Solar at the Mesa Arts Center

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Project Summary

- 874,000 kWh Generated Annually
- Locally Generated Energy
- Adds to Energy Resources Department's Green Portfolio & Local Generation
- Reduces the City's Carbon Footprint
- Creates additional event space for the Mesa Arts Center

RFQ Process

- Selected 4 qualified vendors, 9/2015
- Requested quotes from qualified vendors 3/2016
  - 10 sites in Mesa ESA, 10 in SRP
- Narrowed sites in Mesa ESA down to Mesa Arts Center
  - Solar showcase
  - Multiple Projects with multiple benefits
- Requested best and final offers from qualified vendors in 1/17

Three Projects in One

Shaded “Parasol” for Parking and Events

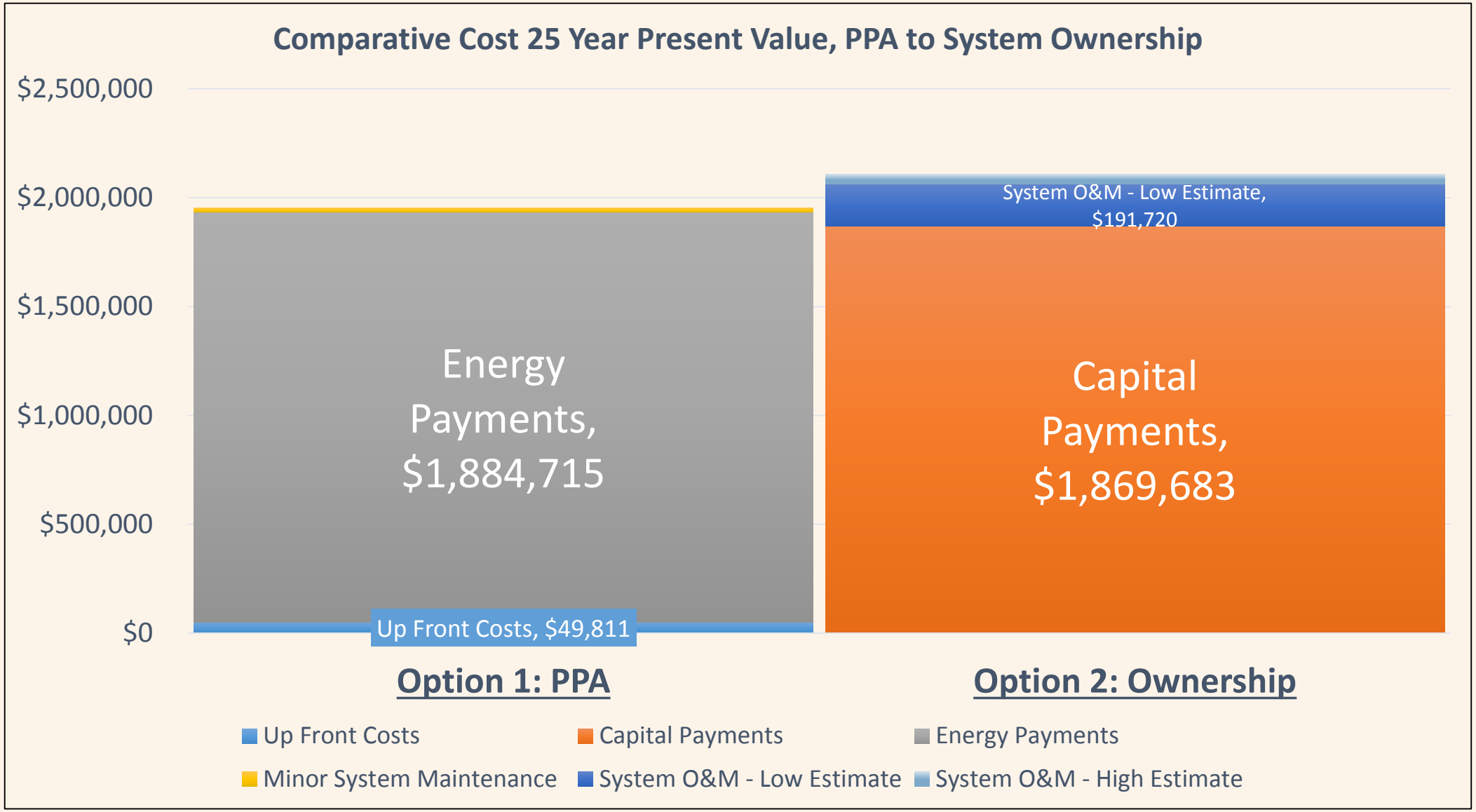
Local, Solar Energy

Special Event Features for the Mesa Arts Center (LED Lighting, Event Power Outlets)

New Venue at MAC

- Placemaking feature, reduction of urban heat island effect, improvement to air quality through emissions reductions
- Additional events at the MAC
  - Additional event revenue and revenue for downtown businesses
- Energy Resources & MAC will collaborate on Public Information Campaign (e.g. “did you know….”) using the mediums at the MAC & including recognition of Energy Resources as sponsors of events, etc.

Cost Comparison



Option 1: Power Purchase Agreement ("PPA")

- Public-Private Partnership
- Ameresco will construct, own, operate, maintain the project and guarantees the project will generate a specific amount of energy for a specific period of time at a specific price
- Options to purchase system at Fair Market Value in years 6, 10, 15, 20 and 25
- City's Energy Resources Department purchases power from Ameresco

Option 1: PPA

Pros

- Ameresco absorbs the risks that Mesa most wishes to avoid
- Mesa assumes no solar system operations & maintenance
- Ameresco responsible for continuous monitoring and verification
- Ameresco capitalizes on significant tax benefits and shares with Mesa
- Less expensive than ownership

