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Estimated State and Regional Economic Impacts of the Facilities for Rare Isotope Beams

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December 14, 2016

The Facilities for Rare Isotope Beams

In December of 2008, the U.S. Department of Energy selected Michigan State University's National Superconducting Cyclotron Laboratory (SCL) to design, implement and operate the Facility for Rare Isotope Beams (FRIB). This facility will build on MSU's leadership in nuclear physics research and education and will replace an existing federal funding line due to expire in 2016. In many ways, the FRIB will complement the rich history of research coming out of the SCL and expand this research to meet today's science, industry and national research needs.

The FRIB represents a significant investment in infrastructure and research on the East Lansing Campus of Michigan State University and will have a discernable, positive impact on regional and state economic activity. The research into this report was funded by the Office of Government Affairs at Michigan State University to estimate the geographic distribution of economic impacts across the state and to update a prior economic impact estimate conducted by the Anderson Consulting Group, LLC undertaken in 2008.

FRIB construction began in 2014, preceded by significant investment in planning and design that invoked leadership from MSU and from scientific, architectural, and engineering circles around the world to build this one-of-a-kind research facility. The actual construction and much of the material inputs are supplied from in-state sources, as well as much of the technical inputs and services. However, specialty research-related instrumentation and controls were imported into the region from specialty suppliers around the world, that may have been supplied from industrial suppliers and even other university research centers.

This report was undertaken to better understand the economic impacts of the establishment and operations of the FRIB based on expected expenditures. In this, the values of allocated expenditures since the Department of Energy (DOE) approval of the FRIB are used to estimate the actual economic impacts between fiscal years 2009 and 2015, and projected expenditures from fiscal years 2016 to 2040. Limiting the analysis to allocated expenditures omits some relevant sources and constraints to estimated impacts as described in this report.

Summary of Findings

Total federal allocations for the construction of the FRIB are expected to total \$635 million, while state investment is expected to total \$94.5 million. Actual construction started in 2014 and is expected to wind down in fiscal year 2021. The DOE has also allocated \$300 million to be distributed annually for the operations of the FRIB. This will augment the expected annual operating costs and revenues through research grants and fee for services. Operational impacts are projections starting in fiscal year 2021 through 2040. As of this writing, expenditures up to the end of fiscal year 2015 have been documented. The remaining expenditures represent planned expenditures and may deviate from initial projections in this report. This excludes some potential sources of impacts to the state. Such exclusions include the economic impact of potential spinoff businesses and commercialization of technology developed with the facilities.

It also excludes potential gains in research funding that may arise from the presence of the facilities.

Impact estimates were created for two phases of the FRIB. The first is a construction phase (fiscal years 2009-2021) for the installation of the new facilities, while the second is for the operational phase (fiscal years 2021-2040). Expenditures were allocated to 14 regions making up the state of Michigan and trade flows across the 14 regions were used to estimate region-specific impacts. Key findings attributed to construction activity of the FRIB between fiscal years 2014 and 2019 include:

- Construction expenditures are expected to mostly take place between the fiscal years 2014 and 2019.
- A total of \$730 million will be spent during the construction phases, including \$94.5 million in state investment and \$635.5 million committed by the U.S. Department of Energy.
- About 83 percent of construction expenditures will go directly to Michigan businesses and workers.
- FRIB construction is expected to generate an average of 779 direct jobs through construction expenditures and 1,535 total jobs, when accounting for secondary transactions.
- FRIB construction will raise Michigan total labor income by \$76.8 million annually
- The average in-state annual construction expenditures of \$82.8 million will generate in-state transactions total \$149.0 million per year.

Key findings attributed to operational activity of the FRIB between fiscal years 2021 and 2040 include:

- FRIB operations are expected to support 260 full-time equivalent positions at the facility, but when accounting for full- and part-time work and indirect administrative positions, just under 390 direct jobs are expected that give rise to approximately 1,002 jobs state-wide.
- On average, operations will generate \$55.6 million in state-wide labor income
- Average annual operational, in-state expenditures of \$77.3 million are expected to generate \$159.5 million in transactions state-wide.
- Operations of the FRIB will likely draw in research investments into Michigan not captured in operational budgets.
- The FRIB will contribute to commercial applications and may contribute to business formation not captured in this impact assessment.

This report assesses the overall merit of Michigan public investment in the FRIB. In this key findings include:

- State investment is leveraged by federal investment by the Department of Energy, resulting in high returns to public investment.
- Over the 32 years from development to the planned life of the FRIB, this project will generate \$1.7 billion in wage and salary income, contribute \$2.4 billion in gross state product and \$4.4 billion in state-wide transactions. On average 1,001 jobs will be created.
- Accounting for all associated impacts, the \$94.5 million state investment in the FRIB is expected to generate \$205.5 million in tax revenues over the 32-year life. Discounted to 2009, this suggests a return of \$100.3 million to the state's initial investment

This report details the methods and findings of the expected economic impact of the construction and operations of the FRIB, and breaks expected impacts out by 14 regions making up Michigan. Estimates are limited to budgeted expenditures at the time of this writing and exclude some relevant sources of economic impacts that may increase the total economic value of the FRIB. It is not intended to provide a fiscal assessment in terms of the impacts to state tax revenues. Additionally, estimated impacts do not net out state investment of \$94.5 million, but net present value calculations on the public return do net out state expenditures in their calculations.

The report starts by describing the methods used in collecting data and modeling the economic impact estimates. This is followed by detailed findings that separate direct and total impacts by region. The report conclusion summarizes the findings and details model limitations.

Methods

Construction Phase Data

Planning and construction expenditure data and estimates were collected from the FRIB management team, from the MSU Infrastructure Planning and Facilities (IPF), and from the MSU Office of Planning and Budget for payroll expenditures, material purchases and the acquisition of services, up to the end of fiscal year 2015. The MSU Enterprise Business Systems (EBS) database provides vendor location by zip code and a description of the purchase for coding into geographic regions and industry sectors. EBS also provides direct professional services and employment by residence for allocating salary distributions by geography. Using the EBS system for FRIB-related expenditures allows a full accounting of the geographic dispersion of direct expenditures and accounting for vendor sectors necessary to drive a multi-regional, economic impact simulation model.

Regional and industry delineations were only available for actual expenditures from fiscal year 2011 to 2015. The geographic and sector allocations of construction expenditure projections from fiscal year 2016 to 2021 were based on these historical distributions. As such, this report will document actual expenditures through fiscal year 2015 and projected expenditures beyond 2015. To time planned expenditures, planned aggregate expenditures by fiscal year were used based on the schedule shown in Figure 1. In this, sectoral and geographic expenditures were extrapolated based on actual and planned total construction expenditures. An additional installation budget was provided by FRIB administration. Projections of these expenditures were

based on a simple allocation from 2015 to 2020 for utility connections was assumed as shown in Figure 1.

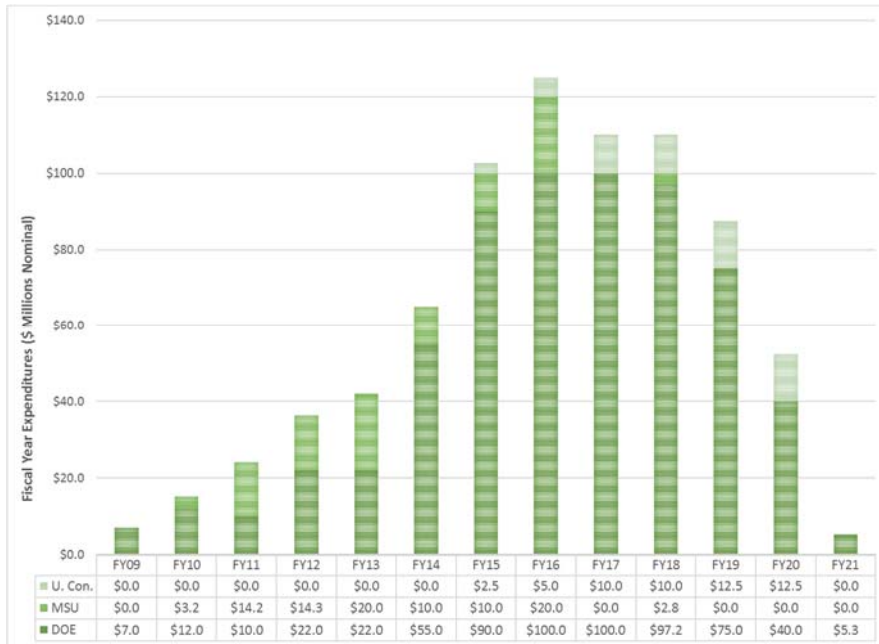


Figure 1: Temporal Distribution of Construction-Related Expenditures

The geographic distribution of impacts is based on the 14 regions defined by MSU Extension Services. These regions do not represent distinct regional groupings of economic activities or demographics, but rather reflect a regional detail used by MSU Extension in administering Extension programs and are used by the MI Spartan Impact reporting system (Michigan State University 2016). Figure 2 shows these impact regions.

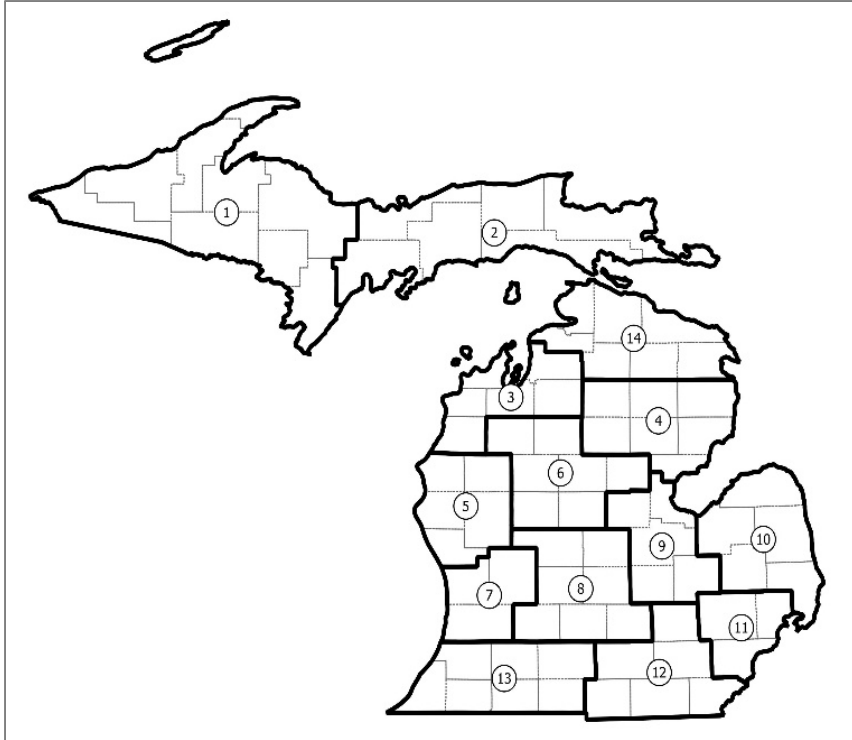


Figure 2: Map MSU Extension Regions

As expenditures and salaries are reported by zip codes, distributing to appropriate MSU Extension Regions required mapping those zip codes to distinct regions. This was accomplished with a simple GIS layering of Michigan Zip Codes into MSU Extension regions. Despite this inherent simplicity, a limited number of zip codes cross into multiple MSU Extension boundaries. Hence, exact centroids (or geometric center) of all zip codes were created and the MSU Extension region was assigned to the location of the centroid.

Using the temporal distribution of expenditures and the spatial distribution of expenditures from 2009 to 2015, a spatial and temporal allocation of actual expenditures through 2015 and planned transactions through fiscal year 2021 is created. This allocation of actual and planned expenditures is then distributed by year for modeling economic impacts.

Figure 3 shows the expenditure shares by region between 2009 and 2015, indicating that most direct expenditures accrued to regions in the Lower Peninsula. More specifically, Region 11 around the Detroit Metropolitan Area received approximately 36.8 percent of expenditures, while Region 8, encompassing the FRIB construction site received about 22.7 percent of the expenditures. In addition, about 17.8 percent of expenditures took place outside of Michigan.

The direct expenditures in Figure 3 only paint a partial picture of the true allocation of economic impacts of the construction expenditures. This is because businesses transact with other businesses within and outside of Michigan. Some of these expenditures will cross regions, as determined by trade flows as described in the next section.

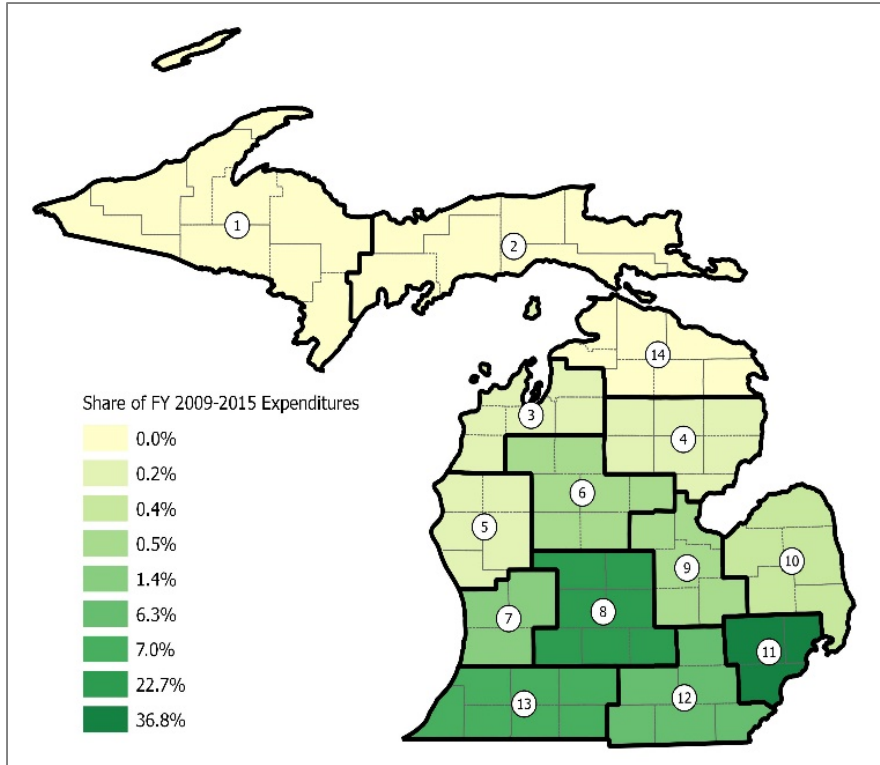


Figure 3: Geographic Distribution of FY 2009-2015 Construction Expenditures

Operational Phase Data

Operations impacts are those impacts stemming from the FRIB ongoing operations. They are estimated based on FRIB management projected operation budgets and represent a business-as-usual scenario. The annual operating budget is largely expected to be stable over time. However, such is subject to change through future enhancements of the facilities, of which, such unforeseen future investments should be attributed to this initial investment in developing the FRIB. As a corollary, consider all the intermittent investments in the MSU Cyclotron that raised it from being rated a K50 in 1965 to K1200 facility in 1989, with each successive increase in power associated with significant investment in upgrades to apply the latest technological advances. Regardless, at this point in time, such future endeavors are not foreseeable, and therefore not included in the economic impact estimates.

