PUBLIC SECTOR CONSULTANTS

Memo

TO Josh Burgett, Executive Director, Consumers Energy

FROM Maggie Pallone, Vice President, Public Sector Consultants

DATE Friday, August 18, 2023

SUBJECT Statewide Economic Contribution Analysis

Introduction

Consumers Energy (Consumers) engaged Public Sector Consultants (PSC) to analyze the economic contributions of its 13 hydroelectric dams and their associated impoundments. In addition to these individual studies, PSC conducted an additional statewide economic contribution analysis using the aggregate totals of recreation and property analysis data in a statewide IMPLAN model.

This economic contribution analysis differs from a related approach called economic impact analysis. While both approaches use the same models to simulate the economic effects of a resource, they differ in some basic assumptions. Economic contribution analyses are a current-state snapshot of the overall market and make no assumptions about future changes in the underlying economy. Rather, they measure the economy-wide effects of the current level of activity of a business or industry, or, for this study, the activity generated from recreational assets. Economic impact analyses, on the other hand, are commonly used to measure the economic effect of a business or industry being added to, or lost from, the local economy. It accounts for the differences in economic activity that will result from the gain or loss.

Statewide Recreational Spending Analysis

Using IMPLAN, as well as data collected from local and state sources, PSC estimates that the recreational spending at each of the dams directly supports 1,420 jobs in the region and about $76 million in value-added to the region's economy on an annual basis (Exhibit 1).

EXHIBIT 1. Economic Contribution Analysis Results

Contribution Type	Employment	Labor Income	Value-added
Direct	1,420	$48,969,737	$76,234,482
Indirect/induced	636	$38,649,802	$62,800,944
Total	**2,056**	**$87,619,539**	**$139,035,426**

Source: PSC analysis

This recreational activity contributes more than $35 million in total annual tax revenue, with nearly $20 million at the local, county, and state levels (Exhibit 2).

EXHIBIT 2. Tax Contributions

Contribution Type	Local	County	State	Federal	Total
Direct	$4,390,847	$996,629	$8,387,687	$7,900,031	**$21,675,194**
Indirect/induced	$1,715,015	$383,805	$3,749,258	$7,510,893	**$13,358,970**
Total	**$6,105,862**	**$1,380,434**	**$12,136,945**	**$15,410,923**	**$35,034,164**

Source: PSC analysis

Hedonic Analysis

PSC also conducted a hedonic analysis, which assesses the contribution of various characteristics to property values. For the purposes of this analysis, it was designed to estimate impoundment contribution to residential property values in areas where 20 or more such properties exist (Exhibit 3).[1] Statewide, the pond adds about $130 million of market value to adjacent properties, resulting in $2.3 million of real property taxes.

EXHIBIT 3. Hedonic Analysis Results for Assessed Value and Tax Revenue

	Number of Properties	Total Estimated Market Value Enhancement	Total Estimated Tax Revenue Enhancement
Adjacent	1,525	$129,999,974	$2,341,764
Baseline	13,839	$0	$0
Total	**15,364**	**$129,999,974**	**$2,341,764**

Source: PSC analysis

Key Takeaways

- The recreational spending around these impoundments directly supports nearly 1,420 jobs across the state.
- In addition to these direct jobs, the indirect and induced purchases made by households and businesses support another 636 jobs statewide.
- Dam-related recreational spending adds nearly $140 million to the state's gross state product each year.
- This spending generates nearly $20 million in local, county, and state tax revenue annually.
- Residential properties adjacent to dam impoundments are estimated to add nearly $130 million in market value and increase tax revenues by $2.3 million.

[1] Hardy, Croton, Rogers, Calkins Bridge, Webber, and Mio Dams

Appendix A. Methodology

IMPLAN Modeling

To analyze the amount of money visitors and residents spend on recreation related to the dam impoundments, Public Sector Consultants used IMpact for PLANning (IMPLAN), an input-output model, to estimate economic impacts and contributions. It is a staple for regional economic analysts.

