

**The Regional Economic Impact of the Red Rock Hydroelectric
Project**

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Executive Summary

This report describes the temporary construction-related economic impacts associated with building an electricity generation facility at the Red Rock Dam in Marion County, Iowa, as well as the ongoing annual economic value of the hydroelectric facility to the region once it is in full operation. This study was requested by Missouri River Energy Services (MRES), which is a multi-state consortium of 19 Iowa municipal electric utilities in combination, under the enabling authority of Iowa Code Chapter 28E, with 42 other municipal electric utilities in Minnesota, South Dakota, and North Dakota. The Department of Economics at Iowa State University conducted this study as a fee-based outreach and assistance service for MRES.

Project Spending

While the full cost of the total enterprise is projected at \$223.7 million, \$115.9 million is expected to be spent in facility construction and \$24.3 million on improving regional electricity transmission systems in the immediate Marion County area. Improvements to regional electricity transmission will occur over the three year period of 2013 through 2015, with peak spending for all activities planned for 2014. The construction of the hydroelectric facility will commence in 2013, as well, and finish by the end of 2015. The remaining spending, which will occur outside of the study area and is therefore not evaluated in this study, includes \$40.6 million for turbine and generation equipment; \$5.2 million for facility design; and \$30.8 million in bond interest costs, transmission upgrade planning, plus other project related costs and contingencies not associated with the actual construction of the facility.

The economic impacts of construction activity were constrained to the four-county region of Marion, Jasper, Warren, and Polk County as this area would supply the majority of construction and supplying firms as well as serve as the primary labor area from which workers would be drawn. The modeling system used to analyze this construction scenario was modified significantly because highly detailed project cost and labor requirements data were supplied by the project planners. This allowed for regional economic impact projections that were highly reflective of the kind of construction activity that would be occurring on this project.

Key Economic Findings

For the 2013 through 2015 period of construction and upgrading of area power lines and transmission capacity,

- Total regional industrial output generated by this project in all affected industrial sectors would be \$41.99 million in 2013, \$134.2 million in 2014, and \$72.3 million in 2015.
- This project would create an annual average of \$82.8 million in total industrial output, 448 jobs, and \$24.6 million in labor income in construction industries, businesses providing supplies and services to the construction firms, and businesses that provide goods and services to the households of all of the workers in the region supported by this project.
- In 2014, the peak year of activity, \$134.2 million in total industrial output and 732 jobs earning \$40.15 million in labor income would be supported regionally.

This is a capital intensive enterprise with comparatively few labor needs at the facility and few regional input requirements once placed in service. When the facility is completed and becomes a fully operational electricity generation plant:

- There will be 1.5 jobs at the facility earning \$100,000 in labor income annually.
- Considering the average annual cost of all potential service and technical needs of the entity over its operational life, plus all other enhancements to the regional economy, the facility is expected to support 4.9 jobs regionally making \$200,698 in labor income.

The construction of this project will result in disruptions in regional recreational activity during the three-year hydroelectric facility construction phase, which may result in shifts in fishing or other recreational preferences to areas with less commotion or greater ease of access. Those shifts would be considered, absent studies to the contrary, temporary and comparatively minor as the overall recreational value of the entire dam and reservoir should not be materially diminished by the construction activity, and may in fact be enhanced in the long-run by a planned addition of a fishing pier to the north tailwater recreation area.

Introduction

This is a report of the regional economic impacts that are projected to accrue to a portion of central Iowa from constructing and operating a hydroelectric facility at the Red Rock Dam near Pella, Iowa. This study has been requested by Missouri River Energy Services (MRES), which is a multi-state consortium of 19 Iowa municipal electric utilities in combination, under the enabling authority of the Iowa Code Chapter 28E, with 42 other municipal electric utilities in Minnesota, North Dakota, and South Dakota. The economic impact analysis will involve different stages of dam construction and related activities over a five year period. The analysis will also describe the annualized value of the hydroelectric facility as an ongoing concern once all construction-related activity has ceased and power generation has commenced.

