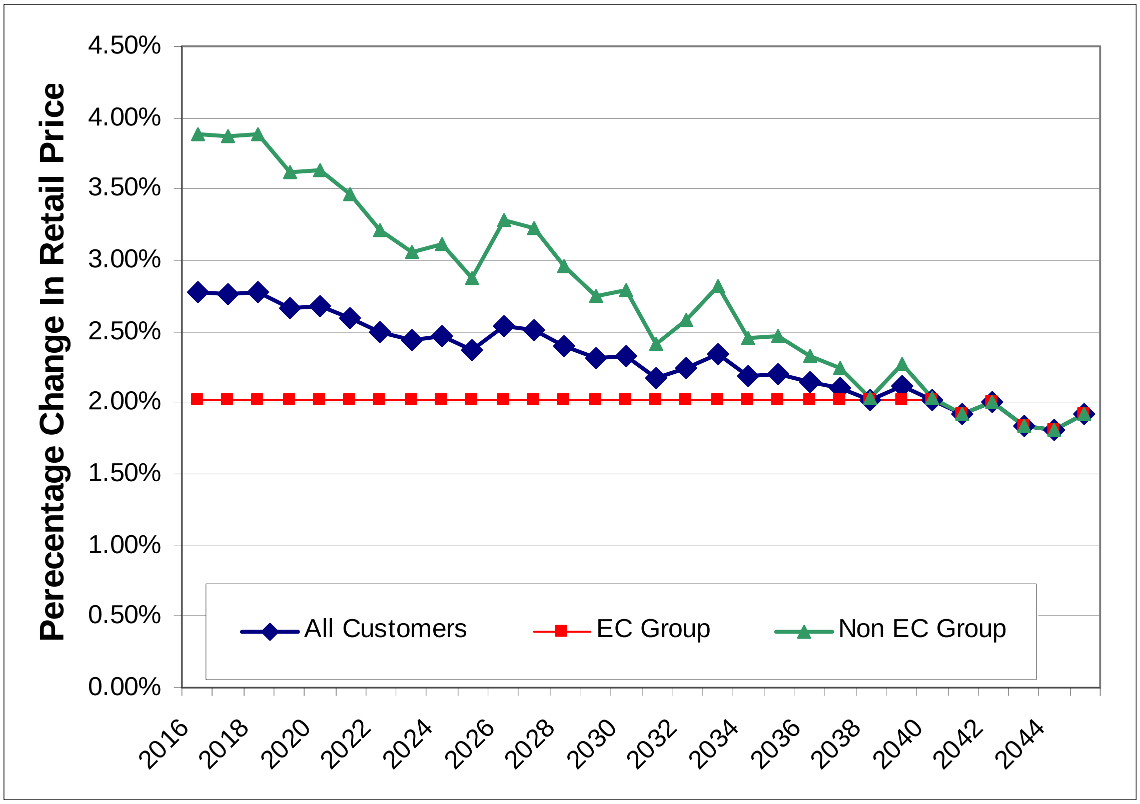
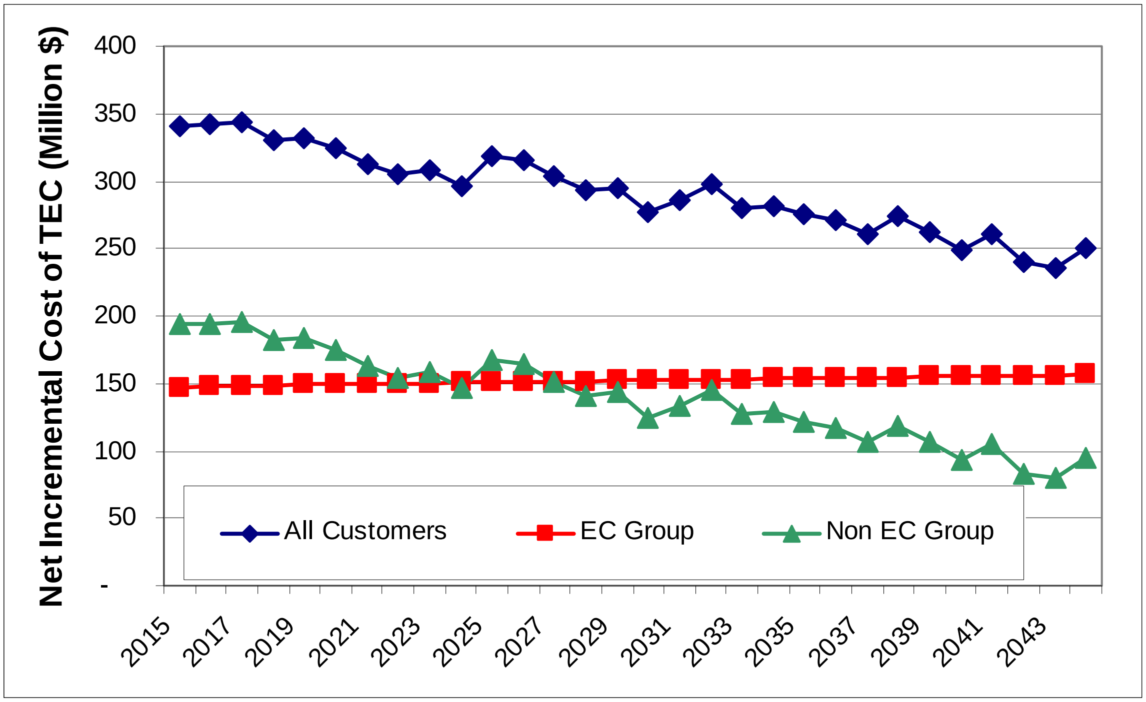


Figure 3 shows the nominal dollar impacts under the Pace Reference case for the EC and Non EC groups. The "All Customers" curve shows the Pace result that an average of about $292 million per year extra would be spent on electricity by Illinois consumers if the TEC facility comes into being, with this impact ranging between a high of $344 million per year (in 2017) and a low of $236 million per year (in 2043). Because of the 2.015% cap, the extra charges to the EC group would average $152 million per year over the 30-year period. The excess costs that are passed on to ARES and their customers, would average $140 million per year over the 30 years.

