

The Economic Impact of Building and Operating Three 650 MW Coal-Based Power Plants in Finney County Kansas



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Executive Summary

In 1957, Sunflower Electric Power Corporation was formed to build and operate generation and transmission services facilities to serve their customers. The 360 MW pulverized-coal-fired generating unit at Holcomb Station is Sunflower's base-load plant.

Holcomb Station is due for imminent expansion. As a result of an agreement reached with Tri-State Generation and Transmission Association, Inc. of Westminster, Colorado, the construction of the first of two 650-megawatt (MW) coal-fired power plants will begin in July 2008. A year later, construction on the second unit will begin. Another agreement, currently in negotiation, may add a third 650 MW unit, which could begin construction in 2007. Construction of the three units will cost approximately \$2.7 billion and will last until 2013. The economic impact of the construction and operation of the enlarged Holcomb Station on Finney County, especially Garden City, on western Kansas and on Kansas as a whole will be dramatic. These economic impacts are summarized in the table (Table E1) below.

An estimate of the total net benefit of the generators over their expected lifetimes in the service of users of electric energy—the present value of net benefits less opportunity costs—is over \$8 billion.

During construction, the average number of jobs available in western Kansas will grow by over 2,000 per year. Earnings will be over \$63 million per year greater, and taxes collected will increase by over \$1.7 million. Similar effects will appear in other regions of Kansas and the nation.

After construction ends and operation begins, these temporary impacts will end being replaced by permanent ongoing effects. For western Kansas, in and around Garden City, the jobs base will be enhanced by over 400 full time equivalent positions, earning over \$22 million per year. Tax collections will grow by over \$400,000 per year. For Kansas, employment will be greater by almost 500 workers, earning over \$24 million per year. Employment and earnings will be greater outside the state as well.

Sunflower currently has a sizeable economic impact on Garden City area, western Kansas, and Kansas as a whole. For example, the direct and induced impacts result in 280 jobs in western Kansas. The earnings impact is approximately \$13.3 million per year from employment, plus another \$493,000 from jobs created by operating and

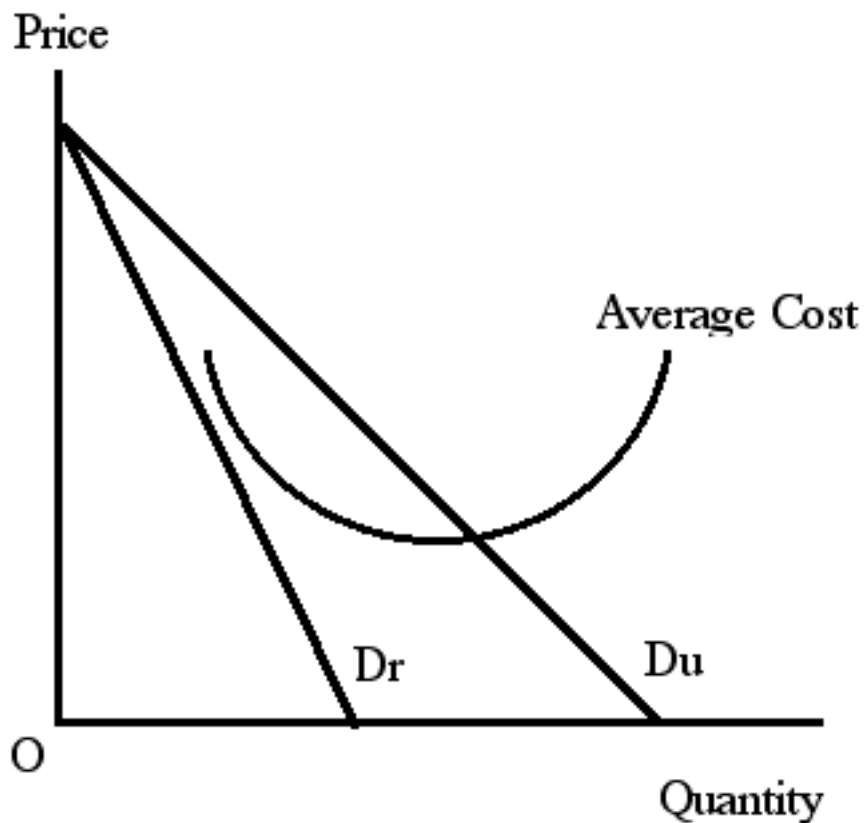
maintenance purchases in western Kansas; \$856,000 for the entire state. In 2004, Sunflower paid \$6.2 million in property taxes. The spending of jobholders and local purchases of non-exempt materials resulted in sales taxes of some \$134,000 for the western Kansas region, almost all of which occurred in Finney County.

Table E1: Total Annual Impact, HE2, TS1, and TS2

	Jobs	Earnings	Taxes
Temporary			
Western Kansas	2,233	\$63,007,706	\$1,727,789
Eastern Kansas	1,439	\$53,488,106	\$675,164
Kansas	3,669	\$116,495,812	\$12,180,348
Out-of-State	17,641	\$478,932,091	NA
Permanent			
Western Kansas	408	\$22,053,702	\$438,782
Eastern Kansas	79	\$2,027,756	\$80,804
Kansas	489	\$24,039,133	\$1,017,615
Out-of-State	417	\$11,005,065	NA

Preface

Sunflower Electric Power Corporation is an electric energy generation and transmission services corporation. It is owned by six distribution cooperatives located in western Kansas, providing them with electric energy for distribution to mostly rural customers. Sunflower owes its existence to the fact that rural regions with low customer density and large geographical areas are not profitable for private electric companies to serve. The graph below shows why.



In the graph, D_r is the demand for electricity of low density, geographically separated rural consumers. D_u is the demand for electricity of high density, compact urban consumers. D_r is small compared to D_u because there are fewer customers per mile of line in rural areas. For example, in western Kansas, distribution utilities have two to three meters for each mile of distribution line, while Kansas City Power and Light has about 100. For quantities that result in a demand price greater than average cost, profitable service can and will occur in a free-market economy. The attractive power of

profitable opportunities guarantees it.

Since no part of the demand for electricity of rural customers is above the average cost of service, profits are not possible; only losses would occur, and so private enterprises will not serve them. And historically, they did not.

While cities were enjoying the benefits of electric energy by the 1920s, the countryside languished without it. Congress began to recognize the value in having electric energy available to farmers, ranchers, and the towns that serve and depend on them for their economic survival. Electricity could replace human labor in a multitude of tasks on the farm, which would raise rural productivity and thereby increase incomes and lead to a greater standard of living; a better way of life. It would also address the large and growing inequities, the divide between rural and urban incomes, and the migration of populations from farms to cities.

The 1920s had been brutal for rural America. The decade was marked by low commodity prices, a drought so severe that whole regions were turned into deserts, mass foreclosures, bank failures, and an exodus of rural residents of Biblical proportions moving from farms to cities. The 1930s did not promise much improvement.

During the 1920s, about six hundred small-town banks per year failed. In 1929 and 1930, the number reached the thousands. In 1930, the Bank of the United States failed, and two hundred of its smaller correspondent banks failed immediately after. One of the first and most telling acts of President Roosevelt's New Deal was the bank holiday. On March 6, 1933, the day after his inauguration, Roosevelt called Congress into a special session and declared a bank holiday. Four days later, Congress passed the Emergency Banking Relief Act which provided for the reopening of the banks as soon as examiners had found them to be financially secure. In just a few months, the FDIC was created as part of the Banking Act of 1933. The era of Recovery had begun.

