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Comparative Operating Costs for Advanced Manufacturing



Prepared for:

City of Yuma, AZ
Office of Economic Development



APPLIED ECONOMICS

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EXECUTIVE SUMMARY

The City of Yuma retained Applied Economics to prepare a comparative operating cost analysis for a 100-employee advanced manufacturing facility. The analysis compares a location in Yuma, Arizona to alternative locations in El Cajon, California and San Bernardino, California. Estimated operating costs in each location include wages, payroll taxes and benefits, real estate, sales and property taxes and utilities.

Project Description

- The pro-forma advanced manufacturing operation would employ 100 non-exempt workers for a single shift. They would employ a mix of assemblers, machine operators and setters, welders, inspectors and other production workers (**Figure 1**).
- They would build an 80,000 square foot facility on 8 acres, and purchase \$12.0 million of manufacturing equipment.
- Electricity usage is estimated at 150,000 kWh per month with a 65 percent load factor. Electric rates reflect current tariffs for the primary electric provider in each location.

**FIGURE 1
ADVANCED MANUFACTURING PRO-FORMA**

<u>Labor and Payroll</u>	
Total Employees	100
Annual Payroll	
Yuma, AZ	\$4,371,299
El Cajon, CA	\$4,854,301
San Bernardino, CA	\$4,541,311
<u>Capital Expenditures</u>	
Manufacturing Equipment	\$12,000,000
<u>Land and Building Cost</u> (80,000 SF on 8 acres)	
Yuma, AZ	\$1,539,207
El Cajon, CA	\$2,284,027
San Bernardino, CA	\$2,246,258
<u>Utilities</u>	
Electricity (65% Load Factor)	150,000 KWh per month/320 KW demand

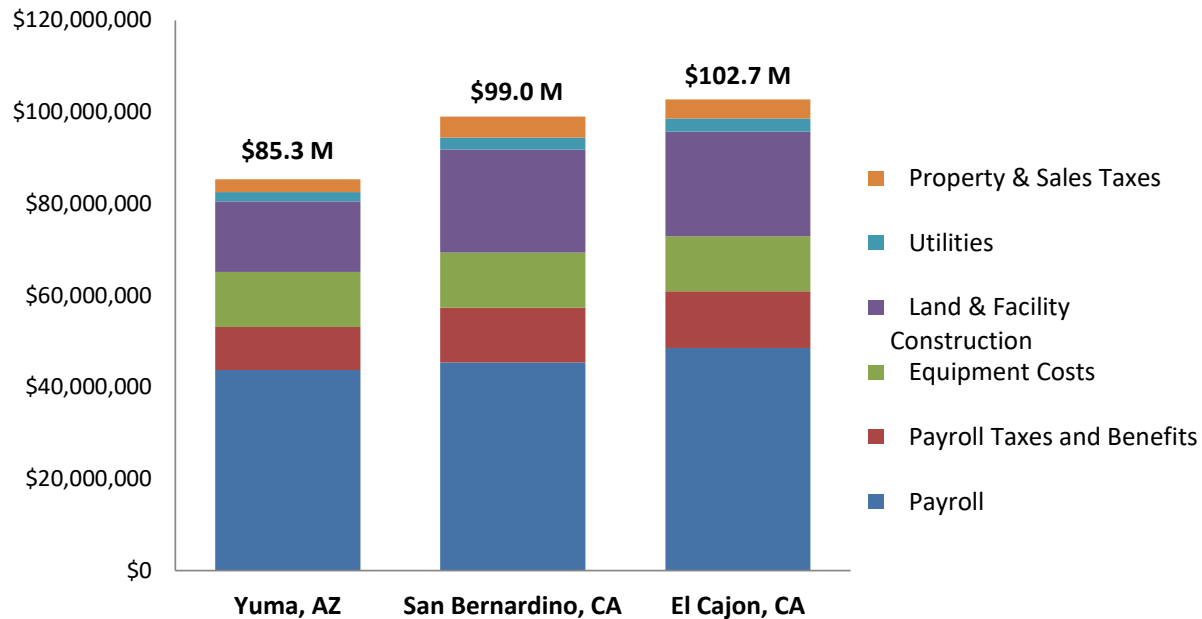
FIGURE 2
MAP OF COMPARATIVE LOCATIONS



Comparative Operating Costs

- Total operating costs are 16 to 20 percent lower in Yuma compared to Southern California at \$85.3 million over 10 years, compared to \$99.0 million in San Bernardino and \$102.7 million in El Cajon.
- The most significant differences between the three locations on a percentage basis are land and construction costs. The land and construction costs in the Southern California locations are more than \$7.4 million higher than those in Yuma, based on the pro-forma used in this analysis.