Figure 3
Pace Reference Case – Dollar Impacts



In the remainder of this section, we present the rate impacts for each of the alternative sets of assumptions defined in Table 13 of Section 0.

Cost Escalation Case

The Cost Escalation Case takes the Pace Reference Case and, as discussed in Section 4.1, assumes that various cost elements of the TEC facility are higher than have been assumed in the Pace analysis. Figure 4 shows that, for this case, the overall rate impact is significantly higher than in the Pace Reference Case, averaging 3% for the entire period. Again, the EC group is partly protected from higher prices, with the CCPSL law restricting the rate increase for EC's to 2.015% for the whole 30 years of the analysis. Consequently, the higher excess costs of the TEC project under this Cost Escalation Case go entirely to the ARES and their Non EC customers, imposing on these customers a rate impact that averages nearly 4.5% for the entire 30-year period.

Figure 4
Cost Escalation Case – Percentage Impacts

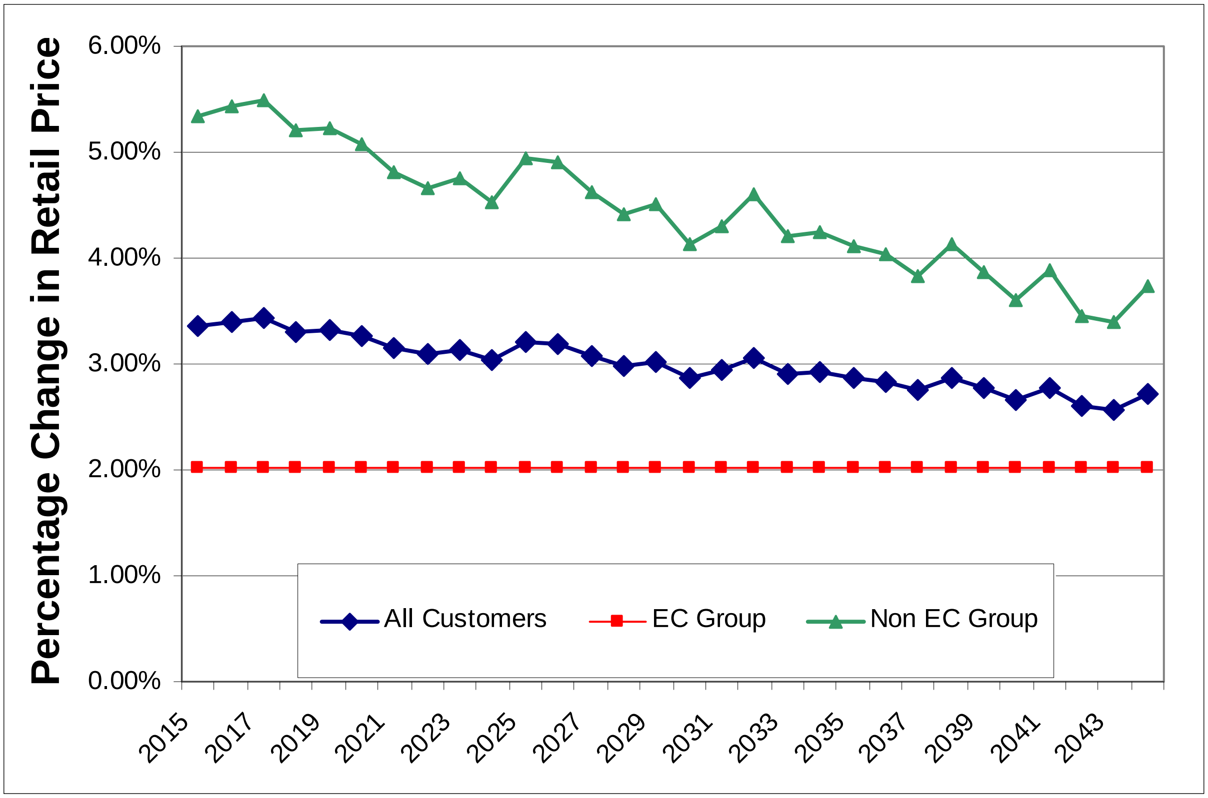
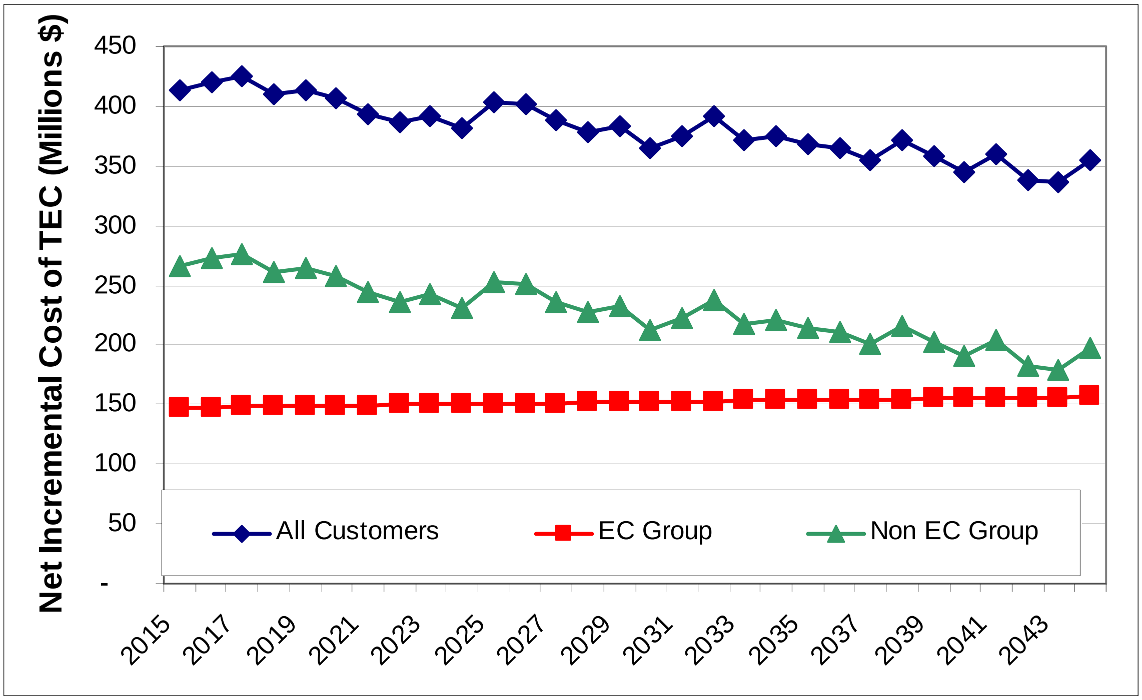


