City of Santa Rosa

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MSCN Business Plan

Energy Efficiency, Renewables, and Microgrid Opportunities

November 29, 2022

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Agenda

- Project Background
- Phase I – Feasibility Study
- Phase II – MSCN Business Plan
- Questions

City of Santa Rosa

Project Background

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Project Background

Resiliency and sustainability objectives of the City of Santa Rosa

- City and State mandates
- Increased cost of energy
- Increased frequency of natural disasters and catastrophic climate events

Phase I - City-Wide Energy Efficiency, Renewables, and Microgrid Feasibility Study

- Studied feasibility of deploying microgrids at two City building clusters
- identified opportunities for installation of solar photovoltaics and energy efficiency measures at all City facilities and parks

Phase II – MSCN business plan and additional solar PV opportunities

- investigates different financing mechanisms for project implementation at MSCN
  - Phase 1 measures (energy efficiency, solar and battery storage)
  - Bus Electrification and electrical infrastructure upgrades
- Feasibility study for carport and floating solar PVs for the Santa Rosa Water

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Phase I – Feasibility Study

City-Wide Energy Efficiency, Renewables, and Microgrid Feasibility Study

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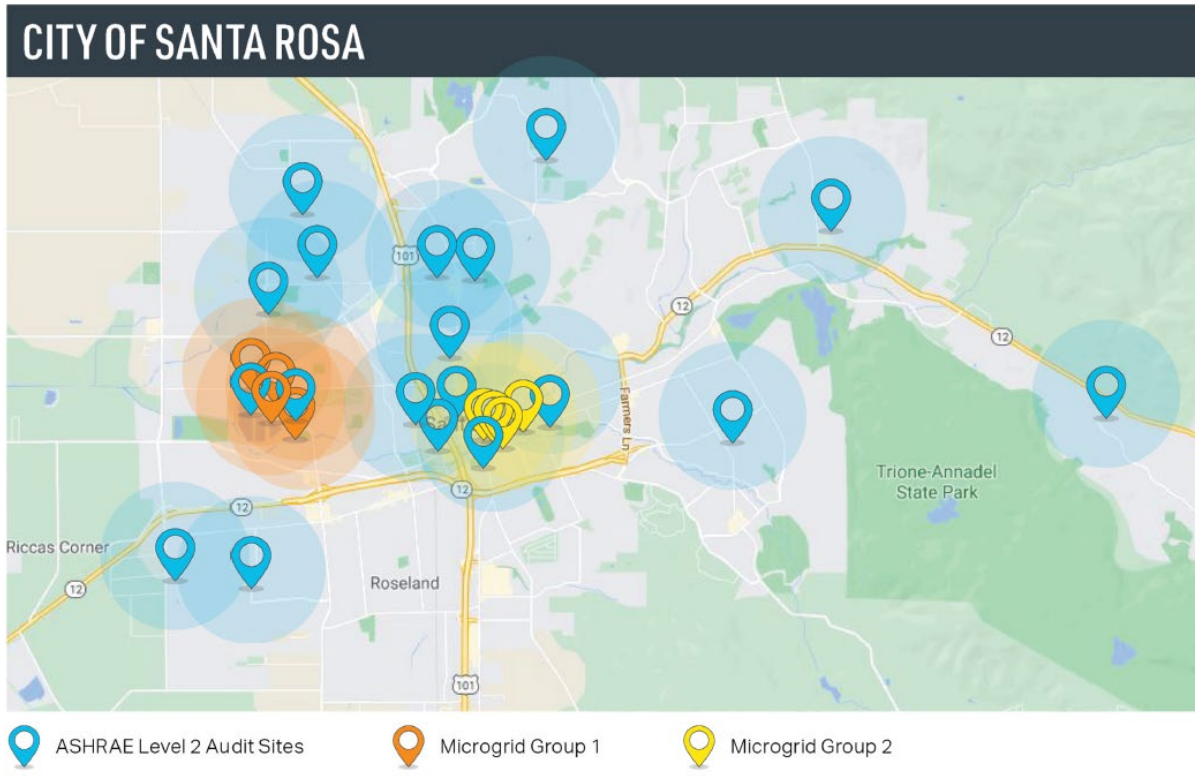
Energy Efficiency

