ECONOMIC IMPACT ASSESSMENT
SANDIA SCIENCE & TECHNOLOGY PARK

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Mid-Region Council of Governments
June 2022

Introduction

The Sandia Science & Technology Park (SS&TP) was established in southeast Albuquerque in May of 1998 and is a major contributor to the economy of the Albuquerque metropolitan area. At the request of the City of Albuquerque, the Mid-Region Council of Governments (MRCOG) provides an economic assessment of the SS&TP every two years.

MRCOG employs the Regional Economic Models, Inc (REMI) model to produce the numbers presented in this report. The REMI model is updated annually by REMI staff and is calibrated specifically to the MRCOG region (which includes the extent of Bernalillo, Sandoval, Torrance, and Valencia Counties, and a small portion of southern Santa Fe County). REMI allows users to quantify the economic impacts associated with a specific policy or investment, or the role a business or industry plays within the local economy.

This report provides a historical overview of employment at the SS&TP and presents an estimate of the economic impact of the Park in 2020 and 2021 on the Mid-Region of New Mexico, the City of Albuquerque, and the balance of Bernalillo County. The cumulative impacts of the Park since its inception are also estimated. The results of this analysis indicate that the Park has provided substantial and continuing benefits to the economy of Albuquerque and the region. The report also explains key inputs, assumptions, and methodology used to derive reported impacts.

MRCOG works in close coordination with the SS&TP Program Office to ensure the information that serves as the basis for this assessment is current and accurate. A more in-depth methodology regarding model functionality and economic assumptions employed by REMI is provided in Appendix A.

Sandia Science & Technology Park

The SS&TP is a master-planned, 340-acre technology community. Associated with Sandia National Laboratories and adjacent to Kirtland Air Force Base, companies located at the Park have easy access to world-class facilities, technologies, scientists, and engineers.

The SS&TP fosters partnerships between Sandia and the private sector by providing direct access to industry science and technology to further Sandia's missions. The Park's approach blends the technology transfer and supply chain strengths of Sandia with community involvement. Adjacent to the multibillion-dollar engineering and science facilities of Sandia and the Air Force Research Laboratory (AFRL), the SS&TP's mature

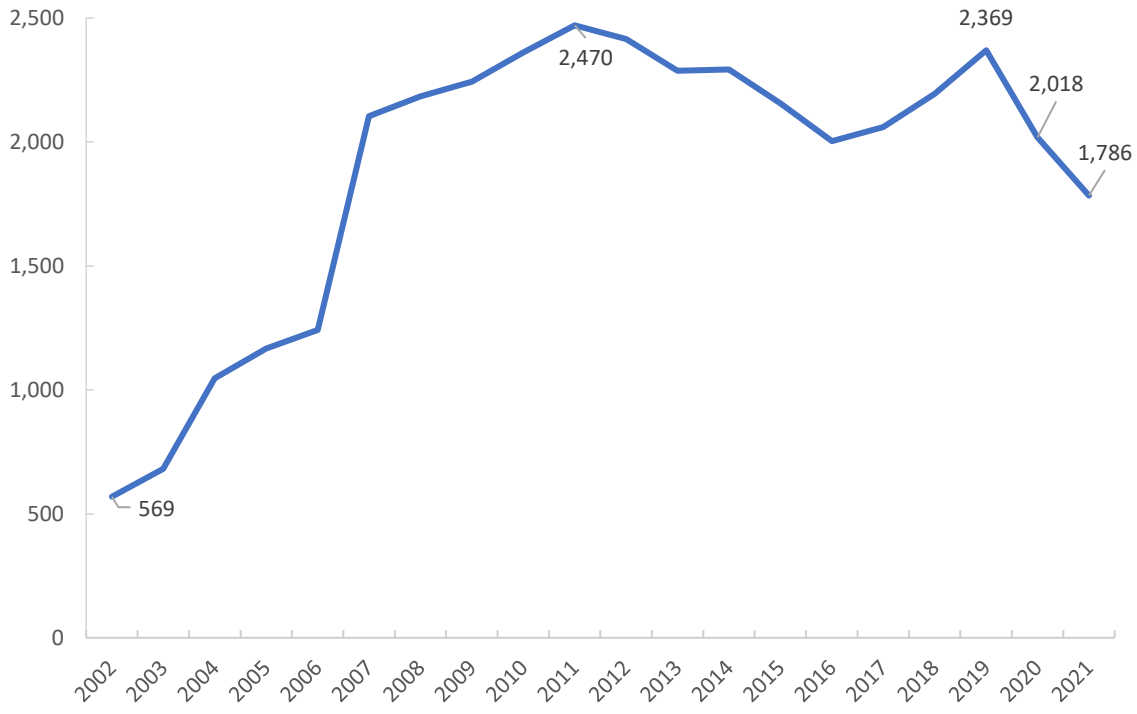
companies and startups collaborate with these top laboratories on a broad assortment of technologies, products, and services.

The Park was planned to be built on vacant land, part of which was a former City of Albuquerque landfill; other areas were covered with weeds or abandoned appliances and furniture. As more and more of the 340-acre site was developed with offices and manufacturing facilities, after cleanup efforts, 17 acres in the SS&TP became the Eubank Landfill Solar Array Project In 2013.