The study region for this analysis is the contiguous four-county area of Marion County, the site of the facility, plus the adjacent counties of Jasper, Warren, and Polk. This region was chosen as a cohesive area from which a very large fraction of the labor required for the construction of the facility would flow. This region contains a large number of construction firms from which a project of this magnitude would expect competitive bids, owing significantly to the size and proximity of the Polk County metropolitan region to the proposed dam. The region represents the hypothesized regionalized expected value of this project irrespective of the degrees to which regional firms and the regional labor supply are utilized.¹

The county level data and the software for processing those data come from Minnesota IMPLAN, Inc. IMPLAN is a transparent and modifiable input-output (IO) modeling software and data system that is widely used by academics and government officials. An IO modeling system documents the expected transactions among industries and households in a region, and in so doing, projects job and income impacts in an area when industrial activity changes. That said,

¹ Economic impacts are higher in statewide models than in smaller regional subsets because there are more industry types contained in a state model than in a subset of the state. Studies like this are often compiled at the state level rather than the regional level, but unless a project has demonstrable statewide economic significance, it is most appropriate to describe anticipated economic impacts at the regional level. Were one to study Iowa's electrical power generation industry, for example, one would use a statewide model, but for a particular power generation facility, one would use a model of the primary region from which the facility drew its labor supply.

IMPLAN is merely an analytic tool that relies on an extensive array of secondary public economic information to determine its initial structure. When researchers possess newer or better information about a potential economic change than that contained within the model's initial configuration they are able to modify that system to make sure that the results more adequately reflect the change scenario to be modeled. The sponsors of this research were able to provide highly detailed cost and labor requirements estimates for this study; hence, the modeling system was modified substantially to more accurately project the regional economic impacts of this project.

The Department of Economics at Iowa State University conducted this study as a fee-based outreach and assistance service for MRES.

The Facility and the Construction Time Horizon

This project would add a hydroelectric generation facility to the Red Rock Dam in Marion County, Iowa. According to the Federal Energy Regulatory Commission (FERC) order issuing the original major license (Project No. 12576-004), the Red Rock Hydroelectric Project (RRHP) is expected to produce an average of 176,000 MWh of electricity annually.² The RRHP would be designed in 2011 and 2012, with construction commencing in 2013 and finishing in 2015. Actual upgrades and additions to regional electricity transmission capacity would occur between 2013 and 2015, as well, and the RRHP would come on-line by the end of 2015.

² Nelson Energy LLC developed this project through the issuance of the FERC license to CRD Hydroelectric LLC, a subsidiary of Nelson Energy LLC. Western Minnesota Municipal Power Agency (WMMPA) will ultimately own the Red Rock Hydroelectric Project (RRHP). Missouri River Energy Services (MRES) will be entitled to the entire output of the RRHP pursuant to an existing exclusive contract between MRES and WMMPA. In addition, MRES will, pursuant to a contract, be the likely operator of RRHP on behalf of WMMPA.

Given the timeframe of planned construction, electricity transmission additions, and operation, the annual economic consequences of the project are variable.³ All activities in the region involving the construction of the facility or transmission systems are considered temporary. The activities associated with the ongoing operation of the finished facility are considered durable, continuous, and an incremental gain in annual regional long-run economic productivity. Accordingly, the economic impact assessment must align the measurement of the economic activity to the appropriate periods in which it is occurring.

Table 1 displays the anticipated total project spending by year of activity and distinguishes among initial design and construction costs, payments for turbines and other generation and capital goods, and all other electricity transmission construction and project administration costs. Total design and construction spending will be \$121.02 million, electric generation equipment purchases will be \$40.6 million, and the additional costs of managing and financing the project and adding transmission capacity are \$62.1 million. The total project will cost \$223.7 million.

The peak spending for design and construction would be in 2014, and nearly two-thirds of total spending will occur in the last two project years. However, over 77 percent of all construction and additions to regional transmission capacity occurs in the last two years, and the short-term job and income impacts would accordingly be further compressed into that time period. This analysis assumes that all purchases of turbine and generation equipment are from manufacturers and distributors originating outside of the state of Iowa; it is further assumed, then, that those purchases will have no meaningful economic impact in the study region or in Iowa. This analysis also assumes that facility design activity costing \$5.2 million in 2011 and 2012 occurs outside of the study area and therefore would not contribute to the regional economic impacts of the project.

³ The results of multi-year projects are properly summarized on an annual basis. Impact summaries that sum multi-year results to arrive at a multi-year grand total are misleading and lead to inappropriate characterizations of the regional economic worth of an activity.