Recovery was further marked by the Rural Electrification Act of 1935. One of its purposes was equity; virtually no farmers had delivered electricity, while nearly everyone living in cities did. But another purpose of the Act was to slow and hopefully reverse the migration of populations from the farm to the city. This concern was voiced in President Roosevelt's first inaugural address.

The Rural Electrification Administration (REA), now the Rural Utilities Service (RUS),

an agency in the Department of Agriculture, was one of the most successful of the programs in the Recovery era. In just a few years, over 98 percent of American farms received electricity because of this program that resulted in the creation of rural electric, consumer-owned, cooperatives.

In 1938, the Brown-Atchison Electric Cooperative Association was the first REA-financed project to deliver power in Kansas. Over the years, the number of cooperatives multiplied, with the majority of the growth occurring in the 1930s until virtually all of rural Kansas was being served by REA-financed utilities.

Sunflower Electric Power Corporation is a part of that system. It is an electric generation and transmission services company. Its primary generation facility is located seven miles west and four miles south of Garden City, near Holcomb, Kansas.

Holcomb Station was built to ensure a reliable source of electric power for western Kansas. Its current generating capacity is 360 megawatts. Construction began in May 1980 and the plant began producing electric energy in the summer of 1983. The total cost of plant construction was approximately \$465 million, which in today's dollars is approximately \$1 billion.¹

Its expansion is the subject of this report.

¹ The cost of electric power capacity has declined over the years, as the productivity of generation systems has improved. For coal-based power capacity, the current cost of construction per megawatt, measured in constant dollars, is only fifty percent of the 1980 cost.

Introduction

Sunflower Electric Cooperative, Inc.² was formed in 1957 to build and operate generation and transmission facilities for service to rural and small-towns in western Kansas. The 360 MW coal-based generating unit at Holcomb Station is the baseload plant of Sunflower Electric Power Corporation, which is owned by six electric distribution cooperatives in western Kansas.³

At present, Sunflower has a sizeable economic impact on the Garden City area, western Kansas, and Kansas as a whole. For example, the direct and induced impacts result in 280 jobs in western Kansas. The earnings impact is approximately \$13.3 million dollars per year from employment, plus another \$493,000 from jobs created by operating and maintenance purchases in western Kansas; \$856,000 for the entire state. In 2004, Sunflower paid over \$6.2 million in property taxes. The spending of job holders and local purchases of non-exempt materials resulted in sales taxes of some \$134,000 for the western Kansas region, almost all of which is in Finney County.

Holcomb Station is due for imminent expansion. Due to an agreement reached with Tri-State Generation and Transmission Association, Inc., of Westminster, Colorado, the construction of the first of two 650 megawatt coal-based power plants will begin in July 2008. A year later, construction on the second unit will begin. Construction will cost approximately \$1.8 billion and will last until 2013. The economic impact of the construction on Finney County, especially Garden City, western Kansas, and Kansas as a whole, will be dramatic.

For perspective, consider that in 2003, total money income of residents of Garden City was approximately \$414 million.⁴ The cost of construction is more than four times the total money income of Garden City, and three times that of Finney County.

Construction of each generating unit is expected to take approximately 42 months

² The company is now known as Sunflower Electric Power Corporation (SEPC), subsequent to a name change in 2003.

³ Lane-Scott Electric Cooperative, Inc., Pioneer Electric Cooperative, Inc., Prairie Land Electric Cooperative, Inc., Victory Electric Cooperative Association, Inc., Western Cooperative Electric Association, Inc., and Wheatland Electric Cooperative, Inc. .

⁴ 2003 is the latest available data for total income in the city and county. For Finney County, total money income was a bit less than fifty percent greater, at \$604 million. The data are calculated by multiplying the per capita money income of \$15,200 (\$15,377) times the population of 27,216 (39,271) for Garden City and (Finney County) respectively.

from the commencement of construction activities until the commercial date of operation. The spending of construction workers on food, beverage and housing, and the contracts and purchases made locally to support construction, will have a large impact on the economy of Garden City and western Kansas from July 2008 until the summer of 2013, but the impact does not end there.

The new plants will be operated by Sunflower. It will receive compensation for its services; however an increase in staffing will be required.

After construction ends and the two new plants go on line, Sunflower's employment at Holcomb Station will be doubled. It will purchase an additional \$28 million of contract services and materials, of which \$3.8 million will be purchased in western Kansas.

The new jobs and spending will induce additional job creation and spending. Sales taxes, housing construction, and property taxes will increase as well. The net revenue earned by Sunflower from operating the generators, and the benefits resulting from the increased economies of scale, will reduce the total net operating costs of Sunflower to the benefit of the customers of the distribution utilities it serves.

It is the purpose of this report to document the expected direct and total economic impact of the construction and operation of 1,300 additional megawatts of generating capacity on Finney County, western Kansas, and the State of Kansas.

Further Expansion

Besides the 1,300 megawatt (MW) generation addition agreement between Sunflower and Tri-State, the possibility of yet another additional expansion exists. Although plans have not yet been finalized, and the counterparty cannot be publicly identified, this expansion would entail a third, 650 MW coal-based generating unit to be constructed at Holcomb Station. The generating unit would be a sub-bituminous pulverized-coal unit, as are the two 650 generators to be built in the Tri-State expansion. The economic impacts are similar, although approximately half as large. The impact of this additional expansion is presented in an appendix to this document.

Theory of Economic Impact

Construction and operation of large industrial plants have several ways of impacting regional economies.

First are payments of wages, salaries and benefits to workers employed in building and, after commercial operation begins, operating the facility. These payments are direct benefits to the workers, their families, children, and heirs. These are the direct economic impact.

Second, the spending, tax-related payments, and saving in the local communities (town, county, region, and state) of wage, salary and benefits create income, and therefore benefit merchants, service providers, government, and school jurisdictions in the workers' communities. As these merchants, service providers and governmental entities receive additional income, they, in turn, increase their purchases. To the extent these purchases remain in the local economy, further income increases occur. The total increase in aggregate income in the local economy is therefore a multiple of the initial increase. Thus, the additional income of employees of new industry engenders a multiplier process. Additional growth is known as the indirect impact.

Third, the provision of supplies and services to the industry itself, by local suppliers, results in additional receipts of local owners and employees. These purchases are made by the firm, not its employees. But like employee spending, taxing, and saving, industrial purchases of supplies and services cause a multiplier process of restocking, hiring, paying new hires, their income expenditure, and further increases in aggregate income and employment. These indirect aggregate increases are known as the supplier effect.

The size of the multiplier depends on several factors, including:

- the fraction of employee income that is spent outside the local economies,
- the fraction of purchases of supplies and services that accrue to recipients located outside the local economies and that are not re-spent in the local economy,
- the fraction of purchases and employee payments of local suppliers that are made outside local economies, and
- the fraction of income receipts that are saved rather than spent.

As these fractions increase, the multiplier effect becomes smaller, and the total aggregate economic impact on local communities is smaller as well.