Pro-forma operational budgets were provided by the FRIB administration team, as approved by the Department of Energy (DOE), and span the operational years of fiscal year 2021 to 2040. The annual operating budgets break expenditures down into distinct functions and are mostly comprised of wages, salaries and benefits. For 2021, the total operational budget is expected to be \$88.165 million, supporting 267 FTE positions that include scientists, technicians and engineers, and other support staff. This includes the retention of \$7 million that currently is allocated to the SCL for the operation of the current Cyclotron, and would be forfeited in the absence of the FRIB. Baring unforeseeable changes in DOE allocations, these expenditures are

expected to rise with inflation (set at 2.5 percent per year for modeling)¹, while staffing counts are expected to remain constant. Because the FRIB has a substantial energy draw, a significant component of the annual budget is the cost of generating or purchasing electricity.

The base budget is advanced each year to account for inflation and wage increases. While the DOE approved an annual rate of 3.2 percent, we applied a more conservative 2.5 percent annual increase, which is more aligned with the U.S. Congressional Budget Office estimate of 2.0 percent (U.S. Congressional Budget Office 2016).

As operational expenditures are largely expected to take place in the proximity of the FRIB facilities, all direct infusions to the state economy are assumed to take place in the home Region 8. In this, while direct transactions are modeled to be limited in this region, secondary transactions that contribute to total economic impacts are free to flow across regional lines and outside of the state, depending on the sector trade flows described below.

IMPLAN

The impact simulation model used in this analysis is the IMpact for PLANning (IMPLAN) model for Michigan by county, using 2013 transactions. The IMPLAN model (IMPLAN Group LLC 2015) is a multi-regional input-output (MRIO) model for estimating economic impacts. Economists routinely turn to regional input-output models for simulating economic impacts of new infusions into local economies. These models trace the transactions that occur amongst producing sectors and across producing sectors and institutions like households and government. By tracing these transactions, a more complete image of how a change in one sector of the economy materializes into changes in other sectors through transactions in the course of producing goods and services is realized. As each sector interacts with institutions, the regions' institutions will also be impacted, changing the basket of goods and services they purchase. For example, an increase in labor income will result in higher household expenditures – some of which will go to local retailers and service providers. Because these models generate economy-wide impacts that exceed the direct change in economic activity, the resulting impacts are generally termed multiplier effects and are well documented in the economics literature (Coughlin and Mandelbaum 1991).

Input-output models account for these transactions using the National Benchmark Input-Output Accounts reported every five years by the U.S. Department of Commerce's Bureau of Economic Analysis (Bureau of Economic Analysis 2013). The last such estimate was for 2012. Because the National Benchmark Input-Output Accounts are national in scope, the transactions are regionalized to reflect the industries and institutions that reside in the defined economic region (Jackson 1998). For example, it accounts for the fact that no oranges are grown in Michigan in the production of orange juice, but they are grown nationally.

The standard approach to impact modeling with input-output models is to establish the direct infusion of new transaction by commodity. This new infusion is the transactions that would not

¹ Allocations for inflation adjustment have been set at 3.2 percent per year; however, we set the model parameter to a more conservative estimate of 2.5 percent based on Congressional Budget Office projections.

have taken place in the absence of the FRIB, and for this analysis, includes the construction phase and the operational phase expenditures. Using standard modeling terminology, this new infusion is referred to as the direct effects, as they are directly linked to the construction and operations of the FRIB facilities. The model uses these direct effects to estimate secondary transactions arising in response to the direct effects. The first set of secondary transactions is the indirect effects, which are transactions between business sectors. Indirect effects arise because direct purchases of goods require the selling firm to restock the goods sold. They also arise as the proportionate share of the selling firm's costs of operations for such expenditures as electricity, rent, business services and others. Indirect effects ripple throughout the economy as the initial selling firm also purchases inputs from other firms. This continuum continues 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, government and other institutions in response to higher labor income, taxes and profits. The total effects are simply the sum of the direct, indirect and induced effects.

This analysis deviates from conventional input-output economic impact estimates, in that the model used links multiple modeled geographies into a single model. This MRIO structure allows for the simultaneous accounting of trade flows across Michigan regions and the distribution of direct purchases across regions. Cross regional transactions are estimated using trade-transportation flow estimates across and within counties (Lindall, Olson et al. 2006, Minnesota IMPLAN Group N.D.). Through this multi-regional structure, secondary transactions can be traced within and across regions and back, providing a much more complete assessment of the overall economic impacts associated with the construction and the operations of the FRIB.

Standard measures of impacts include the number of jobs created, labor income associated with those jobs, the total value of transactions and new value-added activities, which is another term for contributions to gross state product. Impact estimates start with the estimated total value of purchases by category. The IMPLAN model provides 536 expenditure categories, and 11 household types by income group. The expenditure categories represent economic sectors in the modeling region, each with specific expenditure patterns in the production of goods and services. Hence, each expenditure category is associated with a unique economic impact profile. Institutions also have unique purchasing patterns that present a second set of unique impact profiles. These impact profiles are best approximations to actual industry expenditures on inputs, labor, rents and payments to owners. As such, estimated impacts may differ from actual impacts. The best case in point is employment impacts. Direct employment impacts are estimated as a fixed ratio of industry average employment per \$ million in industry sales and are calculated at the industry level. However, any one supplier may have a very different hiring practice or employment to sales ratio than the industry average. In the case of construction expenditures, it is not uncommon to find that direct jobs estimated do not match with actual jobs counted. Hence, we parameterize the employment direct effect estimates against actual estimated annual employment at the construction site for Region 8 impact estimates in 2016. As other factors may

contribute to such miss-matches in measurement, like the seasonality of employment, the measures are not expected to be on par, but rather in the neighborhood of actual observed direct impact estimates.

Standard multiplier interpretations do not hold in MRIO model estimates, as the strict link from regional direct effect to total effect is interrupted by the infusion of multi-regional contributions to total effects. That is, for single region models, a region's total effect is a multiple of and only of the region's direct effect. But for a multiple region model a region's total effect is a compendium of its direct effect and the secondary effects of other regions' purchases from the modeled region. Hence, multipliers do not follow well established bounds of predictable single-region multipliers.

Michigan's 83 counties were mapped into 14 distinct regions as shown in Figure 2. Then regional IMPLAN models were built for each of these 14 regions. Expenditure records from fiscal year 2009 to 2015 were then tabulated by year into 15 regions – the 14 MI Extension regions and non-Michigan regions. The difference between these expenditures to date and total expected construction expenditures were then projected by planned annual expenditures shown in Figure 1, using the 2009-2015 geographical allocations of actual expenditures. Using the 14-linked IMPLAN models, each of the 14 regional models were ran for consecutive odd-numbered years starting in 2009. Even numbered years' impact estimates were extrapolated from odd numbered years for post 2015 estimates based on Figure 1 due to excessively long run times of the model.²

Findings

Estimated Construction Impacts

The construction phase is broken out into three categories, Civil Construction and Technical Construction and utility connection installation. Civil Construction is for office space construction and land improvements while Technical Construction entails the primary research facilities and installation of technical fixtures and equipment. Utility connection installation entails all expenditures to connect the FRIB to MSU and other power generation and distribution sources of electricity. The three construction categories were combined into single model runs because computing capacity was a constraint. A complete table of estimated impacts is presented in the Appendix 1 of this report. Because this is a lot of data to interpret, we present summaries of the findings here.

In total, about \$647 million of the \$730 million expected construction-related expenditures are expected to be realized in Michigan between fiscal year 2009 and 2021. This includes civil, technical and utility connections. About 17 percent of civil and technical construction

² In all there were 13 years and 14 regions to model generating a total of 182 model runs. Each model run took from 20 to 30 minutes to complete. Completing all model runs would have required at least 60 hours of computing time to complete. By only estimating odd numbered years, total computer time was reduced to about 32 hours.

expenditures are expected to accrue to vendors outside of Michigan, while most utility-connection-related expenditures will accrue within the state.

The average annual impacts for fiscal years 2014 through 2019 are reported in Table 1 below. These impact estimates correspond with the heavy construction phase of the project, where initial construction started in 2014. On the back end, construction is due to taper off, depending on how well the construction effort meets planned milestones.

Table shows the estimated average annual direct expenditure impacts by region from Fiscal Year 2014 to 2019. Direct expenditures are those in-state expenditures generated from the actual construction of the FRIB facilities. Table 1 does not include annual estimates in planning for construction nor construction-related expenditures past 2019 for finishing of grounds and other miscellaneous, post construction expenditures. As evident in Table 1, impacts are dispersed throughout the 14 Michigan regions. However, Regions 8 and 11, which include to the Lansing-East Lansing and Detroit metropolitan areas respectively, are poised to receive the largest impacts in terms of jobs and output. Other in-state expenditures are expected to be widely distributed across other regions of the state, where total expected annual expenditures (sales) of \$46.2 million is expected to generate an average of 276 jobs between FY 2014 and 2019 with total labor income of \$15.8 million.

| Region | Employ | Labor Income* | Output (Sales)* | Value Added (Gross Regional Product)* |
|--------------|------------|-------------------|-------------------|---------------------------------------|
| State | 276 | 15,805,326 | 46,158,462 | 19,117,017 |
| 01 | 0.0 | 172 | 455 | 201 |
| 02 | 1.0 | 24,752 | 71,371 | 34,724 |
| 03 | 0.6 | 27,718 | 86,228 | 33,629 |
| 04 | 0.7 | 17,449 | 78,731 | 23,034 |
| 05 | 1.5 | 42,150 | 125,177 | 53,455 |
| 06 | 1.8 | 80,629 | 273,719 | 94,889 |
| 07 | 6.3 | 283,122 | 789,815 | 366,062 |
| 08 | 83.6 | 3,861,593 | 12,804,483 | 4,828,624 |
| 09 | 24.8 | 1,184,861 | 3,202,074 | 1,441,253 |
| 10 | 1.5 | 51,860 | 172,609 | 69,635 |
| 11 | 110.9 | 7,796,445 | 21,131,946 | 9,275,699 |
| 12 | 19.4 | 1,031,588 | 3,226,470 | 1,233,047 |
| 13 | 23.8 | 1,386,862 | 4,137,948 | 1,641,672 |
| 14 | 0.4 | 16,125 | 57,436 | 21,092 |

Table 1: Average Annual Direct Impacts from Construction (FY 2014-2019)

** Dollar values based on 2016 dollars*

Direct expenditures will give rise to secondary transactions as shown in Table 2. Each region's secondary impacts arise from secondary transactions across the state. As shown in Table 2, the distribution of secondary effects largely follows that of the direct effects, though the Detroit region (Region 11) appears to have a larger draw on associated secondary transactions. In total, average annual secondary transactions between FY 2014 and 2019 are expected to reach \$37.4 million, supporting about 279 jobs with annual payroll of about \$12.3 million.

| Region | Employ | Labor Income* | Output (Sales)* | Value Added (Gross Regional Product)* |
|--------------|------------|-------------------|-------------------|---------------------------------------|
| State | 279 | 12,284,498 | 37,415,253 | 20,820,964 |
| 01 | 0.2 | 8,233 | 39,217 | 14,548 |
| 02 | 0.5 | 13,836 | 61,826 | 28,290 |
| 03 | 1.0 | 40,570 | 132,289 | 62,860 |
| 04 | 0.8 | 23,959 | 102,768 | 43,063 |
| 05 | 1.2 | 44,738 | 194,488 | 88,874 |
| 06 | 3.5 | 129,353 | 454,545 | 205,439 |
| 07 | 11.6 | 539,718 | 1,720,050 | 883,210 |
| 08 | 62.8 | 2,158,908 | 7,212,003 | 4,013,749 |
| 09 | 20.7 | 773,439 | 2,588,665 | 1,368,529 |
| 10 | 1.9 | 74,223 | 336,887 | 148,285 |
| 11 | 134.7 | 6,825,602 | 18,986,756 | 11,020,017 |
| 12 | 18.7 | 814,523 | 2,858,260 | 1,481,036 |
| 13 | 20.3 | 799,537 | 2,581,974 | 1,399,531 |
| 14 | 1.0 | 37,859 | 145,526 | 63,533 |

Table 2: Average Annual Secondary Impacts from Construction (FY 2014-2019)

* Dollar values based on 2016 dollars

Total impacts are the sum of direct and secondary impacts. Average annual construction-phase impacts are presented in Table 3 for expenditures from fiscal year 2014 to 2019. They represent the totality of direct and secondary expenditures that remain in Michigan and are reported by region. As indicated in Tables 1 and 2, regions 8 and 11 share is the largest estimated annual impacts, though other regions share in these impacts based on where direct expenditures are made and the flow of secondary transactions across regions. In total, the average annual direct construction expenditures of \$46.2 million (Table 1) is expected to generate about \$83.6 million in annual sales statewide. These annual expenditures are expected to give rise to an annual increase of employment totaling 555 jobs with annual wages of \$28.1 million.

| Region | Employ | Labor Income* | Output (Sales)* | Value Added (Gross Regional Product)* |
|--------------|------------|-------------------|-------------------|---------------------------------------|
| State | 555 | 28,089,824 | 83,573,715 | 39,937,981 |
| 01 | 0.2 | 8,405 | 39,672 | 14,749 |
| 02 | 1.4 | 38,588 | 133,197 | 63,014 |
| 03 | 1.6 | 68,288 | 218,517 | 96,489 |
| 04 | 1.5 | 41,407 | 181,499 | 66,097 |
| 05 | 2.7 | 86,888 | 319,664 | 142,330 |
| 06 | 5.3 | 209,982 | 728,265 | 300,328 |
| 07 | 18.0 | 822,841 | 2,509,865 | 1,249,271 |
| 08 | 146.4 | 6,020,501 | 20,016,486 | 8,842,373 |
| 09 | 45.5 | 1,958,301 | 5,790,739 | 2,809,781 |
| 10 | 3.5 | 126,083 | 509,496 | 217,920 |
| 11 | 245.6 | 14,622,048 | 40,118,702 | 20,295,716 |
| 12 | 38.1 | 1,846,110 | 6,084,730 | 2,714,083 |
| 13 | 44.1 | 2,186,398 | 6,719,922 | 3,041,203 |
| 14 | 1.4 | 53,985 | 202,962 | 84,626 |

Table 3: Average Annual Total Impacts from Construction (FY 2014-2019)

* Dollar values based on 2016 dollars

Estimated Operations Impacts

The DOE has committed to \$1.55 billion in operational funding from twenty years. Expenditures from such funds are expected to start in the fiscal year 2021 and carry on through 2040. However, operations of the FRIB facilities are likely to continue well beyond this span. The fiscal years 2021 and 2040 annual projections were summarily placed into an MRIO IMPLAN model, where all direct expenditures were expected to occur in Region 8. However, secondary transactions across regions are tracked in the model, where the estimated state impact is calculated as the sum of impacts over all regions. The annual inflation adjustment of 2.5 percent per year was applied for the 2040 model run. Only economic impacts for fiscal year 2021 and 2040 were estimated using the IMPLAN model. The inter-year estimates were interpolated by year to generate a consecutive series of estimated annual impacts through 2040. The detailed, annual estimated impacts by region are provided in the Appendix 2.