At the end of 2021, the Park was home to 40 companies and organizations and 1,786 employees. These employees are generally high-skilled and earn higher than average wages in the Albuquerque Metropolitan Statistical Area (MSA) for their industry. The Park typically sees millions of dollars in investments each year from private companies, federal agencies, and local governments.

The SS&TP has substantial direct impacts on the regional economy. Annual employment within the Park is shown in Figure 1 and in Table 1.

Figure 1: Employment in the Sandia Science & Technology Park



The number of jobs within the SS&TP increased strongly from inception until 2007 and continued rising steadily to a peak of 2,470 in 2011. This was during a general period when the Albuquerque Metropolitan Statistical Area (MSA) overall was shedding jobs due to the impact of the Great Recession. After a slight decline, the SS&TP grew again between 2016 and 2019, nearly returning to peak levels of employment. The COVID-19 pandemic in 2020 and 2021 resulted in a decline in employment in the Park as a

number of workers moved out of buildings to telecommute. Several hundred of these workers are expected to return to the Park in 2022 and 2023. The departure of Raytheon in 2021 resulted in a loss of jobs in the Park as well.

As of 2021, SS&TP employment was categorized into twelve industry subsectors as defined by the REMI model, these classifications roughly follow the 2012, three-digit North American Industry Classification System (NAICS). The breakdown of employment by subsector is presented in Table 2. Approximately two-thirds of the employees in the SS&TP work in the broad Professional, Scientific, and Technical Services subsector, performing work that requires a high degree of expertise and training. This subsector is defined as "establishments engaged in processes where human capital is the major input (NAICS, 2012)." These employees include engineers, researchers, and consultants at the Park. The broad manufacturing sector makes up the next largest portion of employment, and comprises workers in computer, electronics, and electrical equipment manufacturing industry subsectors.

Table 1: End of Year Employment

Year	Employment
2010	2,360
2011	2,470
2012	2,414
2013	2,287
2014	2,292
2015	2,155
2016	2,008
2017	2,059
2018	2,194
2019	2,369
2020	2,018
2021	1,786

Table 2: 2020 and 2021 Employment by Industry Subsector

Industry Subsector	2020	2021
Fabricated Metal Product Manufacturing	4	3
Computer and Electronic Product Manufacturing	354	423
Electrical Equipment, Appliance, and Component Manufacturing	100	0
Miscellaneous Manufacturing	42	44
Telecommunications	3	3
Monetary Authorities	11	9
Securities, Commodity Contracts, other Investments	0	3
Professional, Scientific, and Technical Services	1358	1111
Educational Services; Private	100	143
Social Assistance	27	26
Museums, Historical Sites, and Similar Institutions	18	20
Religious, Grantmaking, Civic, Professional, and Similar Organizations	1	1
Total	**2,018**	**1,786**

Source: Sandia Science & Technology Park

The average annual salary in the SS&TP, including for those that are employed by Sandia as well as by private companies, was $97,399 in 2021[1] and the average salary

[1] SS&TP average annual salaries are provided by individual companies and calculated for full-time equivalent employment.

not including Sandia employees was $73,855. Employment in the Park provides high-skilled labor to science and technology industries and Park employees earn substantively higher wages compared to others in the region. The average annual salary in the Albuquerque MSA was $54,028 in 2021, according to the Bureau of Labor Statistics Occupational Employment Statistics Program.

Private and public investment in the SS&TP creates direct and indirect jobs, helps maintain existing jobs, and contributes to the overall health and security of the regional economy. Private companies made capital investments or equipment purchases in the Park totaling $3.5 million in 2020 and $7.9 million in 2021. These investments funded continued outfitting of existing buildings and ongoing operational needs. Table 3 provides information on public and private investment and total investments since the inception of the Park.

Table 3: Investment Spending – Construction, Equipment Purchases, and Building Maintenance

	2020	2021	Since Inception (1998)
Private	$3,527,680	$7,899,974	$317,000,000
Public	$5,000,000	$6,000,000	$99,000,000
Total	$8,527,680	$13,899,974	$416,000,000

Source: Sandia Science & Technology Park

Private investment in the Park, since its inception in 1998, is $317 million. Public investment in the Park, since its inception, is $99 million. Included in the Public investment figure is the U.S. Department of Energy's contribution for the Master Development Plan, Sandia program management of the Park, land value from Albuquerque Public Schools and New Mexico State Land Office, and landfill cleanup from Bernalillo County. In addition, the U.S. Economic Development Administration provided assistance to the SS&TP in the form of grants, including a fiber optic network, a point-of-presence building, and security cameras; the State of New Mexico/City of Albuquerque provided assistance and capital outlay for the market survey, conceptual design and development, and Master Development Plan; and the City of Albuquerque provided infrastructure improvements, such as Park and landfill cleanup, storm sewer, and street improvements as well.