Table 1

Total Project Spending

Year	Design & Construction	Turbines & Generation	Administrative, Transmission, Financial, & Other	Total
2011	1,825,441	-	7,013,077	8,838,518
2012	3,340,558	14,485,440	6,482,688	24,308,686
2013	18,450,399	17,584,940	9,144,857	45,180,196
2014	60,849,153	7,557,390	23,834,804	92,241,347
2015	36,551,146	972,231	15,617,721	53,141,098
Total	\$ 121,016,698	\$ 40,600,001	\$ 62,093,147	\$ 223,709,846

Identifying Major Spending Categories and Modifying the Modeling System

Highly detailed project spending information was provided by MRES and is summarized in Table 2. For the purposes of modifying the IO modeling structure, expected total payments to value added were estimated based on project estimates of total labor costs. According to project planners, the construction would require \$18.13 million in payments to hired labor (which would also include all social security, worker compensation, and other employer-paid benefits). Using the average performance of heavy construction firms in this region as a guide, payments to construction proprietors or other investors were estimated, as were indirect tax payments that would be associated with this level of construction spending. That produced \$29.23 million in estimated expected regional value added.

All other construction and construction input costs were \$86.62 million. The project planners also provided information that estimated 218 jobs-years were required for the project over the entire construction period. For the purposes of model development the job-years value was converted into an estimate of total jobs. Not all of the jobs in all of the construction categories would be considered full-time, full-year positions. To make this adjustment, the average labor income per job on this project was compared to the Iowa civil construction annual per job average for 2010 for all covered employees. Using that comparison, it was determined that

there would probably be 24 percent more construction-related jobs associated with this project than the “job years” number would indicate. That meant that the construction project would require an estimated 284 jobs in total.

Table 2

Total Project Costs	
Basic Construction	\$ 115,850,699
All labor costs	18,133,300
Estimated proprietors' incomes	7,615,986
Estimated investors' incomes	3,082,661
Indirect taxes	398,933
Subtotal value added	29,230,880
Materials & energy	7,821,496
General office & support	492,170
Ready mix	4,886,140
Other durable inputs	7,407,271
Subtotal basic inputs	20,607,077
All other construction related	66,012,742
Design	5,165,999
Turbines & generation	40,600,001
Power transmission infrastructure construction	\$ 34,770,920
Contingency and bond interest payments	\$ 27,322,227
Project Total	\$ 223,709,846
<i>Job years</i>	<i>218</i>
<i>Re-estimated construction jobs</i>	<i>287</i>

The categorical construction cost and revised job information were used to re-calibrate the regional construction sector that aligned with heavy civil engineering projects. These modifications are important to producing both reasonable and defensible estimates. Table 3 below displays a simple example of the magnitude of this modification. The original off-the-shelf model, given regional construction averages, assumed there would be 9.3 construction jobs per \$1 million in construction activity in the study region. This project, based on the

information in Table 2, is expected to require only 2.5 jobs per \$1 million of construction output. The original default model assumed \$385,941 in labor income per million dollars of construction spending, whereas this scenario would have \$222,263. The model was modified to reflect those differences, and several other categories of construction spending, to include labor income, were also revised to bring the modeling structure more closely in line with this scenario.

Table 3

Characteristics Per \$1 Million of Civil Engineering Construction

	Jobs	Labor Income
Original model assumptions	9.3	\$385,941
As modified for this study	2.5	\$222,263

As examples of other modifications, the system was configured to purchase 100 percent of ready-mix concrete from regional suppliers and to also purchase, either from manufacturers or through wholesalers, a large fraction of its materials, energy, and other durable inputs from area suppliers, to the degree those suppliers were estimated to be capable of supplying them.⁴ This revision assumes that wherever possible, the construction activity will prefer locally sourced inputs to those purchased from outside of the region. Once all model adjustments were made, the construction sector was allowed to purchase all remaining materials and input services in manners similar to the average heavy construction firm in the region.

⁴ Modeling systems have coefficients that determine the fraction of inputs expected to be supplied locally. These are called regional purchase coefficients (RPCs), and it is important for analysts to scrutinize critical input category RPCs to assure they make sense relative to the scenario evaluated. While the RPC for ready-mix concrete was re-set to 100 percent local purchases, it was not necessary to significantly adjust other major input RPCs for civil engineering construction as they appeared to be reasonable.