Table 1 shows the annual average direct expenditure impacts from operations. Direct expenditures are mostly for the operations of the facilities and mostly accounts for personnel and energy inputs. While a minimum amount of direct expenditures may occur outside of Region 8, this assessment asserts all expenditures accrue locally. It is notable that the direct employment estimate exceeds the FTE projections made by the FRIB administration team of 267 full-time equivalent jobs. Two factors contribute to this. First the anticipated FTEs reported by the administration team understates the number of jobs since estimated jobs are a combination of partial and full-time equivalent jobs. Second, along with the FRIB budget, is an allocation to the university for managing the university function and for electricity. This overhead is allocated to the overall university and energy sector and supports additional jobs outside of the FRIB. Hence, the overall direct employment effect is expected to be larger than the number of jobs in FTEs the FRIB employs.

| Region | Employ | Labor Income* | Output (Sales)* | Value Added (Gross Regional Product)* |
|--------------|------------|-------------------|-------------------|---------------------------------------|
| State | 389 | 29,361,043 | 77,347,855 | 34,593,778 |
| 1 | 0.0 | 0 | 0 | 0 |
| 2 | 0.0 | 0 | 0 | 0 |
| 3 | 0.0 | 0 | 0 | 0 |
| 4 | 0.0 | 0 | 0 | 0 |
| 5 | 0.0 | 0 | 0 | 0 |
| 6 | 0.0 | 0 | 0 | 0 |
| 7 | 0.0 | 0 | 0 | 0 |
| 8 | 389.3 | 29,361,043 | 77,347,855 | 34,593,778 |
| 9 | 0.0 | 0 | 0 | 0 |
| 10 | 0.0 | 0 | 0 | 0 |
| 11 | 0.0 | 0 | 0 | 0 |
| 12 | 0.0 | 0 | 0 | 0 |
| 13 | 0.0 | 0 | 0 | 0 |
| 14 | 0.0 | 0 | 0 | 0 |

Table 4: Average Annual Direct Impacts from Operations (FY 2021-2040)

* Dollar values based on 2016 dollars

Secondary impacts are expected to be disbursed throughout the state, depending on trade flows. Table 5 shows the expected secondary impacts, indicating that most secondary impacts are experienced in the home region, Region 8. However, trade flows across regions assert that other regions of the state will also benefit by supplying resources that go into the FRIB operations and through household purchases. State-wide, the operations of the FRIB is expected to generate an increase in employment of 613 jobs annually, with wages totaling \$26.2 million.

Total impacts are calculated as the sum of direct and secondary impacts, as shown in Table 6. There, the estimated average annual total impacts by region is reported. As opposed to construction impacts, the operational impacts are largely consistent from year to year, as discussed in the next section. Regardless, once fully operational, the FRIB will likely support a total of 613 jobs in Michigan, dispersed throughout the state. Most jobs will be generated in proximity of the FRIB, as captured in Region 8 impacts. These jobs are expected to generate about \$26.22 million in labor income with direct and secondary expenditures (sales) totaling \$82.2 million.

| Region | Employ | Labor Income* | Output (Sales)* | Value Added (Gross Regional Product)* |
|--------------|------------|-------------------|-------------------|---------------------------------------|
| State | 613 | 26,220,682 | 82,193,368 | 43,726,195 |
| 1 | 0.1 | 3,956 | 18,739 | 6,436 |
| 2 | 0.2 | 7,358 | 37,986 | 15,230 |
| 3 | 1.0 | 46,578 | 166,276 | 84,913 |
| 4 | 0.2 | 7,646 | 33,469 | 12,531 |
| 5 | 1.1 | 51,203 | 270,454 | 126,849 |
| 6 | 9.0 | 411,293 | 1,305,755 | 616,601 |
| 7 | 31.4 | 1,631,951 | 4,671,236 | 2,505,253 |
| 8 | 494.9 | 19,324,952 | 63,355,195 | 33,614,199 |
| 9 | 7.8 | 364,676 | 1,166,592 | 602,964 |
| 10 | 0.6 | 24,342 | 116,875 | 49,411 |
| 11 | 34.7 | 2,381,548 | 5,524,533 | 3,147,760 |
| 12 | 15.8 | 905,985 | 3,009,197 | 1,514,909 |
| 13 | 15.6 | 1,036,569 | 2,422,062 | 1,386,224 |
| 14 | 0.5 | 22,625 | 94,999 | 42,915 |

Table 5: Average Annual Secondary Impacts from Operations (FY 2021-2040)

* Dollar values based on 2016 dollars

While the operational impacts, as modeled, are to take place between the fiscal years 2021 and 2040, some of the faculty that will be working with the FRIB have already been placed at MSU and others may be added before 2021. As these positions are and will be added because of the FRIB, these early placements are pertinent to the economic impact estimates. However, we refrained from estimating the associated impacts of these early placements on the basis that funding for them up to 2021 largely came from internal funding sources. Impacts from such funds are negated by reductions in other expenditures that would have taken place in their absence. Regardless these positions are likely to generate immediate impacts to the state through federal grant funding they generate. Such impacts are difficult to project and hence, not considered in this report.

Combined Expected Economic Impacts

In this section, we summarize the total state findings over all years and attribute key expected values of the development and operations of the FRIB. In total, about \$730 million will be invested in the construction of the FRIB. Most will be from federal government funds, while about \$94.5 million came from Michigan public funds. Additionally, the DOE will contribute to the operational costs of the FRIB. While much of the construction funds have been spent since 2009, most of these expenditures will be made in Michigan and to Michigan firms and contractors.

| Region | Employ | Labor Income* | Output (Sales)* | Value Added (Gross Regional Product)* |
|--------------|--------------|-------------------|--------------------|---------------------------------------|
| State | 1,002 | 55,581,726 | 159,541,224 | 78,319,973 |
| 1 | 0.1 | 3,956 | 18,739 | 6,436 |
| 2 | 0.2 | 7,358 | 37,986 | 15,230 |
| 3 | 1.0 | 46,578 | 166,276 | 84,913 |
| 4 | 0.2 | 7,646 | 33,469 | 12,531 |
| 5 | 1.1 | 51,203 | 270,454 | 126,849 |
| 6 | 9.0 | 411,293 | 1,305,755 | 616,601 |
| 7 | 31.4 | 1,631,951 | 4,671,236 | 2,505,253 |
| 8 | 884.2 | 48,685,995 | 140,703,050 | 68,207,977 |
| 9 | 7.8 | 364,676 | 1,166,592 | 602,964 |
| 10 | 0.6 | 24,342 | 116,875 | 49,411 |
| 11 | 34.7 | 2,381,548 | 5,524,533 | 3,147,760 |
| 12 | 15.8 | 905,985 | 3,009,197 | 1,514,909 |
| 13 | 15.6 | 1,036,569 | 2,422,062 | 1,386,224 |
| 14 | 0.5 | 22,625 | 94,999 | 42,915 |

Table 6: Average Annual Total Impacts from Operations (FY 2021-2040)

* Dollar values based on 2016 dollars

The prior two sections report the estimated impacts and the distribution of those impacts during the construction phase and the operational phases respectively. Both phases will occur sequentially with minimal overlap. This section will review the sequential impact estimates over time, from fiscal year 2009 to 2040, encompassing the planning phase through the final estimated operational impacts. The complete year-to-year estimated impacts are in Appendix 1 and 2 for construction phase and operational phase impacts, respectively.

The expected direct and total employment impacts are graphed in Figure 4. Up to fiscal year 2015, estimates are based on actual data. Beyond that they are projections based on expected construction and operational expenditures. In fiscal year 2021, there is a slight of overlap with construction expenditures winding down and operational expenditures starting. Beyond fiscal year 2021, employment impacts largely remain unchanged and distributed across the 14 regions.

As notable in Figure 4, both direct and total state employment impacts ramp up considerably during the construction phase, where actual construction starts in 2014 and is largely expected to be completed by 2019. Some installation and construction-related expenditures are expected to take place after 2019, but this is expected to have minor contributions to total state impacts.

Beyond 2021 and during the operational phase, direct and total employment impacts are expected to remain stable.

Economists are often interested in the ratio of total effects to direct effects. This is known as the multiplier of the project. Referencing Figure 4, the implied employment multiplier, as measured by the average over all years is 2.35. This is generally considered to be within the bounds of acceptable estimates but borders on being robust. This ratio implies that for every one direct job, an additional 1.35 jobs are created in the state.

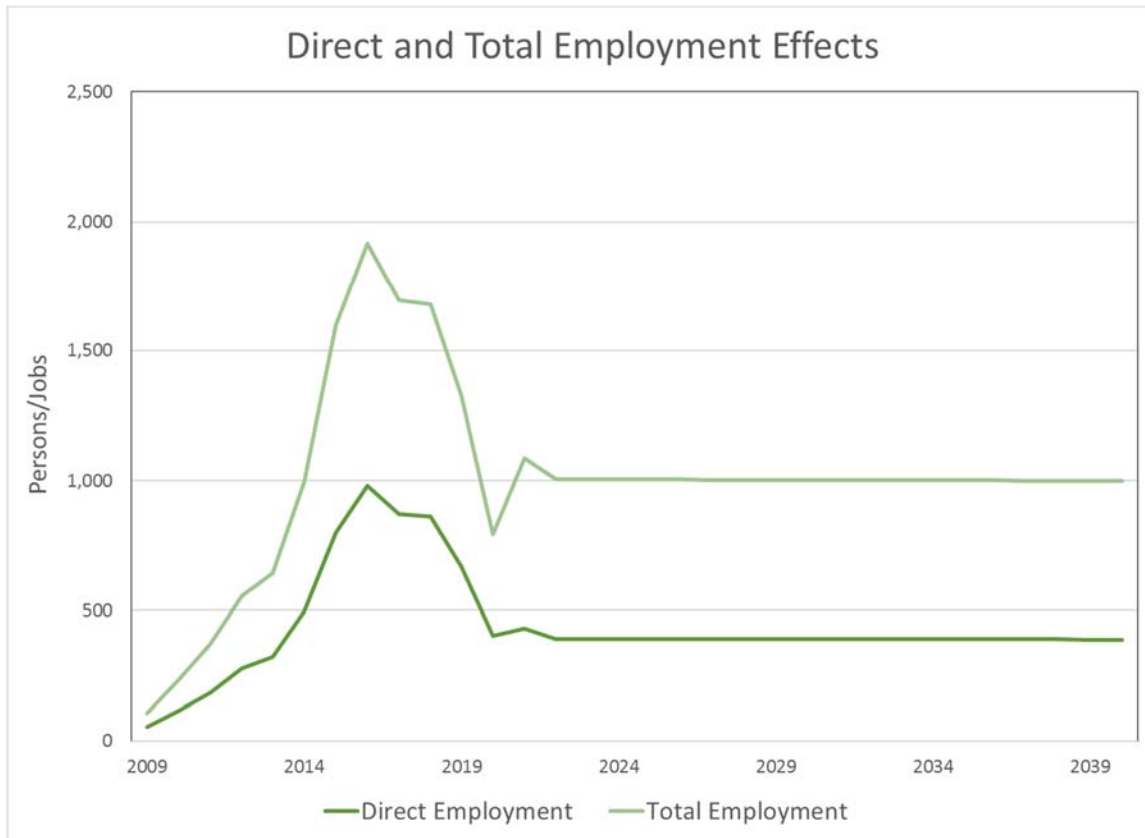


Figure 4: Time Series of State Direct and Total Employment Effects (FY 2009-2040)

Output, as a measure of the value of transactions that arise from FRIB development and operations provides an alternate perspective of state-level impacts. Direct output expenditures largely mirror direct employment impacts, but deviate slightly depending on what inputs and services are purchased. This is because different industries have different labor needs. Figure 5, shows the expected direct and total output effects from fiscal year 2009 to 2040. When compared with Figure 4, the operation impacts in terms of output are much larger than employment impacts. This mostly reflects that the operation of the FRIB facilities is less labor intensive than the construction of the facility. It also suggests that output multipliers, as measured by the annual ratio of total output to direct output is smaller. The implicit annual output multiplier shown in Figure 5, as measured by the average annual output multiplier is a more conservative 1.96. Similar to the implied employment multiplier, the implied output

multiplier suggests that for every one dollar of direct expenditure, an additional \$0.96 is generated in the state economy through secondary transactions.

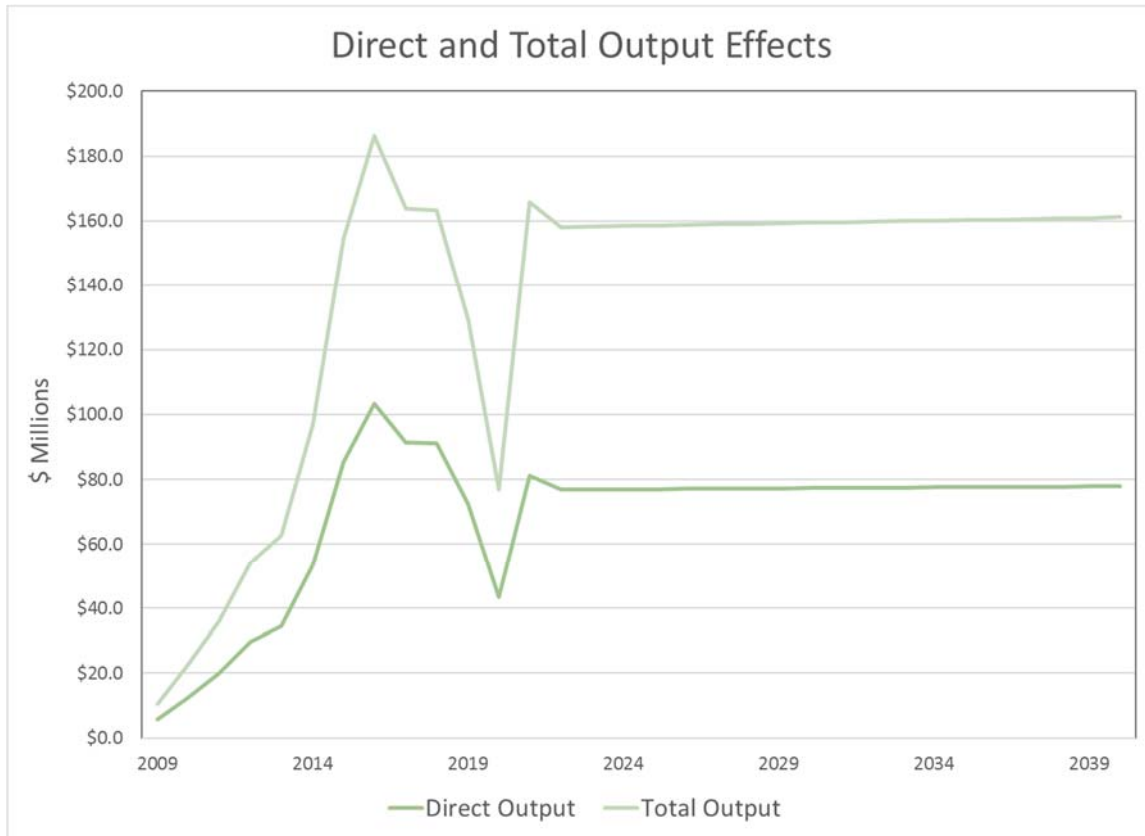


Figure 5: Time Series of Direct and Total Output (Sales) Effects (FY 2009-2040)

The final consideration in this analysis considers state investment in the FRIB and the expected return of that investment. In this, we treat the state investment of \$94.5 million in initial construction and calculate the net present value of the resulting stream of income. To be clear, this is not a fiscal impact evaluation, where government expenditures are compared to tax revenues. Rather we compare public investment of \$94.5 million against public earnings as measured by gross state (regional) product. Gross state product is a measure of total earnings accruing to the state as the sum of labor income, returns to proprietors and business owners and indirect business tax. To facilitate this analysis, we assume the decision point is 2009, whether to go with public investment or not. A positive value indicates a positive return to public investment, while a negative return suggests that returns over time were not sufficient to cover the initial public investment.