Option 1: PPA

Pros

- Budget certainty - fixed cost per kWh for 25 years
- Mesa pays only if solar energy is delivered to Mesa's electric utility
  - If solar energy is not generated, Mesa does not pay for structure nor panels
- Mesa has experience with this type of agreement: 5 SSA's with Solar City
- Construction Timeline is 2 – 3 months + Design & Review Time
- Preserves City's capital for competing priorities
- Parasol provides additional event space at the MAC

Option 1: PPA

Cons

- Less operational control over the generation asset
- If City wants to keep after 25 years, must purchase for Fair Market Value or have Ameresco remove project
- Institution of a property tax on solar would impact cost

Option 2: Purchase with Utility Bonds

- Need to rebid project as a Title 34 design/build project
- Winning bid designs, constructs and tests the Project
- Mesa's electric utility bonds funds a portion of the capital cost
  - Other capital sources would need to be identified
- Mesa receives all of the energy from the project and maintains it or contracts for 3rd party maintenance
- Uses electric utility rate revenue from customers to pay the debt service for 24 years on the Project

Option 2: Purchase with Utility Bonds

Pros

- City pays fixed payment over the term of the bonds (plus O&M)
- Mesa will own the solar structure & is exempt from property tax
- After bond repayment period, cost of energy = the cost for O&M
- Parasol provides additional event space at MAC

Cons

- All ownership risks from cost increases to production risk are borne by Mesa
- The most expensive option (bond issuance costs, O&M, no tax credits)
- Using bond funds for this project depletes funding for large scale solar projects
- Exceeds amount of Utility bonds designated for solar in the 2014 bond election
- Design and construction timeline affected negatively due to Title 34 requirements
- Electric utility customers fund the debt service and any additional capital needed
- No contractual incentive to produce energy