Figure 5 shows that, for the Cost Escalation Case, "All Customers" will pay an annual average of $381 million more per year with the TEC plant than they would without that plant, and that they will do so for at least thirty years. These extra payments will range between a high of $425 million (in 2017) per year and a low of $335 per year (in 2043). Of the $381 million, EC group customers will pay an average of $152 million more per year while Non EC group customers will pay an average of $229 million more per year.

Figure 5
Cost Escalation Case – Dollar Impacts



Cost Escalation Plus Revenue Offset Reduction Case

This Case 2 starts with the Cost Escalation Case and reduces or eliminates two of the revenue offsets assumed in the Pace Reference Case:

- Capacity market prices are set 50% below those projected by Pace; and
- Section Q45 CO_2 tax credits are assumed to be exhausted after five years rather than after the ten years assumed by Pace.

Figure 6 presents results for this second case. Compared to the Cost Escalation Case, the impact of the TEC facility on Illinois rates is a bit higher. The "Pct Change for All Customers" series averages about 3% for the entire 30-year period, the EC group faces a price impact that is at the 2.015% cap for the entire period, and the Non EC group experiences rate impacts averaging about 4.75% over the 30 years, relative to 2009 benchmark rates.

Figure 6
Cost Escalation Plus Revenue Offset Adjustment Case – Percentage Impacts