Figure 6 shows the schedule of net gross state product, measured in 2016 dollars. The measures are net in that the first year (2009) subtracts initial public investment of \$94.55 million dollars from the estimated direct and total gross state product impacts. The remaining data points are estimated direct and total gross state product impacts by year.

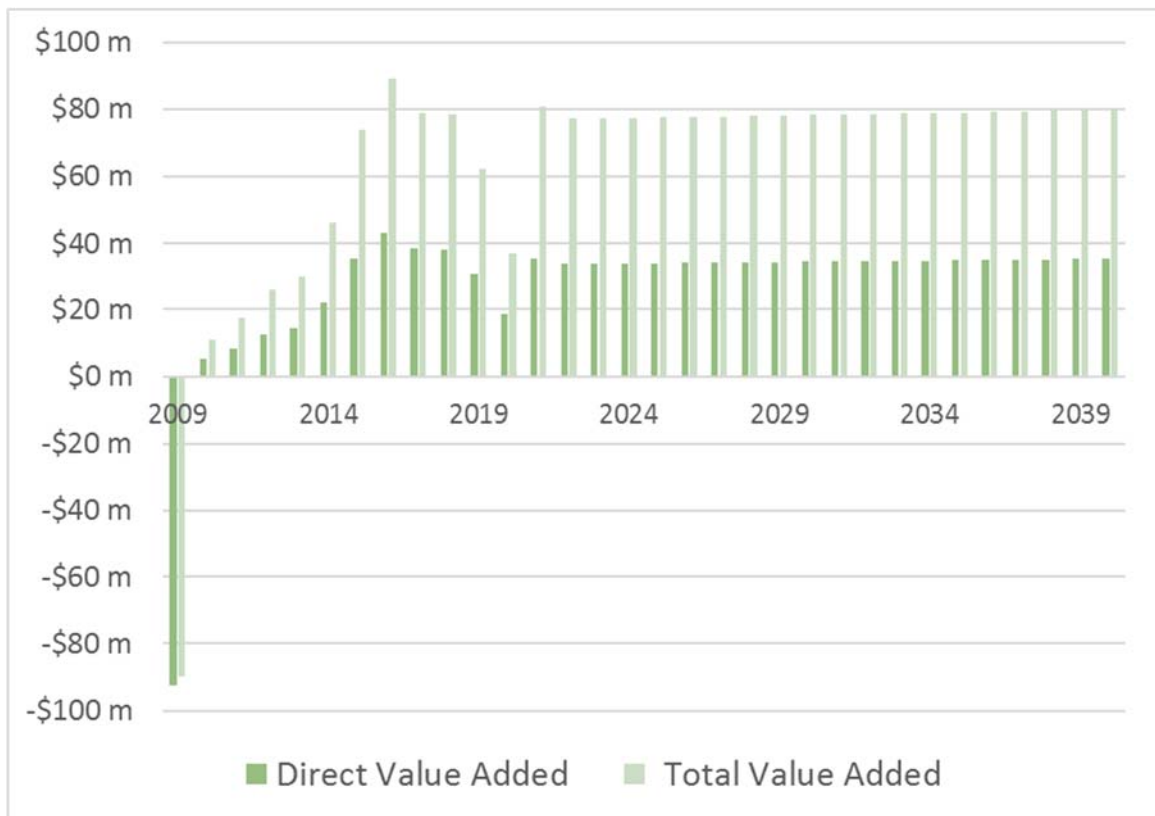


Figure 6: Returns to Gross State Product, Net of Initial Public Investment (Net Gross State Product valued in 2016 dollars)

As evident in Figure 6, the state starts with a net negative return due to initial investment. However, positive returns are significant, leveraged by federal DOE investments in construction. Because of this federal investment, net returns turn positive in 2014 if considering total gross state product as income, and 2016 if limiting returns to direct gross state product.³ In effect, a large component of the returns to state investment is in leveraging significant federal investment in the construction and operations of the FRIB. This explains the relatively large returns from a small state investment in the facilities that precipitates a positive net return on public investment.

Net present values of public investment in the FRIB are calculated based on direct and total gross state product flows to Michigan. Future streams are discounted using a five percent discount rate. Additionally, we assume state, public investment takes place in 2009, the same year that initial DOE investment takes place.⁴ We found that the net present value of this investment in 2016 dollars is equal to \$333 million if limiting consideration to direct flows in gross state product.

³ Future flows are discounted based on a five percent discount rate.

⁴ The findings are not sensitive to this assumption.

However, if considering the larger total flows of gross state product that includes secondary transactions, the net present value rises to \$831.6 million.

To further estimate the economic payoff from state investment in the FRIB, tax revenue impacts are estimated arising from the construction and operation of the FRIB. Total state revenues reported in various issues of the Michigan Comprehensive Annual Financial Reports were collected against various metrics of state economic activities to generate a simple model relating changes in state revenues to changes in state economic production.⁵ The resulting estimates provide an expected stream of state revenues over the project's 32 years, from 2009 to 2040. In total \$205.5 million in state revenues are expected. When discounted to 2009, this suggested a project return of \$100.3 million. Measured against the state's initial investment of \$94.5 this amounts to a positive return of \$5.8 million at the time of investment.

Conclusions

This report details best approximations of the economic impact of the MSU FRIB and accounts for both construction-phase and operational phase impacts. A multi-regional input-output model is used in estimating economy-wide impacts for 14 regions that encompass all of Michigan. Impact estimates are also broken out by year of expenditures from the year of first approval for construction (2009) through to the expected life of the FRIB through 2040.

The Facilities for Rare Isotope Beams will be an important contribution to science and contribute to industry through supplying isotopes for commercial applications and the potential for generating commercial applications from cutting-edge science. For Michigan and MSU, this represents a significant enhancement to an already established reputation as a leader in particle physics research partially build from the presence of the Cyclotron housed in the MSU National Superconducting Cyclotron Laboratory, for which the new facilities will replace and complement. The new facilities are expected to be fully operational by 2021.

The U.S. Department of Energy has committed significant resources for the establishment and operations of the Facilities for Rare Isotope Beams, including \$635.5 million in construction and \$1.5 billion in operational funding over twenty years. The state contributed another \$94.5 million toward construction. For Michigan residents, this is an investment in the future flows of benefits generated from the construction and operation of the facilities, where federal sources make up a significant component.

Annual economic impact estimates are broken out into two parts; those from the construction phase and those from the operational phase of the FRIB. To assess the value of Michigan, public investment in the FRIB, the report shows the expected net present value of initial state investment in this research facility. While estimated construction impacts varied by year, the analysis shows that expected jobs impacts during the primary construction phase from 2014 to

⁵ Actual inflation rates through 2016 applied and projected inflation through 2040 set at 2 percent per year. A discount rate of 5 percent was applied for measuring the present value of the tax revenue stream.

2019 totaled 1,535 jobs statewide. These jobs impacts are dispersed throughout the state, where larger impacts are expected in the metropolitan regions of Lansing-East Lansing and Detroit. These are expected to generate approximately \$76.8 million in annual labor incomes, measured in 2016 dollars. Operational impacts start in 2021, where, on average, the operations of the facility are expected to generate about 1,002 jobs per year with average annual labor income of \$55,6 million.

In the aggregate, the FRIB is expected to generate 32,043 year-equivalent jobs⁶ in Michigan with accumulated wages totaling \$1.7 billion. Average annual contributions to gross state product are expected to top \$66.4 million per year. When considering whether this was a profitable investment for Michigan residents, we show that the net present value of this investment is expected to generate an \$831.6 million positive return to Michigan through a positive stream in annual gross state product, and to generate \$205.5 million in public revenues.

This report omits some sources and constraints to realized economic impacts. In this, the report does not take into account many economic factors that may expand or crowd out such impacts. Such factors include commercial applications of isotopes or innovation spin-offs, nor the FRIB's role in advancing Michigan's scientific and engineering communities. Such omissions are expected to positively impact Michigan's economy but are difficult to project. Additionally, the analysis does not take into account for crowding out effects of the construction and operations of the FRIB. In this, it is conceivable that construction expenditures at the FRIB crowds out other construction expenditures in the state by raising the cost of materials and labor. Additionally, scientific resources allocated to the FRIB may crowd out other scientific endeavors in ways that are difficult to measure. The analysis also does not take into consideration additional grant and contract funding for undertaking research. Here, it is anticipated that the presence of the Facilities for Rare Isotope Beams will benefit Michigan researchers in competing for additional research dollars. However, it is difficult to estimate how significant these flows of research dollars will be. Despite these issues, it is likely such omitted considerations are small in comparison to direct expenditures associated with the establishment and operations of the FRIB.

⁶ Sum of annual jobs

Appendix 1: Construction Impacts (FY 2009-2021)

| Year | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|-------------|--------------|---------------|--------------|---------------------|--------------------|-------------------|-------------------|--------------------|-------------------|
| 2009 | State | 53 | 108 | 3,075,514 | 5,448,102 | 5,754,000 | 10,438,376 | 2,402,249 | 5,009,858 |
| | 01 | 0 | 0 | 33 | 1,645 | 58 | 5,050 | 25 | 1,890 |
| | 02 | 0 | 0 | 4,757 | 7,425 | 8,902 | 16,613 | 4,317 | 7,853 |
| | 03 | 0 | 0 | 5,255 | 13,035 | 10,654 | 27,054 | 4,134 | 11,931 |
| | 04 | 0 | 0 | 3,472 | 8,199 | 10,180 | 23,304 | 2,961 | 8,472 |
| | 05 | 0 | 1 | 8,152 | 16,752 | 15,612 | 39,804 | 6,687 | 17,775 |
| | 06 | 0 | 1 | 15,981 | 41,253 | 34,931 | 92,503 | 12,167 | 38,185 |
| | 07 | 1 | 3 | 54,794 | 158,721 | 98,226 | 312,726 | 45,738 | 156,028 |
| | 08 | 16 | 28 | 753,633 | 1,172,577 | 1,600,324 | 2,507,234 | 608,295 | 1,113,261 |
| | 09 | 5 | 9 | 232,154 | 383,729 | 408,470 | 737,133 | 182,719 | 356,684 |
| | 10 | 0 | 1 | 10,126 | 24,445 | 21,895 | 63,911 | 8,777 | 27,351 |
| | 11 | 21 | 48 | 1,521,058 | 2,838,101 | 2,635,542 | 5,011,504 | 1,168,245 | 2,547,161 |
| | 12 | 4 | 7 | 201,574 | 358,947 | 403,474 | 761,033 | 155,748 | 341,283 |
| | 13 | 5 | 8 | 264,451 | 417,414 | 505,564 | 825,831 | 202,378 | 375,989 |
| | 14 | 0 | 0 | 74 | 5,859 | 169 | 14,675 | 59 | 5,994 |
| 2010 | State | 116 | 234 | 6,679,730 | 11,832,251 | 12,494,400 | 22,666,085 | 5,214,968 | 10,877,127 |
| | 01 | 0 | 0 | 73 | 3,552 | 126 | 10,871 | 55 | 4,047 |
| | 02 | 0 | 1 | 10,432 | 16,242 | 19,516 | 36,306 | 9,461 | 17,162 |
| | 03 | 0 | 1 | 11,421 | 28,296 | 23,144 | 58,729 | 8,981 | 25,897 |
| | 04 | 0 | 1 | 7,509 | 17,741 | 22,006 | 50,415 | 6,405 | 18,329 |
| | 05 | 1 | 1 | 17,750 | 36,440 | 33,969 | 86,543 | 14,556 | 38,651 |
| | 06 | 1 | 2 | 34,559 | 89,253 | 75,518 | 200,157 | 26,311 | 82,625 |
| | 07 | 3 | 8 | 119,185 | 345,004 | 213,360 | 679,433 | 99,475 | 339,089 |
| | 08 | 35 | 62 | 1,637,039 | 2,546,655 | 3,476,335 | 5,445,383 | 1,320,308 | 2,416,635 |
| | 09 | 11 | 19 | 504,058 | 832,710 | 884,351 | 1,596,925 | 396,364 | 773,521 |
| | 10 | 1 | 1 | 22,034 | 53,157 | 47,592 | 138,923 | 19,095 | 59,459 |
| | 11 | 47 | 103 | 3,306,531 | 6,169,059 | 5,729,424 | 10,892,898 | 2,538,682 | 5,535,440 |
| | 12 | 8 | 16 | 437,633 | 779,484 | 876,419 | 1,653,106 | 338,005 | 740,973 |
| | 13 | 10 | 18 | 571,344 | 901,959 | 1,092,273 | 1,784,580 | 437,141 | 812,311 |
| | 14 | 0 | 0 | 160 | 12,699 | 367 | 31,813 | 128 | 12,988 |
| 2011 | State | 185 | 372 | 10,637,218 | 18,841,569 | 19,892,400 | 36,086,624 | 8,300,599 | 17,315,229 |
| | 01 | 0 | 0 | 118 | 5,621 | 201 | 17,156 | 89 | 6,351 |
| | 02 | 1 | 1 | 16,776 | 26,054 | 31,374 | 58,178 | 15,203 | 27,503 |
| | 03 | 0 | 1 | 18,201 | 45,036 | 36,863 | 93,475 | 14,305 | 41,215 |
| | 04 | 0 | 1 | 11,905 | 28,143 | 34,876 | 79,962 | 10,158 | 29,072 |
| | 05 | 1 | 2 | 28,338 | 58,121 | 54,195 | 137,963 | 23,235 | 61,624 |
| | 06 | 1 | 4 | 54,790 | 141,575 | 119,694 | 317,527 | 41,713 | 131,075 |
| | 07 | 4 | 12 | 190,086 | 549,851 | 339,802 | 1,082,329 | 158,633 | 540,329 |
| | 08 | 56 | 98 | 2,607,276 | 4,055,331 | 5,536,872 | 8,671,410 | 2,101,160 | 3,846,350 |
| | 09 | 17 | 31 | 802,439 | 1,324,901 | 1,403,746 | 2,536,466 | 630,410 | 1,229,917 |
| | 10 | 1 | 2 | 35,156 | 84,755 | 75,850 | 221,414 | 30,461 | 94,775 |
| | 11 | 75 | 165 | 5,270,282 | 9,832,046 | 9,132,434 | 17,360,104 | 4,044,963 | 8,820,234 |
| | 12 | 13 | 26 | 696,644 | 1,241,113 | 1,395,843 | 2,632,856 | 537,831 | 1,179,545 |
| | 13 | 16 | 29 | 904,953 | 1,428,841 | 1,730,063 | 2,827,215 | 692,233 | 1,286,605 |
| | 14 | 0 | 0 | 254 | 20,179 | 585 | 50,566 | 204 | 20,634 |