The perfect industry, in terms of high economic impact, would sell all of its output outside the local community, while purchasing all of its inputs only from suppliers in the local community. Its employees would spend all their income, but buy only those items produced in the local community, made only from only local materials, fashioned only by local craftsmen. The industry's suppliers would hire only local labor and buy only local materials. Such an industry does not exist in reality, but if it did, the maximum possible impacts from its construction and operation would occur.

Meta-Benefit

One way to quantify the impact of an economic action relies on the concept of consumer surplus. It is the difference between what rational, informed consumers would be willing to pay for a good or service and what they are required to pay, rather than go without the good or service. For example, if a group of citizens would be willing to pay \$100,000 for an extra unit of police protection that costs only \$40,000, then the consumer surplus is \$60,000. This represents the net benefit or economic gain from using \$40,000 in police protection. In this analysis, neither the identities of beneficiaries nor the distribution of the gains are measured, only the total net economic benefit.

From the standpoint of total net impact of Tri-State Units 1 and 2 (hereafter TS1, TS2) regardless of the distribution of the benefits, consider the following:

The generators will produce approximately 9,771 million kilowatt hours (kWh) per year, with a useful life of some 35 years.⁵

During that time, the marginal valuation of the electric energy produced will exceed the marginal cost by approximately \$.026 per kWh, to begin with, and increase with inflation as time goes by.⁶ This is the marginal net impact, in terms of the excess

⁵ Based on an output-to-capacity ratio of 85.8 percent. With upgrades and efficiency improvements, given the existing trend in efficiency improvements and extension of useful life, its output and usable life will in all probability be greater.

⁶ Source: data obtained for previous study. See *The Economic Impact of Building and Operating a 600 MW Coal-Fired Power Plant in Finney County Kansas*; Gamble, Ralph; July, 2002. The future inflation rate is expected to be 3% per year. This is higher than the recent (2002-2005) rate of 2.5%, but less than the average rate over the last 35 years (4.0% compounded annually, based on the implicit price deflator for GDP). Source: St. Louis Federal Reserve Bank database.

valuation of the electric energy produced over the opportunity cost of the valuation of the resources needed to create it. These include the cost of fuel and other materials, labor, and all other operating costs. Also included are costs due to maintenance, and payments for environmental impacts in the form of emissions allowances. Congress established these allowances in 1990 to guide industry to achieve a national cap on sulfur dioxide emissions. These are intended to approximate the value of environmental degradation that may be caused by the coal-based production of electric energy.⁷

The present value of the total of the annual marginal net impacts, properly discounted, over the lifetimes of TS1 and TS2, is \$7,144,640,872.⁸ This assumes annual 3% growth in marginal net impact over the 35-year lifetimes of TS1 and TS2. The opportunity cost of TS1 and TS2, including Engineering and Design, Planning and Construction (EPC) cost, other construction costs, and development costs, is \$1,765,294,155. This represents the present sacrifice, in terms of foregone alternatives.

The total impact is the difference: Present value of net marginal impact less the opportunity cost of TS1 and TS2. The difference is \$5,379,346,717.

The ratio of total net benefit to opportunity cost is 405%. In other words, a dollar used in building TS1 and TS2 produces \$4.05 in benefits. It is as if users of electricity could receive \$4.05 worth of energy, in terms of their valuation of it, at a cost of one dollar.

Put another way, if TS1 and TS2 were not to be built and operated, then the construction costs would be saved. But each \$1 saved would result in a reduction of economic welfare of \$4.05.

There is another, more personal way, to visualize the net benefits of the two generators. The construction cost of TS1 is currently expected to be \$871,750,200. It will provide generating capacity of 650 MW, which would serve the electric energy

⁷ Costs for tailpipe control technology, including SCR (Selected Catalytic Reduction) and a sulfur dioxide scrubber represent approximately 6% of total plant operating cost. The charges were instituted years ago for acid rain compensation; since then, scientists have speculated that the actual amount of damage to lakes and forests attributable to acid rain is uncertain.

⁸ The discount rate used is 4.39%, which is the 8-year moving average of the monthly observations on the 1-year constant maturity Treasury security, as maintained by the St. Louis Federal Reserve Bank.

needs of about 650,000 average homes.⁹ The useful life of the generating unit is at least 35 years, although in actual practice can be much longer.

For example, the 360 MW generating unit at Holcomb (HE1) is 22 years old, but it has about 30 years of remaining useful life as currently projected. Based on a conservative estimate of 35 years for TS1, the annual cost per household is about \$38.82, or about 10¢ per day, and would be lower if the useful life is longer. The net benefit can be thought of as the difference between what having the opportunity to have delivered electric energy is worth to the people living in the average household, and the cost of that opportunity. The cost of the opportunity is 10¢ per day.¹⁰

Value of Water

One additional consideration deserves mention. In a study released by the Docking Institute, the value in crop-production agriculture of an acre-foot of water drawn from the Ogallala Aquifer is estimated at \$18¹¹ This is based on the annual subsidized cash-flow (revenue plus government subsidies minus the sum of production costs and fixed costs) derived from the production of crops irrigated by Ogallala water, and does not include secondary (multiplier) impacts. If TS1 uses Ogallala water for cooling, it will add approximately 7,958 acre-feet per year to the demand for Central High Plains Ogallala water. First-year cash flow from its operation is estimated to be \$34,935,000.¹²

Using these estimates, the value per acre-foot of Ogallala water used in TS1 and TS2 is \$4,390. This is 244 times the valuation of water used in crop production.

⁹ Based on average consumption of 720 KWh per month. This estimate of opportunity cost of deliverable electric energy does not include the cost of peaking capacity, which is necessary since electric energy is not consumed at a constant rate by all day every day.

¹⁰ The discerning reader will note that this valuation is equivalent to the net option value of a household-sized unit of deliverable electric energy.

¹¹ Gilson, Preston; Aistrup, J; Heinrichs, J; and Zollinger, B: *The Value of Ogallala Aquifer Water in Southwest Kansas*. Docking Institute of Public Affairs, FHSU, Hays, Kansas; 2001. In the study, an estimate for the direct economic impact of Ogallala water used in livestock production is given as \$498 (pp.40-41). However, the numbers for livestock production and crop production are not comparable, since the livestock estimate is based on revenue, while the agriculture (crop) estimate is based on subsidized cash flow. Based on operating revenue of a typical 600 MW generator, the value of water in the production of electric energy at TS1 and TS2 is more than 42 times the value in livestock production. See also Gamble, op.cit.

¹² These estimates are based on a previous study by Gamble, op.cit. The generator in that study was a 600 MW facility, while TS1 and TS2 are 650 MW facilities. Construction costs of all three differ by less than ½ of 1 percent after accounting for cost escalation of 2.5% per year.