COMPARATIVE 10 YEAR OPERATING COSTS



- Average wages are also higher in the California locations. Based on prevailing industry wages for typical occupations in advanced manufacturing, payroll costs are estimated at \$43.7 million in Yuma over ten years versus \$45.4 million in San Bernardino and \$48.5 million in El Cajon. This is significant because wages make up about half of total operating costs.
- Payroll taxes and benefit costs vary significantly between the locations. Unemployment, worker's compensation, health insurance, Social Security and Medicare costs combined are 27 percent higher in San Bernardino and 31 percent higher in El Cajon at approximately \$12.0 million to \$12.4 million over ten years, versus \$9.4 million in Yuma. Some of these costs are a percentage of payroll like worker's compensation, while other costs like health insurance are based on the number of employees.
- Finally, there are differences in electricity costs between the locations. Electric costs are 27 percent higher in San Bernardino and 40 percent higher in El Cajon.

OPERATING COST DETAIL

Land and Construction

This analysis assumes that the company would purchase an 8-acre site and build an 80,000 square foot concrete tilt-up building. Land costs were obtained from listings data for industrial land in each location. An average cost per acre was computed based on the available properties. Typical industrial land costs are significantly higher in San Bernardino at \$525,000 per acre, and \$480,000 per acre in El Cajon, compared to \$110,000 per acre in Yuma (**Figure 3**).

Building construction costs are based on the 2023 average cost per square foot for a single-story manufacturing facility from Gordian, Square Foot Cost Data adjusted by the city cost index for each location. Construction costs for an 80,000 square foot building are estimated at \$12.0 million in Yuma, versus \$14.6 million in San Bernardino and \$15.3 million in El Cajon. Note that the total annual cost listed for each city in Figure 3 represents the estimated annual loan payment on a 10-year commercial loan at 8 percent interest with a 20 percent down payment.

FIGURE 3
REAL ESTATE COSTS

*Assumptions: 80,000 SF manufacturing facility on an 8 acre parcel.
Construction costs of \$173 per square foot, adjusted for local labor
and materials cost indices.*

Yuma, AZ

Land	\$880,000
Building	\$12,030,252
Total Annual Cost ¹	\$1,539,207

El Cajon, CA

Land	\$3,840,000
Building	\$15,317,508
Total Annual Cost ¹	\$2,284,027

San Bernardino, CA

Land	\$4,200,000
Building	\$14,640,720
Total Annual Cost ¹	\$2,246,258

Sources: Loopnet industrial land listings, February 2023; Gordian 2023

Building Construction Cost and Square Foot Cost Data with R.S. Means data.

¹ Total annual cost for new construction represents the annual payment on a commercial real estate loan for 10 years, at 8 percent interest, on 80 percent of the land and building cost.

Payroll and Benefits

The manufacturer in this comparison would employ 100 people. Payroll estimates are based on occupational wages for key occupations that are representative of the workforce mix for advanced manufacturing. These occupations include team assemblers, electronic assemblers, various machine setters, inspectors, laborers, machinists, welders, supervisors, engineers and shipping clerks. In total, annual wages in Yuma are about 11 percent lower than those in El Cajon and 4 percent lower than San Bernardino. The most significant differences are for cutting machine operators, mechanical engineers and welders. Annual payroll is estimated at \$4.4 million in Yuma, versus \$4.9 million in El Cajon and \$4.5 million in San Bernardino (**Figure 4**). This is significant since payroll makes up about half of total annual operating costs.