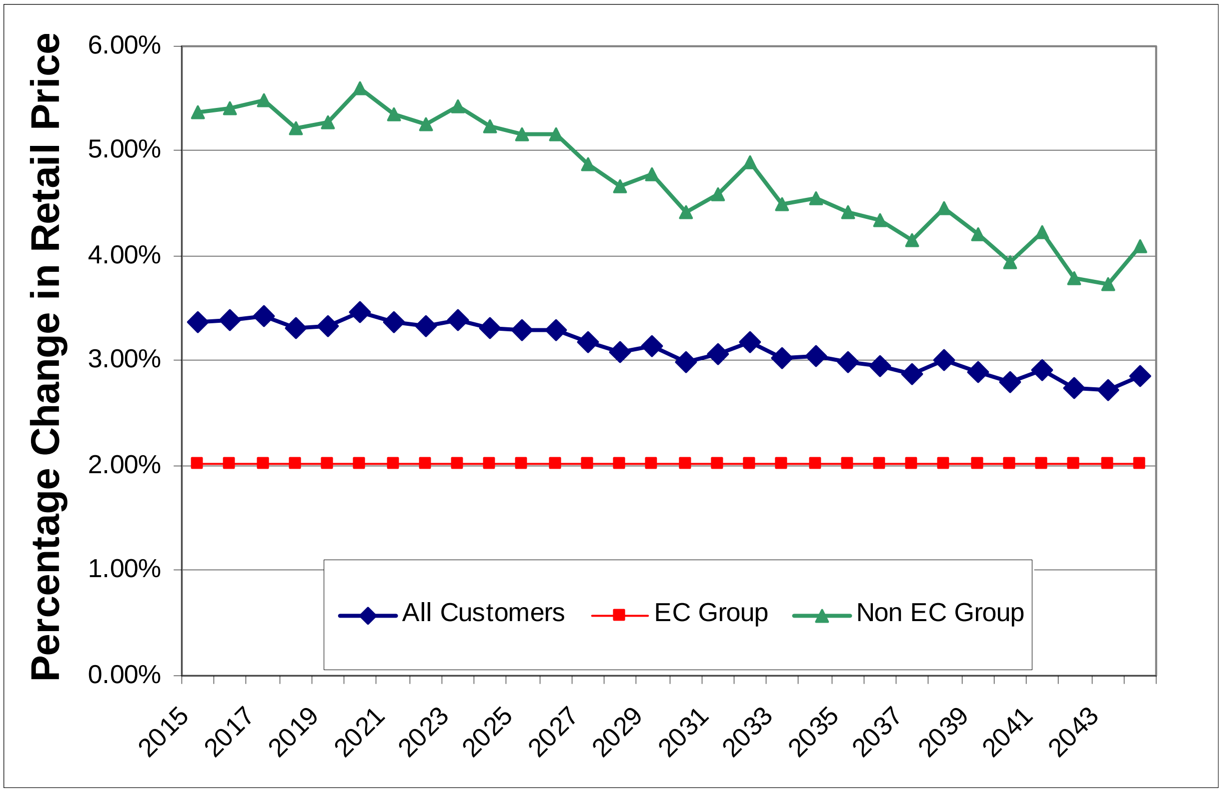
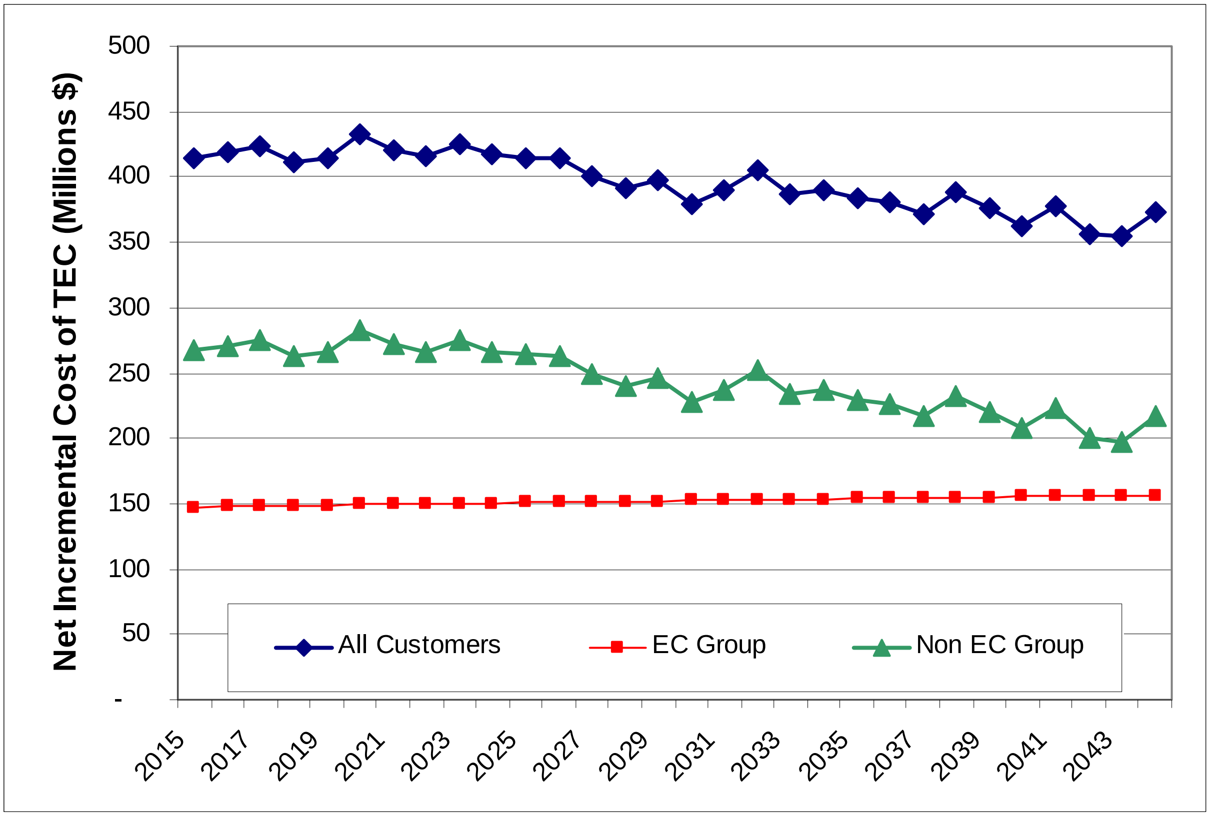


Figure 7 shows that, under this Case 2, the extra costs of the TEC project amount to $396 million per year for All Customers, with the EC group bearing its capped share of $152 million, and the Non EC group absorbing the excess of $244 million per year. The impact in the first ten years of TEC's operations will be the most devastating, with all customers paying extra costs averaging $420 million per year and the ARES' customers bearing an average of $271 million more in electricity costs.

Figure 7
Cost Escalation Plus Revenue Offset Adjustment Case – Dollar Impacts



No Sequestration Case

There is one additional scenario that warrants mention because it would significantly affect the TEC project's economics and would significantly raise the electricity costs of customers in the Non EC group. As acknowledged by the WorleyParsons Study, it is possible that TEC may not be able to store its captured CO_2 through either delivery to Denbury or through geological storage in its own storage field. The WorleyParsons Study notes that, in such an event:

> "[TEC] would earn no CO_2 sales revenue and would not receive any production tax credits, and would also incur the cost of purchasing carbon emission allowances (if applicable) for the CO_2 that it is not able to store. However… [TEC] would not be compressing CO_2, so this cost would be saved. The projected net annual effect of these changes would be an increase in costs… of approximately $63 million per year on average for the first 10 years and $137 million per year on average over 30 years."[68]

Figure 8 and Figure 9 present the percentage rate increases and the total cost impacts of the TEC plant under a "No Sequestration Case," which is based on the Pace Study Reference Case and the incremental cost impacts as stated in the WorleyParsons Study. Figure 8 shows that, if TEC cannot sell its CO_2 to

[68] WorleyParsons Study, p. 82.

Denbury and cannot sequester it, the overall percentage rate impact relative to 2009 prices averages just above 3% for the 30-year period. The impact on ARES customers is worse, averaging 4.71% during the first 10 years of operation and 5.71% over the last 20 years of operation.