Temporary (Construction) Impacts

Construction Crew Expenditures

The construction of TS1 and TS2 is expected to take approximately four years each. During that time, the total workforce will approach 2,000. Trades include ironworkers, carpenters, laborers, insulators, millwrights, teamsters, sheetmetal workers, painters, masons, equipment operators, pipefitters, boilermakers, electricians, laborers, and others. Not all trades will be employed at the same time, and none will be employed for the entire construction period. Based on the estimate of employment of the various trades, as well as estimates of time-on-task and home location of tradesmen,¹³ the total spending of construction crews is expected to be over \$56,000,000 during the project. This spending on housing and food expenses of the construction crew is termed “maintenance spending.” Almost all of it will flow to the hospitality service sector of Garden City. Additional hiring can be expected from flows of this size.¹⁴

¹³ Estimates of employment and location of tradesmen hired were provided by Sunflower. Estimates of time on task were provided by Sunflower and separate estimates by a design/construction company that wishes to remain anonymous. By assumption, only 20% of hires from eastern Kansas (eastern Kansas) will not commute. This is the maintenance spending by construction crews over the 42 months of the construction project. Secondary (multiplier) effects are not included. Most of the spending is in Garden City, the nearest retail/housing/restaurant/medical center in the region, and virtually all is in Finney and Grant counties. Usually, trailer space is provided by the general contractor. The spending estimates are confined to food, beverage, and housing expenditures. Other assumptions are: western Kansas: 20% motels @\$40/day, 5 days per week, no trailers. Kansas: 60% motels @\$60/day, 20% trailers, and 20% commute. Motel, 5 days/wk. Trailering, 7 days/wk. OUTSTATE: 70% trailers, 7 days/wk, 30% motels, 5.5 days/wk. \$20/day meals and incidentals are included for all construction tradesmen. Trailer space is assumed to be provided at no charge. Motel rates are less than average daily rates, since most motels will reduce rates for long-term occupancy.

¹⁴ Additional construction is also likely. In many cases, new convenience stores and restaurants are often built near the highway entrances of powerplant construction projects. Although their useful life is limited, because entry and exit from the convenience store business is easy and inexpensive, and because profit rates are quite large, they are rational investments. Some of them survive, and remain in business long after construction has ended, as local customers become habituated to their existence. They are ITMON (In The Middle Of Nowhere) stores, fossils of former activity, usually located at country crossroads that once had construction traffic, or near the location of former materials storage or subcontracting sites.

The following table shows the amount of maintenance spending in the Garden City region by home location of construction crews.

Table 1: Maintenance Spending per Week In Garden City Region

	Western Kansas	Eastern Kansas	Out-of-State	TOTAL
Per week	\$48,339	\$127,698	\$141,508	\$317,544
Per Year	\$2,513,624	\$6,640,280	\$7,358,402	\$16,512,306
Project Total	\$8,588,216	\$22,687,623	\$25,141,208	\$56,417,047

Construction Purchases and Subcontracting

In addition to the spending of construction crews, large purchases of supplies, materials, and services are to be expected in the Garden City region. TS1 and TS2's estimated total construction cost, separate from financing costs, including taxes, is \$1,765,294,155. Much of that expenditure will flow outside the Garden City region. In other words, the amount of the total engineering, planning, and construction expenditures that directly affects the western Kansas economy may be small. However, many material and service providers have home offices and suppliers in eastern Kansas. It is not possible to make a comfortable estimate of the amount of this total expenditure that accrues to eastern Kansas. However, each 10 percent of the total represents almost \$177 million.

This expenditure is entirely composed of high-powered, autonomous expenditures. That is to say, each dollar comes from outside Kansas. Unlike a government investment financed by taxes, for example, where each unit of additional government-subsidized spending reduces private spending by a large fraction, autonomous investment does not reduce private spending at all. It is often argued that tax abatements and other benefits used to lure industry to a county or city can be unproductive because the higher taxes needed to finance the benefits serve to reduce private spending. That argument is correct, however, it does not apply in this case. Therefore, the spending on construction and operation of TS1 and TS2 has maximum economic impact on the recipient regions.

Some spending categories have high labor components and/or high proportions of local value-added to total value-added. For these categories, construction expenditures

have a large impact on the local economy. Others, in particular large sub-contracts and direct materials purchases, flow mostly to outside vendors. For these categories, the direct impact on Garden City, western Kansas, and Kansas is small. Consequently, local and state multipliers (total income growth per dollar of initial expenditure growth) for construction spending may be quite small.

By applying the plant expenditure multipliers discussed in the topic labeled “Continuing-Impact Multipliers” below, an estimate of the induced impact of construction spending on earnings and employment is obtained, and presented in Table 2. It should be noted that these are temporary, and do not occur for the full period of construction. In addition, unlike permanent effects, temporary impacts do not create lasting jobs. The job expansion, direct and induced, should be considered to be an estimate of the increases in work requirements, earnings and taxes that would not occur otherwise (see footnote 38).

Table 2: Induced Impact of Construction on Earning and Jobs

	Spending	Earnings	Jobs
All Regions	\$925,123,476	\$397,803,095	12,767
Western Kansas	\$83,787,280	\$26,811,929	1,157
Eastern Kansas	\$27,929,093	\$9,831,041	386
Kansas	\$111,716,373	\$43,256,579	1,541
Out-of-State	\$813,407,104	\$346,446,354	11,226

Income of Construction Crews

Using estimates of time-on-task for the various trades, and the *2000 State Occupational Employment and Wage Estimates: Kansas* as reported by the Bureau of Labor Statistics, adjusted for wage changes to 2007, the construction earnings of residents of western Kansas, eastern Kansas, and Kansas and the remaining (out-of-state) region are estimated.¹⁵ These are presented in the following table.

¹⁵ These occupational employment and wage estimates are calculated with data collected from employers in all industry divisions in metropolitan and non-metropolitan areas in Kansas. They are available on the web at <http://stats.bls.gov/oes>.

Table 3: Total Annual Income of Construction Crews

	Western Kansas	Eastern Kansas	Kansas	Out-of-State	TOTAL
Pipe Fitters	\$684,741	\$2,738,964	\$3,423,705	\$6,162,668	\$9,586,373
Electricians	\$1,237,477	\$4,124,922	\$5,362,398	\$7,012,367	\$12,374,766
Boilermakers	\$726,538	\$2,906,151	\$3,632,689	\$5,085,764	\$8,718,453
Equipment Operators	\$1,262,910	\$1,262,910	\$2,525,820	\$1,262,910	\$3,788,730
Ironworkers	\$659,535	\$1,319,070	\$1,978,605	\$1,978,605	\$3,957,210
Carpenters	\$1,210,264	\$1,210,264	\$2,420,527	\$0	\$2,420,527
Laborers	\$2,752,209	\$2,752,209	\$5,504,419	\$0	\$5,504,419
Insulators	\$364,662	\$364,662	\$729,324	\$364,662	\$1,093,986
Millwrights	\$251,266	\$1,005,062	\$1,256,328	\$1,005,062	\$2,261,390
Teamsters	\$402,025	\$402,025	\$804,050	\$0	\$804,050
Sheetmetal workers	\$295,526	\$197,017	\$492,543	\$0	\$492,543
Painters	\$242,098	\$80,699	\$322,798	\$0	\$322,798
Masons	\$288,386	\$672,900	\$961,286	\$0	\$961,286
Totals, Annual	\$10,377,636	\$19,036,855	\$29,414,491	\$22,872,038	\$52,286,529
Project Total	\$36,321,724	\$66,628,993	\$102,950,718	\$80,052,134	\$183,002,851

Table 3 shows that each year, on average, during the construction of TS1 and TS2, workers living in western Kansas will receive about \$10 million and eastern Kansas workers approximately \$19 million. These two regions of Kansas together will enjoy additional incomes of some \$29 million because of the Tri-State agreement. For the five-year lifetime of construction, the totals are \$36 million (western Kansas), \$67 million (eastern Kansas), and \$103 million (Kansas).