Option 3: Customer Rooftop PV

- City continues/increases incentive for customer rooftop PV for an additional 520 kW
  - At 3 kW per customer, 173 homes
- Customer owns, maintains generation system, reducing their bill and utility payments
- City Utility receives all kWh that customer generates in excess of what the customer is using in any given hour
- Mesa's electric service area does not support a high penetration rate for rooftop solar
  - Mesa's residential electric rates are relatively low; thus, the potential benefits/bills savings for our solar customers are less than they are for an SRP customer. SRP rates/bills are:
    - 26.5% higher for 1st quartile customer
    - 13.6% higher for average customer
    - 12.9% higher for 4th quartile customer
- Demographics
  - 52.4% of our customers are renters
  - 17% vacancy rate
  - Median annual income of $36,000

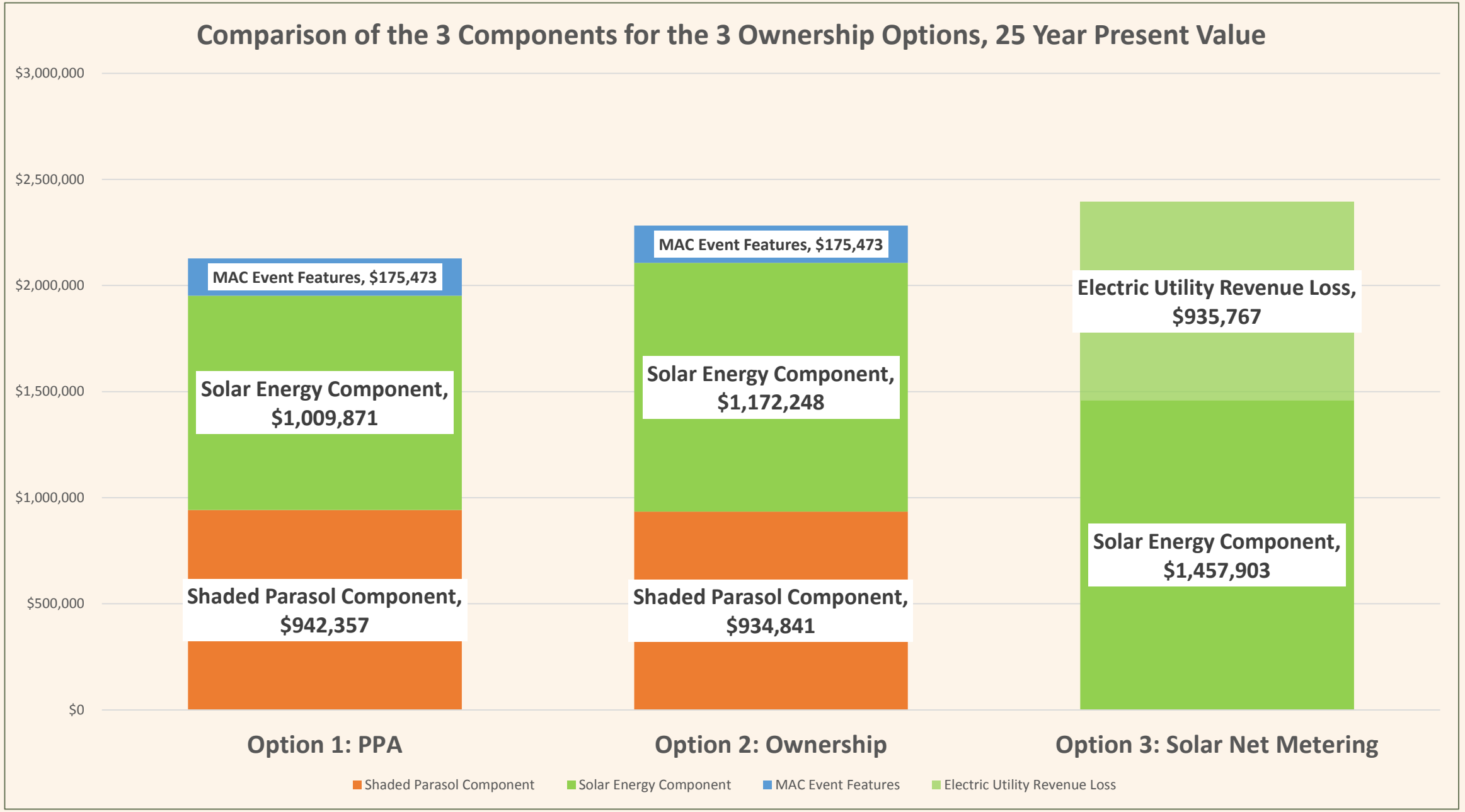
Option 3: Customer Rooftop PV

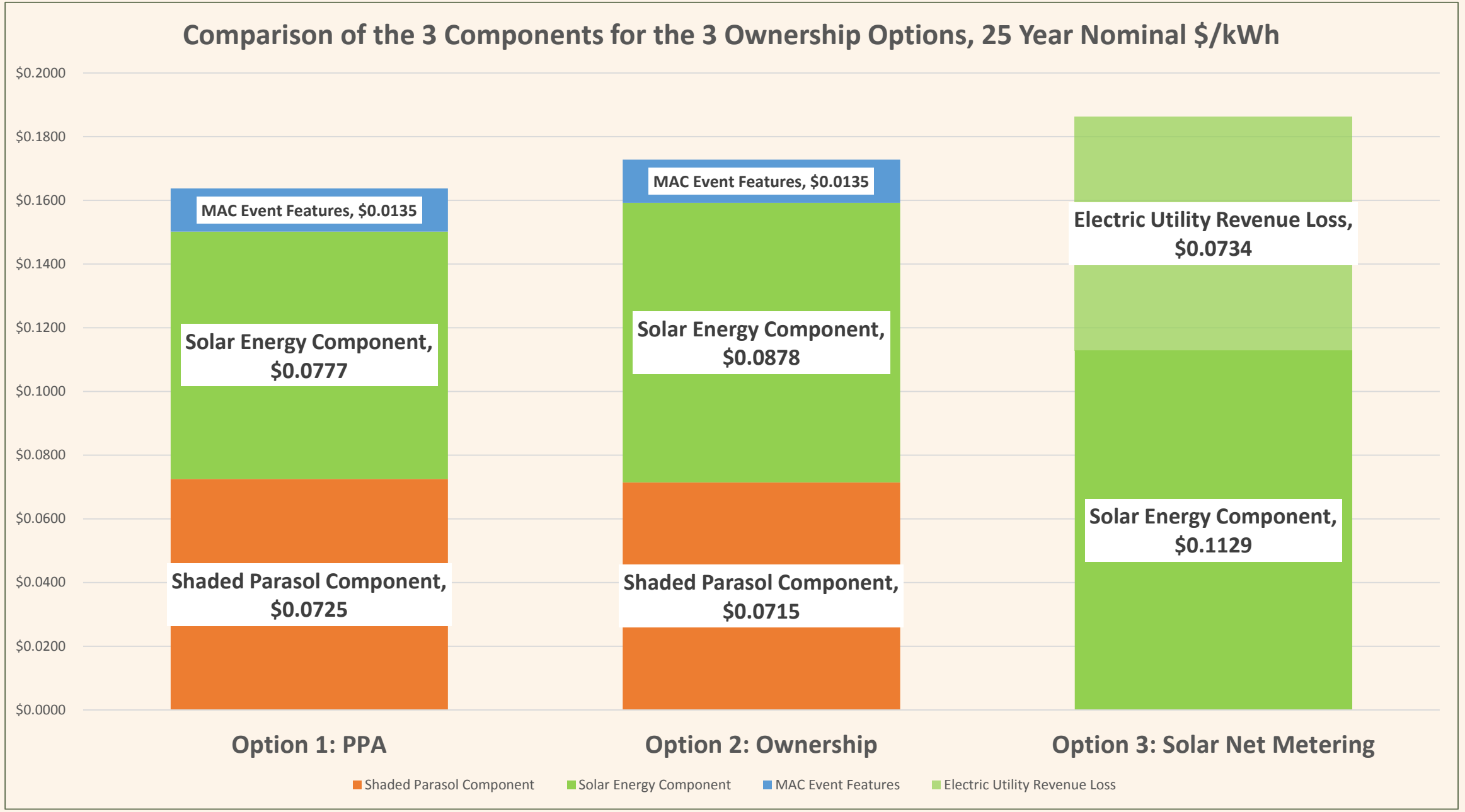
Pros

- Customer is responsible for maintaining
- Participating customer(s) see potential bill reductions