Appendix 1: Construction Impacts (FY 2009-2021)

| Year | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|-------------|--------------|---------------|--------------|---------------------|--------------------|-------------------|-------------------|--------------------|-------------------|
| 2012 | State | 277 | 557 | 15,926,470 | 28,224,876 | 29,838,600 | 54,109,512 | 12,442,432 | 25,952,962 |
| | 01 | 0 | 0 | 175 | 8,416 | 301 | 25,704 | 132 | 9,531 |
| | 02 | 1 | 1 | 25,166 | 39,059 | 47,061 | 87,201 | 22,846 | 41,260 |
| | 03 | 1 | 2 | 27,337 | 67,624 | 55,347 | 140,313 | 21,498 | 61,875 |
| | 04 | 1 | 2 | 17,772 | 42,002 | 52,016 | 119,298 | 15,171 | 43,384 |
| | 05 | 1 | 3 | 42,547 | 87,219 | 81,371 | 207,042 | 34,911 | 92,477 |
| | 06 | 2 | 5 | 81,787 | 211,662 | 178,776 | 474,728 | 62,281 | 195,972 |
| | 07 | 6 | 18 | 285,740 | 825,626 | 511,955 | 1,625,952 | 239,083 | 811,722 |
| | 08 | 84 | 147 | 3,901,950 | 6,071,194 | 8,301,243 | 12,996,446 | 3,147,852 | 5,761,661 |
| | 09 | 25 | 46 | 1,202,212 | 1,984,300 | 2,101,424 | 3,796,849 | 945,164 | 1,842,404 |
| | 10 | 2 | 3 | 52,659 | 127,013 | 113,585 | 331,858 | 45,699 | 142,083 |
| | 11 | 112 | 247 | 7,886,451 | 14,725,739 | 13,699,091 | 26,031,994 | 6,061,032 | 13,219,430 |
| | 12 | 20 | 38 | 1,042,798 | 1,858,845 | 2,093,107 | 3,947,312 | 805,804 | 1,767,520 |
| | 13 | 24 | 43 | 1,359,496 | 2,145,980 | 2,602,449 | 4,249,218 | 1,040,653 | 1,932,826 |
| | 14 | 0 | 1 | 380 | 30,196 | 873 | 75,596 | 304 | 30,816 |
| 2013 | State | 321 | 644 | 18,392,284 | 32,612,154 | 34,524,000 | 62,581,672 | 14,386,098 | 30,004,491 |
| | 01 | 0 | 0 | 202 | 9,718 | 346 | 29,705 | 152 | 11,033 |
| | 02 | 1 | 2 | 29,119 | 45,165 | 54,451 | 100,815 | 26,482 | 47,747 |
| | 03 | 1 | 2 | 31,672 | 78,326 | 64,101 | 162,464 | 24,922 | 71,652 |
| | 04 | 1 | 2 | 20,460 | 48,345 | 59,829 | 137,261 | 17,475 | 49,929 |
| | 05 | 2 | 3 | 49,277 | 100,960 | 94,241 | 239,669 | 40,463 | 107,045 |
| | 06 | 2 | 6 | 94,154 | 244,063 | 205,936 | 547,406 | 71,718 | 225,981 |
| | 07 | 7 | 21 | 331,339 | 956,282 | 595,033 | 1,884,202 | 277,978 | 940,647 |
| | 08 | 97 | 170 | 4,503,956 | 7,010,435 | 9,599,892 | 15,024,478 | 3,637,501 | 6,657,000 |
| | 09 | 29 | 53 | 1,389,263 | 2,292,243 | 2,426,393 | 4,383,680 | 1,093,038 | 2,128,758 |
| | 10 | 2 | 4 | 60,840 | 146,815 | 131,194 | 383,653 | 52,885 | 164,298 |
| | 11 | 129 | 285 | 9,102,176 | 17,011,395 | 15,850,713 | 30,109,921 | 7,005,111 | 15,282,175 |
| | 12 | 23 | 44 | 1,203,954 | 2,147,358 | 2,420,990 | 4,564,784 | 931,211 | 2,042,920 |
| | 13 | 27 | 50 | 1,575,437 | 2,486,197 | 3,019,877 | 4,926,470 | 1,206,811 | 2,239,812 |
| | 14 | 0 | 1 | 437 | 34,851 | 1,005 | 87,164 | 350 | 35,493 |
| 2014 | State | 495 | 995 | 28,391,443 | 50,380,598 | 53,430,000 | 96,817,698 | 22,221,927 | 46,371,857 |
| | 01 | 0 | 0 | 311 | 15,015 | 533 | 45,909 | 235 | 17,057 |
| | 02 | 2 | 3 | 44,824 | 69,569 | 83,794 | 155,314 | 40,762 | 73,543 |
| | 03 | 1 | 3 | 49,200 | 121,391 | 99,447 | 251,725 | 38,705 | 111,051 |
| | 04 | 1 | 3 | 31,512 | 74,491 | 92,138 | 211,493 | 26,928 | 76,943 |
| | 05 | 3 | 5 | 75,997 | 155,971 | 145,622 | 370,728 | 62,422 | 165,422 |
| | 06 | 3 | 9 | 145,199 | 376,892 | 318,158 | 845,844 | 110,640 | 349,065 |
| | 07 | 11 | 32 | 510,860 | 1,477,387 | 919,386 | 2,913,802 | 428,459 | 1,453,305 |
| | 08 | 150 | 263 | 6,949,799 | 10,823,103 | 14,851,783 | 23,234,877 | 5,618,817 | 10,284,842 |
| | 09 | 45 | 82 | 2,140,307 | 3,533,089 | 3,740,928 | 6,760,400 | 1,684,941 | 3,282,257 |
| | 10 | 3 | 6 | 93,716 | 226,663 | 202,090 | 592,676 | 81,493 | 253,720 |
| | 11 | 199 | 441 | 14,040,705 | 26,270,268 | 24,519,145 | 46,565,825 | 10,812,377 | 23,609,471 |
| | 12 | 35 | 68 | 1,857,391 | 3,316,361 | 3,744,512 | 7,060,534 | 1,437,304 | 3,156,460 |
| | 13 | 42 | 78 | 2,450,949 | 3,866,619 | 4,710,918 | 7,674,071 | 1,878,303 | 3,483,968 |
| | 14 | 0 | 1 | 673 | 53,778 | 1,548 | 134,500 | 540 | 54,752 |

Appendix 1: Construction Impacts (FY 2009-2021)

| Year | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|-------------|--------------|---------------|--------------|---------------------|--------------------|--------------------|--------------------|--------------------|-------------------|
| 2015 | State | 800 | 1,597 | 45,244,380 | 80,194,413 | 85,449,706 | 154,572,334 | 35,509,692 | 73,944,789 |
| | 01 | 0 | 1 | 475 | 23,739 | 816 | 72,644 | 359 | 26,953 |
| | 02 | 3 | 4 | 68,583 | 107,047 | 128,176 | 239,518 | 62,366 | 113,330 |
| | 03 | 2 | 4 | 75,979 | 189,125 | 153,373 | 392,560 | 59,755 | 173,372 |
| | 04 | 2 | 4 | 48,244 | 115,214 | 141,043 | 327,252 | 41,247 | 118,995 |
| | 05 | 4 | 7 | 116,508 | 244,325 | 223,682 | 585,552 | 95,725 | 261,026 |
| | 06 | 5 | 15 | 222,582 | 596,833 | 488,616 | 1,340,567 | 169,670 | 554,075 |
| | 07 | 17 | 52 | 782,949 | 2,365,986 | 1,412,113 | 4,679,960 | 656,456 | 2,336,175 |
| | 08 | 270 | 466 | 12,338,281 | 19,081,184 | 26,090,538 | 40,650,149 | 10,015,545 | 18,135,256 |
| | 09 | 68 | 126 | 3,277,654 | 5,445,219 | 5,733,218 | 10,439,008 | 2,581,867 | 5,065,574 |
| | 10 | 4 | 10 | 143,494 | 350,737 | 309,434 | 919,410 | 124,827 | 393,026 |
| | 11 | 306 | 679 | 21,529,668 | 40,449,452 | 37,703,565 | 71,802,417 | 16,589,608 | 36,367,704 |
| | 12 | 53 | 106 | 2,848,408 | 5,132,606 | 5,757,282 | 10,963,737 | 2,205,251 | 4,896,517 |
| | 13 | 65 | 121 | 3,790,525 | 6,008,167 | 7,305,479 | 11,946,665 | 2,906,188 | 5,415,931 |
| | 14 | 0 | 2 | 1,030 | 84,778 | 2,369 | 212,896 | 827 | 86,855 |
| 2016 | State | 980 | 1,917 | 54,299,461 | 96,295,039 | 103,289,734 | 186,303,415 | 43,173,937 | 89,336,604 |
| | 01 | 0 | 1 | 567 | 28,288 | 974 | 86,777 | 429 | 32,184 |
| | 02 | 3 | 5 | 81,847 | 128,070 | 152,924 | 286,701 | 74,424 | 135,777 |
| | 03 | 2 | 5 | 91,504 | 227,470 | 184,478 | 472,088 | 71,947 | 208,523 |
| | 04 | 2 | 5 | 57,607 | 137,422 | 168,399 | 390,343 | 49,278 | 141,972 |
| | 05 | 5 | 9 | 139,312 | 292,840 | 267,985 | 702,724 | 114,492 | 313,141 |
| | 06 | 6 | 18 | 266,130 | 710,997 | 585,291 | 1,598,464 | 202,942 | 660,783 |
| | 07 | 21 | 62 | 935,942 | 2,841,012 | 1,691,746 | 5,629,730 | 784,511 | 2,808,290 |
| | 08 | 345 | 561 | 14,908,910 | 23,033,874 | 32,047,610 | 49,568,437 | 12,639,618 | 22,413,597 |
| | 09 | 82 | 151 | 3,914,896 | 6,505,878 | 6,852,997 | 12,474,994 | 3,085,681 | 6,054,257 |
| | 10 | 5 | 11 | 171,365 | 420,790 | 369,543 | 1,103,138 | 149,131 | 471,505 |
| | 11 | 366 | 814 | 25,749,367 | 48,473,448 | 45,221,326 | 86,149,145 | 19,853,222 | 43,592,508 |
| | 12 | 64 | 127 | 3,407,038 | 6,150,179 | 6,904,195 | 13,153,166 | 2,639,009 | 5,868,110 |
| | 13 | 79 | 146 | 4,573,746 | 7,242,609 | 8,839,437 | 14,430,764 | 3,508,265 | 6,530,743 |
| | 14 | 0 | 3 | 1,230 | 102,164 | 2,829 | 256,944 | 988 | 105,213 |
| 2017 | State | 870 | 1,695 | 47,544,258 | 84,152,798 | 91,277,038 | 163,804,092 | 38,490,698 | 78,780,159 |
| | 01 | 0 | 1 | 470 | 24,270 | 808 | 74,739 | 356 | 27,644 |
| | 02 | 3 | 4 | 67,814 | 107,159 | 126,670 | 240,697 | 61,660 | 114,051 |
| | 03 | 2 | 4 | 76,538 | 192,887 | 154,102 | 400,913 | 60,163 | 177,285 |
| | 04 | 2 | 4 | 47,758 | 115,246 | 139,595 | 327,564 | 40,876 | 119,065 |
| | 05 | 4 | 8 | 115,663 | 250,219 | 222,945 | 606,570 | 95,084 | 270,242 |
| | 06 | 5 | 15 | 220,939 | 611,619 | 486,837 | 1,376,769 | 168,547 | 570,669 |
| | 07 | 17 | 54 | 776,843 | 2,501,120 | 1,407,377 | 4,977,300 | 650,962 | 2,486,682 |
| | 08 | 342 | 557 | 14,802,445 | 22,678,105 | 31,898,987 | 48,818,055 | 13,096,135 | 22,556,729 |
| | 09 | 68 | 126 | 3,246,605 | 5,439,811 | 5,687,608 | 10,450,631 | 2,560,545 | 5,070,699 |
| | 10 | 4 | 10 | 142,089 | 354,684 | 306,415 | 932,063 | 123,704 | 397,802 |
| | 11 | 305 | 681 | 21,383,265 | 40,511,822 | 37,664,599 | 72,078,569 | 16,497,408 | 36,440,055 |
| | 12 | 53 | 106 | 2,829,645 | 5,173,885 | 5,749,569 | 11,103,759 | 2,192,870 | 4,949,099 |
| | 13 | 66 | 123 | 3,833,165 | 6,103,206 | 7,429,180 | 12,191,666 | 2,941,569 | 5,507,382 |
| | 14 | 0 | 2 | 1,019 | 88,767 | 2,345 | 224,797 | 819 | 92,755 |