Figure 8
No Sequestration Case – Percentage Impacts

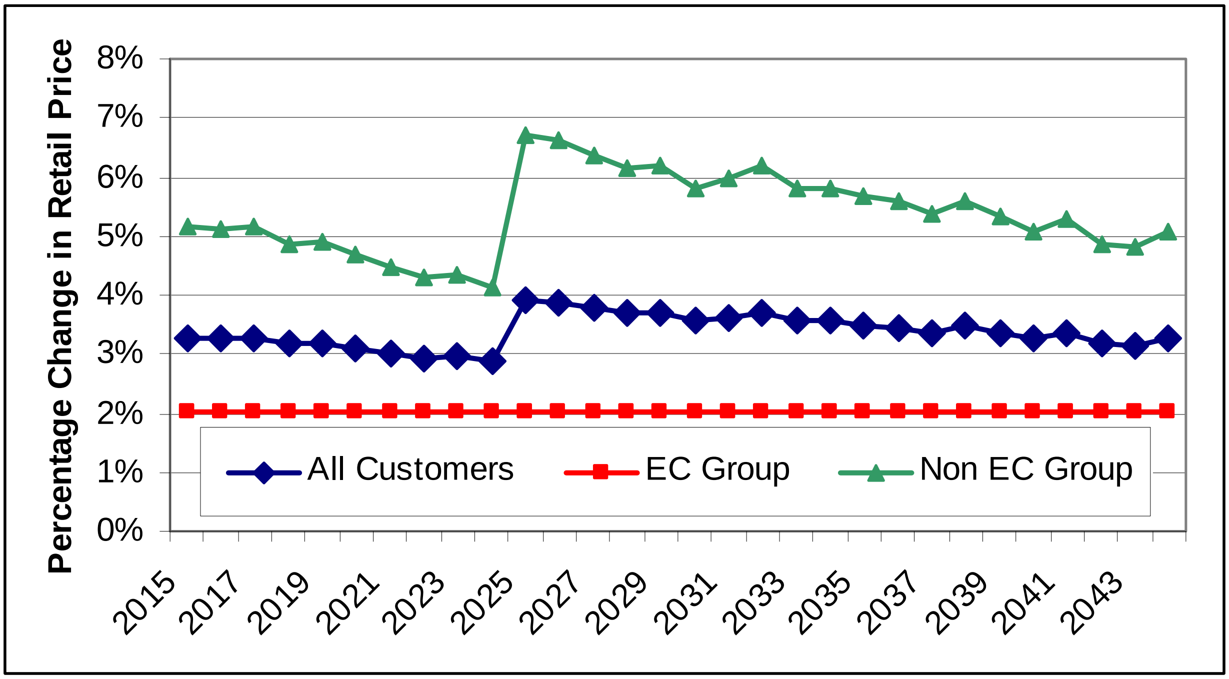
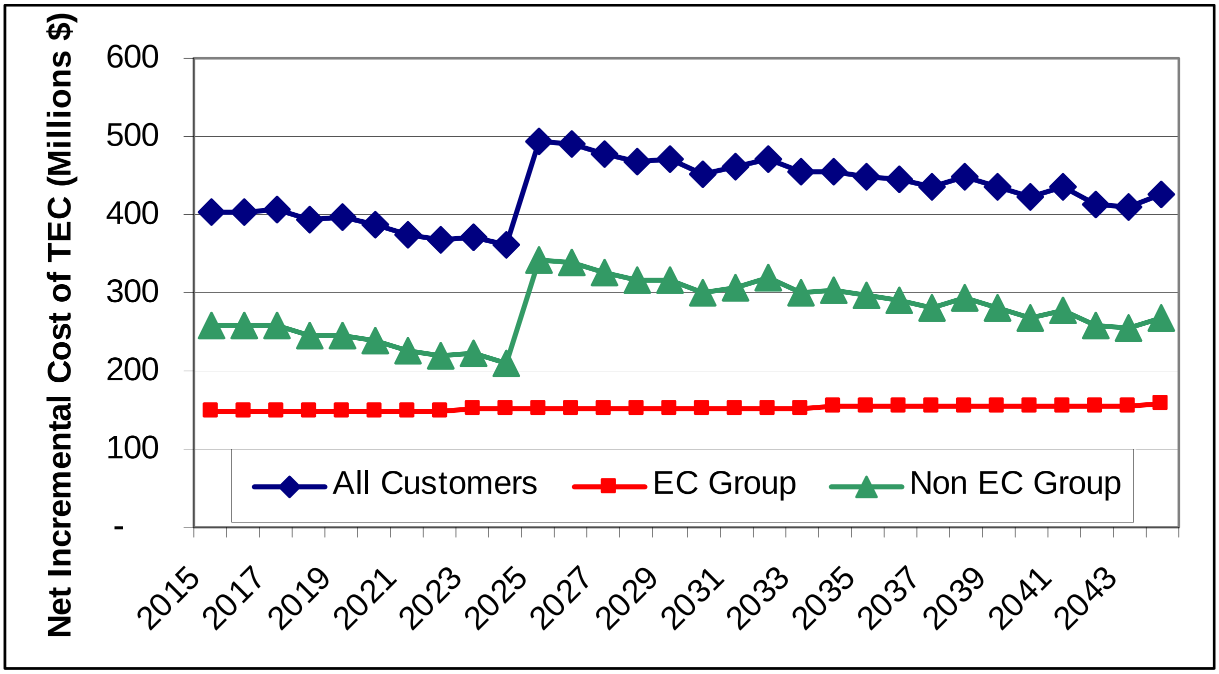


Figure 9 presents the total cost impact under this scenario. The extra payments by All Customers due to the TEC plant range from a low of $360 million per year (in 2024) to a high of $493 million per year (in 2025), with an average $429 million per year. While the EC group is limited to paying an average of $152 million per year, the Non EC group will pay an average of $277 million per year due to the TEC plant. Given that the Non EC group will pay an average of $140 million per year extra in the Pace Reference Case with sequestration, the costs of TEC's failure to sequester CO_2 would be entirely borne by the Non EC group – that is, essentially by Illinois businesses – to the tune of $137 million per year.[69]

[69] $106 = $246 - $140.