Results

Output from the REMI model is organized and presented below in Tables 4 through 7. Although the SS&TP only directly impacts employment in East Albuquerque, indirect impacts are prominent throughout the greater regional economy. To demonstrate this, economic indicators are presented for three regions: the MRCOG region (Table 4), the City of Albuquerque (Table 5), and the remainder of Bernalillo County (Table 6).

The SS&TP is an important asset to the MRCOG region and plays a crucial role in the well-being of the local economy. This analysis indicates that for every direct job located

within the Park in 2020 and 2021, nearly two indirect jobs were created in the region. The Park was responsible for an increase of $553 million[2] in Gross Regional Product (GRP) in 2020 and $514 million in 2021.

Table 4: Economic Impacts in the MRCOG Region (Bernalillo, Sandoval, Torrance, Valencia, and Southern Santa Fe Counties)

Measure	Estimated 2020 Impact	Estimated 2021 Impact
Impact on Total Employment	5,778	4,963
Construction	587	491
Manufacturing	624	580
Retail Trade	450	379
Professional and Technical Services	1,669	1,379
Health Care and Social Assistance	478	409
Accommodation and Food Services	267	223
Other Industries	1,703	1,501
Direct Employment (Employment at the SS&TP)	2,018	1,786
Indirect Employment	3,760	3,177
Gross Regional Product	$553,400,000	$514,400,000
Wage and Salary Disbursements	$372,700,000	$331,200,000
Increase in Personal Consumption	$306,000,000	$293,000,000
Increase in Taxable Personal Consumption	$175,700,000	$168,900,000
Increase in Tax Revenue Generated from Personal Consumption to the State of New Mexico	$8,400,000	$8,000,000
Impact on Population	1,663	1,332

Economic activity at the SS&TP was responsible for an estimated population increase of 1,663 in 2020 and 1,332 in 2021 in the MRCOG region. The increase was primarily due to economic migration, which assumes that some new workers and their families are drawn to the area for employment opportunities. This affects consumption as the new population spends their dollars within their community.

[2] All dollar values are reported in 2022 inflation adjusted dollars.

Table 5: Economic Impacts in the City of Albuquerque

Measure	Estimated 2020 Impact	Estimated 2021 Impact
Impact on Total Employment	4,852	4,183
Construction	355	297
Manufacturing	593	554
Retail Trade	348	293
Professional and Technical Services	1,545	1,271
Health Care and Social Assistance	410	351
Accommodation and Food Services	222	186
Other Industries	1,379	1,229
Direct Employment (Employment at the SS&TP)	2,018	1,786
Indirect Employment	2,834	2,397
Gross Regional Product	$476,300,000	$446,700,000
Wage and Salary Disbursements	$330,100,000	$290,600,000
Increase in Personal Consumption	$206,600,000	$199,500,000
Increase in Taxable Personal Consumption	$122,300,000	$118,900,000
Increase in Tax Revenue Generated from Personal Consumption to the City of Albuquerque	$3,100,000	$3,000,000
Impact on Population	960	776

Most of the economic benefits of the SS&TP are to the City of Albuquerque (Table 5). In 2020, 2,018 direct jobs were located in the Park and an additional 2,834 jobs were created in the city. In 2021, 1,786 direct jobs were located in the Park and an additional 2,397 jobs were created in the city. The largest increases in GRP ($476 million[3] in 2020 and $447 million in 2021), wage and salary disbursements ($330 million in 2020 and $291 million in 2021), and taxable personal consumption ($122 million in 2020 and $119 million in 2021) occurred in Albuquerque. The next largest economic impacts occurred in the rest of Bernalillo County, presented in Table 6. The figures in Table 4 include those presented in Tables 5 and 6.

Not all direct employees of the SS&TP reside in the City of Albuquerque or spend their disposable income within city limits. This results in benefits being shared across the region. In particular, the presence of the Park supports increased levels of consumption and results in a large number of indirect jobs in the service sector. For example, increased disposable income leads to job creation in the health care and social assistance, and the accommodation and food service industry sectors.

[3] All dollar values are reported in 2022 inflation adjusted dollars.

Table 6: Economic Impacts in the Rest of Bernalillo County (Area outside the City of Albuquerque)

Measure	Estimated 2020 Impact	Estimated 2021 Impact
Impact on Total Employment	569	481
Construction	158	133
Manufacturing	23	18
Retail Trade	43	36
Professional and Technical Services	113	99
Health Care and Social Assistance	30	26
Accommodation and Food Services	21	17
Other Industries	181	152
Direct Employment (Employment at the SS&TP)	0	0
Indirect Employment	569	481
Gross Regional Product	$48,300,000	$44,600,000
Wage and Salary Disbursements	$29,900,000	$29,200,000
Increase in Personal Consumption	$36,400,000	$36,700,000
Increase in Taxable Personal Consumption	$19,600,000	$19,400,000
Increase in Tax Revenue Generated from Personal Consumption to Bernalillo County	$1,900,000	$1,800,000
Impact on Population	236	186

Additional jobs draw new people to the region and generate higher tax revenues and increased economic activity. This is particularly true of the SS&TP because of the high quality of jobs. Between the State, the City of Albuquerque, and Bernalillo County, about $13.4[4] million in tax revenue from gross receipts tax was attributable to economic impacts from the Park in 2020 and $12.8 million in 2021. The State of New Mexico received the largest share ($8.4 million in 2020 and $8 million in 2021), followed by the City of Albuquerque ($3.1 million in 2020 and $3 million in 2021), and Bernalillo County ($1.9 million in 2020 and $1.8 million in 2021). It should be noted that these figures only include taxes on increased spending from individuals.