Cons

- Non participating customers ultimately absorb the bill reduction benefits of participating customers
- If customer does not maintain kWh production, Mesa has no method to incent increase in kWh production
- No event space created at MAC
- The most expensive option when accounting for revenue loss
  - $936,000 revenue loss (25 yr NPV) affects electric utility's ability to make General Fund Transfer and keep rates low


Comparison of the 3 Components for the 3 Ownership Options, 25 Year Present Value
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$0
MAC Event Features, $175,473
Solar Energy Component, $1,009,871
Shaded Parasol Component, $942,357
MAC Event Features, $175,473
Solar Energy Component, $1,172,248
Shaded Parasol Component, $934,841
Electric Utility Revenue Loss, $935,767
Solar Energy Component, $1,457,903
Option 1: PPA
Option 2: Ownership
Option 3: Solar Net Metering
Shaded Parasol Component
Solar Energy Component
MAC Event Features
Electric Utility Revenue Loss


Comparison of the 3 Components for the 3 Ownership Options, 25 Year Nominal $/kWh
$0.2000
$0.1800
$0.1600
$0.1400
$0.1200
$0.1000
$0.0800
$0.0600
$0.0400
$0.0200
$0.0000
MAC Event Features, $0.0135
Solar Energy Component, $0.0777
Shaded Parasol Component, $0.0725
MAC Event Features, $0.0135
Solar Energy Component, $0.0878
Shaded Parasol Component, $0.0715
Electric Utility Revenue Loss, $0.0734
Solar Energy Component, $0.1129
Option 1: PPA
Option 2: Ownership
Option 3: Solar Net Metering
Shaded Parasol Component
Solar Energy Component
MAC Event Features
Electric Utility Revenue Loss