FIGURE 4
WORKFORCE ASSUMPTIONS AND TYPICAL WAGES
ADVANCED MANUFACTURING

SOC Code	Occupation Title	Employees	Annual Wages		
			Yuma, AZ	El Cajon, CA	San Bernardino, CA
51-2098	Team assemblers	25	\$33,950	\$39,186	\$33,773
51-2028	Electrical and electronic equipment assemblers	10	\$38,741	\$42,134	\$37,574
51-4072	Molding, coremaking, and casting machine setters	10	\$39,012	\$41,395	\$43,056
51-9061	Inspectors, testers, sorters, samplers, and weighers	8	\$51,100	\$51,985	\$49,733
53-7062	Laborers and freight, stock, and material movers	8	\$33,600	\$34,944	\$36,519
51-4021	Extruding and drawing machine setters, operators	7	\$37,453	\$36,618	\$36,259
51-4041	Machinists	6	\$49,750	\$49,920	\$47,075
51-4121	Welders, cutters, solderers, and brazers	6	\$43,980	\$54,974	\$45,123
51-1011	First-line supervisors of production workers	5	\$64,970	\$75,322	\$69,344
17-2112	Industrial engineers	4	\$90,080	\$98,754	\$101,774
17-2141	Mechanical engineers	4	\$80,840	\$102,049	\$92,550
51-4031	Cutting, punching and press machine operators	4	\$31,530	\$40,532	\$39,001
43-5071	Shipping, receiving, and traffic clerks	3	\$36,070	\$38,763	\$37,883
Total Annual Payroll		100	\$4,371,299	\$4,854,301	\$4,541,311

Source: Arizona Office of Economic Opportunity, 2021 Occupational Employment and Wage Estimates; California Employment Development Department, OES Employment and Wages 1Q 2021.

The differences in wage rates not only impact payroll costs, but also have an impact on benefit costs. Total annual benefit costs are estimated at \$942,000 per year in Yuma, or 22 percent of payroll versus \$1.2 million per year in El Cajon and San Bernardino, or 25 to 26 percent of payroll (**Figure 5**).

Benefits shown here include Social Security and Medicare, which are estimated at 7.65 percent of payroll in all locations. Health insurance costs represent state averages for the employer portion of the annual premium for employees enrolled in employer-based health plans. Health insurance costs per employee are based on data from the Kaiser Foundation.

Benefits also include unemployment insurance. In California, unemployment insurance applies to the first \$7,000 of payroll per employee, and in Arizona it applies to the first \$8,000 of payroll. Rates vary depending on individual employer experience. For this analysis, a new employer rate of 2.0 percent is applied in Arizona and 3.4 percent in California, based on state-specific rates published by the U.S. Department of Labor.

Worker’s compensation rates vary by occupation, but an average machinery manufacturing rate of 5.08 percent of payroll is applied for California and 1.86 percent for Arizona. These rates are based on survey information collected by the Oregon Department of Consumer and Business Services. California typically has some of the highest worker’s compensation rates in the country.

**FIGURE 5
PAYROLL TAXES AND BENEFITS**

<i>Assumptions: Unemployment insurance is based on the new employer rate: California 3.4% of first \$7,000 of wages, Arizona 2% of first \$8,000 of wages. Workers compensation is calculated as a percent of payroll: California 5.08%, Arizona 1.86%.</i>	
Yuma, AZ	\$941,511
Social Security and Medicare	\$334,404
Health Insurance ¹	\$509,800
Unemployment Insurance	\$16,000
Worker's Compensation	\$81,306
El Cajon, CA	\$1,235,153
Social Security and Medicare	\$371,354
Health Insurance ¹	\$593,400
Unemployment Insurance	\$23,800
Worker's Compensation	\$246,598
San Bernardino, CA	\$1,195,309
Social Security and Medicare	\$347,410
Health Insurance ¹	\$593,400
Unemployment Insurance	\$23,800
Worker's Compensation	\$230,699

Source: Kaiser Foundation State Health Facts, 2021 data; U.S. Department of Labor, Significant Provisions of State Unemployment Insurance Laws, July 2022; Arizona Department of Economic Security, January 2023; Oregon Department of Consumer and Business Services, Worker's Compensation Premium Rate Ranking Study, 2022 - typical premium rates for manufacturers.

¹ Average annual single premium (employer portion) per enrolled employee for employer-based health insurance.