[4] All dollar values are reported in 2022 inflation adjusted dollars.

Summary

The SS&TP remains a significant contributor to the regional economy with public or private investments creating clear economic gains year after year. Table 7 presents the estimated historical level of economic impacts of the SS&TP in the MRCOG Region. These are cumulative values for tax revenue, wage and salary disbursements, and the peak level of employment.[5]

Table 7: Impacts of Sandia Science & Technology Park

Economic Indicator	Economic Value
Peak Number of Jobs Created (2011)**	
Direct Jobs Created	2,470
Indirect Jobs Created	4,123
Total Jobs Created	6,593
Indirect Jobs to Direct Jobs	1.7
Increase in Tax Revenue Since Inception (1998-2021)	
Cumulative Impact on Taxable Personal Consumption	$4,039,900,000
Cumulative Increase in Revenue Generated from Taxable Personal Consumption to the City of Albuquerque	$36,600,000
Cumulative Increase in Revenue Generated from Taxable Personal Consumption to the State of New Mexico	$166,100,000
Wage and Salary Impacts	
Cumulative Impact on Wage and Salary Disbursements (1998-2021)	$7,180,700,000
Average Salary for All Park Employees (2021)	$97,399
Average Salary for Non-Sandia/Industry Employees in Park (2021)	$73,855
Average Salary for the Albuquerque Metropolitan Area (2021)	$54,028

Notes:

****** The SS&TP had their highest levels of employment in 2011. The 'peak number of jobs' presented in this table reflect employment impacts from that year.

All dollar values are reported in 2022 inflation adjusted dollars.

The average salary for the Albuquerque Metropolitan Area is from the Bureau of Labor Statistics Occupational Employment Statistics Program (May 2021).

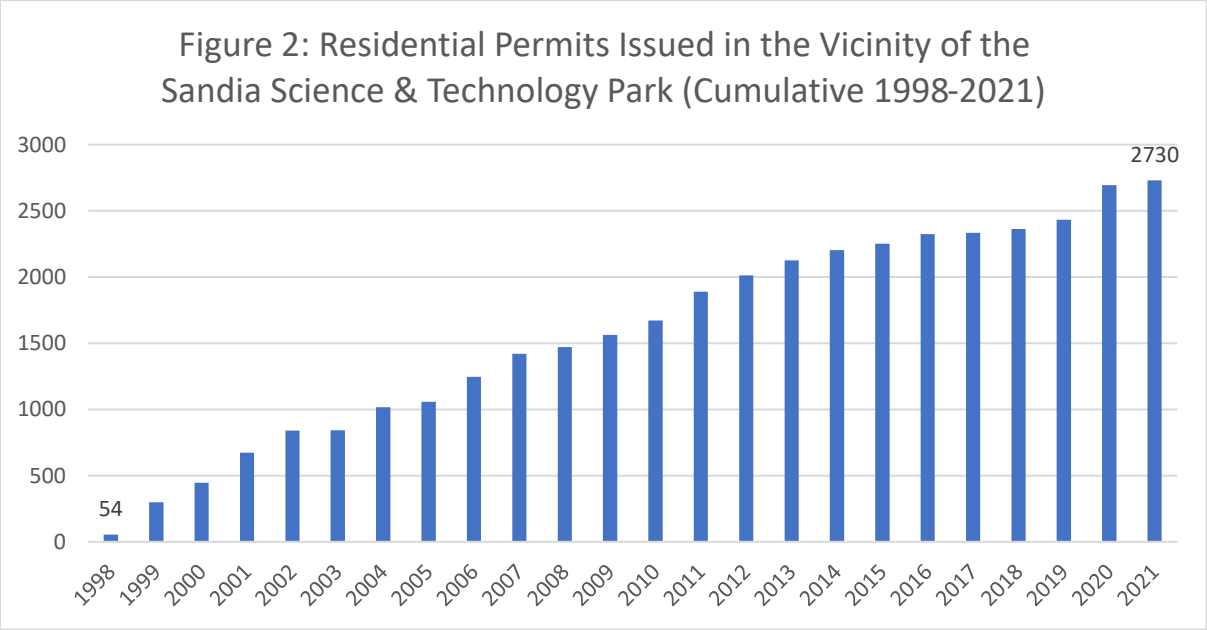
To maintain consistency with previous reports, the total estimate of the impact on gross receipts tax revenues for Albuquerque is calculated using the city-imposed tax rate and does not include the portion of the state revenues that is redistributed to the City.

Figures have been derived using a number of different versions of the REMI model. Each report contains the best available estimates of these impacts at the time, but summing results from different models may be problematic. Values presented in this table should be considered rough estimates.

[5] As discussed in the "Notes on the REMI Model" section, these estimates are an aggregation of totals from multiple versions of the REMI model.

