Fiscal Year 2022 New Economy Initiative: Fiscal Breakeven for the Arizona State University Proposal

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Prepared For:

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Introduction

Rounds Consulting Group, Inc. (RCG) was tasked with independently analyzing the economic and fiscal impact of Arizona State University’s (ASU) $46.0M Fiscal Year 2022 (FY22) Public Investment Proposal. The purpose of this analysis is to identify whether or not the state’s taxpayer investment will yield a positive return on investment (ROI) within a certain number of years. Note: This analysis is part of a comprehensive review of the budget requests of Arizona’s three universities.

ASU’s FY22 Public Investment Proposal Overview

For FY22, ASU developed an investment proposal to enhance Arizona’s economic growth and competitiveness in the “New Economy,” a revolutionary era that will be dominated by diverse technologies spanning fields such as advanced computing, biology, engineering, artificial intelligence (AI), 3D manufacturing, and autonomous systems.

To do so, ASU is seeking $46.0M of state funding in order to create more experiential learning programs, provide additional student support, increase the faculty and staff, and advance research and development.

There also exist issues related to ongoing funding versus one-time impacts. This analysis formally assumes the need for ongoing funding for the related projects and impacts. This can be considered the baseline analysis.

Over the longer term, fewer dollars will be needed on the listed programs (at reported activity levels) and some ongoing monies can be redeployed. These investments will generate additional economic and fiscal impacts that are not captured in the initial analysis, mainly due to uncertainty. However, perspective is provided on the additional impact potential. This secondary analysis can be considered the optimistic impact scenario.

Specifically, the funding would be budgeted as follows:

1) **$26.0M for Academic Programs and Student Support** – To create new academic and experiential learning programs in the natural sciences, neuroscience, digital culture and design, media arts, data science, computer science, and other New Economy fields.

   This investment will enable ASU to hire additional faculty and equip classrooms/labs for augmented reality (AR) and virtual reality (VR) instruction. These investments will lead to the creation of more experiential learning, additional student support, and an increased enrollment/retention in science, technology, engineering, and mathematics (STEM) programs.

2) **$10.0M for Engineering Faculty** – To increase the world-class faculty of the Fulton School of Engineering (FSE). More faculty will help to expand degree production and accelerate research breakthroughs. This investment will propel ASU to become one of the largest producers of
engineering and technology talent in the nation and become a first-tier center for knowledge-driven economic change.

This investment will increase total on-campus FSE enrollment from 16,400 to 25,000 students and online FSE enrollment from 8,000 to 15,000 students by 2025; and allow ASU to pursue large research programs that will put ASU research on par with that of Stanford, MIT, and Georgia Tech. This is an opportunity for Arizona to drive the creation of high-wage jobs, generate new startups, and attract high-tech companies.

3) **$10.0M for Science and Technology Centers** – To establish new science and technology centers that will foster the growth of new companies and create high-value jobs. These companies will solve problems related to energy and materials, extreme environments, advanced manufacturing, and other industries vital to Arizona and the New Economy.

This investment will pair advanced tech companies with students to perform research and development – ultimately leading to significant increases in the number of inventions, patents, startups, and tech-oriented businesses operating in Arizona.

*Note: This FY22 analysis includes a more sophisticated review of new job creation from the planned programs as well as additional considerations that were not included in the previous FY21 conservative model.*
Executive Summary

In order to quantify the economic impact produced by the proposed $46.0M annual investment, a custom-built economic model was developed by RCG. The model measures the effects produced by increases in the production of New Economy graduates, the expansion of ASU faculty and staff, and the advancement of research and development resulting from the proposed investment funding. The impacts are measured in terms of economic output, jobs, labor income, and government tax revenues.

The analysis considers the synergy created when university and private sector endeavors converge, which further increases job creation, wage levels, and business development. Additional analyses were also produced related to innovation potential. Finally, interviews with economic development experts were conducted to confirm or refute the assumptions contained in this analysis.

The timeframe for the proposed investment is distinct in comparison with other economic development proposals that utilize a 5- to 10-year timeframe. The state utilizes a 5-year breakeven analysis on business recruitment projects, while cities and towns typically defer to 10 years for individual business location analyses. When infrastructure issues are considered, such as transportation, communications, or longer-term workforce efforts, the breakeven goal falls within 20 and 40 years.