Appendix 1: Construction Impacts (FY 2009-2021)

| Year | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|-------------|--------------|---------------|--------------|---------------------|--------------------|-------------------|--------------------|--------------------|-------------------|
| 2018 | State | 861 | 1,678 | 47,328,655 | 83,839,858 | 91,059,928 | 163,388,298 | 38,315,786 | 78,493,223 |
| | 01 | 0 | 1 | 468 | 24,202 | 804 | 74,533 | 354 | 27,580 |
| | 02 | 3 | 4 | 67,428 | 106,594 | 125,916 | 239,452 | 61,306 | 113,432 |
| | 03 | 2 | 4 | 76,805 | 192,991 | 154,445 | 401,007 | 60,357 | 177,369 |
| | 04 | 2 | 4 | 47,514 | 114,668 | 138,869 | 325,908 | 40,690 | 118,485 |
| | 05 | 4 | 8 | 115,235 | 249,493 | 222,568 | 605,357 | 94,760 | 269,441 |
| | 06 | 5 | 15 | 220,112 | 609,410 | 485,932 | 1,372,596 | 167,981 | 568,685 |
| | 07 | 17 | 54 | 773,785 | 2,491,261 | 1,405,008 | 4,961,636 | 648,231 | 2,476,508 |
| | 08 | 334 | 542 | 14,668,408 | 22,487,947 | 31,671,156 | 48,472,483 | 12,970,686 | 22,364,234 |
| | 09 | 68 | 126 | 3,230,988 | 5,414,868 | 5,664,498 | 10,407,954 | 2,549,779 | 5,049,014 |
| | 10 | 4 | 10 | 141,383 | 353,593 | 304,899 | 929,728 | 123,138 | 396,674 |
| | 11 | 304 | 679 | 21,309,707 | 40,411,491 | 37,644,136 | 72,008,943 | 16,450,920 | 36,365,174 |
| | 12 | 53 | 106 | 2,820,179 | 5,160,103 | 5,745,420 | 11,090,320 | 2,186,593 | 4,937,717 |
| | 13 | 66 | 123 | 3,855,630 | 6,134,889 | 7,493,944 | 12,274,695 | 2,960,175 | 5,536,663 |
| | 14 | 0 | 2 | 1,014 | 88,348 | 2,333 | 223,686 | 815 | 92,246 |
| 2019 | State | 668 | 1,327 | 37,337,124 | 66,011,857 | 72,460,013 | 129,388,650 | 30,750,158 | 62,341,523 |
| | 01 | 0 | 0 | 349 | 18,710 | 599 | 57,845 | 264 | 21,345 |
| | 02 | 2 | 3 | 50,267 | 80,307 | 93,844 | 181,046 | 45,701 | 85,813 |
| | 03 | 1 | 3 | 57,813 | 147,386 | 116,103 | 306,725 | 45,420 | 135,822 |
| | 04 | 1 | 3 | 35,444 | 86,595 | 103,580 | 246,292 | 30,370 | 89,481 |
| | 05 | 3 | 6 | 86,091 | 192,081 | 166,629 | 470,803 | 70,815 | 209,526 |
| | 06 | 4 | 12 | 164,433 | 472,386 | 363,737 | 1,065,266 | 125,540 | 442,553 |
| | 07 | 13 | 43 | 577,932 | 1,975,520 | 1,051,892 | 3,950,166 | 484,024 | 1,974,733 |
| | 08 | 273 | 469 | 12,906,121 | 19,655,429 | 27,909,999 | 42,367,306 | 11,780,256 | 19,878,828 |
| | 09 | 50 | 95 | 2,410,952 | 4,076,277 | 4,230,189 | 7,850,551 | 1,903,863 | 3,807,568 |
| | 10 | 3 | 7 | 105,482 | 268,438 | 227,480 | 707,566 | 91,908 | 301,433 |
| | 11 | 228 | 511 | 15,924,399 | 30,404,506 | 28,217,000 | 54,237,166 | 12,301,609 | 27,365,574 |
| | 12 | 40 | 80 | 2,107,685 | 3,909,293 | 4,305,801 | 8,431,914 | 1,635,005 | 3,750,640 |
| | 13 | 50 | 93 | 2,909,400 | 4,655,757 | 5,671,421 | 9,339,678 | 2,234,773 | 4,204,952 |
| | 14 | 0 | 2 | 756 | 69,173 | 1,740 | 176,327 | 609 | 73,256 |
| 2020 | State | 402 | 792 | 22,034,142 | 38,762,842 | 43,431,452 | 76,842,013 | 18,722,210 | 37,220,094 |
| | 01 | 0 | 0 | 182 | 11,021 | 312 | 34,268 | 138 | 12,575 |
| | 02 | 1 | 2 | 26,187 | 44,446 | 48,875 | 102,774 | 23,807 | 48,605 |
| | 03 | 1 | 2 | 30,396 | 83,881 | 60,967 | 176,022 | 23,874 | 78,394 |
| | 04 | 1 | 2 | 18,475 | 48,243 | 53,987 | 138,068 | 15,840 | 50,563 |
| | 05 | 2 | 3 | 44,941 | 107,360 | 87,161 | 268,601 | 36,977 | 119,583 |
| | 06 | 2 | 7 | 85,833 | 268,363 | 190,235 | 606,269 | 65,557 | 253,446 |
| | 07 | 7 | 25 | 301,623 | 1,165,969 | 550,258 | 2,347,356 | 252,552 | 1,177,965 |
| | 08 | 189 | 321 | 9,015,261 | 13,596,132 | 19,507,256 | 29,274,694 | 8,590,029 | 14,077,446 |
| | 09 | 26 | 50 | 1,257,114 | 2,169,380 | 2,207,350 | 4,193,301 | 993,320 | 2,033,458 |
| | 10 | 2 | 4 | 54,991 | 145,306 | 118,596 | 384,810 | 47,934 | 163,447 |
| | 11 | 119 | 271 | 8,315,152 | 16,113,365 | 14,777,498 | 28,749,582 | 6,427,529 | 14,499,217 |
| | 12 | 21 | 43 | 1,100,650 | 2,101,176 | 2,254,520 | 4,557,858 | 854,228 | 2,026,181 |
| | 13 | 26 | 50 | 1,533,986 | 2,487,548 | 2,998,902 | 5,008,697 | 1,178,841 | 2,250,036 |
| | 14 | 6 | 12 | 249,350 | 420,651 | 575,536 | 999,714 | 211,583 | 429,179 |

Appendix 1: Construction Impacts (FY 2009-2021)

| Year | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|-------------|--------------|---------------|--------------|---------------------|--------------------|------------------|------------------|--------------------|-------------------|
| 2021 | State | 40 | 80 | 2,257,901 | 4,023,184 | 4,356,600 | 7,856,570 | 1,779,994 | 3,724,407 |
| | 01 | 0 | 0 | 23 | 1,313 | 40 | 4,011 | 18 | 1,492 |
| | 02 | 0 | 0 | 3,384 | 5,729 | 6,315 | 13,315 | 3,077 | 6,249 |
| | 03 | 0 | 0 | 3,967 | 10,624 | 7,947 | 22,234 | 3,115 | 9,910 |
| | 04 | 0 | 0 | 2,389 | 6,177 | 6,981 | 17,715 | 2,050 | 6,580 |
| | 05 | 0 | 0 | 5,821 | 12,278 | 11,315 | 29,585 | 4,791 | 13,093 |
| | 06 | 0 | 1 | 11,118 | 29,725 | 24,691 | 67,032 | 8,495 | 27,632 |
| | 07 | 1 | 3 | 39,060 | 115,493 | 71,436 | 229,709 | 32,697 | 113,797 |
| | 08 | 12 | 20 | 534,405 | 835,855 | 1,164,152 | 1,816,977 | 435,439 | 798,610 |
| | 09 | 3 | 6 | 162,632 | 270,347 | 285,796 | 519,457 | 128,591 | 251,873 |
| | 10 | 0 | 0 | 7,113 | 17,603 | 15,340 | 46,272 | 6,203 | 19,744 |
| | 11 | 15 | 34 | 1,077,393 | 2,038,187 | 1,920,818 | 3,649,980 | 833,383 | 1,836,690 |
| | 12 | 3 | 5 | 142,624 | 256,917 | 292,983 | 553,163 | 110,750 | 245,339 |
| | 13 | 3 | 6 | 200,829 | 316,166 | 393,813 | 635,063 | 154,410 | 285,212 |
| | 14 | 2 | 3 | 67,141 | 106,770 | 154,971 | 252,057 | 56,974 | 108,187 |

Appendix 2: Operational Impacts (FY 2021-2040)

| | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|------|--------|---------------|--------------|---------------------|--------------------|---------------|--------------|--------------------|-------------------|
| 2021 | State | 390 | 1,005 | 28,586,560 | 54,501,146 | 76,790,683 | 158,001,459 | 33,780,390 | 76,963,066 |
| | 1 | 0 | 0 | 0 | 3,921 | 0 | 18,575 | 0 | 6,380 |
| | 2 | 0 | 0 | 0 | 7,285 | 0 | 37,611 | 0 | 15,077 |
| | 3 | 0 | 1 | 0 | 46,119 | 0 | 164,650 | 0 | 84,087 |
| | 4 | 0 | 0 | 0 | 7,575 | 0 | 33,150 | 0 | 12,412 |
| | 5 | 0 | 1 | 0 | 50,667 | 0 | 267,408 | 0 | 125,376 |
| | 6 | 0 | 9 | 0 | 407,756 | 0 | 1,294,431 | 0 | 611,254 |
| | 7 | 0 | 32 | 0 | 1,617,357 | 0 | 4,628,498 | 0 | 2,482,236 |
| | 8 | 390 | 886 | 28,586,560 | 47,667,037 | 76,790,683 | 139,336,644 | 33,780,390 | 66,943,695 |
| | 9 | 0 | 8 | 0 | 361,084 | 0 | 1,154,800 | 0 | 596,803 |
| | 10 | 0 | 1 | 0 | 24,089 | 0 | 115,635 | 0 | 48,884 |
| | 11 | 0 | 35 | 0 | 2,360,567 | 0 | 5,474,959 | 0 | 3,119,638 |
| | 12 | 0 | 16 | 0 | 897,779 | 0 | 2,980,676 | 0 | 1,500,761 |
| | 13 | 0 | 16 | 0 | 1,027,490 | 0 | 2,400,262 | 0 | 1,373,918 |
| | 14 | 0 | 1 | 0 | 22,419 | 0 | 94,159 | 0 | 42,544 |
| 2022 | State | 390 | 1,005 | 28,667,658 | 54,614,296 | 76,849,025 | 158,162,691 | 33,865,562 | 77,105,151 |
| | 1 | 0 | 0 | 0 | 3,925 | 0 | 18,592 | 0 | 6,386 |
| | 2 | 0 | 0 | 0 | 7,293 | 0 | 37,650 | 0 | 15,093 |
| | 3 | 0 | 1 | 0 | 46,167 | 0 | 164,820 | 0 | 84,174 |
| | 4 | 0 | 0 | 0 | 7,582 | 0 | 33,184 | 0 | 12,424 |
| | 5 | 0 | 1 | 0 | 50,723 | 0 | 267,727 | 0 | 125,531 |
| | 6 | 0 | 9 | 0 | 408,126 | 0 | 1,295,617 | 0 | 611,814 |
| | 7 | 0 | 32 | 0 | 1,618,885 | 0 | 4,632,973 | 0 | 2,484,646 |
| | 8 | 390 | 886 | 28,667,658 | 47,773,734 | 76,849,025 | 139,479,724 | 33,865,562 | 67,076,081 |
| | 9 | 0 | 8 | 0 | 361,460 | 0 | 1,156,035 | 0 | 597,448 |
| | 10 | 0 | 1 | 0 | 24,115 | 0 | 115,765 | 0 | 48,939 |
| | 11 | 0 | 35 | 0 | 2,362,764 | 0 | 5,480,150 | 0 | 3,122,583 |
| | 12 | 0 | 16 | 0 | 898,638 | 0 | 2,983,662 | 0 | 1,502,242 |
| | 13 | 0 | 16 | 0 | 1,028,441 | 0 | 2,402,545 | 0 | 1,375,206 |
| | 14 | 0 | 1 | 0 | 22,441 | 0 | 94,247 | 0 | 42,583 |
| 2023 | State | 390 | 1,005 | 28,748,755 | 54,727,445 | 76,907,368 | 158,323,923 | 33,950,733 | 77,247,235 |
| | 1 | 0 | 0 | 0 | 3,929 | 0 | 18,609 | 0 | 6,392 |
| | 2 | 0 | 0 | 0 | 7,300 | 0 | 37,689 | 0 | 15,109 |
| | 3 | 0 | 1 | 0 | 46,215 | 0 | 164,991 | 0 | 84,260 |
| | 4 | 0 | 0 | 0 | 7,590 | 0 | 33,217 | 0 | 12,437 |
| | 5 | 0 | 1 | 0 | 50,780 | 0 | 268,046 | 0 | 125,685 |
| | 6 | 0 | 9 | 0 | 408,497 | 0 | 1,296,803 | 0 | 612,374 |
| | 7 | 0 | 32 | 0 | 1,620,413 | 0 | 4,637,448 | 0 | 2,487,056 |
| | 8 | 390 | 886 | 28,748,755 | 47,880,431 | 76,907,368 | 139,622,803 | 33,950,733 | 67,208,466 |
| | 9 | 0 | 8 | 0 | 361,836 | 0 | 1,157,269 | 0 | 598,094 |
| | 10 | 0 | 1 | 0 | 24,142 | 0 | 115,895 | 0 | 48,995 |
| | 11 | 0 | 35 | 0 | 2,364,961 | 0 | 5,485,341 | 0 | 3,125,528 |
| | 12 | 0 | 16 | 0 | 899,498 | 0 | 2,986,649 | 0 | 1,503,724 |
| | 13 | 0 | 16 | 0 | 1,029,391 | 0 | 2,404,828 | 0 | 1,376,495 |
| | 14 | 0 | 1 | 0 | 22,462 | 0 | 94,335 | 0 | 42,622 |
| 2024 | State | 390 | 1,004 | 28,829,853 | 54,840,595 | 76,965,711 | 158,485,155 | 34,035,905 | 77,389,320 |
| | 1 | 0 | 0 | 0 | 3,932 | 0 | 18,626 | 0 | 6,398 |
| | 2 | 0 | 0 | 0 | 7,308 | 0 | 37,729 | 0 | 15,125 |
| | 3 | 0 | 1 | 0 | 46,263 | 0 | 165,161 | 0 | 84,347 |
| | 4 | 0 | 0 | 0 | 7,597 | 0 | 33,250 | 0 | 12,449 |
| | 5 | 0 | 1 | 0 | 50,836 | 0 | 268,365 | 0 | 125,839 |
| | 6 | 0 | 9 | 0 | 408,867 | 0 | 1,297,988 | 0 | 612,934 |
| | 7 | 0 | 32 | 0 | 1,621,941 | 0 | 4,641,923 | 0 | 2,489,466 |
| | 8 | 390 | 886 | 28,829,853 | 47,987,129 | 76,965,711 | 139,765,882 | 34,035,905 | 67,340,852 |
| | 9 | 0 | 8 | 0 | 362,213 | 0 | 1,158,504 | 0 | 598,739 |
| | 10 | 0 | 1 | 0 | 24,169 | 0 | 116,024 | 0 | 49,050 |
| | 11 | 0 | 35 | 0 | 2,367,158 | 0 | 5,490,532 | 0 | 3,128,472 |
| | 12 | 0 | 16 | 0 | 900,357 | 0 | 2,989,635 | 0 | 1,505,205 |
| | 13 | 0 | 16 | 0 | 1,030,342 | 0 | 2,407,111 | 0 | 1,377,783 |
| | 14 | 0 | 1 | 0 | 22,484 | 0 | 94,423 | 0 | 42,661 |