An Introduction to Economic Impact Terminology

It is important to learn how to read the input output tables that will describe the different types of regional economic impacts summarized in this study. The tables that are produced in IO models display the amount and the types of economic activities that are generated by building and operating the hydroelectric plant in the region along with enhancing the area's power line and transmission capacity. There are four categories of economic information that will be produced in subsequent tables:

- ▶ **Total industrial output.** This is the value of what is produced annually in the industries that are evaluated. In this study it will involve, separately, spending on construction activities, improving and adding to electrical transmission capacity, and finally the annual operation of the facility.
- ▶ **Total value added.** Value added is composed of wages and salaries to workers, returns to management to sole proprietors, incomes from properties and other investments and indirect tax payments that are part of the industrial production processes. Value added is the same thing as Gross Regional Product, and it is the standard manner in which we gauge the size of an economic activity, especially on a comparative basis with other regions and over time.
- ▶ **Labor income.** Labor income is a subset of value added. It is composed of payments to workers and proprietors' incomes. Labor incomes are useful for regional analysis because very large fractions of them accumulate to resident workers, whereas incomes from investments mostly accumulate out of the region of scrutiny.
- ▶ **Jobs.** Jobs are not the same as employed persons as many people have more than one job. There are, therefore, more jobs in an economy than employed persons. In addition, not all jobs are equal. Some are seasonal, others are part-time. The modeling system provides an annualized value of the jobs associated with some level of industrial output even if the jobs only occur during a short period of time or have implicit seasonal components.

There are three levels of economic activity summarized:

- ▶ **Direct activity.** This refers to all of the economic values listed above in the industrial categories that are directly or initially assessed: construction, power line and transmission enhancements, and ongoing operations.
- ▶ **Indirect activity.** All firms require inputs into production such as supplies, services, wholesale goods, transportation, banking services, and utilities. When levels increase or decrease in the direct sector, that influences the demand for inputs. As this scenario represents either temporary (construction-related) or permanent (ongoing operations) boosts to regional accounts, there will be concomitant temporary and permanent boosts in regionally supplied inputs.
- ▶ **Induced activity.** This occurs when workers in the direct firms that are evaluated and workers in the indirect, or the supplying, sectors spend their labor incomes on typical household needs. This stimulates another round of regional economic activity that, in turn, stimulates jobs and pays incomes and further adds to regional goods and service demand. This is sometimes called the household impact.

The sum of these three levels of economic activity yields the total economic value of the industrial scenario that is being measured.

This study only assumes regionalized economic impact gains as a result of this overall scenario, as the vast majority of the operational, labor force, and other activities associated with it will be constrained to a reasonably circumscribed territory. The findings will be described in so far as they have an impact whether temporarily or permanently on the four county region of analysis.⁵

⁵ Owing, as will be demonstrated, to the small labor and input requirements of the finished facility, the model territory for ongoing operations was limited to just Marion County.

The Economic Impacts

Between 2013 and 2015, there will be a series of construction related activities associated with building the hydroelectric generation facility at the Red Rock Dam plus enhancements to area electricity transmission systems. While it is often done, it is inappropriate to sum the total, multi-year impacts. The economic impacts are summarized for the year in which the economic activity takes place, with an annual average value for the five year period summarized at the end so that the value of economic activity is not distorted.

Red Rock Hydroelectric Project Construction Activity Impacts: 2013 – 2015

Table 4 displays the annual electricity generation facility construction activity economic impacts for 2013 through 2015. Direct construction-related spending is \$18.5 million in 2013, grows to \$60.85 million in 2014, and reduces to \$36.6 million in 2015. 2014 is the year of the greatest spending, so that year is summarized next for illustration purposes and to demonstrate how to read and interpret economic impact summaries.

The \$60.85 million of construction activity in 2014 will require an estimated 151 jobs earning \$13.524 million in labor income. The construction firms will indirectly stimulate \$27.94 million in required supplies and services, which in turn will require 214 jobs making \$10.0 million in labor income. When the indirect and the direct workers convert their incomes into household consumption, they will induce \$19.4 million in additional output requiring 180 jobs making \$6.5 million in labor income. Summed, the regional economy will see total industrial output grow for that year by \$108.151 million, value added (or GDP) by \$43.02 million, labor income by \$30.02 million, and 544 jobs.