Scope Overview

- Performed Site Investigations for 47 Facilities
- Provided the City:
  - Energy Efficiency Measures
    - Reducing Energy Consumption
    - Addressing Deferred Maintenance
    - Supporting City Electrification Goals



Energy Efficiency

Results

Mix of Energy Efficiency Measures (EEMs) that address different City needs, goals and level of capital investment

Lighting and Lighting Controls Upgrades

Upgrades at 44 Facilities

- $155,000 Annual Cost Savings
- Simple Payback 5.5 Years

HVAC Upgrades

Upgrades at 8 Main Facilities

- City Hall
- City Hall Annex
- Chamber Building
- Finley Park Community Center
- MSCN
- MSCS
- PSB
- Steele Lane Community Center

Energy Management and Control System

Remote Monitoring and Control System for 10 Buildings

- City Hall
- City Hall Annex
- Chamber Building
- Finley Park Community Center
- Finley Park Swim Center
- Finley Senior Center
- MSCN
- MSCS
- PSB
- Sam Jones Hall

Renewables

Scope Overview

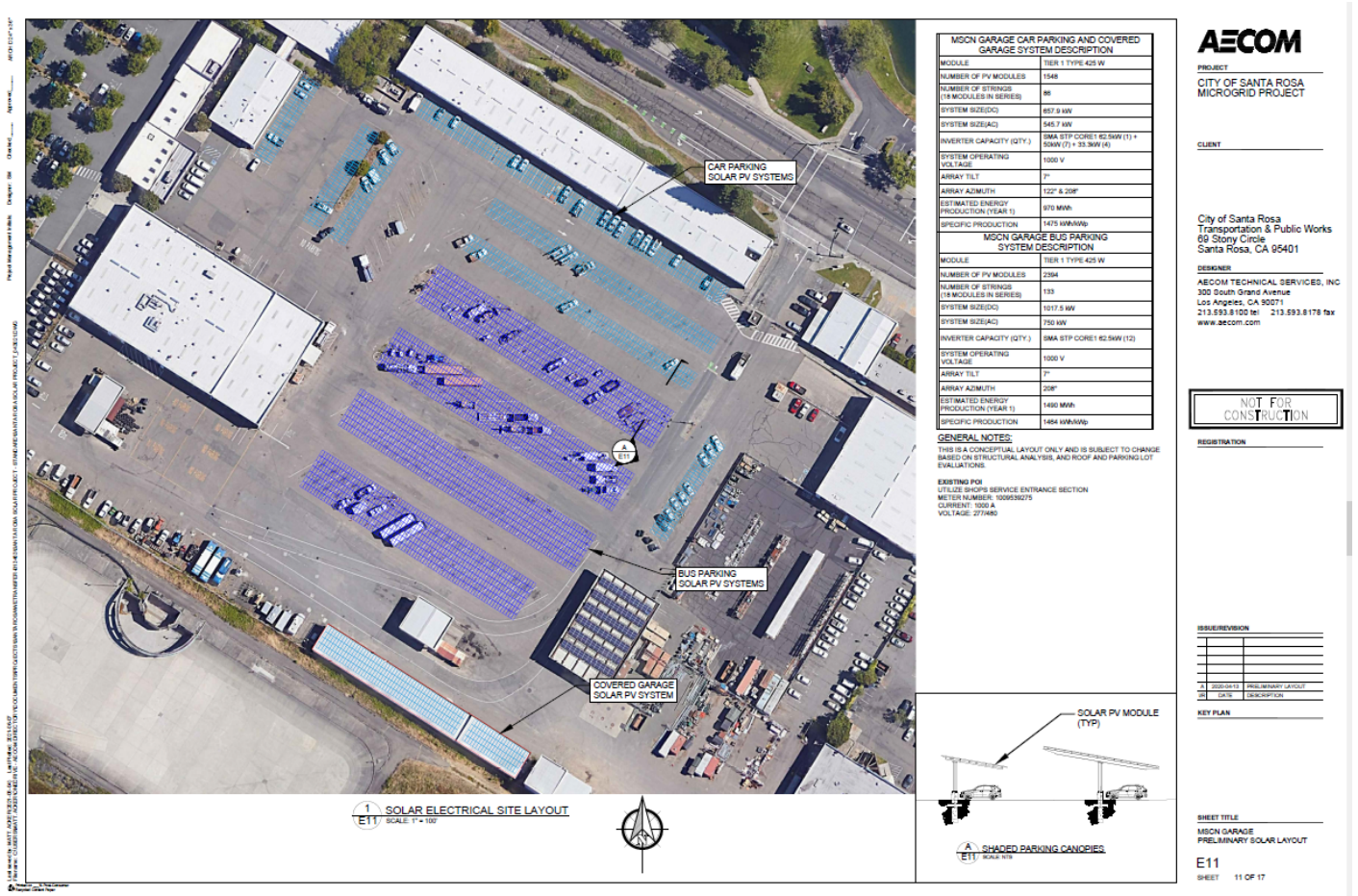
- Total of 107 Sites
- Evaluated for Solar Application Based on:
  - Space Availability
  - Shading
  - Electrical Infrastructure