Appendix 2: Operational Impacts (FY 2021-2040)

| | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|------|--------|---------------|--------------|---------------------|--------------------|---------------|--------------|--------------------|-------------------|
| 2025 | State | 390 | 1,004 | 28,910,951 | 54,953,745 | 77,024,053 | 158,646,387 | 34,121,076 | 77,531,404 |
| | 1 | 0 | 0 | 0 | 3,936 | 0 | 18,644 | 0 | 6,404 |
| | 2 | 0 | 0 | 0 | 7,316 | 0 | 37,768 | 0 | 15,141 |
| | 3 | 0 | 1 | 0 | 46,311 | 0 | 165,331 | 0 | 84,433 |
| | 4 | 0 | 0 | 0 | 7,605 | 0 | 33,284 | 0 | 12,462 |
| | 5 | 0 | 1 | 0 | 50,892 | 0 | 268,684 | 0 | 125,993 |
| | 6 | 0 | 9 | 0 | 409,237 | 0 | 1,299,174 | 0 | 613,494 |
| | 7 | 0 | 32 | 0 | 1,623,470 | 0 | 4,646,399 | 0 | 2,491,876 |
| | 8 | 390 | 885 | 28,910,951 | 48,093,826 | 77,024,053 | 139,908,961 | 34,121,076 | 67,473,237 |
| | 9 | 0 | 8 | 0 | 362,589 | 0 | 1,159,739 | 0 | 599,384 |
| | 10 | 0 | 1 | 0 | 24,195 | 0 | 116,154 | 0 | 49,105 |
| | 11 | 0 | 35 | 0 | 2,369,355 | 0 | 5,495,723 | 0 | 3,131,417 |
| | 12 | 0 | 16 | 0 | 901,216 | 0 | 2,992,622 | 0 | 1,506,687 |
| | 13 | 0 | 16 | 0 | 1,031,292 | 0 | 2,409,393 | 0 | 1,379,072 |
| | 14 | 0 | 1 | 0 | 22,505 | 0 | 94,511 | 0 | 42,700 |
| 2026 | State | 390 | 1,004 | 28,992,049 | 55,066,894 | 77,082,396 | 158,807,618 | 34,206,248 | 77,673,489 |
| | 1 | 0 | 0 | 0 | 3,939 | 0 | 18,661 | 0 | 6,410 |
| | 2 | 0 | 0 | 0 | 7,323 | 0 | 37,807 | 0 | 15,157 |
| | 3 | 0 | 1 | 0 | 46,360 | 0 | 165,501 | 0 | 84,519 |
| | 4 | 0 | 0 | 0 | 7,612 | 0 | 33,317 | 0 | 12,474 |
| | 5 | 0 | 1 | 0 | 50,948 | 0 | 269,003 | 0 | 126,148 |
| | 6 | 0 | 9 | 0 | 409,608 | 0 | 1,300,360 | 0 | 614,054 |
| | 7 | 0 | 32 | 0 | 1,624,998 | 0 | 4,650,874 | 0 | 2,494,286 |
| | 8 | 390 | 885 | 28,992,049 | 48,200,523 | 77,082,396 | 140,052,040 | 34,206,248 | 67,605,623 |
| | 9 | 0 | 8 | 0 | 362,965 | 0 | 1,160,974 | 0 | 600,029 |
| | 10 | 0 | 1 | 0 | 24,222 | 0 | 116,284 | 0 | 49,160 |
| | 11 | 0 | 35 | 0 | 2,371,552 | 0 | 5,500,914 | 0 | 3,134,362 |
| | 12 | 0 | 16 | 0 | 902,075 | 0 | 2,995,608 | 0 | 1,508,168 |
| | 13 | 0 | 16 | 0 | 1,032,243 | 0 | 2,411,676 | 0 | 1,380,361 |
| | 14 | 0 | 1 | 0 | 22,527 | 0 | 94,599 | 0 | 42,738 |
| 2027 | State | 389 | 1,003 | 29,073,146 | 55,180,044 | 77,140,739 | 158,968,850 | 34,291,419 | 77,815,573 |
| | 1 | 0 | 0 | 0 | 3,943 | 0 | 18,678 | 0 | 6,415 |
| | 2 | 0 | 0 | 0 | 7,331 | 0 | 37,847 | 0 | 15,173 |
| | 3 | 0 | 1 | 0 | 46,408 | 0 | 165,671 | 0 | 84,606 |
| | 4 | 0 | 0 | 0 | 7,620 | 0 | 33,350 | 0 | 12,487 |
| | 5 | 0 | 1 | 0 | 51,004 | 0 | 269,322 | 0 | 126,302 |
| | 6 | 0 | 9 | 0 | 409,978 | 0 | 1,301,546 | 0 | 614,613 |
| | 7 | 0 | 32 | 0 | 1,626,526 | 0 | 4,655,349 | 0 | 2,496,697 |
| | 8 | 389 | 885 | 29,073,146 | 48,307,220 | 77,140,739 | 140,195,119 | 34,291,419 | 67,738,009 |
| | 9 | 0 | 8 | 0 | 363,341 | 0 | 1,162,209 | 0 | 600,674 |
| | 10 | 0 | 1 | 0 | 24,248 | 0 | 116,414 | 0 | 49,215 |
| | 11 | 0 | 35 | 0 | 2,373,749 | 0 | 5,506,105 | 0 | 3,137,306 |
| | 12 | 0 | 16 | 0 | 902,934 | 0 | 2,998,595 | 0 | 1,509,650 |
| | 13 | 0 | 16 | 0 | 1,033,194 | 0 | 2,413,959 | 0 | 1,381,649 |
| | 14 | 0 | 1 | 0 | 22,548 | 0 | 94,687 | 0 | 42,777 |
| 2028 | State | 389 | 1,003 | 29,154,244 | 55,293,194 | 77,199,082 | 159,130,082 | 34,376,591 | 77,957,658 |
| | 1 | 0 | 0 | 0 | 3,947 | 0 | 18,695 | 0 | 6,421 |
| | 2 | 0 | 0 | 0 | 7,338 | 0 | 37,886 | 0 | 15,189 |
| | 3 | 0 | 1 | 0 | 46,456 | 0 | 165,842 | 0 | 84,692 |
| | 4 | 0 | 0 | 0 | 7,627 | 0 | 33,384 | 0 | 12,499 |
| | 5 | 0 | 1 | 0 | 51,060 | 0 | 269,641 | 0 | 126,456 |
| | 6 | 0 | 9 | 0 | 410,349 | 0 | 1,302,732 | 0 | 615,173 |
| | 7 | 0 | 31 | 0 | 1,628,054 | 0 | 4,659,824 | 0 | 2,499,107 |
| | 8 | 389 | 885 | 29,154,244 | 48,413,918 | 77,199,082 | 140,338,198 | 34,376,591 | 67,870,394 |
| | 9 | 0 | 8 | 0 | 363,717 | 0 | 1,163,443 | 0 | 601,319 |
| | 10 | 0 | 1 | 0 | 24,275 | 0 | 116,544 | 0 | 49,270 |
| | 11 | 0 | 35 | 0 | 2,375,946 | 0 | 5,511,296 | 0 | 3,140,251 |
| | 12 | 0 | 16 | 0 | 903,794 | 0 | 3,001,581 | 0 | 1,511,131 |
| | 13 | 0 | 16 | 0 | 1,034,144 | 0 | 2,416,241 | 0 | 1,382,938 |
| | 14 | 0 | 1 | 0 | 22,570 | 0 | 94,775 | 0 | 42,816 |

Appendix 2: Operational Impacts (FY 2021-2040)

| | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|------|--------|---------------|--------------|---------------------|--------------------|---------------|--------------|--------------------|-------------------|
| 2029 | State | 389 | 1,003 | 29,235,342 | 55,406,344 | 77,257,424 | 159,291,314 | 34,461,762 | 78,099,742 |
| | 1 | 0 | 0 | 0 | 3,950 | 0 | 18,712 | 0 | 6,427 |
| | 2 | 0 | 0 | 0 | 7,346 | 0 | 37,925 | 0 | 15,205 |
| | 3 | 0 | 1 | 0 | 46,504 | 0 | 166,012 | 0 | 84,779 |
| | 4 | 0 | 0 | 0 | 7,635 | 0 | 33,417 | 0 | 12,512 |
| | 5 | 0 | 1 | 0 | 51,116 | 0 | 269,960 | 0 | 126,610 |
| | 6 | 0 | 9 | 0 | 410,719 | 0 | 1,303,917 | 0 | 615,733 |
| | 7 | 0 | 31 | 0 | 1,629,582 | 0 | 4,664,300 | 0 | 2,501,517 |
| | 8 | 389 | 885 | 29,235,342 | 48,520,615 | 77,257,424 | 140,481,277 | 34,461,762 | 68,002,780 |
| | 9 | 0 | 8 | 0 | 364,093 | 0 | 1,164,678 | 0 | 601,964 |
| | 10 | 0 | 1 | 0 | 24,301 | 0 | 116,673 | 0 | 49,325 |
| | 11 | 0 | 35 | 0 | 2,378,143 | 0 | 5,516,487 | 0 | 3,143,196 |
| | 12 | 0 | 16 | 0 | 904,653 | 0 | 3,004,568 | 0 | 1,512,613 |
| | 13 | 0 | 16 | 0 | 1,035,095 | 0 | 2,418,524 | 0 | 1,384,226 |
| | 14 | 0 | 1 | 0 | 22,591 | 0 | 94,863 | 0 | 42,855 |
| 2030 | State | 389 | 1,002 | 29,316,440 | 55,519,493 | 77,315,767 | 159,452,546 | 34,546,934 | 78,241,827 |
| | 1 | 0 | 0 | 0 | 3,954 | 0 | 18,729 | 0 | 6,433 |
| | 2 | 0 | 0 | 0 | 7,354 | 0 | 37,965 | 0 | 15,221 |
| | 3 | 0 | 1 | 0 | 46,552 | 0 | 166,182 | 0 | 84,865 |
| | 4 | 0 | 0 | 0 | 7,642 | 0 | 33,450 | 0 | 12,524 |
| | 5 | 0 | 1 | 0 | 51,172 | 0 | 270,279 | 0 | 126,764 |
| | 6 | 0 | 9 | 0 | 411,090 | 0 | 1,305,103 | 0 | 616,293 |
| | 7 | 0 | 31 | 0 | 1,631,110 | 0 | 4,668,775 | 0 | 2,503,927 |
| | 8 | 389 | 884 | 29,316,440 | 48,627,312 | 77,315,767 | 140,624,357 | 34,546,934 | 68,135,165 |
| | 9 | 0 | 8 | 0 | 364,469 | 0 | 1,165,913 | 0 | 602,609 |
| | 10 | 0 | 1 | 0 | 24,328 | 0 | 116,803 | 0 | 49,381 |
| | 11 | 0 | 35 | 0 | 2,380,340 | 0 | 5,521,678 | 0 | 3,146,140 |
| | 12 | 0 | 16 | 0 | 905,512 | 0 | 3,007,555 | 0 | 1,514,094 |
| | 13 | 0 | 16 | 0 | 1,036,046 | 0 | 2,420,807 | 0 | 1,385,515 |
| | 14 | 0 | 1 | 0 | 22,613 | 0 | 94,951 | 0 | 42,894 |
| 2031 | State | 389 | 1,002 | 29,397,537 | 55,632,643 | 77,374,110 | 159,613,778 | 34,632,106 | 78,383,911 |
| | 1 | 0 | 0 | 0 | 3,957 | 0 | 18,746 | 0 | 6,439 |
| | 2 | 0 | 0 | 0 | 7,361 | 0 | 38,004 | 0 | 15,237 |
| | 3 | 0 | 1 | 0 | 46,600 | 0 | 166,352 | 0 | 84,952 |
| | 4 | 0 | 0 | 0 | 7,650 | 0 | 33,484 | 0 | 12,537 |
| | 5 | 0 | 1 | 0 | 51,228 | 0 | 270,598 | 0 | 126,919 |
| | 6 | 0 | 9 | 0 | 411,460 | 0 | 1,306,289 | 0 | 616,853 |
| | 7 | 0 | 31 | 0 | 1,632,638 | 0 | 4,673,250 | 0 | 2,506,337 |
| | 8 | 389 | 884 | 29,397,537 | 48,734,009 | 77,374,110 | 140,767,436 | 34,632,106 | 68,267,551 |
| | 9 | 0 | 8 | 0 | 364,845 | 0 | 1,167,148 | 0 | 603,255 |
| | 10 | 0 | 1 | 0 | 24,354 | 0 | 116,933 | 0 | 49,436 |
| | 11 | 0 | 35 | 0 | 2,382,537 | 0 | 5,526,869 | 0 | 3,149,085 |
| | 12 | 0 | 16 | 0 | 906,371 | 0 | 3,010,541 | 0 | 1,515,576 |
| | 13 | 0 | 16 | 0 | 1,036,996 | 0 | 2,423,089 | 0 | 1,386,803 |
| | 14 | 0 | 1 | 0 | 22,634 | 0 | 95,039 | 0 | 42,933 |
| 2032 | State | 389 | 1,002 | 29,478,635 | 55,745,793 | 77,432,452 | 159,775,010 | 34,717,277 | 78,525,996 |
| | 1 | 0 | 0 | 0 | 3,961 | 0 | 18,763 | 0 | 6,445 |
| | 2 | 0 | 0 | 0 | 7,369 | 0 | 38,043 | 0 | 15,253 |
| | 3 | 0 | 1 | 0 | 46,648 | 0 | 166,522 | 0 | 85,038 |
| | 4 | 0 | 0 | 0 | 7,657 | 0 | 33,517 | 0 | 12,549 |
| | 5 | 0 | 1 | 0 | 51,284 | 0 | 270,917 | 0 | 127,073 |
| | 6 | 0 | 9 | 0 | 411,830 | 0 | 1,307,475 | 0 | 617,413 |
| | 7 | 0 | 31 | 0 | 1,634,167 | 0 | 4,677,725 | 0 | 2,508,748 |
| | 8 | 389 | 884 | 29,478,635 | 48,840,706 | 77,432,452 | 140,910,515 | 34,717,277 | 68,399,936 |
| | 9 | 0 | 8 | 0 | 365,221 | 0 | 1,168,383 | 0 | 603,900 |
| | 10 | 0 | 1 | 0 | 24,381 | 0 | 117,063 | 0 | 49,491 |
| | 11 | 0 | 35 | 0 | 2,384,734 | 0 | 5,532,060 | 0 | 3,152,030 |
| | 12 | 0 | 16 | 0 | 907,231 | 0 | 3,013,528 | 0 | 1,517,057 |
| | 13 | 0 | 16 | 0 | 1,037,947 | 0 | 2,425,372 | 0 | 1,388,092 |
| | 14 | 0 | 1 | 0 | 22,656 | 0 | 95,127 | 0 | 42,972 |