Table 4

Construction and Construction Management Activity

Construction Year: 2013	Direct	Indirect	Induced	Total
Industrial output	\$ 18,450,399	\$ 8,472,996	\$ 5,869,749	\$ 32,793,144
Value added	\$ 4,655,314	\$ 4,821,039	\$ 3,566,989	\$ 13,043,343
Labor income	\$ 4,100,835	\$ 3,032,555	\$ 1,970,536	\$ 9,103,926
Jobs	45.7	64.8	54.6	165.0
 Construction Year: 2014	 Direct	 Indirect	 Induced	 Total
Industrial output	\$ 60,849,151	\$ 27,943,819	\$ 19,358,349	\$ 108,151,320
Value added	\$ 15,353,160	\$ 15,899,718	\$ 11,763,880	\$ 43,016,758
Labor income	\$ 13,524,496	\$ 10,001,322	\$ 6,498,801	\$ 30,024,620
Jobs	150.7	213.6	180.0	544.3
 Construction Year: 2015	 Direct	 Indirect	 Induced	 Total
Industrial output	\$ 6,551,145	\$ 16,785,421	\$ 11,628,261	\$ 64,964,827
Value added	\$ 9,222,406	\$ 9,550,715	\$ 7,066,381	\$ 25,839,502
Labor income	\$ 8,123,956	\$ 6,007,640	\$ 3,903,729	\$ 18,035,325
Jobs	90.5	128.3	108.1	326.9

Table 5 displays the construction activity multipliers. A multiplier is simply the total value in a category divided by the direct value. It tells how much the entire economy is expected to change given a one unit change in the category scrutinized. The output multiplier of 1.78 means that for every \$1 of construction output, there is \$.78 in additional output sustained in the rest of the regional economy. The value added multiplier of 2.72 means that for every \$1 of value added generated on the project, \$1.72 in value added is generated in the rest of the regional economy. A labor income multiplier of 2.16 means that for every \$1 of labor income paid in the construction sector, \$1.16 in labor income is supported in the rest of the economy. Finally, the jobs multiplier of 3.38 means that for every job in construction, there is 2.38 jobs in the remainder of the economy.

Because of the more capital-intensive and equipment-intensive nature of this construction project, plus the low number of jobs per \$ million of output, as clearly demonstrated in Table 3

above, the value added, labor income, and jobs multipliers are significantly higher than would be the case for this construction sector before modifications.⁶

Table 5

Construction Activity Multipliers

Industrial output	1.78
Value added	2.72
Labor income	2.16
Jobs	3.38

Regional Electricity Transmission Construction: 2013 - 2015

MRES will have to add power lines to completely connect the electricity generated by the RRHP to the regional transmission grid. Spending on those enhancements will occur over a three year period. Table 6 displays the annual value of that activity. Like the facility construction, 2014 will be the year with the greatest effort, so for illustrative purposes those values are summarized.

In 2014, the addition of power transmission infrastructure is expected to cost \$14.85 million, which will require 89 jobs making \$6.05 million in labor income. That sector is expected to require \$4.7 million in regionally supplied inputs, which in turn supports nearly 39 jobs making \$1.9 million in labor income. When the direct and the indirect sector workers convert their labor income into household spending, they will induce \$6.5 million regional output, which will require 60 jobs making \$2.2 million in labor income. In total, for 2014, \$26.0 million in output is supported yielding \$13.6 million in value added, \$10.13 million in labor income, and 188 jobs.

⁶ Readers are advised to not apply these particular multipliers to other civil engineering construction projects. They are only appropriate to this scenario and should not be generalized to other civil engineering construction activities in the region or elsewhere.