Figure 9
No Sequestration Case – Dollar Impacts



Estimated Impacts on the Illinois Economy

The electricity price increases induced by the TEC project will make Illinois a less attractive place to do business relative to other states, and will therefore reduce business investment and jobs in Illinois. Thus, although the CCPSL may appear to shield "eligible" retail electricity customers from the rate shock that could happen under the various scenarios considered, the residential and small commercial customers who comprise this EC group will nonetheless "feel the pain" indirectly in the form of job losses and/or lower earnings as the TEC project drains the Illinois economy of billions of dollars. State government itself will share in the adverse impacts through lower tax revenues and higher expenditures on social services, as well as in higher electricity bills for state government.

Reduced Demand for Electricity by Large Customers

Price increases for the Non EC group, which includes large commercial and industrial customers, can be translated into estimates of changes in business demand for electricity.[70] This can be accomplished by tying demand changes to price changes through estimated elasticities of demand for electricity.[71] The economic literature provides many estimates of price elasticities of demand for commercial and industrial customers in both the short-run (when demand response is relatively small) and the long-run

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[70] We can find no discussion in the Pace Study of the impact of higher retail electricity prices resulting from TEC on the demand for electricity by Illinois customers.

[71] The elasticity of demand for a good is defined as: a) the percentage change in demand for the good that accompanies a small percentage change in the price of the good; divided by b) the small percentage change in the price of the good.

(when demand response is relatively large). Table 14 summarizes the elasticity ranges found in the literature.

Table 14
Estimates of Short-Run and Long-Run Price Elasticity of Demand for Electricity

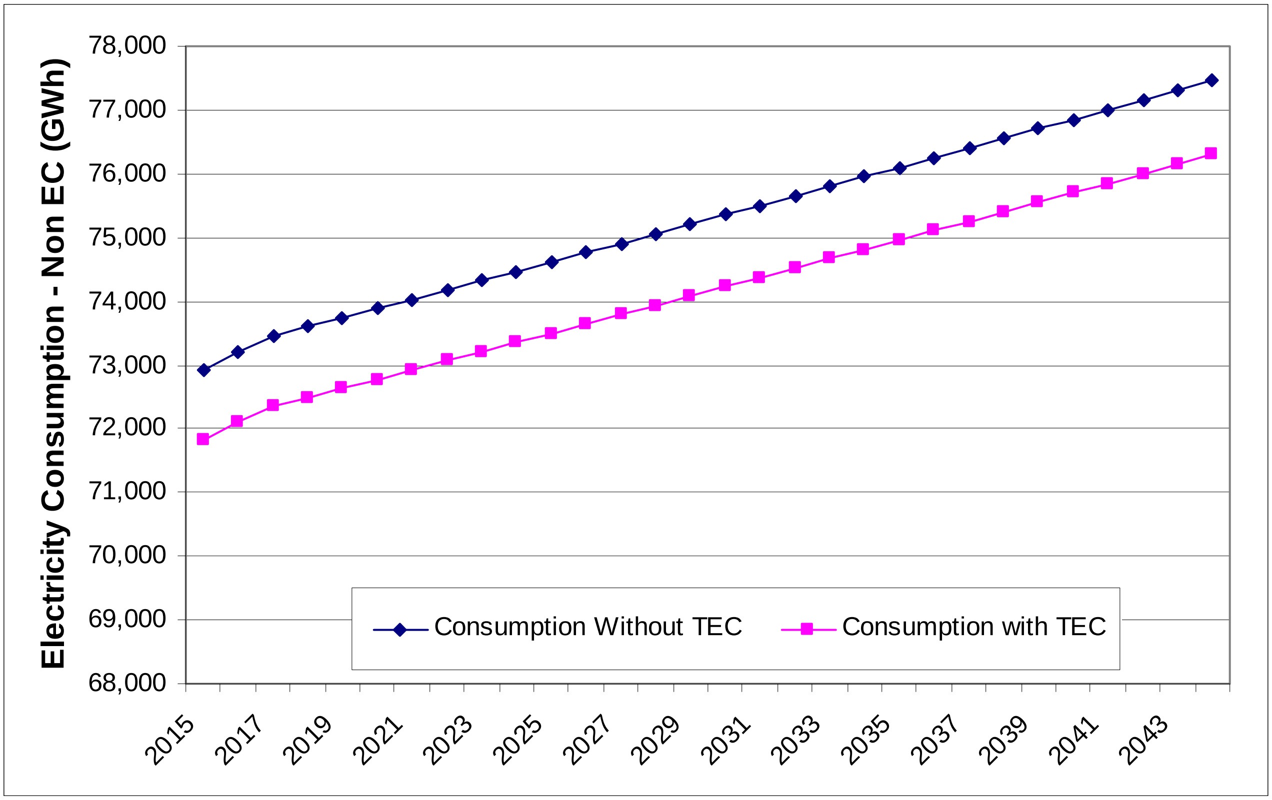
Elasticity Type	Residential	Commercial	Industrial
Short-run	-0.35[72] -0.45 to -1.89[73]		
Long-run	-0.85[74] -0.75 to -0.90[76]	-1.0 to -1.6[75]	-0.51 to -1.82 -0.80 to -1.76[77] -0.85[78] -0.79[79]

To compute the impacts on electricity demand by the Non EC group, we assume that the large commercial and industrial long-run own price elasticities equal -0.5. This elasticity figure is at the (absolute) low end of the commercial and industrial elasticities shown in Table 14 and therefore provides a conservative (low) estimate of the negative impacts of higher retail electricity prices on the Illinois economy.