Appendix 2: Operational Impacts (FY 2021-2040)

| | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|------|--------|---------------|--------------|---------------------|--------------------|---------------|--------------|--------------------|-------------------|
| 2033 | State | 389 | 1,002 | 29,559,733 | 55,858,942 | 77,490,795 | 159,936,242 | 34,802,449 | 78,668,080 |
| | 1 | 0 | 0 | 0 | 3,965 | 0 | 18,781 | 0 | 6,451 |
| | 2 | 0 | 0 | 0 | 7,376 | 0 | 38,083 | 0 | 15,269 |
| | 3 | 0 | 1 | 0 | 46,696 | 0 | 166,693 | 0 | 85,124 |
| | 4 | 0 | 0 | 0 | 7,665 | 0 | 33,551 | 0 | 12,562 |
| | 5 | 0 | 1 | 0 | 51,340 | 0 | 271,236 | 0 | 127,227 |
| | 6 | 0 | 9 | 0 | 412,201 | 0 | 1,308,660 | 0 | 617,973 |
| | 7 | 0 | 31 | 0 | 1,635,695 | 0 | 4,682,201 | 0 | 2,511,158 |
| | 8 | 389 | 884 | 29,559,733 | 48,947,404 | 77,490,795 | 141,053,594 | 34,802,449 | 68,532,322 |
| | 9 | 0 | 8 | 0 | 365,597 | 0 | 1,169,617 | 0 | 604,545 |
| | 10 | 0 | 1 | 0 | 24,408 | 0 | 117,193 | 0 | 49,546 |
| | 11 | 0 | 35 | 0 | 2,386,931 | 0 | 5,537,251 | 0 | 3,154,975 |
| | 12 | 0 | 16 | 0 | 908,090 | 0 | 3,016,514 | 0 | 1,518,538 |
| | 13 | 0 | 16 | 0 | 1,038,898 | 0 | 2,427,655 | 0 | 1,389,381 |
| | 14 | 0 | 1 | 0 | 22,678 | 0 | 95,215 | 0 | 43,011 |
| 2034 | State | 389 | 1,001 | 29,640,831 | 55,972,092 | 77,549,138 | 160,097,474 | 34,887,620 | 78,810,165 |
| | 1 | 0 | 0 | 0 | 3,968 | 0 | 18,798 | 0 | 6,457 |
| | 2 | 0 | 0 | 0 | 7,384 | 0 | 38,122 | 0 | 15,285 |
| | 3 | 0 | 1 | 0 | 46,744 | 0 | 166,863 | 0 | 85,211 |
| | 4 | 0 | 0 | 0 | 7,672 | 0 | 33,584 | 0 | 12,574 |
| | 5 | 0 | 1 | 0 | 51,397 | 0 | 271,555 | 0 | 127,381 |
| | 6 | 0 | 9 | 0 | 412,571 | 0 | 1,309,846 | 0 | 618,532 |
| | 7 | 0 | 31 | 0 | 1,637,223 | 0 | 4,686,676 | 0 | 2,513,568 |
| | 8 | 389 | 883 | 29,640,831 | 49,054,101 | 77,549,138 | 141,196,673 | 34,887,620 | 68,664,707 |
| | 9 | 0 | 8 | 0 | 365,974 | 0 | 1,170,852 | 0 | 605,190 |
| | 10 | 0 | 1 | 0 | 24,434 | 0 | 117,322 | 0 | 49,601 |
| | 11 | 0 | 35 | 0 | 2,389,128 | 0 | 5,542,442 | 0 | 3,157,919 |
| | 12 | 0 | 16 | 0 | 908,949 | 0 | 3,019,501 | 0 | 1,520,020 |
| | 13 | 0 | 16 | 0 | 1,039,848 | 0 | 2,429,937 | 0 | 1,390,669 |
| | 14 | 0 | 1 | 0 | 22,699 | 0 | 95,302 | 0 | 43,050 |
| 2035 | State | 389 | 1,001 | 29,721,928 | 56,085,242 | 77,607,480 | 160,258,706 | 34,972,792 | 78,952,249 |
| | 1 | 0 | 0 | 0 | 3,972 | 0 | 18,815 | 0 | 6,463 |
| | 2 | 0 | 0 | 0 | 7,391 | 0 | 38,161 | 0 | 15,301 |
| | 3 | 0 | 1 | 0 | 46,793 | 0 | 167,033 | 0 | 85,297 |
| | 4 | 0 | 0 | 0 | 7,680 | 0 | 33,617 | 0 | 12,587 |
| | 5 | 0 | 1 | 0 | 51,453 | 0 | 271,874 | 0 | 127,536 |
| | 6 | 0 | 9 | 0 | 412,942 | 0 | 1,311,032 | 0 | 619,092 |
| | 7 | 0 | 31 | 0 | 1,638,751 | 0 | 4,691,151 | 0 | 2,515,978 |
| | 8 | 389 | 883 | 29,721,928 | 49,160,798 | 77,607,480 | 141,339,752 | 34,972,792 | 68,797,093 |
| | 9 | 0 | 8 | 0 | 366,350 | 0 | 1,172,087 | 0 | 605,835 |
| | 10 | 0 | 1 | 0 | 24,461 | 0 | 117,452 | 0 | 49,656 |
| | 11 | 0 | 35 | 0 | 2,391,325 | 0 | 5,547,633 | 0 | 3,160,864 |
| | 12 | 0 | 16 | 0 | 909,808 | 0 | 3,022,487 | 0 | 1,521,501 |
| | 13 | 0 | 16 | 0 | 1,040,799 | 0 | 2,432,220 | 0 | 1,391,958 |
| | 14 | 0 | 1 | 0 | 22,721 | 0 | 95,390 | 0 | 43,088 |
| 2036 | State | 389 | 1,001 | 29,803,026 | 56,198,391 | 77,665,823 | 160,419,938 | 35,057,963 | 79,094,334 |
| | 1 | 0 | 0 | 0 | 3,976 | 0 | 18,832 | 0 | 6,469 |
| | 2 | 0 | 0 | 0 | 7,399 | 0 | 38,201 | 0 | 15,317 |
| | 3 | 0 | 1 | 0 | 46,841 | 0 | 167,203 | 0 | 85,384 |
| | 4 | 0 | 0 | 0 | 7,687 | 0 | 33,651 | 0 | 12,600 |
| | 5 | 0 | 1 | 0 | 51,509 | 0 | 272,193 | 0 | 127,690 |
| | 6 | 0 | 9 | 0 | 413,312 | 0 | 1,312,218 | 0 | 619,652 |
| | 7 | 0 | 31 | 0 | 1,640,279 | 0 | 4,695,626 | 0 | 2,518,388 |
| | 8 | 389 | 883 | 29,803,026 | 49,267,495 | 77,665,823 | 141,482,831 | 35,057,963 | 68,929,479 |
| | 9 | 0 | 8 | 0 | 366,726 | 0 | 1,173,322 | 0 | 606,480 |
| | 10 | 0 | 1 | 0 | 24,487 | 0 | 117,582 | 0 | 49,711 |
| | 11 | 0 | 35 | 0 | 2,393,522 | 0 | 5,552,824 | 0 | 3,163,809 |
| | 12 | 0 | 16 | 0 | 910,668 | 0 | 3,025,474 | 0 | 1,522,983 |
| | 13 | 0 | 16 | 0 | 1,041,749 | 0 | 2,434,503 | 0 | 1,393,246 |
| | 14 | 0 | 1 | 0 | 22,742 | 0 | 95,478 | 0 | 43,127 |

Appendix 2: Operational Impacts (FY 2021-2040)

| | Region | Direct Employ | Total Employ | Direct Labor Income | Total Labor Income | Direct Output | Total Output | Direct Value Added | Total Value Added |
|------|--------|---------------|--------------|---------------------|--------------------|---------------|--------------|--------------------|-------------------|
| 2037 | State | 389 | 1,000 | 29,884,124 | 56,311,541 | 77,724,166 | 160,581,170 | 35,143,135 | 79,236,418 |
| | 1 | 0 | 0 | 0 | 3,979 | 0 | 18,849 | 0 | 6,474 |
| | 2 | 0 | 0 | 0 | 7,407 | 0 | 38,240 | 0 | 15,333 |
| | 3 | 0 | 1 | 0 | 46,889 | 0 | 167,373 | 0 | 85,470 |
| | 4 | 0 | 0 | 0 | 7,695 | 0 | 33,684 | 0 | 12,612 |
| | 5 | 0 | 1 | 0 | 51,565 | 0 | 272,512 | 0 | 127,844 |
| | 6 | 0 | 9 | 0 | 413,683 | 0 | 1,313,403 | 0 | 620,212 |
| | 7 | 0 | 31 | 0 | 1,641,807 | 0 | 4,700,102 | 0 | 2,520,798 |
| | 8 | 389 | 883 | 29,884,124 | 49,374,193 | 77,724,166 | 141,625,911 | 35,143,135 | 69,061,864 |
| | 9 | 0 | 8 | 0 | 367,102 | 0 | 1,174,557 | 0 | 607,125 |
| | 10 | 0 | 1 | 0 | 24,514 | 0 | 117,712 | 0 | 49,767 |
| | 11 | 0 | 35 | 0 | 2,395,719 | 0 | 5,558,016 | 0 | 3,166,753 |
| | 12 | 0 | 16 | 0 | 911,527 | 0 | 3,028,460 | 0 | 1,524,464 |
| | 13 | 0 | 16 | 0 | 1,042,700 | 0 | 2,436,786 | 0 | 1,394,535 |
| | 14 | 0 | 1 | 0 | 22,764 | 0 | 95,566 | 0 | 43,166 |
| 2038 | State | 389 | 1,000 | 29,965,222 | 56,424,691 | 77,782,508 | 160,742,402 | 35,228,306 | 79,378,503 |
| | 1 | 0 | 0 | 0 | 3,983 | 0 | 18,866 | 0 | 6,480 |
| | 2 | 0 | 0 | 0 | 7,414 | 0 | 38,279 | 0 | 15,349 |
| | 3 | 0 | 1 | 0 | 46,937 | 0 | 167,544 | 0 | 85,556 |
| | 4 | 0 | 0 | 0 | 7,702 | 0 | 33,717 | 0 | 12,625 |
| | 5 | 0 | 1 | 0 | 51,621 | 0 | 272,831 | 0 | 127,998 |
| | 6 | 0 | 9 | 0 | 414,053 | 0 | 1,314,589 | 0 | 620,772 |
| | 7 | 0 | 31 | 0 | 1,643,336 | 0 | 4,704,577 | 0 | 2,523,209 |
| | 8 | 389 | 882 | 29,965,222 | 49,480,890 | 77,782,508 | 141,768,990 | 35,228,306 | 69,194,250 |
| | 9 | 0 | 8 | 0 | 367,478 | 0 | 1,175,791 | 0 | 607,770 |
| | 10 | 0 | 1 | 0 | 24,540 | 0 | 117,842 | 0 | 49,822 |
| | 11 | 0 | 34 | 0 | 2,397,916 | 0 | 5,563,207 | 0 | 3,169,698 |
| | 12 | 0 | 16 | 0 | 912,386 | 0 | 3,031,447 | 0 | 1,525,946 |
| | 13 | 0 | 15 | 0 | 1,043,651 | 0 | 2,439,068 | 0 | 1,395,823 |
| | 14 | 0 | 1 | 0 | 22,785 | 0 | 95,654 | 0 | 43,205 |
| 2039 | State | 389 | 1,000 | 30,046,319 | 56,537,841 | 77,840,851 | 160,903,634 | 35,313,478 | 79,520,587 |
| | 1 | 0 | 0 | 0 | 3,986 | 0 | 18,883 | 0 | 6,486 |
| | 2 | 0 | 0 | 0 | 7,422 | 0 | 38,319 | 0 | 15,365 |
| | 3 | 0 | 1 | 0 | 46,985 | 0 | 167,714 | 0 | 85,643 |
| | 4 | 0 | 0 | 0 | 7,709 | 0 | 33,751 | 0 | 12,637 |
| | 5 | 0 | 1 | 0 | 51,677 | 0 | 273,150 | 0 | 128,153 |
| | 6 | 0 | 9 | 0 | 414,423 | 0 | 1,315,775 | 0 | 621,332 |
| | 7 | 0 | 31 | 0 | 1,644,864 | 0 | 4,709,052 | 0 | 2,525,619 |
| | 8 | 389 | 882 | 30,046,319 | 49,587,587 | 77,840,851 | 141,912,069 | 35,313,478 | 69,326,635 |
| | 9 | 0 | 8 | 0 | 367,854 | 0 | 1,177,026 | 0 | 608,416 |
| | 10 | 0 | 1 | 0 | 24,567 | 0 | 117,971 | 0 | 49,877 |
| | 11 | 0 | 34 | 0 | 2,400,113 | 0 | 5,568,398 | 0 | 3,172,643 |
| | 12 | 0 | 16 | 0 | 913,245 | 0 | 3,034,433 | 0 | 1,527,427 |
| | 13 | 0 | 15 | 0 | 1,044,601 | 0 | 2,441,351 | 0 | 1,397,112 |
| | 14 | 0 | 1 | 0 | 22,807 | 0 | 95,742 | 0 | 43,244 |
| 2040 | State | 389 | 999 | 30,208,515 | 56,764,140 | 77,957,536 | 161,226,097 | 35,483,821 | 79,804,756 |
| | 1 | 0 | 0 | 0 | 3,994 | 0 | 18,918 | 0 | 6,498 |
| | 2 | 0 | 0 | 0 | 7,437 | 0 | 38,397 | 0 | 15,397 |
| | 3 | 0 | 1 | 0 | 47,081 | 0 | 168,054 | 0 | 85,816 |
| | 4 | 0 | 0 | 0 | 7,724 | 0 | 33,817 | 0 | 12,662 |
| | 5 | 0 | 1 | 0 | 51,789 | 0 | 273,788 | 0 | 128,461 |
| | 6 | 0 | 9 | 0 | 415,164 | 0 | 1,318,146 | 0 | 622,451 |
| | 7 | 0 | 31 | 0 | 1,647,920 | 0 | 4,718,003 | 0 | 2,530,439 |
| | 8 | 389 | 882 | 30,208,515 | 49,800,981 | 77,957,536 | 142,198,227 | 35,483,821 | 69,591,406 |
| | 9 | 0 | 8 | 0 | 368,606 | 0 | 1,179,496 | 0 | 609,706 |
| | 10 | 0 | 1 | 0 | 24,620 | 0 | 118,231 | 0 | 49,987 |
| | 11 | 0 | 34 | 0 | 2,404,507 | 0 | 5,578,780 | 0 | 3,178,532 |
| | 12 | 0 | 16 | 0 | 914,964 | 0 | 3,040,406 | 0 | 1,530,390 |
| | 13 | 0 | 15 | 0 | 1,046,503 | 0 | 2,445,916 | 0 | 1,399,689 |
| | 14 | 0 | 1 | 0 | 22,850 | 0 | 95,918 | 0 | 43,322 |

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