Table 6

Power Line And Related Structures Construction

Construction Year: 2013	Direct	Indirect	Induced	Total
Industrial output	\$ 5,248,800	\$ 1,646,979	\$ 2,296,414	\$ 9,192,193
Value added	\$ 2,443,693	\$ 976,157	\$ 1,395,539	\$ 4,815,389
Labor income	\$ 2,136,856	\$ 671,740	\$ 771,485	\$ 3,580,081
Jobs	31.5	13.6	21.3	66.5
Construction Year: 2014	Direct	Indirect	Induced	Total
Industrial output	\$ 14,849,600	\$ 4,659,538	\$ 6,496,882	\$ 26,006,019
Value added	\$ 6,913,555	\$ 2,761,686	\$ 3,948,177	\$ 13,623,418
Labor income	\$ 6,045,468	\$ 1,900,447	\$ 2,182,641	\$ 10,128,556
Jobs	89.1	38.6	60.4	188.1
Construction Year: 2015	Direct	Indirect	Induced	Total
Industrial output	\$ 4,174,800	\$ 1,309,977	\$ 1,826,526	\$ 7,311,303
Value added	\$ 1,943,669	\$ 776,417	\$ 1,109,986	\$ 3,830,073
Labor income	\$ 1,699,616	\$ 534,289	\$ 613,625	\$ 2,847,531
Jobs	25.0	10.8	17.0	52.9

Table 7 displays the regional impact multipliers that would be associated with power line transmission construction. These values are lower than those displayed for the RRHP construction activity.⁷

Table 7

Power Line Transmission Construction Multipliers

Industrial output	1.75
Value added	1.97
Labor income	1.68
Jobs	2.11

⁷ Like the RRHP dam construction activity, this estimate required a substantial modification to a construction sector in the original regional model. Characteristics of production for the power and communication line and related structures construction sector (NAICS 237130) were obtained from the 2007 Economic Census. Expected jobs per \$1 million of total economic activity, labor costs (further adjusted to reflect Iowa prevailing wages), and other major input costs were used to adjust the regional modeling system to better reflect the probable job and income consequences from this spending.

Combined Economic Impacts: 2013 - 2015

Table 8 presents the combined annual economic impact values of the RRHP and the enhancements and additions to regional electricity transmission. As has already been pointed out, the preponderance of economic activity accrues to the region in 2014. In total that year the combined projects will contribute \$134.2 million to regional total industrial output, \$56.64 million in total value added (or GDP), \$40.15 million in total labor income, and 732 total jobs. Economic activity is still quite substantial in the last year where 380 jobs and \$20.9 million in labor income are projected to be supported.

Table 8

Combined RRHP and Power Line And Related Structures Construction				
Construction Year: 2013	Direct	Indirect	Induced	Total
Industrial output	\$ 23,699,199	\$ 10,119,975	\$ 8,166,163	\$ 41,985,337
Value added	\$ 7,099,008	\$ 5,797,196	\$ 4,962,528	\$ 17,858,731
Labor income	\$ 6,237,691	\$ 3,704,294	\$ 2,742,022	\$ 12,684,007
Jobs	77.2	78.4	75.9	231.5
 Construction Year: 2014	 Direct	 Indirect	 Induced	 Total
Industrial output	\$ 75,698,751	\$ 32,603,357	\$ 25,855,231	\$ 134,157,339
Value added	\$ 22,266,715	\$ 18,661,405	\$ 15,712,056	\$ 56,640,176
Labor income	\$ 19,569,964	\$ 11,901,769	\$ 8,681,442	\$ 40,153,176
Jobs	239.8	252.1	240.4	732.3
 Construction Year: 2015	 Direct	 Indirect	 Induced	 Total
Industrial output	\$ 40,725,945	\$ 18,095,398	\$ 13,454,787	\$ 72,276,130
Value added	\$ 11,166,075	\$ 10,327,133	\$ 8,176,367	\$ 29,669,575
Labor income	\$ 9,823,572	\$ 6,541,929	\$ 4,517,355	\$ 20,882,856
Jobs	115.5	139.1	125.1	379.8

Average Annual Construction-Related Impacts

Table 9 annualizes the dam and the power transmission construction activities for the 2013 through 2015 period. The average annual regional impacts would be \$82.8 million in total output, \$34.7 million in value added, \$24.6 million in regional labor income, and 448 jobs.