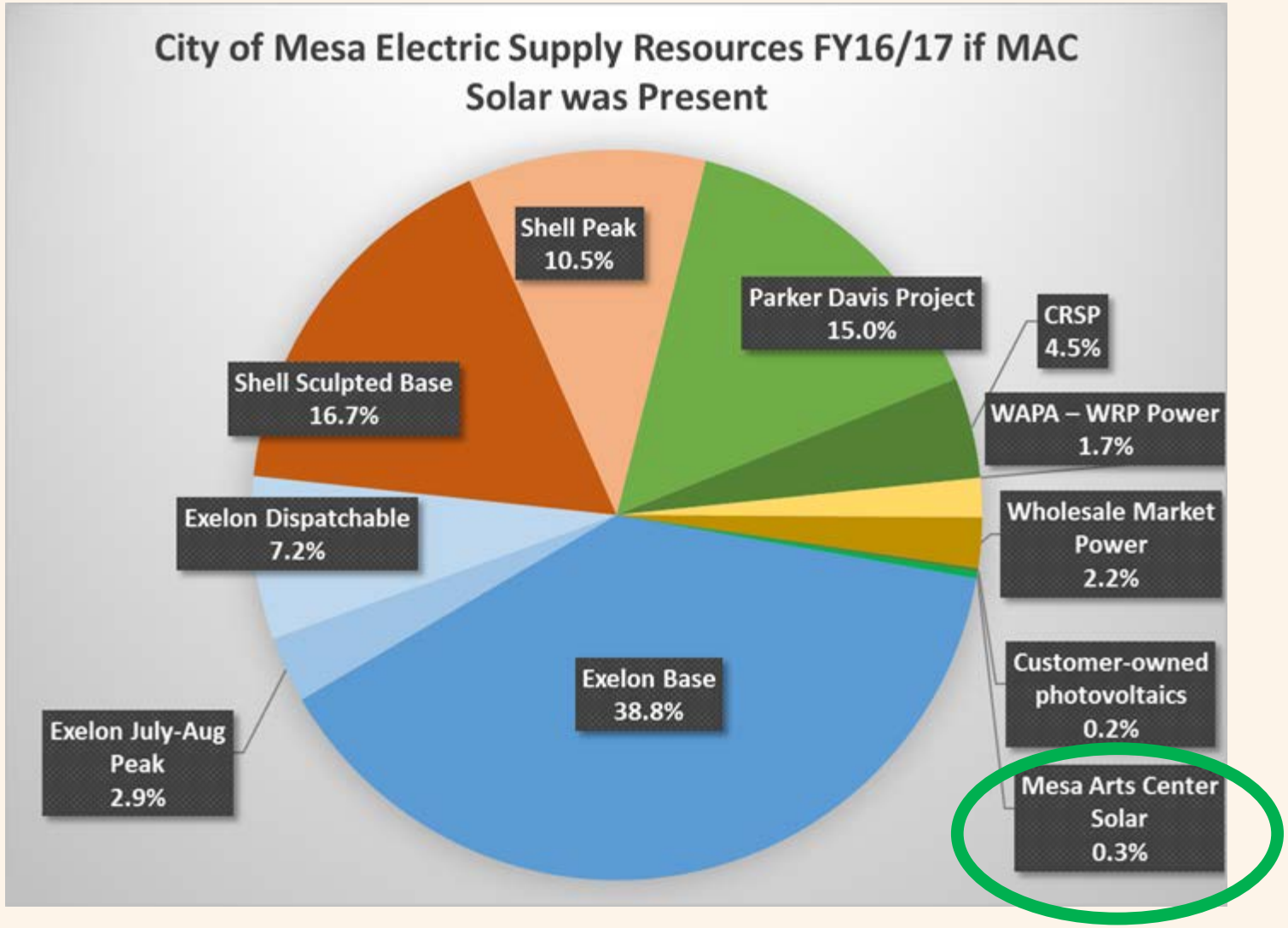
Long Term Questions: Technology

Technology

MAC Solar would be one **PART** of our multi-part supply portfolio

As parts of our diverse supply portfolio expire, we evaluate the economics & acquire replacements based on Integrated Resource Planning criteria & principles including considerations for environmental stewardship & technology

MAC Solar fits a specific & current purpose in the portfolio and should be compared to and be evaluated to today's options



ASU's Experience

ASU Operates Multiple Power Parasols

- PPA on Lot 59
- Own Memorial Union and Gammage (working to contract for O&M)

APS Customer

- Incentives enhanced economics
- Incentives no longer offered

Maintenance requirements

- Vehicles
- Trees
- Equipment Failure
- Aesthetic maintenance
- Vandalism

Questions and Discussion

MAC Event Features

- LED Lighting
  - Focused and ambient lighting for festivals
  - Controllable
  - Dimmable
  - Colored
  - Energy Efficient
- Power Outlets
  - Vendor power for events
- Rigging Bracketry
  - Hang speakers, lighting etc.