“Hard” infrastructure investments, such as roads, are typically analyzed between 20 and 40 years, while “soft” infrastructure investments, such as education, should not exceed 20 years. Therefore, the breakeven for ASU’s public investment proposal should occur within 20 years. If the timeframe falls well under this 20-year threshold, the proposal is considered to be a good taxpayer investment.

ASU NEI - Key Findings

- ASU’s investment proposal will support **48,011 jobs by year 10** and **158,161 jobs by year 20**.

- Over 20 years, approximately **$78.3B in labor income** (i.e., the wages and benefits) will be created for the total jobs that are supported by ASU’s proposal.

- A total of **$177.8B in economic output** (i.e., the value of goods or services produced in an area) will be generated by ASU’s proposal over the 20-year period.

- ASU’s $46.0M investment proposal will generate a total of **$11.1B in tax revenues** (i.e., $5.8B in state tax revenues and $5.3B in local tax revenues) over the 20-year investment timeframe.

- The breakeven point for the state’s investment in ASU is achieved after year 8. In each year thereafter, the positive ROI further increases. The breakeven point occurs in less than half of the amount of time than would be considered acceptable for this type of investment (20-years).
In order to estimate ROI and breakeven points, state costs must be compared with state revenues. Over 20 years, approximately $5.8B in state tax revenues will be generated by ASU’s $46.0M a year investment proposal. The investment begins to produce a positive ROI after year 8 (the breakeven point). The total 20-year ROI (i.e., area between the revenue and investment curves) is equal to $4.9B. Over 15 years, the state ROI is $2.0B.
The concept of **compound economic development benefits is a crucial point to understand.**

As the previous figure displays, economic benefits from year to year expand exponentially, similar to how compound interest is calculated.

More immediate investment commitments in the ASU NEI will allow the compounding effect to occur earlier in the analysis period. Delays in investing resources in high ROI projects over the longer term, will “flatten the benefit curve.”

As the economic gains are delayed and reduced, the financial burden on the state, businesses, and families will only increase.
Economic and Breakeven Analysis

This analysis, prepared by RCG, summarizes the economic and fiscal impacts of ASU’s proposed $46.0M investment to identify whether or not the Arizona taxpayer’s investment will yield a positive ROI within a feasible investment timeframe. In order to quantify the economic impact produced by the annual investment, a custom-built economic model was developed.

The model measures the direct and resulting multiplier effects produced by increases in the production of New Economy graduates, the expansion of ASU faculty and staff, and the advancement of research and development resulting from the proposed investment funding. The impacts are measured in terms of economic output, jobs, labor income, and tax revenues.

Economic output captures the level of economic activity, or the total value of goods and services produced in the broader region, similar to how statistics like gross domestic product (GDP) capture economic volume across the country. Jobs refers to the employment impact on an annualized basis, and labor income simply represents the wages and benefits earned by the jobs. A job-year is one year of work for one person (for example, a new research program job that lasts five years is equivalent to five job-years). The economic activity is then converted into government tax revenues in each of the relevant categories affected.

The analysis considers the synergy created when university and private sector endeavors converge, which further increases job creation, wage levels, and business development. This enhances the state’s ability to attract other high-value companies and spurs economic growth from within the state. Finally, interviews with economic development experts were conducted to confirm or refute the assumptions contained in the analysis.

The timeframe for the proposed investment is distinct in comparison with other economic development proposals that utilize a 5- to 10-year timeframe. The state utilizes a 5-year breakeven analysis on business recruitment projects, while cities and towns typically defer to 10 years for individual business location analyses.

“Hard” infrastructure investments, such as roads, are typically analyzed between 20 and 40 years, while “soft” infrastructure investments, such as education, should not exceed 20 years. Therefore, the breakeven point for ASU’s public investment proposal should occur within 20 years. If the timeframe falls well under this 20-year threshold, the proposal is considered to be a good taxpayer investment.