The SS&TP advances the economy of New Mexico; its impacts are concentrated in the central region of the state, particularly in the East Central Avenue community within the City of Albuquerque. The Park is of great benefit to local business owners, home builders throughout the region, and the high technology sector in the state. The SS&TP has created many high-quality direct jobs and additional indirect jobs exist because of the Park's presence. Millions of dollars of gross receipts tax revenue and billions of dollars in wage and salary disbursements are attributable to the Park since its inception.

The community that surrounds the SS&TP has experienced significant growth and investment. Since the Park was established, more than 2,700 permits for new homes and apartments have been issued in the immediate vicinity (Figure 2). This includes the area south of I-40, east of Eubank Boulevard, and west of Juan Tabo Boulevard, as well as a large residential subdivision, Juan Tabo Hills, south of the Tijeras arroyo on the east and west sides of Juan Tabo. Single Family residential growth in the area since 2015 has been concentrated in Volterra Village, just north of Juan Tabo Hills. A large senior housing development with 92 apartments near Central and Eubank was completed in 2020.



In addition to new facilities at the Park, business investment in the area includes major restaurants, retailers, new warehouses, and new office buildings. There are 15 restaurants located within a mile of the Park and 29 hotels within three miles of the Park. Commercial retail buildings within one mile of the SS&TP consistently enjoy a lower vacancy rate than the rest of the city (0.7 percent near the SS&TP compared to 3.3 percent for Albuquerque in 2022)[6]. The National Museum of Nuclear Science &

[6] CoStar

History, which is located along Eubank at Southern, attracts national and international visitors to the southeast Albuquerque area.

The East Central Avenue area has been the point of focus for planning and revitalization efforts, including improvements to the nearby community park and recreation facilities; the Manzano Mesa Multigenerational Center and Elementary School are examples of investment activity in the area. The SS&TP also features pocket parks, picnic areas, walking trails, exercise stations, and security cameras. The SS&TP is served by the City of Albuquerque Bus Route 2, which runs primarily along Eubank, provides service to Kirtland Air Force Base and Sandia Tech Area One, and connects to the Albuquerque Rapid Transit system which provides frequent bus rapid transit service along Central.

In addition to the economic benefit the SS&TP provides to the region, it improves the reputation of Albuquerque and New Mexico as a viable and attractive location for high-tech companies. Sandia, a key partner in the Park, has contributed to the growth of jobs and innovation at the Park. The Labs are renowned for their world-class facilities and capabilities that are a strategic advantage for the region.

The location of the SS&TP contributes to its success for several reasons. The Park benefits Sandia by providing direct access to industry. The immediate proximity to Sandia enables successful partnerships with the Labs, making it easier for Park companies to act as convenient suppliers of goods and services while supporting Sandia's missions. Here are a few examples of the many Park companies that support Sandia:

- **BlueHalo**: Contracts to support upgrades to the Hermes and Saturn accelerators, and tester development for Mobile Guardian Transporter and JTA6R projects.
- **Excelligent**: Contracts to provide project management consulting services to support major modernization programs.
- **QC Group, LLC**, an IIA Company: Contracts to provide Metrology and Precision Dimensional Inspection Services.
- **TEAM Technologies**: Holds a technology transfer license from Sandia for an explosive tool called Stingray, and contracts to build security panels, power supplies, sensors, and a variety of machine parts.

The proximity of SS&TP to the Labs enables those who are doing business with Sandia to have more frequent collaboration, while saving time and money. Employees of Park companies and Sandia can meet outside of the base at the company facilities without access and security restrictions that exist on base. In addition, Park companies and organizations can also build relationships and collaborations with each other.

Sandia affiliated organizations such as the Center for Global Security and Cooperation (CGSC), Center for Integrated Nanotechnology (CINT), Computer Science Research Institute (CSRI), and Cyber Engineering Research Laboratory (CERL) are also located in the SS&TP. This has the impact of reducing expenses and enhancing productivity at the Labs.

Overall, in support of Sandia's missions, growth of the SS&TP creates economic impact for Sandia, the Park companies and organizations, City of Albuquerque, Bernalillo County, and State of New Mexico.

Methods

The data contained in this report has been generated by the REMI model. MRCOG has operated REMI since 1999 for the purpose of long-range employment forecasting and for analyzing economic activity in central New Mexico. REMI models are well respected and used by organizations throughout the world for economic impact analyses. REMI accepts inputs regarding projects of economic interest. These inputs are used to calculate, or to simulate, resulting economic impacts. At its core, REMI is an input-output computational general equilibrium model. The model uses information specific to the region collected from various agencies including the Bureau of Labor Statistics and the U.S. Department of Commerce. Hundreds of variables interact to produce a regional control for the model. Inputs, from the SS&TP, are then used to create a simulation which can be compared to the regional control and estimate economic impacts of the Park.

There are a few key points that should be considered when reviewing the data contained in this report.