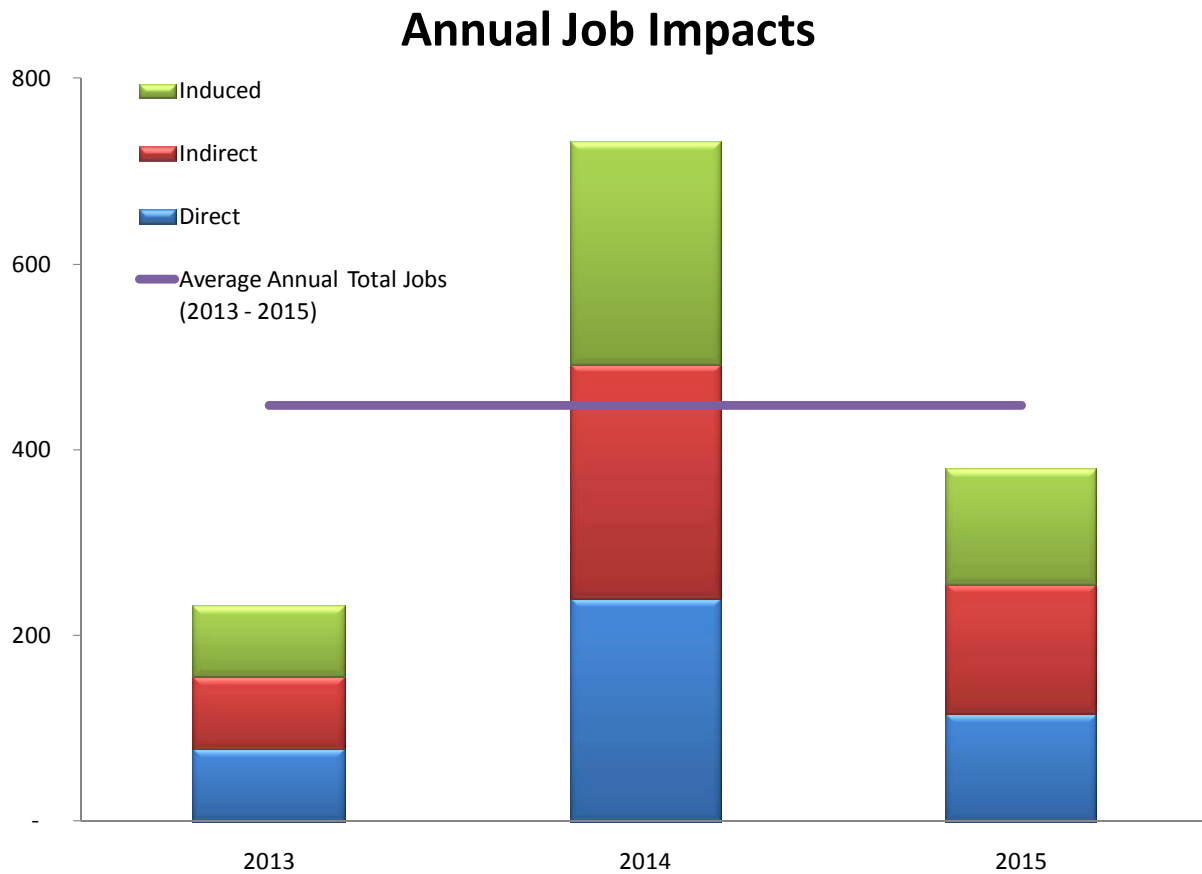
Table 9

RRHP and Power Transmission Construction Annual Average Impacts

2013 through 2015 Annual Averages	Direct	Indirect	Induced	Total
Industrial output	\$ 46,707,965	\$ 20,272,910	\$ 15,825,394	\$ 82,806,269
Value added	\$ 13,510,599	\$ 11,595,244	\$ 9,616,984	\$ 34,722,827
Labor income	\$ 11,877,076	\$ 7,382,664	\$ 5,313,606	\$ 24,573,346
Jobs	144.2	156.6	147.2	447.9

Figure 1 illustrates the combined annual total job values from RRHP construction and from all transmission enhancements (as summarized in Table 8) as they compare to the 3-year total job average. The job gains are 232 in year one, but they pick up considerably by 2014 growing to 732 jobs before declining in the final construction year to 380 jobs.

Figure 1



Ongoing Operations Impacts

Once constructed, this facility will be a comparatively low-maintenance and low inputs operation. According to the project planners, the facility would require only one or two jobs, and would require ongoing contract site maintenance mostly in terms of driftwood or debris removal from its intake. Modeling such a simple operation, however, must still assume that there will be a probability of periodic technical maintenance over a long number of years, that there will be some regionally supplied business or other services, that workers will receive training or other regionally supplied services, that office and other equipment will need replacing, and that the facility will have at least a nominal relationship with the area economy. As the hydroelectric plant, once in operation, will have no meaningful impact in the territory

beyond Marion County, in this analyst’s opinion, the ongoing impacts of the operation were modeled with only Marion County as the study area.