Annual Economic and Fiscal Impacts

The following provides a summary of the total (sum of direct, indirect, and induced) jobs, labor income, economic output, and tax revenues generated by ASU’s $46.0M investment proposal.
Over the 20-year analysis period, an estimated $11.1B in state and local tax revenues will be generated from the requested $46.0M per year investment.

This investment will increase total on-campus Fulton School of Engineering (FSE) enrollment from 16,400 to 25,000 students and online FSE enrollment from 8,000 to 15,000 students by 2025. It is likely that not all enrollees will graduate (the economic model assumes about half will graduate to remain conservative); and that there will be at least a 2-year delay on when enrollees graduate, enter the workforce and begin generating tax revenues for the state. Once they do enter the workforce, they will earn about 65% more than the average worker in Arizona.

Also, historically, about half of ASU engineering and tech graduates remain in the state. This does not mean ASU is inefficiently training the workforce of other states because Arizona is a net importer of skilled workers due to its strong growth fundamentals. Employment movement across the nation is fluid, and these statistics are common.

Engineering and STEM field graduate retention is estimated by RCG to increase to 65% or more when the New Economy programs are fully implemented and integrated with the state’s overall economy and economic development entities. However, this analysis uses a more conservative 60% maximum long-term retention rate.

Additional benefits occur when specialized engineering and STEM programs are matched with private sector activities and the local economy’s strengths. Public/private partnerships are also recommended. This results in a higher retention rate as well as higher wages and levels of productivity. The ASU proposal focuses on these efficiencies.

Impacts were calculated based on Arizona-specific multipliers and the state’s tax structure. Actual impacts may vary, and some impacts may not materialize due to unanticipated events and changing circumstances. However, RCG has made extensive efforts to confirm the accuracy of the information contained in this analysis.

<table>
<thead>
<tr>
<th>Year</th>
<th>Jobs 1)</th>
<th>Labor Income 2)</th>
<th>Economic Output 3)</th>
<th>State Taxes 4)</th>
<th>Local Taxes 5)</th>
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<tr>
<td>Year 5</td>
<td>5,052</td>
<td>$320.0</td>
<td>$739.4</td>
<td>$36.1</td>
<td>$30.8</td>
</tr>
<tr>
<td>Year 10</td>
<td>48,011</td>
<td>$3,048.1</td>
<td>$6,921.5</td>
<td>$230.6</td>
<td>$211.9</td>
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<tr>
<td>Year 15</td>
<td>103,086</td>
<td>$6,545.6</td>
<td>$14,847.3</td>
<td>$475.0</td>
<td>$435.2</td>
</tr>
<tr>
<td>Year 20</td>
<td>158,161</td>
<td>$10,043.2</td>
<td>$22,773.1</td>
<td>$719.5</td>
<td>$658.5</td>
</tr>
<tr>
<td>Total – 20 Years</td>
<td>1,233,571</td>
<td>$78,322.5</td>
<td>$177,756.4</td>
<td>$5,771.9</td>
<td>$5,257.0</td>
</tr>
</tbody>
</table>

1) Total direct, indirect, and induced jobs supported by ASU’s investment proposal. 20-Year total in job-years.
2) Total wages and benefits earned by the direct, indirect, and induced jobs supported by ASU’s investment proposal.
3) Total direct, indirect, and induced economic activity generated by ASU’s investment proposal.
4) Total direct, indirect, and induced state tax revenues generated by ASU’s investment proposal.
5) Total direct, indirect, and induced municipal and county tax revenues generated by ASU’s investment proposal.

Source: IMPLAN; Rounds Consulting Group, Inc.
Breakeven Analysis

There are multiple considerations in analyzing a breakeven point for ASU’s $46.0M investment proposal. A breakeven point is when an investment begins to generate a positive return. For a public investment of this type, the breakeven point should occur within 20 years. If the timeframe falls well under this 20-year threshold, the proposal is considered to be a good taxpayer investment.

The multiple breakeven considerations that are provided follow a straightforward progression, from the breakeven point with no consideration of the full static and dynamic impacts, to the breakeven point with the additional impacts related to further innovation and growth in economic development and business recruitment and retention.