Economic Impact and Contribution Analyses

There are two major frameworks for input-output simulations. The first is an economic impact analysis, which examines the effect of something that affects the economy—like changes in wages or jobs—in a specific area. In this case, it is the dam impoundment and the recreational activities and expenditures associated with it. Because an economic impact analysis provides a model of what the economy is like with the economic feature being examined—in this case, the dam impoundment—a full accounting of what the economy would be like without the feature is required in modeling the outcomes.

The second framework is called an economic contribution analysis. This framework doesn't take the possible absence of an economic feature into consideration. It only models the value of economic activity that can trace its source back to the existence of the economic feature being modeled.

IMPLAN Terminology and Methodology

Input-output models trace transactions among and between different economic sectors (like households, businesses, and governments) over the course of a year. Tracing these transactions offers a clearer picture of how a change in economic activity in one part of the economy creates changes in other parts of the economy. When a business sells from inventory, it takes a portion of those earnings to pay for other goods and services (for example, to restock its inventory). Some of the wages companies pay to employees will go to local retailers and service providers, continuing the ripple effect throughout the economy. Because of all of these additional transactions, the overall economic effect is greater than the value of all the different direct revenue streams (employer to employee, consumer to business, business to business, etc.), which is called the multiplier effect. The existence of multiplier effects in regional and national economies is well documented in economics literature (Coughlin and Mandelbaum 1991).

Direct Effects

The standard approach to modeling economic impacts with input-output models is to begin by establishing the value of transactions that represent direct expenditures related to the dam and impoundment. For the purposes of this study, these are expenditures by individuals utilizing impoundment, feeder river system, and other adjacent recreational facilities. The direct effects of this spending are organized into various commodity categories. Each commodity type, such as grocery retailing, gasoline, and restaurant meals, have unique economic profiles in the local economy. For example, purchases made at a local grocery store create a different set of secondary transactions than purchases made in other industries.

While recreational expenditures make up the direct effects, they are largely derived from the number of recreational users at facilities around the impoundment. As discussed above, the analysis assumes that these users will spend money in a particular pattern while visiting recreational assets in and around the

dam impoundment. The expenditure profile used for this analysis is an inflation-adjusted version of the one adopted by the United States Department of Agriculture and United States Forest Service (USDA/USFS)(White 2017). Expenditures by recreational users are measured on a per-party basis. To account for the different spending patterns of impound visitor types, party counts were broken out into distinct categories.

Indirect and Induced Effects

These direct effects are then used to estimate the secondary transactions that happen because of the direct effects. The first set of secondary transactions is the indirect effects, which are transactions between business sectors. Indirect effects are the intermediate purchases of goods from one business by another (such as restocking). A business's operational costs—like electricity, rent, and business services—are also indirect effects. Indirect effects ripple throughout the economy as businesses purchase goods and services from other businesses. These transactions cascade throughout the region, reduced only by the extent that inputs are purchased from suppliers outside the region. The second set of secondary transactions are called induced effects. Induced effects measure the value of new transactions by households, governments, and other institutions in response to higher labor income, taxes, and profits. These household and institutional expenditures from earnings generate new rounds of business-to-business transactions and associated payments to institutions. These expenditures continue throughout the regional economy, hampered only by the extent to which purchases are made for goods, services, and payments to institutions outside the local economy. The direct, indirect, and induced effects are summed together to calculate the total economic effects.

Contribution estimates start with the estimated total value of purchases by category. Standard input-output models examine the economy through the flow of transactions. However, figures for employment, labor income, and total regional income, which are also known as contributions to gross state product, are determined with fixed ratios to the value of sales transactions. For instance, if Industry X employs one employee for every $1 million in sales, then an increase in sales by $10 million translates into an increase in employment by ten workers. Similar fixed ratios for labor income and gross state product apply. The IMPLAN model provides 544 expenditure categories, and 11 household types by income group.