Continuing Impact

Employee Income

At present, Sunflower employs 140 people at Holcomb Station.¹⁶ The Holcomb Unit 1 generating unit has a rated capacity of 360 MW. TS1 and TS2 will increase rated capacity by 1,300 MW, with an additional 100 workers. In other words, a 361% increase in energy production requires a 71% increase in personnel. This is one example of the

¹⁶ This includes certain allocated non-operational personnel, performing accounting and other support tasks, as well as engineering and maintenance workers directly connected with the transformation of chemical into electrical energy.

economies of scale to be realized from the combination of TS1 and TS2 with Holcomb Unit 1.¹⁷ Operation is scheduled to begin after project completion, in 2012 (TS1) and 2013 (TS2).

Sunflower estimates that the additional employees will receive wages and benefits of approximately \$7.9 million per year. These payments include employer portions of Social Security and Medicare contributions of 7.65%. Deducting these payments, total wages and benefits are \$7.3 million. From these, federal income taxes and employee contributions to Social Security and Medicare are deducted. The effective federal tax rate for earners in this category averages 16.55%, which is the sum of income tax and FICA/Medicare rates after allowing for deductions and exclusions. The disposable income of the augmented workforce, in cash and benefits, is therefore \$6.1 million per year. Since all of the augmented workforce will be employed at Holcomb Station, most of the income will accrue to residents of Finney County.

This income will not result in an offsetting reduction in incomes of others in the region. Even if the new positions are filled by current residents of the region, hired away from their present employment, their former jobs must be filled by someone else. Ultimately, either the labor force of the region must grow, or the existing labor force become more productive, or both. Either way, a net increase in regional income and usable benefits of \$6.1 million will result.

The total economic impact to the region(s) of this increase in disposable income and benefits is estimated using multiplier analysis. Multiplier estimates for income range from approximately 1.2 to 7. In general, smaller regions have smaller multipliers because more of the spending is received by sellers who are outside the region. A small town produces little of what it consumes, perhaps only 10%: It trades with other units for most of its consumables. For example, a newly arrived resident to a small city may purchase a new automobile, adding \$30,000 to the total expenditure of the local economy. But almost all of that expenditure escapes quickly from the local economy, as

¹⁷ More important is the likely reduction in coal transportation rates, made possible by the increased tonnage serving Units 1 and 2 combined. The combined tonnage will be large enough to make connection to the UP system viable. If this is done, then freight rates will be based on competitive market outcomes, with both UP and BNSF lines bidding for Holcomb Station freight. Other economies of scale involve accounting services, ordering, maintenance, pollution permit trading, management economies, and others both expected and unforeseeable.

payments to the auto assembler, parts suppliers, transporters, and so on. The \$30,000 of spending on the auto adds little to the incomes of others in the city.¹⁸ A larger region produces a larger fraction of its consumables.

For this reason, regions the size of Finney County or western Kansas have total economic multipliers on the small side; closer to 1.2 than to 7. The reader can attach his own multiplier to the \$6.1 million in added income. In a later section, approximate multipliers are used, mainly to provide a benchmark rather than to forecast with any precision. The total impact of the \$6.1 million in added income is, however, certainly larger than \$6.1 million per year.

Supplier Impact

In the initial year of operation, \$13,878,919 is expected to be spent on variable operating and maintenance expenses, SCR¹⁹ expenses and capital purchases, for each unit, or \$27,637,838 for TS1 and TS2 together. Of this, 13.51% is expected to be received by Finney County suppliers, 5.45% by suppliers in the remainder of western Kansas, 12.94% for eastern Kansas, and 68.1% for suppliers outside Kansas.

Table 4 indicates the annual expenditure, measured in current dollars, of ongoing expenditures, and the location of the suppliers and/or contractors. These are expected to begin in 2012, and will increase over time at approximately the rate of Producer Price Index (PPI) inflation, expected to be 2.5% per year. For Finney county, ongoing supply expenditures total \$3,750,084 per year; for all of western Kansas, \$5,262,886; for all of Kansas, \$8,854,750.

¹⁸ For example, the spending on operation and maintenance of automobiles, although much smaller than the initial purchase expenditure, adds more to the local economy: Payments for mechanic services, oil change labor, car wash operators, fuel marketers and so on add more to the incomes of residents than the initial purchase.

¹⁹ Selective Catalytic Reduction

Table 4: Ongoing O&M Expenditures

	Percentage	Expenditure
All Regions	100.00%	\$27,757,838
Finney County	13.51%	\$3,750,084
Western Kansas less Finney County	5.45%	\$1,512,802
Western Kansas	18.96%	\$5,262,886
Eastern Kansas	12.94%	\$3,591,864
Kansas	31.90%	\$8,854,750
Out-of-State	68.10%	\$18,903,088

Continuing-Impact Multipliers

All these expenditures have associated impact multipliers, analogous to consumption spending multipliers, as suppliers of services order more, hire more, spend more in their local regions. To the extent the expenditures flow to labor, or to firms with high value-added to total value ratios, the multipliers will be larger. Regional (western Kansas) supplier multipliers for electric utilities are likely to be less than two.²⁰ But no precision is possible: the industrial category that includes electric generation concatenates electric distribution, transmission and generation, as well as state and local government utilities, most of which are municipal (distribution) utilities. Even RIMS II, the Regional Input-Output Modeling System, does not provide estimates for utilities that are generators rather than full-function, integrated utilities.²¹ One estimate for the category is 1.86; but that is probably biased upward by the effects of the high labor utilization of distribution utilities and state and local government utilities. In addition, the

²⁰ One estimate, for the entire state of California, asserts an earnings multiplier (total earnings change, CA/earnings change, CA utilities) of 3.4250. But that is for a huge state, with the fourth largest economy in the world, and for a large number of distribution utilities, both electric and gas, and for sanitary services, all of which have high labor/output ratios. For generation and transmission utilities, for smaller regions, the earnings multiplier must be much smaller. See *Regional Multipliers: A User handbook for the Regional Input-Output Modeling System (RIMS II)*, third edition. Washington DC: Government Printing Office March 1997.

²¹ See the note above.

region includes both western and north-central Kansas.²² Therefore, the following analysis should be used as a benchmark rather than a precise estimate.

Using a RIMS II example for the Kansas City metro region, from data on increased earnings and spending, the ratio of induced earnings per \$1 in autonomous spending is found to be .92. This is an approximation of the ratio of induced earnings in the Garden City region per \$1 of spending by construction crews. If the marginal propensity to consume is .85, then the ratio of induced earnings to initial earnings is .78.²³ This is an approximate value for the ratio of induced earnings per \$1 of autonomous earnings of the 100 added employees at TS1 and TS2, once operation begins in 2012.