Purchase Structure	Constructed & Owned By	Maintenance Responsibility	Net Present Value 25 Year Cost	25 Year Electric Utility Revenue Loss
Option 1: Power Purchase Agreement ("PPA") includes O & M	Ameresco	Ameresco	$1,952,000	$0
Option 2: Up Front Purchase of Project with Utility Bonds	Mesa	Mesa / 3rd Party Contractor	$2,061,000 - $2,107,000	$0
Option 3: Incentivize Customers to Install PV on Their Rooftops	Electric Utility Customer	Electric Utility Customer	$1,458,000	$936,000
			Total: $2,394,000	

Technology

- Solar panel prices have fallen consistently and rapidly
  - 1977: $76.00/Watt for PV Modules
  - 2017: $0.50/Watt for PV Modules
- Solar panel efficiency has risen steadily
- Solar panels, inverters etc. are ~40-60% of the cost of this type of project
- This project, due to its raised nature, will always be more expensive than other forms of energy
- Our forecasts of cost increases, rates, kWh production, replacements cost & frequency of inverters, etc. will have error
  - We account for uncertainty in these forecasts
  - How we manage and mitigate these uncertainties is the key challenge

Technology

- Contract accounts for project production to decline over time (0.5% per year)
- Plan for contract provisions to provide Ameresco incentive to replace failing or faltering equipment (i.e. panels or inverters) with lower cost and/or more efficient equipment over time
- Technology will continue to improve no matter:
  - When the project is built
  - What ownership structure is pursued
- Plan for the PPA to allow Mesa to buy the system in specific years (6,10,15,20 and 25) and make such investments
- Ownership would allow us to change panels on our timeframe
- Energy Resources and Environmental Management & Sustainability plan to pursue additional renewable energy projects to take advantage of technological innovations

Option 1: PPA

MAC SOLAR'S 3 COMPONENTS

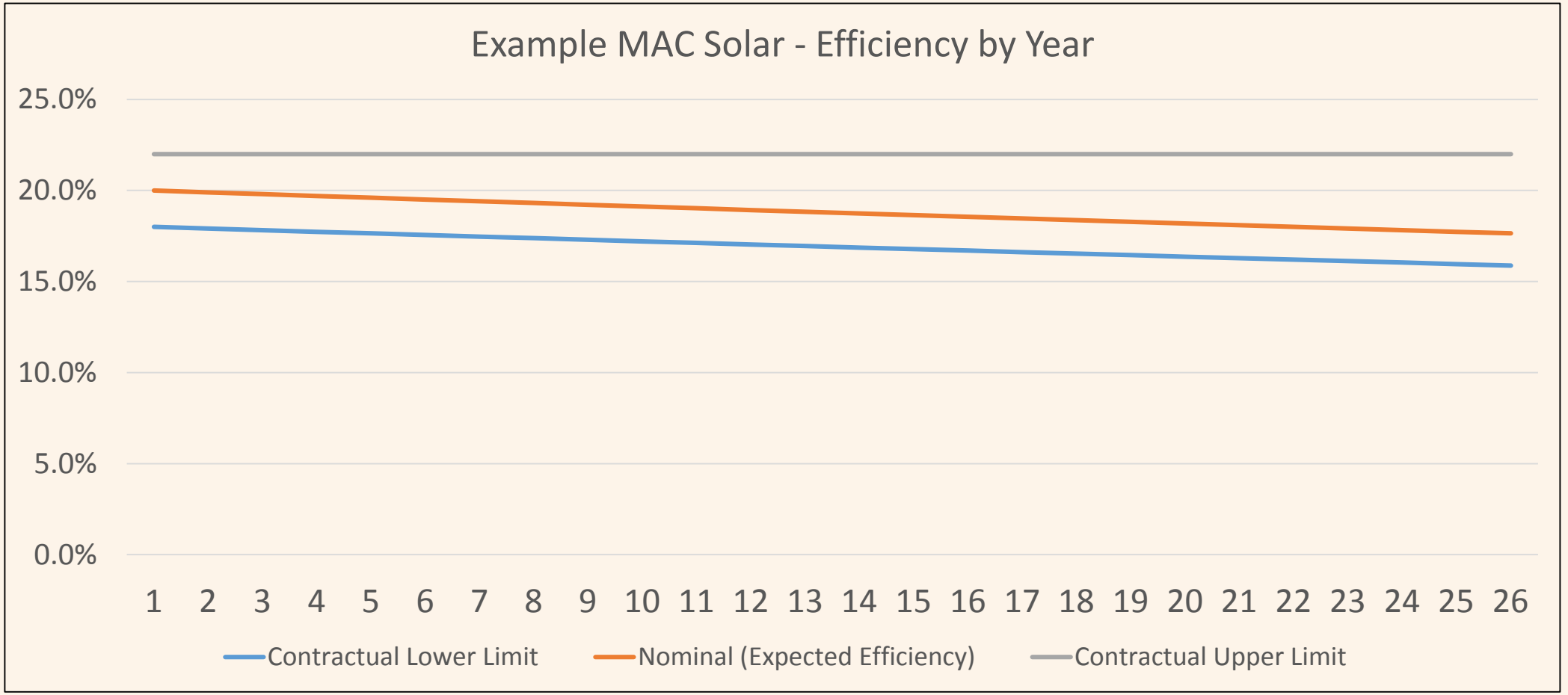
Project Component	How It's Paid	Impact to Customer
Shaded "Parasol" for Parking and Events	**Only City Buildings** •Paid via their electric bill •$0.0725/kWh or $63k/year •No residential or commercial impacts	**Average City Building** **$46.29 per month** **2.6% increase**
Local Solar Energy	**All Electric Utility Customers** • Paid via their electric bill • Net: $0.0381/kWh or $33k (1st yr)	**Average Residential** **$0.09 per month** **0.096% bills incr.**
Specific Event Features for the Mesa Arts Center (LED Lighting, Event Power Outlets)	Mesa Arts Center Pays the $12,000 per year from its budget or rentals	No impact to electric customers