Hedonic Analysis

If a dam impoundment is an amenity that adds value to surrounding properties, people will be willing to pay more for a property near the impoundment than they would for a property not near the impoundment. Alternatively, if a dam impoundment is detrimental, people will want to pay less for a property near the impoundment than they would for a property not near the impoundment. The actual value that an amenity adds to a property can overlap with other property attributes, so determining how much the amenity contributes to a property's value is difficult without a detailed case-by-case analysis of individual properties.

To address this problem, economists created a model approach called hedonic analysis to statistically control for other factors that contribute to property values. Researchers compare the values of properties near the amenity to properties not near the amenity when holding all other factors constant. For example, because there is limited lake-adjacent property, developers usually restrict the lot size of waterfront properties. Because smaller lots are generally considered less desirable than larger lots, holding all other factors constant, waterfront properties should cost less than larger lots away from the water.

If an analysis compares the market value of waterfront lots to the value of lots away from the water without considering the smaller waterfront lot sizes, the analysis will underestimate the value the amenity brings to adjacent properties. Once the analysis acknowledges that smaller lot sizes along the water should suppress waterfront property values, the true relationship between prices and proximity to the water is revealed. Other factors apply, and once accounting for all relevant factors that explain market values, the remaining difference between the expected value and the actual value is then statistically determined as the overall average realized property premiums of properties in proximity to the body of water relative to baseline properties distant from the water (Monson 2009).

For this study, the model limits the impoundment's influence on those properties immediately adjacent to the impoundment. This is a conservative restriction on the expected influence the impoundment has on property values and property tax revenues. The comparison group of properties are lots in a two-mile band around the impoundment to ensure common markets with those properties bordering the impoundment.

There are two measures of residential property values: assessed and taxable values. Property information was provided by the county assessor offices and followed a common construct. The property variables are lot size and dimensions, address, owner's home mailing address and zip code, city/township jurisdiction, school district, property type, and taxable status. The importance or weight of each factor on the overall assessed value is determined statistically by the hedonic model. The analysis used these variables, including values derived from them, to determine the factors that contribute to the properties' overall assessed and taxable values.

Other factors not represented in the analysis may also contribute to a property's overall value. Typically, there is a fair amount of variation in these other factors—like structure type, size, number of rooms, and presence of a garage—such that excluding them from the analysis is not expected to result in systematic bias in the estimated values.

GIS mapping software was applied to spatially determine lot locations relative to dam impoundments. Adjacent properties are those sharing a border with the impoundment. Comparison properties, up to two miles away, were determined based on the nearest geographic distance of the property centroid to the impoundment edge. Taxing status was both used as a variable to determine property value and to calculate the net expected tax contributions of properties adjacent to the impoundment.

All the comparisons were made on expected values, controlling for other factors. To control for the possibility that any estimated price differences between properties and types of properties was not due to random chance, testing for statistical significance in property price differences was done but is not reported in the narrative. Once significance is established, the average differential can be applied across all corresponding residential properties to derive an overall estimate of the residential property values and property tax revenues that can be attributed to the impoundment.

References for Appendix

Coughlin, Cletus, and Thomas Mandelbaum. January 1991. "A Consumer's Guide to Regional Economic Multipliers." *Federal Reserve Bank of St. Louis Review* 73: 19–32. Accessed February 20, 2023. https://files.stlouisfed.org/files/htdocs/publications/review/91/01/Consumer_Jan_Feb1991.pdf

Monson, Matt. July 1, 2009. "Valuation Using Hedonic Pricing Models." *Cornell Real Estate REview* 7: 62–72. Accessed February 20, 2023. https://ecommons.cornell.edu/bitstream/handle/1813/70656/2009_62_73_Monson.pdf?sequence=1&isAllowed=y

White, Eric. 2017. *Spending Patterns of Outdoor Recreation Visitors to National Forests*. Corvallis: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Accessed March 6, 2023. https://www.fs.usda.gov/pnw/publications/spending-patterns-outdoor-recreation-visitors-national-forests