The ongoing purchases of the plant drive earnings, employment and regional output further. For plant expenditures (purchases of goods and services) associated multipliers are interpolated from Kansas City data.²⁴ They are then used to drive the induced earnings and output of the region. In 1999, median earnings for fulltime, male workers in Garden City was \$29,343; for females, \$21,247. If the ratio of male/female workers is 6/4, then the average fulltime earnings in 1999 were \$26,105. Deflating back to the date of the RIMS II study data (1995) at 3% per year, the value is \$23,194. This yields a jobs multiplier of 13.8.²⁵

The induced changes in employment, earnings, and regional product (output) are given in Table 5 below. It shows the induced increases in regional output, earnings, and employment due to plant purchases of supplies and services after operation begins. Supply effects will create 52 jobs in Finney County, 73 in all of western Kansas, 50 more in eastern Kansas, and 261 more outside the state. Regional product and earnings will increase by the amounts shown in the following table.

²² For a good example of the process and problems in estimating and correctly using regional impact multipliers, see Burress, David: *Economic Impact Multipliers for Kansas*, Kansas Business Review, Vol.12 No.3, Spring 1989.

²³ Given by multiplying .92 times .85.

²⁴ See the note above.

²⁵ The calculation is earnings multiplier times \$1 million divided by median earnings. This is only an approximation, since there is no certainty that new employees will be paid the median earnings value. If less, then the employment multiplier will be higher.

Table 5: Changes in Output, Earnings and Jobs

Ongoing O&M Expenditures	Δ Output	Δ Earnings	Δ Jobs
All Regions	\$54,405,362	\$9,992,822	383
Finney County	\$6,600,148	\$1,200,027	52
Western Kansas less Finney	\$2,662,532	\$484,097	21
Western Kansas	\$9,262,680	\$1,684,124	73
Eastern Kansas	\$6,968,217	\$1,257,152	50
Kansas	\$15,938,551	\$2,922,068	122
Out-of-State	\$37,428,114	\$6,805,112	261

The economic impact of continuing operations at TS1 and TS2 is summarized in Table 6 below. Breakdowns for Finney County (the Garden City region), western Kansas and the entire state are shown. The impact of the employment of 100 added persons at TS1 and TS2 flows to the Garden City region, while most of the induced earnings and employment from purchases of supplies and services flows outside the region. This is because purchases made by TS1 and TS2 employees occurs near their homes, while most supply-purchases (made by TS1 and TS2 itself) occur in eastern Kansas.

For Finney county, TS1 and TS2 should add over \$15 million to annual earnings, and create 230 new jobs; for western Kansas, almost \$16 million and 251 jobs; and for Kansas, \$17 million in earnings and 305 new jobs.

Table 6: Impact of Continuing Operations

		Finney County		Western Kansas		Kansas, Entire State	
		Earnings	Jobs	Earnings	Jobs	Earnings	Jobs
Plant Employment	Direct	\$7,900,000	100	\$7,900,000	100	\$7,900,000	100
	Induced	\$6,162,000	78	\$6,162,000	78	\$6,162,000	78
	Subtotal	\$14,062,000	178	\$14,062,000	178	\$14,062,000	178
Plant Purchases	Induced	\$1,200,027	52	\$1,684,124	73	\$2,922,068	127
	Total	\$15,262,027	230	\$15,746,124	251	\$16,984,068	305

Tax Effects

The construction and operation of TS1 and TS2 will have several tax consequences. During construction, sales tax collections will increase, due to the taxable spending of construction crews.²⁶ In addition, retail liquor taxes, gallonage, tobacco and other excise taxes collections will increase.

The reduction in disposable income that results from federal and state income tax and work-tax liabilities has been accounted for above. There will be no immediate property tax liability of TS1 and TS2, due to the enactment of legislation in 2001 exempting new electric utility generation from Kansas property tax from initiation of construction until 12 years after completion. At that time (2024), the property tax is expected to be \$11,961,475 and \$24,042,565 the following year, when both units have been in service for 12 years.²⁷ The distribution is shown in the table below.

Table 7: Year 2024 Property Tax Payments

	Percentage	Amount
Holcomb USD 383	44.0%	\$10,578,729
Finney County	34.0%	\$8,174,472
GC Community College	20.0%	\$4,808,513
State	1.5%	\$360,638
Sherlock Township	0.5%	\$120,213
TOTAL		\$24,042,565

There will also be federal and state income tax consequences of electric energy sales. The amounts are expected to vary from year to year as different depreciation and expensing treatments are chosen, and as sales occur in various tax jurisdictions. Since no tax consequences are expected on the part of the operator (Sunflower), no attempt to model them is made.

²⁶ Garden City currently collects 7.45% of eligible retail expenditures as sales tax.

²⁷ This value assumes that assessed valuation will increase by one percent per year, and that Kansas will not change tax law during the 12 year period following construction completion.

Finney County Property Tax Impact

Because new housing will be required for the initial and induced employee additions in the Finney County region, property taxes collections will increase to the benefit of the school district, and county and city governments. A conservative estimate of the impact is as follows: The number of new jobs totals 230. The number of added households is 154.²⁸ Approximately 75% of new households will require additions to the housing stock.²⁹ If the average property tax per new home is \$1,000 then the incremental property tax collections by county governments is at approximately \$116,000 per year, after housing equilibrium is re-established.³⁰

Finney County Sales Tax Impact

In Garden City, eligible sales are assessed with a 7.45% tax that is collected from the buyer. Of that, 2.15% is retained by governments and non-governmental recipients. According to estimates, retail sales per person in Garden City were \$13,879 in 1997, or \$16,261 in 2005 dollars.³¹ There are 3.09 persons per household.³² If there are 154 added households, then added retail sales total \$7,737,959. Most retail sales are subject to taxation. In addition, many services are also taxed. Assuming all retail sales are taxed, county businesses will collect \$576,478 in additional sales taxes from personal purchases. State government will receive \$410,112, and county governments and non-governmental recipients will receive \$166,366.

A portion of plant purchases of supplies and services, which total \$27,757,838 for all regions (\$8,854,750 for Kansas), is exempt from sales tax. Using past purchases and sales taxes paid, based on the estimate of exemptions provided by Sunflower, approximately 60% of plant purchases have been found to be exempt from sales tax, over a sample period of the past several years. Using this benchmark, and applying

²⁸ Based on a marginal household/marginal worker ratio of .67.

²⁹ This is quite conservative. Usually, few homes "on the market" are purchased for permanent residency. The chain of events is, first, a reduction in the for-sale/total housing "vacancy" rate, followed by higher prices, more rentals, and new home construction.

³⁰ These values are estimates based on likely behavior. They are not from survey data.

³¹ This is based on the change in the Price Index for Personal Consumption Expenditures (PCECTPI). Source: St. Louis Federal Reserve Bank.