Renewables

Results

- Maximum Solar Potential of 7.2 MWdc at 17 Sites
  - Tire 1 - Maximum Solar Potential of 3.2 MWdc at 11 Sites
  - Tire 2 - Maximum Solar Potential of 4.0 MWdc at 6 Sites

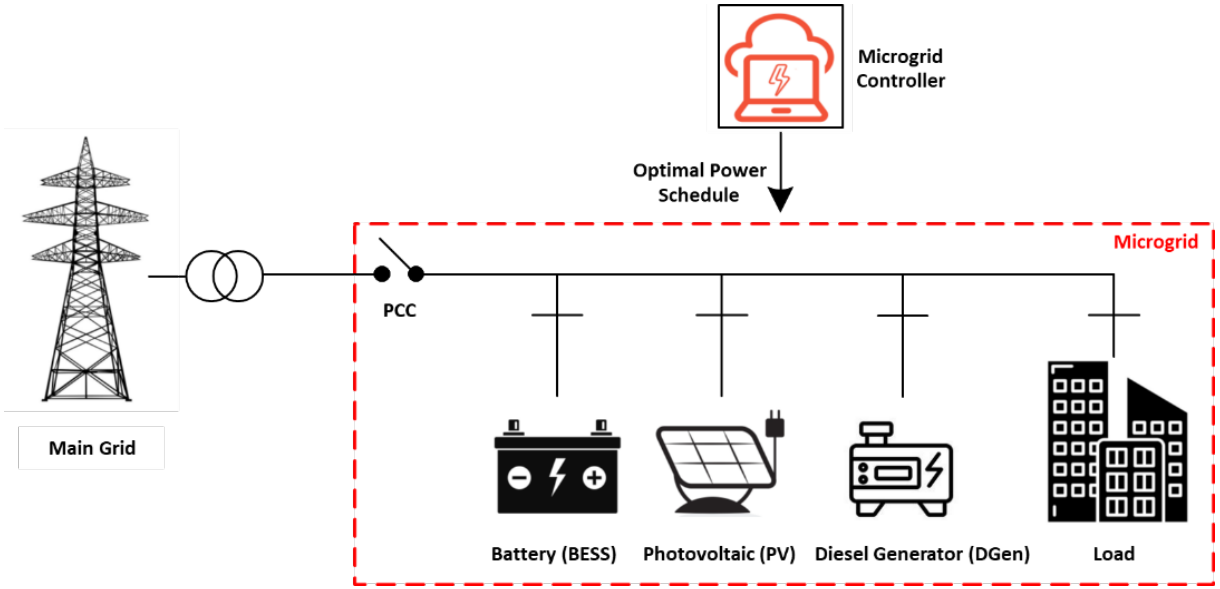
- Preliminary Site Layouts for each of the 17 Sites