Data on expected annual operating costs were obtained from MRES. Table 10 displays the projected annual hydroelectric facility impacts for Marion County. The facility would have \$16.01 million in annual operating costs, which in lieu of actual production figures become the expected direct output value for the enterprise. It would require 1.5 jobs with labor income of \$100,000.

There is a robust value-added component. The RRHP is financed with revenue bonds. The annual average interest payments on those bonds for the duration of that bond issue count as payments to investors. In all, considering labor income, investor payments, and indirect taxes and fees, the facility is expected to contribute \$8.3 million to regional value added.⁸ The facility would indirectly require \$232,220 in inputs annually, which would need 2.5 jobs making \$76,427 in labor income. When direct and indirect workers converted their earnings into household consumption, they would induce \$77,166 in output, and 9/10th of a job earning \$24,272 in labor income in the county. In all, in the Marion County economy, the facility would contribute \$16.4 million in industrial output annually, \$8.47 million in value added, \$200,698 in labor income, and sustain the equivalent of 4.9 jobs.

Table 10

	Annual Operations Impacts			
	Direct	Indirect	Induced	Total
Industrial output	\$ 16,068,990	\$ 232,220	\$ 77,166	\$ 16,378,376
Value added	\$ 8,311,701	\$ 114,571	\$ 44,086	\$ 8,470,358
Labor income	\$ 100,000	\$ 76,427	\$ 24,272	\$ 200,698
Jobs	1.5	2.5	0.9	4.9

⁸ Job, labor income, and total value added economic impacts are counted in the county where the output-producing enterprise is located, not where the job holders live or where components of value added, like payments to bond holders, are made.

Finally, Table 11 displays the expected multipliers for the RRHP. Owing to the paucity of required regional inputs relative to the total cost of operating the plant, the output multiplier is very low. As the value added component is also very high due to annual interest payments on \$223.7 million borrowed funds, that multiplier is very low also. Both labor income and job multipliers are comparatively high because of the meager labor needs to operate and annually maintain the facility.

Table 11

Annual Operations Multipliers

Industrial output	1.02
Value added	1.02
Labor income	2.01
Jobs	3.28

Other Economic Consequences and Considerations

There are two conventional measures of economic activity when evaluating public works and civil projects. As has just been described, there are the regional economic consequences of construction activity during its duration as well as the annual contribution to regional productivity that would be measured from the ongoing operation of the facility. Those values are best measured using current and regionally-configured input output models. The other type of standard economic measure looks at the production of discernible and tangible benefits relative to the public's costs. Those outcomes are measured using benefit-costs evaluation techniques and principles based on the sum of social enhancements (or welfare gains) that are generated from, in this case, electricity generation.

This analysis does not evaluate the benefits or the costs of an incremental gain in hydroelectric power generation in the region, and the results of this analysis should not be construed to represent benefits within the very restricted meaning of the term when referring to civil engineering projects.

However, both during the period of construction and thereafter, there may be negative economic consequences as well as a diminution of benefits in the region. As the Red Rock Dam is an established and popular fresh water recreation area, any activities that interfere with recreational opportunities may have consequences for users as well as area vendors that supply those users. Construction of the facility may interfere with fishing at the site or in the tailwaters for portions of the year and may result in shifts in fishing preferences or fishing quality. As there is an ample supply of fishing locations as well as other water recreation opportunities in the region, there will likely be shifts to the next acceptable nearby substitutes within the region during the construction period. Stated simply, losses in the immediate area of construction may result in concomitant gains at other recreational venues still within the region yielding no appreciable net economic impact.

There may, however, be a minor diminution of water-recreation benefits both during construction and thereafter as the hydroelectric facility may alter the actual quality of angling in the region or other amenity attributes. The project has agreed as part of the FERC license to construct an additional fishing pier, which may work to enhance the recreational value of the site. Alterations in regional recreational value may be more than a minor consideration, but absent a scholarly analysis that reliably projects those potential changes, it is reasonable in the interim to assume that they are negligible, short-term, and that the sum of water-based recreational benefits in the area will not be altered significantly in the long run by the RRHP.