³² From the Census Bureau: <http://quickfacts.census.gov/qfd/states/20/20055.html>

40% of the annual in-Kansas purchases of \$8,854,750, an estimate of total annual sales tax collections is 7.45% of 40% of \$8,854,750 or \$263,872 per year for Kansas.³³ Sales tax estimates from O&M purchases are presented below.³⁴

Table 8: Sales Taxes from O&M Expenditures

	Percentage	Expenditure	Tax Rate	Sales tax per year
All Regions	100.00%	\$27,757,838	NA	NA
Finney County	13.51%	\$3,750,084	2.15%	\$32,251
Western Kansas less Finney County	5.45%	\$1,512,802	2.15%	\$13,010
Western Kansas	18.96%	\$5,262,886	2.15%	\$45,261
Eastern Kansas	12.94%	\$3,591,864	2.15%	\$30,890
Kansas	31.90%	\$8,854,750	7.45%	\$263,872
Out-of-State	68.10%	\$18,903,088	NA	NA

Do increased tax collections represent a net improvement in economic welfare for county residents, or do they represent illusory gains, such as the economic impacts of reconstruction spending that follows after hurricanes, tornados, earthquakes or other natural disasters? They may represent positive economic impacts, but only to the extent that the additional services required for new residents have a lower opportunity cost than the reduced disposable income.³⁵ But the taxes do not appear alone. They appear only because of taxation of incremental households. Households include children that must be educated, and requirements for more street maintenance, firemen, police, emergency medical services, and so on. The incremental taxes arise only because of incremental households that impose extra costs and use extra resources, the value of

³³ Not all counties of Kansas have the same local sales tax rate as Finney County, which means that the precise trade-weighted average sales tax for all of Kansas is not equal to 7.45%. The value of 2.15% for local tax rates for all jurisdictions is used for convenience, to provide a benchmark for estimation purposes. (See the note following).

³⁴ Some Kansas counties have a 6.45% sales tax, rather than a 7.45% county tax. But most retail sales are made in towns where the rate is 7.45%. In these calculations it is assumed that the parts of the counties that receive the bulk of sales tax collections are subject to the 7.45% tax, even though in theory a reduction could be obtained by going through the process of proving delivery of sales in a lower-tax-rate jurisdiction.

³⁵ If the collections were made from law abiding, non-littering transients (driving weightless automobiles, so that no marginal wear occurs on county roads) then the tax collections would represent an economic improvement.

which may be greater or smaller than the incremental tax collections. For that reason, incremental property and sales taxes should not be thought of as positive economic benefits. Rather, they are a way of estimating the marginal cost of services provided by governmental and non-governmental agencies.

Summary

In this section, a summary of all economic impacts is presented. The goal is to summarize the direct and induced economic impacts during construction and during ongoing operation of TS1 and TS2. Most of the items are straightforward, with the exception of taxes and spending. Table 1 shows the increased spending for temporary living expenses in the Garden City area, according to home residency of the purchaser.

During construction, sales taxes in Finney County are increased by the taxes on this increased spending, plus the increased sales taxes (because of induced earnings) of Finney county residents on ordinary retail purchases. State sales taxes are computed based on eastern and western Kansas tax collections from induced spending of incremental jobholders. Hospitality taxes will also increase in the Garden City area. The amount of induced hospitality taxes is not estimated.³⁶

Income taxes of the increased workforce are not estimated.³⁷

Local housing additions add to property tax collections in western Kansas; estimates of these are made as noted previously.

Local tax increases accruing to western Kansas (and the other regions) from ongoing plant operations, including purchases of supplies and services and the induced employment effects from those purchases, is the sum of (1) taxes on new spending by new workers, (2) property tax collections on new homes constructed for new workers, and (3) sales taxes collected as a result of direct spending by TS1 and TS2. All of these effects are included in Table 9.³⁸

³⁶ Neither is incremental tobacco, liquor or other excise taxes.

³⁷ Based on earnings or per capita work-taxes per worker, an estimate of federal and/or state income taxes may be computed, although (as discussed above) these revenues have little effect on economic benefits.

³⁸ The sums for western Kansas and eastern Kansas do not add to the Kansas total, since multiplier precision is limited to two, and in some cases, one decimal place. In addition, the permanent employment values are calculated using a total impact model, rather than adding the component impacts. The difference in impact varies from two to four percent. The temporary impacts (on induced jobs during construction) should not be thought of as creating new jobs. Rather, the data represent the amount of full-time equivalent workers that have some aspect of their employment devoted to the Holcomb project. For example, one worker at a Schenectady, New York, General Electric plant may devote a week of labor toward producing a generator used at Holcomb Station, while an ironworker at a Beijing Shougang Group plant may work a week on metal to be used in boiler assembly. The total, in work-years, of all labor used in any way leading to the completion of the Holcomb addition is what is measured here.

Table 9: Total Annual Impact

	Region	Jobs	Earnings	Taxes State & Local
Payroll effects—temporary				
Construction Workers	Western Kansas	344	\$15,537,513	\$491,604
	Eastern Kansas	581	\$26,119,981	\$230,275
	Kansas	925	\$41,657,494	\$2,501,393
	Out-of-State	631	\$28,427,893	NA
Supply effects—temporary				
Construction Purchases	Western Kansas	1,157	\$26,811,929	\$669,697
	Eastern Kansas	386	\$9,831,041	\$223,524
	Kansas	1,541	\$36,642,970	\$6,832,861
	Out-of-State	11,226	\$293,477,283	NA
Payroll effects—permanent				
Permanent Employment	Western Kansas	196	\$13,007,543	\$176,656
	Eastern Kansas	0	\$0	\$0
	Kansas	196	\$13,007,543	\$270,022
	Out-of-State	0	\$0	NA
Supply effects—permanent				
O&M Purchases	Western Kansas	77	\$1,815,437	\$118,262
	Eastern Kansas	53	\$1,362,918	\$54,311
	Kansas	132	\$3,149,907	\$413,949
	Out-of-State	280	\$7,396,847	NA

Finally, the total impact of TS1 and TS2, including both direct and induced impacts, is presented in Table 10. The total impact is separated into two parts: temporary effects that occur during construction and permanent effects that occur soon after electric energy generation and transmission begin in 2012. Most of the impact in western Kansas is in the Finney County vicinity. Using the western Kansas area as an example, 1,501 temporary jobs per year are created during construction of TS1 and TS2 for residents of western Kansas. Earnings rise by about \$42 million per year during

construction, and tax collections increase by over \$1 million. After 2013, when both TS1 and TS2 are in service, western Kansas employment will be increased by 274 full-time equivalent workers, with earnings and fringe benefits increasing approximately \$15 million and tax collections about \$300,000 per year higher.³⁹

Table 10: Total Annual Impact, TS1 and TS2

	Jobs	Earnings	State & Local Taxes
Temporary Impacts			
Western Kansas	1,501	\$42,349,442	\$1,161,301
Eastern Kansas	967	\$35,951,022	\$453,799
Kansas	2,466	\$78,300,464	\$9,334,253
Out-of-State	11,857	\$321,905,176	NA
Permanent Impacts			
Western Kansas	274	\$14,822,980	\$294,919
Eastern Kansas	53	\$1,362,918	\$54,311
Kansas	329	\$16,157,450	\$683,971
Out-of-State	280	\$7,396,847	NA

³⁹ Monetary estimates are given in current (2005) dollars. Their nominal values will increase over time as inflation occurs.

Appendix: Further Expansion

In addition to the 1,300 MW of new generation involved in the Sunflower and Tri-State agreement, another expansion may occur. The expansion would build a third 650 MW coal-based generating unit at Holcomb Station. The unit would be virtually identical to the 650 MW generators to be built in the Tri-State expansion. The economic impacts are similar, although approximately half as large. According to current negotiations, the project (hereafter called HE2) would begin construction in July 2007 and be completed in 2011 when energy production and sales begin. A portion of the HE2 generator's output would be taken by Sunflower, for delivery to customers of its six distribution cooperatives or for merchant (bulk) sales to other buyers. Since Sunflower will operate HE2, a fee will be collected and additional staff hired.