The initial cumulative breakeven point, as shown in Figure #1, compares the state investment with the state tax revenues generated with no consideration of the full list of static and dynamic impacts. **The breakeven occurs in year 10.** Note: This excludes any local tax revenues and approximately 35% of the full economic benefits (related to stronger economic activity lifting other industry sectors as well as business recruitment and retention).

![Graph: Figure #1 - Breakeven of State Revenues vs. Investment](graph)

Source: Rounds Consulting Group, Inc.

**However, there are additional impacts related to further innovation and the development of an educated job cluster that need to be considered.** New innovation hubs become engines of prosperity, supporting industry-wide growth.

These new hubs form ecosystems that increase the multiplier effect of job creation and advance the wages of both the direct and secondary jobs higher than what identical workers earn and produce elsewhere. **The breakeven point for ASU’s investment proposal with this additional dynamic effect is reached in year 9 (Figure #2).** These additional effects have marginal impacts in the initial years but increase significantly over time.
ASU’s efforts will play a vital role in Arizona’s long-term economic outlook and stimulate economic competitiveness. This will allow for additional economic development growth and advance business recruitment, retention and expansions. The breakeven point with business location and recruitment enhancements is displayed in the following chart (Figure #3).

**Figure #3 represents this more complete economic analysis of ROI**, including direct, indirect and induced impacts and the dynamic benefits that are realized under these conditions. **The breakeven point occurs after year 8.**
The previous breakeven analyses only considered the impacts on the state. However, local government entities should also take a greater interest in higher education investment proposals, specifically in those that yield a positive return to the taxpayer. **If both state and local tax revenues are considered, the breakeven point is reached in year 6 (Figure #4).**
The analysis included various exercises that strengthen and weaken the key economic inputs to identify a level of confidence within the modeling. For example, both lower and higher graduate figures were analyzed, along with varying levels of retention, wages, and impact on the overall economy. Under no conservative set of scenarios did the investment’s breakeven point exceed 20 years.

**Additional Considerations**

As previously noted, there will exist opportunities for additional economic benefit. For example, a more aggressive stance on high ROI workforce development will lead to more of the large-scale business locations that are promoted every two or three years. For perspective, each 1,000-worker business location or expansion opportunity that averages $100,000 per year in wages will yield another $11.2M in state and local tax collections on an annual basis. New business activity will also require the construction of new facilities, generating even more tax revenues.

*If the state adds only one new large-scale business every five years, the aforementioned breakeven points will all advance by two years.*

Also, a 60% state retention rate of specialized engineering graduates was used in this analysis. If the retention rate increases by as little as 5%, the breakeven point would advance by one additional year. Similarly, if the retention rate was reduced to 55%, the breakeven point would be pushed back by a year.

Note: These values are only applicable if private sector demand for engineering and STEM jobs increases in proportion. ASU will need to continue to develop its ties with the private sector and various government entities for the full potential to be realized. The university needs to be very aggressive in its student recruitment efforts and in keeping the program up-to-date with a changing global marketplace. Policymakers should consider these points as they review the budget request. The university should be asked to provide a clear description of how it plans on maximizing the ROI for the taxpayer.

Furthermore, as noted in the introduction, ASU will later have an opportunity to redeploy a portion of the ongoing NEI funding as planned program funding shifts from average to marginal costs. The additional economic development activity for a later to-be-determined next phase of the ASU NEI will produce additional tax dollars. Based on research completed by RCG, it is roughly estimated that for every 20% increase in additional job generation, $600.0M in additional state tax collections will occur over the identified timeline (Year 10 through Year 20).
Conclusion and Recommendations

This independent analysis identifies that ASU’s investment proposal of $46.0M for the creation of enhanced learning programs, additional student support, expanding New Economy Initiative graduates, increasing faculty and staff, and advancing research and development, will yield a positive fiscal benefit to the state’s taxpayers in a relatively short period of time.

The additional tax monies generated by the NEI investment and program enhancements can later be used for other economy-boosting initiatives over the next two decades.

The benefits will accumulate rapidly if ASU continues to assess how the engineering and technology programs will blend with changing New Economy demands.

From an economic impact point of view, it is recommended that the ASU’s investment proposal be seriously considered.