Utilities

The advanced manufacturing facility in this analysis is assumed to have monthly electricity consumption of 150,000 kWh and a 65 percent load factor, or 320 kW demand per month. Total electricity costs are estimated at \$202,000 per year in Yuma versus \$282,000 per year in El Cajon and \$257,000 per year in San Bernardino (**Figure 6**). These rates reflect time-of-use discounts. Electric utility costs at investor-owned utilities throughout California tend to be significantly higher than in Arizona.

**FIGURE 6
ANNUAL UTILITY COSTS**

<i>Assumptions: 150,000 kWh/month, 320 kW/month (65% Load Factor)</i>	
Yuma, AZ (APS)	\$201,818
El Cajon, CA (SDG&E)	\$281,989
San Bernardino, CA (SoCal Edison)	\$257,316

Source: Arizona Public Service Rate Schedule E-32 TOU M; San Diego Gas & Electric Schedule AL-TOU; Southern California Edison Schedule TOU-GS-3, Option D-CPP.

Sales Taxes

Sales taxes can potentially apply to the purchase of machinery, utilities and construction materials. In Arizona, manufacturing equipment is exempt from sales tax, which saves the company an estimated \$1.0 million on a \$12.0 million equipment purchase. In California, manufacturing equipment is only exempt from the 3.9375 percent state tax, resulting in a savings of only \$473,000. Utilities are not subject to sales tax in California, although they are taxable in Arizona. The City of San Bernardino imposes a local utility user tax of 7.75%.

The total state and local sales tax rate is 8.412 percent in Yuma and 8.25 percent in El Cajon and 8.75 percent in San Bernardino. Total sales and utility taxes over 10 years are estimated at \$828,000 in Yuma versus \$1.3 million in El Cajon and \$1.6 million in San Bernardino (**Figure 7**). While the sales tax rates are similar in all three locations, the difference in the tax exemption on manufacturing equipment in Arizona is sizeable.

FIGURE 7
LOCAL SALES TAX COMPARISON

***Assumptions:** Sales and use tax calculation includes purchases of machinery, utilities and construction materials. Exemptions and tax rates vary by state. Analysis assumes 65% of construction cost is materials. Construction costs vary by location. Note that manufacturing equipment is exempt from all sales tax in Arizona and exempt from state sales tax (3.9375%) in California. Electricity, water and sewer are exempt from sales tax in California and no utility user taxes apply in the City of El Cajon.*

Yuma, AZ		8.412% effective state & local tax rate									
	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
no abatement	\$1,836,999	\$1,684,207	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977
Mfg Exemptions	(\$1,009,440)	(\$1,009,440)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Tax Due	\$827,559	\$674,767	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977	\$16,977
El Cajon, CA		8.250% effective state & local tax rate 0.00% local utility user tax									
	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
no abatement	\$1,811,401	\$1,811,401	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mfg Exemptions	(\$472,500)	(\$472,500)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Tax Due	\$1,338,901	\$1,338,901	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
San Bernardino, CA		8.750% effective state & local tax rate 7.75% local utility user tax									
	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
no abatement	\$2,100,661	\$1,921,183	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942
Mfg Exemptions	(\$472,500)	(\$472,500)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Tax Due	\$1,628,161	\$1,448,683	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942	\$19,942

Property Taxes

Property taxes apply to real and personal property in both states. In this analysis, the value of the land and building are multiplied by 85 percent to approximate assessed value in California, and by 70 percent in Arizona to approximate limited property value, which is generally less than market value. The property tax estimates also incorporate the commercial and industrial assessment ratio for Arizona that is scheduled to decline from a current rate of 17 percent to 15 percent by 2027 based on recent legislative changes. This assessment ratio applies to both real and personal property in Arizona.

For personal property, the \$12.0 million of equipment is depreciated based on a 10-year schedule that would apply to manufacturing equipment in each state. In Arizona, depreciation for all equipment is set at a rate of 2.5 percent in all years, resulting in a negligible amount of personal property tax. In California, the depreciation schedule used in this analysis ranges from 90 percent of original cost in the first year to 23 percent in the tenth year.