- REMI is subject to annual updates. These updates incorporate methodology enhancements and the most current year of historical data. Annual changes to the modeling tool mean that in any given year results may not be directly comparable to other years. This presents a challenge when performing historical analysis or analyzing cumulative impacts for the SS&TP over time. A summary table (Table 7) of estimated impacts of the Park since inception represents a best effort at combining the results of previous economic impact analyses into a reasonable estimate of the cumulative impact on the region. These cumulative impacts are, therefore, best understood as the aggregation of a series of economic assessments that have been conducted using models that are fundamentally similar, albeit with differences from year to year.
- In 2010, MRCOG expanded its "economic regions," internal to REMI, from four to seven regions.[7] This entailed splitting up some larger geographies to achieve a

[7] Geographies used in the current version of the model include: East Albuquerque, West Albuquerque, Rest of Bernalillo County, Rio Rancho, Rest of Sandoval County, Valencia County, Torrance, and Southern Santa Fe Counties.

more nuanced and localized assessment of the benefits associated with a project or investment. One of the key divisions was the separation of the City of Albuquerque into East and West sections, divided by the Rio Grande, to reflect the varied economic contexts within the City. The SS&TP is located in the eastern portion of Albuquerque; therefore, all employment and investment associated with the Park were input to the East Albuquerque region within the REMI model. This is significant because it allows for a more accurate and refined estimate of economic impacts resulting from the Park than were previously available.

- Finally, a key assumption that underlies this analysis is that there is little local competition to provide the goods and services produced at the SS&TP. As such, sales displacement to and from other local firms is minimal. This assumption is based on the understanding that many of the goods and services developed at the Park are highly specialized and generally supplied under exclusive contracts.

Because direct impacts of the SS&TP (i.e. employment, wages, and investments) are based on actual data, we can use this information as REMI inputs and calculate indirect and total economic impacts.

In this report, the model analysis years are 2020 and 2021. Inputs to REMI were provided by the SS&TP for the analysis years. Inputs include total employment, equipment costs, wages and investment spending. Employment is entered by subsector, to reflect the varying intermediate demands and secondary economic impacts, for each year.

Due to disproportionately high wages at the SS&TP, a wage adjustment was made for certain subsectors of employment. This was necessary due, in part, to the broad employment subsectors that drive the REMI model. In particular, a large number of employees in the Park are employed by Sandia and are paid higher than average wages. More than half of Park employees fall into the broad industrial classification of Professional, Scientific, and Technical Services. While this category encompasses research and development occupations, which better describes Park jobs, it also includes relatively lower-wage positions such as accountants and building inspectors. A similar situation exists in the Electrical Equipment and Appliance Manufacturing subsector. In order to reflect the high-skill, high-wage employment found in the Park, wages were adjusted to reflect current wage conditions.

Capital investments or equipment purchase investments lead to impacts on the regional economy, including direct and indirect job creation and intermediate demand for goods and services used in the production process. Private investments were categorized as equipment and intellectual property products. After investments were categorized, they were used as inputs to the REMI model.

Economic Indicators

There are hundreds of variables that are produced by the REMI model. When estimating the total impact the SS&TP has on the larger economy, several indicators are of particular interest. Specifically, increases in wages, employment, population, and taxable income highlight the benefits of the Park. In this analysis we report on the impacts to employment by subsector, gross regional product, wage and salary disbursements, personal consumption, taxable personal consumption, tax revenue from consumption, and population. These indicators, provided in Tables 4 through 7, are defined as follows:

Employment: Total employment is made up of direct employment and indirect employment. Direct employment includes the people employed at the SS&TP. Indirect employment includes the jobs created that would not have existed without employment or investment in the Park. Indirect jobs are explained through what is known as the multiplier effect. REMI calculates indirect jobs using a number of equations and varies depending on the subsector and types of investment. For example, investments in infrastructure lead to a short-term increase in construction employment; however, these jobs may not be permanent. Higher wages and direct employment will lead to more demand for goods and services and will create permanent jobs in sectors like accommodation and food services or retail trade.

Gross Regional Product (GRP): GRP is the total value of consumption, investment, and government spending in the region. Investments and government spending not only impact GRP directly, but also help create jobs and spur further consumption. GRP can also be seen as the total value of final goods and services produced within the regional economy.

Wage and Salary Disbursements: Wage and Salary Disbursements are the monetary remuneration of employees, including the compensation of corporate officers; commissions, tips, and bonuses; voluntary employer contributions to certain deferred compensation plans, such as 401(k) plans; and receipts in kind that constitute income. The estimated change in disbursements is directly related to the type of employment generated at the SS&TP. Since Park jobs are primarily in high technology industry sectors, comprised mainly of engineering and research jobs, a high wage rate is associated with them.

Personal Consumption: Personal Consumption is the dollar amount of disposable income spent on goods and services by individuals. Higher wages lead to higher disposable income and generally higher levels of consumption.

Taxable Personal Consumption: Not all forms of consumption are subject to gross receipts tax. For example, New Mexico has no tax on food products. Taxable Personal Consumption is calculated using the percentage of gross receipts that were taxable for each respective geographical area as reported by the State of New Mexico Taxation and Revenue Department Combined Reporting System.