The construction cost of the facility will be approximately \$870,488,000 if construction begins in July 2007. For purposes of estimating the total economic impact, the same multipliers, household size, construction worker spending, tax rates, and all other factors used in the Tri-State analysis are assumed for the HE2 project.

Using those data, along with the cost-of-construction and other estimates specific to HE2, and assuming the planned date of July 2007 for commencement of construction is met, the following economic consequences are noted for the construction period of 2007 through 2011.

The EPC plant cost is \$871,750,200; the Meta-Benefit is \$2.4 billion. Construction crew spending (in or near Garden City) is \$154,900 per week; \$8,054,775 per year with a total construction crew spending of \$27,520,511. The income of the construction crews, by home residency, during the total construction time is western Kansas: \$17,717,914; eastern Kansas: \$32,501,948; and Out-of-State: \$39,049,821.

After construction is completed, the annual operation and maintenance spending, by recipient region is Finney County, Kansas: \$1,829,309; western Kansas: \$2,567,261; eastern Kansas: \$1,752,129; Kansas: \$4,319,390; Out-of-State: \$9,221,019.

After twelve years of operation, with distribution according to Table 10, and growth of approximately 1% per year, the property tax payments will be \$11,728,080. The property taxes paid by new residents as a result of increase housing construction due to direct and induced job growth per year will be \$56,588.

Annual sales taxes paid on non-exempt operation and maintenance purchases will be \$128,718. Sale taxes paid by new residents as a result of direct and induced job growth per year will be \$281,209.

Table 11 presents the total impact on jobs, earnings, and taxes of the HE2 expansion. Unlike permanent effects, temporary impacts do not create lasting jobs, but reflect the increases in work requirements, earnings, and taxes that would not occur otherwise (see footnote 38).

Table 11: Total Annual Impacts, HE2

	Jobs	Earnings	State & Local Taxes
Temporary			
Western Kansas	732	\$20,658,264	\$566,488
Eastern Kansas	472	\$17,537,084	\$221,365
Kansas	1,203	\$38,195,348	\$2,846,095
Out-of-State	5,784	\$157,026,915	NA
Permanent			
Western Kansas	134	\$7,230,722	\$143,863
Eastern Kansas	26	\$664,838	\$26,493
Kansas	160	\$7,881,683	\$333,644
Out-of-State	137	\$3,608,218	NA

Finally, Table 12 summarizes the temporary and permanent economic effects on employment, earnings, and state and local (non-income) taxes for both expansion projects. A total of 1,950 MW of new capacity would be online after 2013. When added to the existing 360 MW, Holcomb Station would have 2,310 MW of generating capacity, and would be the largest generating site in Kansas.

Table 12: Total Annual Impacts, HE2, TS1 and TS2

	Jobs	Earnings	Taxes
Temporary			
Western Kansas	2,233	\$63,007,706	\$1,727,789
Eastern Kansas	1,439	\$53,488,106	\$675,164
Kansas	3,669	\$116,495,812	\$12,180,348
Out-of-State	17,641	\$478,932,091	NA
Permanent			
Western Kansas	408	\$22,053,702	\$438,782
Eastern Kansas	79	\$2,027,756	\$80,804
Kansas	489	\$24,039,133	\$1,017,615
Out-of-State	417	\$11,005,065	NA

Addendum

Instantly delivered electric energy has become woven into the fabric of life. Like air and water, we need it, and often. Yet because it is so readily available and often used, and because it has been part of life since many of us were children, we usually do not often think about its usefulness, or about its true value to us, nor about the fact that it does not naturally occur. In fact, electric energy is manufactured, using a great amount of acquired engineering expertise, intricate machinery, and capital. Ironically, heavy industry is required to economically move almost weightless electrons.

A count of the devices in the average home that require delivered electric energy easily exceeds one hundred. A bedroom with a ceiling fan, light fixtures, lamps, electric blankets, television, and clock radios can easily have a dozen or more; a living room even more. Outside too, from porch lights to garage door openers, we rely on electric energy. It powers our blenders and heats and cools our homes and offices. Through email and internet, it allows us access to the far corners of the globe, and the wonders of global information. Powering a child's nightlight, it keeps the monsters under the bed, where monsters belong.

Life at home would be difficult without it. Commercial life would be impossible. A modern economy requires many things to function efficiently; ethical people who value free exchange, stable financial systems, governments that uphold the rights and duties of contractors and property owners, and an integrated connective network of communication, transportation and energy. Electric energy is a vital part of that network.

It is probable that delivered electric energy will grow in importance more rapidly in the future than in the past or present. For one thing, tomorrow's transportation may rely more and more on delivered electric energy. Plug-in hybrids, rechargeable battery-electric powered vehicles, fuel-cell electrically powered vehicles, water-to-hydrogen electrolysis; these point to an increased demand for delivered electric energy. The growth of computers, information networks and servers has already demonstrated the need for more electric energy, not just for the computers themselves, but for cooling them. But perhaps more important than current uses are those that are unknown, that will be developed as the cost of alternative energy sources—dependent on crude oil—remain high.

It is an old story in the history of economic innovation. As increasing scarcity causes the price of a useful item to increase and remain high, alternatives that fulfill its use promise great profits, and therefore are sought and found. From whale oil to kerosene to coal gasification to natural gas, to electric lighting, potential profit draws innovation as surely and as powerfully as a gravity well draws matter. It is likely that these forces will result in innovations that are powered by delivered electric energy.

Hopefully, more generators will be built in time to serve the increased demand for delivered electric energy. It would indeed be unfortunate otherwise. The lead time for constructing economical coal-fired generation is long. Even after all necessary permits are obtained, actual physical construction requires an average of almost four years to complete. Natural gas-fired generators can be constructed much faster, especially so since environmental concerns are fewer—but their output is expensive and increasingly so. Wind will never provide a substitute for dependable power. Because of the inconstancy of wind, these generators do not reduce the need for dependable capacity. In addition to their cost, they mandate the extra cost of standby capacity. Probably the only practical use for wind will be off-grid, powering electrolysis production of hydrogen, compressed and pipelined much like stripper-sized natural gas wells. Nuclear power takes much longer to construct, and very much longer to permit. Remembrances of Chernobyl and Three-Mile-Island have probably doomed nuclear fission generation except in countries where the government either owns and operates nuclear facilities, or assumes the liability for damages they may cause. Fusion, especially cold-fusion, is useful only for garnering government grants. For these reasons, coal-fired generation is likely to be the backbone of electric energy generation for decades to come.

The alternative to building new generation is unacceptable. Unlike other energy sources, electric energy cannot be stored economically. When demand exceeds supply—when there is a shortage—rationing must occur, and there are only two alternatives. The price can go up dramatically, since demand is inelastic, which results in voluntary rationing, or there can be rolling blackouts, as in parts of California in the recent past.

Because we have become accustomed to economical delivered electric energy, most of us can only picture what life would be with shortages. But high winds, ice

storms, hurricanes, earthquakes, floods, and unwise energy policies occasionally deliver object lessons. Some have experienced high prices and rolling blackouts. Some have been urged to turn off air conditioners. Some have lived for a week or more without delivered electric energy. Those who have never experienced an extended outage can try to visualize a world of electric energy shortages. But those who have experienced one do not have to imagine.

They know.

About the Author



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