Option 2: Ownership

MAC SOLAR'S 3 COMPONENTS

Project Component	How It's Paid	Impact to Customer
Shaded "Parasol" for Parking and Events	**City as a Whole** • Paid via transfer to ERD • $61,300/yr in Capital Costs	**Average City Building** **$45.15 per month** **2.5% increase**
Local Solar Energy	**All Electric Utility Customers** • $61,300/yr in Capital Costs • $13,500/yr (avg.) in O&M Costs • Reduction of $30k in Supply Costs	**Average Residential** **$0.10 per month** **0.101% bills incr.**
Specific Event Features for the Mesa Arts Center (LED Lighting, Event Power Outlets)	Mesa Arts Center Pays the $12,000 per year from its budget or rentals	No impact to electric customers

Contractual Production Limits Example



ASU Solar Projects

Power Parasol	Total Project Cost	System Size	Installed $/kW
Mesa MAC Solar	$1.952 million	512 kW-DC	$3,815/kW
Lot 59 – Rio Salado	$11.171 million	2,124 kW-DC	$5,259/kW
Memorial Union (Cady Mall)	$590 thousand	86 kW-DC	$6,843/kW
Gammage Pkwy - W	$1.77 million	296 kW-DC	$6,569/kW
Gammage Pkwy - E	$1.486 million	225 KW-DC	$6,619/kW

City's Perspective

Customer-owned & Net Metered Solar

- **$76,000 first year energy cost charged to all customers**
- **Incentive payment of $104,000 to customers**
- **$57,000 in lost revenue that must be recovered from other residential, commercial, City and governmental entity customers**

$0.0961/kWh
or
0.17% increase rates/bills

MAC Solar PPA

Specific Event Equipment & Aesthetics Upgrades allows parking transformation to Special Event space	Mesa Arts Center Pays the $12,000 per year from its budget and/or fundraising	Flat $12,000/year impact to Arts Center
Solar Panel Electric Energy production 874,000 kWh (first year)	**A portion of the $33k (net) is charged to the City as an electric utility customer, similar to all other customers**	**$0.10/Month or 0.101% increase rates/bills**
Structural Support & "Parasol" Configuration of Panels Creating Special Event Space	$64,000 is charged to City directly via its electric bill for the structural support	$45.15/month or 2.5% increase rate/bills