The total effective property tax rate is approximately 2.16 percent in Yuma, 1.20 percent in El Cajon and 1.26 percent in San Bernardino. Real and personal property taxes are significantly lower in Yuma at \$2.0 million over 10 years, versus \$2.8 million in El Cajon and \$2.9 million in San Bernardino, due the differences in personal property depreciation between the two states (**Figure 8**).

**FIGURE 8
PROPERTY TAX COMPARISON**

Assumptions: Value of New Machinery: \$8.5 million; facility value varies by location. Machinery and equipment is depreciated on a 10 year schedule. Real property has not been depreciated in this example. No replacement equipment purchases are assumed. Effective Tax Rates: Yuma 2.16%, El Cajon 1.20%, San Bernardino 1.26%.

Yuma, AZ											
	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Real Property	\$1,915,115	\$230,448	\$223,670	\$216,892	\$210,114	\$172,332	\$172,332	\$172,332	\$172,332	\$172,332	\$172,332
Personal Property	\$57,739	\$6,345	\$6,156	\$5,967	\$5,778	\$5,589	\$5,586	\$5,584	\$5,581	\$5,578	\$5,575
Total	\$1,972,854	\$236,793	\$229,826	\$222,859	\$215,892	\$177,921	\$177,918	\$177,915	\$177,913	\$177,910	\$177,907
El Cajon, CA											
	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Real Property	\$1,953,610	\$195,361	\$195,361	\$195,361	\$195,361	\$195,361	\$195,361	\$195,361	\$195,361	\$195,361	\$195,361
Personal Property	\$868,117	\$129,570	\$130,606	\$123,682	\$108,896	\$95,378	\$81,082	\$67,376	\$54,693	\$44,039	\$32,796
Total	\$2,821,727	\$324,931	\$325,967	\$319,043	\$304,257	\$290,739	\$276,443	\$262,737	\$250,054	\$239,400	\$228,157
San Bernardino, CA											
	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Real Property	\$2,022,325	\$202,233	\$202,233	\$202,233	\$202,233	\$202,233	\$202,233	\$202,233	\$202,233	\$202,233	\$202,233
Personal Property	\$913,762	\$136,382	\$137,473	\$130,185	\$114,622	\$100,393	\$85,345	\$70,919	\$57,569	\$46,355	\$34,520
Total	\$2,936,087	\$338,615	\$339,706	\$332,417	\$316,854	\$302,625	\$287,578	\$273,151	\$259,801	\$248,587	\$236,752

SUMMARY OF RESULTS

Yuma offers a significantly lower cost location for advanced manufacturing than competitive locations in Southern California. Over a ten-year period, the cost of a location in Yuma would be about \$13.6 million less than a location in San Bernardino and \$17.4 million less than a location in the San Diego metro area (represented by El Cajon) (**Figure 9**). Payroll accounts for about 50 percent of total operating costs in all three locations and the occupational wages for advanced manufacturing in Yuma average 4 to 11 percent less than those in Southern California. The combination of a lower wage base and lower payroll tax rates also results in payroll taxes and benefits that are 27 to 31 percent less in Yuma. Finally, there are significant advantages to a location in Yuma based on real estate costs due to both lower land costs and lower construction costs.

FIGURE 9
SUMMARY OF COMPARATIVE OPERATING COSTS FOR ADVANCED MANUFACTURING

	Yuma, AZ	El Cajon, CA	% Difference vs Yuma	San Bernardino, CA	% Difference vs Yuma
Operating Costs - 10 Year Total	\$85,338,749	\$102,715,325	20%	\$98,966,186	16%
Payroll	\$43,712,988	\$48,543,010	11%	\$45,413,110	4%
Payroll Taxes and Benefits	\$9,415,105	\$12,351,525	31%	\$11,953,089	27%
Equipment Costs	\$12,000,000	\$12,000,000	0%	\$12,000,000	0%
Land and Facility Construction*	\$15,392,066	\$22,840,269	48%	\$22,462,583	46%
Electric Utilities	\$2,018,176	\$2,819,892	40%	\$2,573,156	27%
Property & Sales Taxes	\$2,800,413	\$4,160,629	49%	\$4,564,248	63%

*Facility cost represents 10 years of annual payments on commercial real estate loan.