Tax Revenue from Consumption: Consumption for each geographic area is estimated; then, the share of the gross receipts tax attributable to each government is calculated. For instance, in Albuquerque, the total gross receipts tax is 7.875 percent. Of that, Bernalillo County and the City of Albuquerque get almost 1 percent each while the State of New Mexico gets 5.125 percent. Of the 5.125 percent, an additional 1.3 percent is paid to the City of Albuquerque in a transfer. This means Albuquerque gets just over 2 percent in tax revenue from taxable personal consumption taking place within the city.

Population: Population is affected by two factors. These are natural increase (births minus deaths) and migration. Large economic projects like the SS&TP tend to draw people to the region through economic migration.

Appendix A: Overview of the REMI Model[8]

The REMI model incorporates aspects of four major modeling approaches: Input-Output, General Equilibrium, Econometric, and Economic Geography. Each of these methodologies has distinct advantages as well as limitations when used alone. The REMI integrated modeling approach builds on the strengths of each of these approaches.

The REMI model, at its core, has the inter-industry relationships found in Input-Output models. As a result, the industry structure of a particular region is captured within the model, as well as transactions between industries. Changes that affect industry sectors that are highly interconnected to the rest of the economy will often have a greater economic impact than those for industries that are not closely linked to the regional economy.

General Equilibrium is reached when supply and demand are balanced. This tends to occur in the long run, as prices, production, consumption, imports, exports, and other changes occur to stabilize the economic system. For example, if real wages in a region rise relative to the U.S., this will tend to attract economic migrants to the region until relative real wage rates equalize. The general equilibrium properties are necessary to evaluate changes such as tax policies that may have an effect on regional prices and competitiveness.

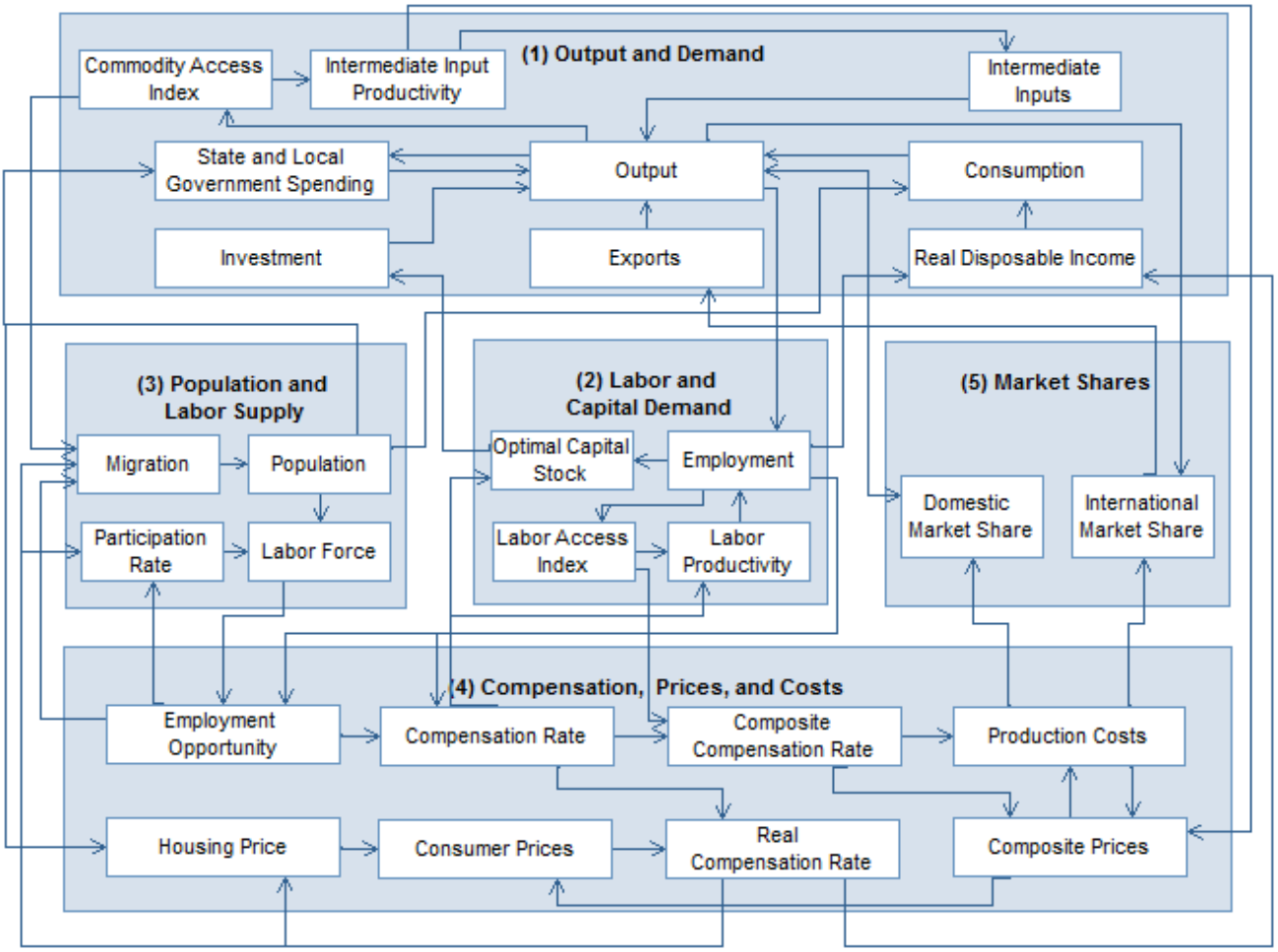
REMI is sometimes called an "Econometric model," as the underlying equations and responses are estimated using advanced statistical techniques. The estimates are used to quantify the structural relationships in the model. The speed of economic responses is also estimated, since different adjustment periods will result in different policy recommendations and even different economic outcomes.