Figure 10 shows how Illinois' GWh per year of electricity demand for the Non EC group will fall if TEC induces rate increases averaging 3% per year relative to the 2009 benchmark price. With a price elasticity of -0.5, the electricity consumption (GWh) will fall by about 1.5%.[80]

[72] J.A. Espey and M. Espey, "Turning on the Lights: A Meta-Analysis of Residential Electricity Demand Elasticities," *Journal of Agricultural and Applied Economics*, 36(1): 65-81, April 2004.
[73] D.R. Bohi, *Analyzing Demand Behavior; A Study of Energy Elasticities*, The Johns Hopkins University Press, 1981.
[74] Espey and Espey, *op cit*.
[75] Bohi, *op cit*.
[76] C.A. Dahl, "A Survey of Oil Demand Elasticities for Developing Countries," *OPEC Review*, XVII(4): 399-419, Winter 1993.
[77] J. Roy, A.H. Sanstad, J.A. Santhaye, and R. Khaddaria, *Substitution and price elasticity estimates using inter-country pooled data in a translog cost model*, Lawrence Berkeley National Laboratory, June 1, 2006.
[78] R.S. Pindyck, "Interfuel Substitution and the Industrial Demand for Energy: An International Comparison," *Review of Economics and Statistics*, pp. 169–179, May 1979.
[79] G.M. Griffin and P.R. Gregory, "An Intercountry Translog Model of Energy Substitution Responses," *American Economic Review*, pp. 845–857, December 1976.
[80] The percentage increase in price each year would be less than shown in Figure 2 if the revenue requirement without TEC were permitted to increase with the rate of inflation (i.e., retail rates were permitted to increase at the rate of inflation). In that case, the reduction in electricity consumption by the Non EC group will be slightly less than shown in Figure 10.

Figure 10
Impacts of TEC-Induced Price Increases on Illinois Non EC Electricity Demand



Reduced Jobs and Earnings

If the TEC permanently increases Illinois electricity prices by an average of 3% relative to the 2009 prices, we estimate the number of Illinois jobs lost and earnings reduced in the commercial and industrial sectors of the state economy relative to 2009 employment levels and 2009 average weekly earnings.[81] Table 15 presents the results of our computations.

[81] Illinois Department of Employment Security, Current Employment Statistics Program, Economic Information and Analysis, - I_NSA_CES_Illinois_MSAs_Hours_Earnings_2003_to_Current.xls and I_NSA_CES_Illinois_MSAs_Jobs_1990_to_Current.xls, obtained at http://lmi.ides.state.il.us/cesfiles/cesmenu.htm.

Table 15
Estimate of Job Loss and Earnings Reductions Due to Sustained TEC Retail Rate Impacts

	2009 Employment	Reduction in Jobs	Reduction in Earnings
Industrial Sector			
Construction	219,100	534	$ 34,435,739
Manufacturing	577,600	1,408	$ 49,351,156
Durable Goods	339,400	827	$ 30,043,323
Non-Durable Goods	238,100	580	$ 19,263,166
Sub-Total: Industrial Sector	1,374,200	3,350	$ 133,093,385
Commercial Sector			
Wholesale Trade	291,000	709	$ 26,051,223
Retail Trade	597,000	1,455	$ 27,871,124
Transportation, Warehousing, and Utilities	252,500	615	$ 11,788,038
Information	106,400	259	$ 10,027,327
Financial Activities	371,800	906	$ 35,147,959
Professional and Business Services	784,900	1,913	$ 74,200,197
Educational and Health Services	817,100	1,992	$ 60,164,216
Leisure and Hospitality	516,200	1,258	$ 24,412,517
Other Services	257,400	627	$ 17,092,582
Government	857,400	2,090	$ 40,027,976
Sub-Total: Commercial Sector	4,851,700	11,826	$ 326,783,158
Total	6,225,900	15,176	$ 459,876,542

The projected job losses are derived in the following manner. Based upon the information in Table 14, we conservatively assume an own price elasticity of demand for electricity of -0.5 for both the industrial and commercial sector categories. The percentage change in labor employed in each sector is computed according to the following formula:[82]

$$\%\Delta L_i \quad = \quad \eta_i^{LY} \times \eta_i^{YE} \times \eta_i^{E} \times \%\Delta P_E$$

where $\%\Delta L_i$ is the percentage change in Labor employed in the i[th] sector, η_i^{LY} is the elasticity of demand for labor in sector i with respect to the output of that sector, η_i^{YE} is the elasticity of the output of sector i with respect to the electricity consumption of that sector, η_i^{E} is the own-price elasticity of demand for

[82] This expression for the percentage change in labor demand resulting from a percentage change in the price of electricity can be derived directly from the specification of a general production function involving labor and electricity as inputs. Refer, for example, to H. Varian, *Microeconomic Analysis*, third edition, W.W. Norton & Co., 1992. This formula performs the same type of computation as would be found in an input-output analysis.

electricity by sector i, and $\%\Delta P_E$ is the percentage change in the retail price of delivered electricity. The empirical literature has generally found the first two elasticities to have values less than one.[83] If we assume that all sectors have an output elasticity of labor equal to 0.65, an output elasticity of electricity equal to 0.25, and (based on Table 14) an own-price elasticity of demand for electricity equal to -0.5, and that there is a 3% increase in the retail price of delivered electricity to Non EC customers, the percentage change in employment will be a negative 0.24% in all sectors.[84] The number of annual jobs lost is computed by multiplying the percentage reduction in jobs by the number of persons employed in each industrial or commercial sector in 2009.

These job loss estimates represent the difference between what Illinois jobs would be without the TEC plant and what they would be with the Illinois plant, on average, over a 30-year period. The job losses will occur because businesses will take electricity costs into account when contemplating whether to locate operations in Illinois or someplace else, or whether to schedule production or service at Illinois locations or at their locations elsewhere. Some of the job loss may be existing jobs, but most of the job loss will likely be jobs that will be created elsewhere rather than in Illinois. In other words, the job losses will not occur on the day that the TEC plant begins operation, but will instead occur over time as businesses weigh the long-term higher costs of Illinois electricity in making their locational decisions, implicitly recognizing that the higher electricity costs imposed by TEC on Illinois will persist for decades.

Table 15 indicates that, over three decades, an average of about 3,400 jobs will be lost in the industrial sector, with a reduction in annual earnings of approximately $113 million (2009 dollars). For the commercial sector, the job loss is projected to be about 11,800, with lost annual earnings of about $327 million (2009 dollars). The total potential job loss is projected to be about 15,200, with a reduction in earnings of about $460 million (2009 dollars).

For the cases in which TEC is unable to sequester its CO_2 emissions, the job and economic impacts are even worse. In the Pace Reference Case with no sequestration, the percentage rate increase for the Non EC group is predicted to be an average of about 5.4% over the 30-year period, which would result in a loss of around 27,000 jobs. For the Cost Escalation Case with no sequestration, the percentage increase in electricity rates for the Non EC group is estimated to be 7%, which would lead to about 35,000 in job losses.

[83] See for example, R.H.Rasche and J.A Tatom, *Energy Resources and GNP*, Federal Reserve Bank of St. Louis, 1977.

[84] -0.24% approximates 0.65 times 0.25 times -0.5 times 3%. The 0.24% figure may be biased upward if the first two elasticities actually have values less than those we assume. On the other hand, the 0.24% figure may be biased downward because: a) Table 14 indicates that the own-price elasticity of demand for electricity is likely to have an absolute value greater than 0.5; b) the various figures in Section 4 show that the Non EC group is likely to see price increases larger than 3%; and c) the job impacts are based upon 2009 employment levels, which (because of population growth and economic growth) are likely to be significantly lower than those seen over the next thirty years. On balance, the combination of these considerations implies that the 0.24% figure is more likely to be low rather than high, so that the estimated job losses are more likely to be low rather than high.

Reduced State Income Tax Revenues

The Illinois state personal income tax rate is 3% of federal adjusted gross income (AGI). Assuming that AGI is 75% of gross earnings, based on the estimated reduction in earnings relative to the 2009 level of employment and earnings presented in Table 15, the estimated reduction in personal income tax revenues at the 2009 level are estimated to be about $10.35 million.[85]

Increased Cost of Electricity for State Government

The State of Illinois spends approximately $82 million per year on electricity. A sustained increase in electricity prices of 3% per year relative to 2009 prices, will mean that the State will pay an additional $2.5 million per year for its electricity.

Conclusions and Recommendations

The Pace Study is subject to all of the uncertainties that inevitably complicate forecasts of future economic outcomes. In defining its future states of the world, it has considered only some of the uncertainties that impact Illinois retail rates, and has ignored other uncertainties that have large impacts on Illinois rates. These latter uncertainties include those in core plant capital costs, interest rates, construction costs, fuel costs, and revenue offsets. When the latter uncertainties are considered, the range of plausible rate impacts can be seen to include outcomes that are more adverse than are found by Pace. Furthermore, separate consideration of rate impacts on eligible and non-eligible customers indicates that while the eligible customers would be protected by the 2.015% rate cap, the customers served by ARES will bear a significantly larger electricity rate impact relative to 2009 rates – ranging between 3% and 4.75%, depending upon scenario – for the entire 30-year period.

Contrary to the implicit claims of the WorleyParsons Study, what matters to the Illinois economy, and the people of Illinois, are the *net* impacts of the TEC project, not the *gross* impacts. The fact that the TEC project will create a certain number of jobs is important; but it is also important that some of those jobs will be created elsewhere if TEC is not built, and that the high costs of the TEC project will suck dollars and jobs from other sectors of the Illinois economy. When the adverse economic impacts of TEC project are considered, it turns out the TEC project will result in a net job and income loss for Illinois. Yes, Illinois' coal industry benefits, and it is reasonable to hope that the TEC project can advance a CO_2-reducing technology; but the TEC project is being subsidized, by federal loan guarantees and by the CCPSL's cost guarantees, precisely because the TEC project requires government mandates to obtain the resources that it needs. Those resources will be given to the TEC project at a net cost to the people of Illinois.

[85] $10.35 million equals $459.88 million times 3% times 75%.

About Christensen Associates Energy Consulting LLC

CA Energy Consulting is a wholly owned subsidiary of Laurits R. Christensen Associates, Inc., which has been serving the electric power industry and other infrastructure industries since 1976. CA Energy Consulting's focus on energy markets covers a broad range of technical and policy issues concerning wholesale and retail electricity market restructuring, market design, power supply, franchise license agreements, cost of capital, determination of revenue requirements, asset evaluation, transmission pricing, market power, and retail rate design. Our clients include electric utilities, regulatory agencies, power developers and generation companies, public cooperatives, transmission companies, municipalities, distribution companies, consumer advocates, and industry associations. We have represented clients in numerous state and federal regulatory proceedings focused on revenue requirements, cost allocation, transmission plans, wholesale power supply and contracts, transmission service agreements, market power, market design, RTO participation, cost of capital, cost and performance benchmarking, retail service design, demand response, cost-of-service allocation, and marginal cost estimation.

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