The New Economic Geography features represent the spatial dimension of the economy. Transportation costs and accessibility are important economic determinants of interregional trade and the productivity benefits that occur due to industry clustering and labor market access. Firms benefit having access to a large, specialized labor pool and from having access to specialized intermediate inputs from supplying firms. The productivity and competitiveness benefits of labor and industry concentrations are called agglomeration economies and are modeled in the economic geography equations.

The REMI model consists of thousands of simultaneous equations with a structure that is relatively straightforward. The exact number of equations used varies depending on the extent of industry, demographic, demand, and other detail in the model. The overall structure of the model can be summarized in five major blocks: (1) Output and Demand, (2) Labor and Capital Demand, (3) Population and Labor Supply, (4) Compensation, Prices and Costs, and (5) Market Shares. The blocks and their key interactions are shown in Figure 3.

[8] The information contained in this technical appendix largely comes from REMI directly either through their technical documents, their webpage (www.remi.com), or the REMI model itself.

Figure 3: REMI Model Linkages



Block 1. Output and Demand

This block includes output, demand, consumption, investment, government spending, import, commodity access, and export concepts. Output for each industry in the home region is determined by industry demand in all regions in the nation, the home region's share of each market, and international exports from the region.

For each industry, demand is determined by the amount of output, consumption, investment, and capital demand on that industry. Consumption depends on real disposable income per capita, relative prices, differential income elasticities, and population. Input productivity depends on access to inputs because a larger choice set of inputs means it is more likely that the input with the specific characteristics required for the job will be found. In the capital stock adjustment process, investment occurs to fill the difference between optimal and actual capital stock for residential, non-residential, and equipment investment. Government spending changes are determined by changes in the population.

Block 2. Labor and Capital Demand

The Labor and Capital Demand block includes the determination of labor productivity, labor intensity, and the optimal capital stocks. Industry-specific labor productivity depends on the availability of workers with differentiated skills for the occupations used in each industry. The occupational labor supply and commuting costs determine firms' access to a specialized labor force.

Labor intensity is determined by the cost of labor relative to the other factor inputs, capital and fuel. Demand for capital is driven by the optimal capital stock equation for both non-residential capital and equipment. Optimal capital stock for each industry depends on the relative cost of labor and capital, and the employment weighted by capital use for each industry. Employment in private industries is determined by the value added and employment per unit of value added in each industry.

Block 3. Population and Labor Supply

The Population and Labor Supply block includes detailed demographic information about the region. Population data is given for age, gender, and ethnic category, with birth and survival rates for each group. The size and labor force participation rate of each group determines the labor supply. These participation rates respond to changes in employment relative to the potential labor force and to changes in the real after-tax compensation rate. Migration includes retirement, military, international, and economic migration. Economic migration is determined by the relative real after-tax compensation rate, relative employment opportunity, and consumer access to variety.

Block 4. Compensation, Prices and Costs

This block includes delivered prices, production costs, equipment cost, the consumption deflator, consumer prices, the price of housing, and the compensation equation. Economic geography concepts account for the productivity and price effects of access to specialized labor, goods, and services.

These prices measure the price of the industry output, taking into account the access to production locations. This access is important due to the specialization of production that takes place within each industry, and because transportation and transaction costs of distance are significant. Composite prices for each industry are then calculated based on the production costs of supplying regions, the effective distance to these regions, and the index of access to the variety of outputs in the industry relative to the access by other uses of the product.

The cost of production for each industry is determined by the cost of labor, capital, fuel, and intermediate inputs. Labor costs reflect a productivity adjustment to account for access to specialized labor, as well as underlying compensation rates. Capital costs include costs of non-residential structures and equipment, while fuel costs incorporate electricity, natural gas, and residual fuels.

The consumption deflator converts industry prices to prices for consumption commodities. For potential migrants, the consumer price is additionally calculated to include housing prices. Housing prices change from their initial level depending on changes in income and population density.

Compensation changes are due to changes in labor demand and supply conditions and changes in the national compensation rate. Changes in employment opportunities relative to the labor force and occupational demand change determine compensation rates by industry.

Block 5. Market Shares

The market shares equations measure the proportion of local and export markets that are captured by each industry. These depend on relative production costs, the estimated price elasticity of demand, and the effective distance between the home region and each of the other regions. The change in share of a specific area in any region depends on changes in its delivered price and the quantity it produces compared with the same factors for competitors in that market. The share of local and external markets then drives the exports from and imports to the home economy.