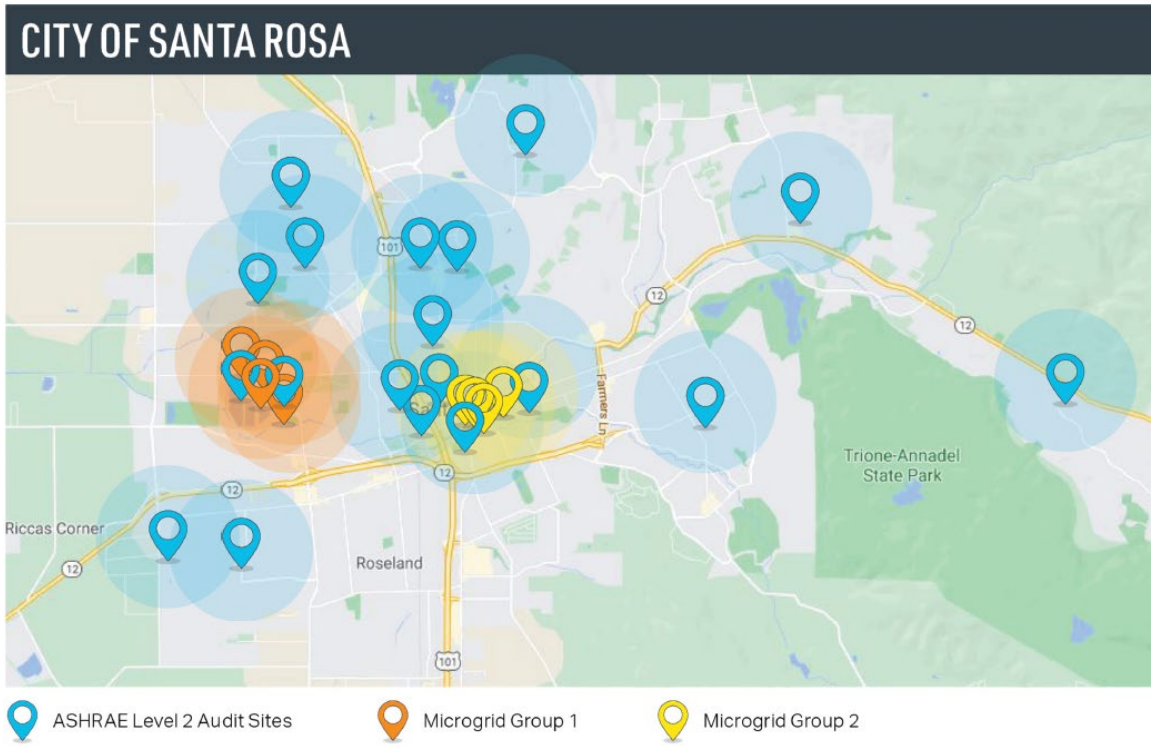


Microgrid

Scope Overview

- Investigate Microgrid Viability for Two Groups of Facilities
  - Group 1 - 18 Buildings and 4 Unique Address
  - Group 2 - 7 Buildings and 4 Unique Address





Microgrid

Results

– Seven (7) Individual Microgrids

Microgrid Implementation Cost Summary					
Facility	Battery Energy Storage System	Solar PV (kWac)	Stand By Generator (kW)	Implementation Cost ($)	O&M Costs ($)
MSCN	840 kWh / 200 kW	400	365	$1,991,000	$35,000
MSCS	106 kWh / 46 kW	150	100	$877,542	$10,000
City Hall	210 kWh / 50 kW	0	450	$923,500	$25,000
City Hall Annex	210 kWh / 50 kW	0	450	$923,500	$25,000
PSB	840 kWh / 200 kW	0	365	$1,635,000	$25,000
Finley Park Senior Center	210 kWh / 50 kW	310	100	$1,030,612	$25,000
Finley Park Community Center	132 kWh / 58 kW	63	100	$904,611	$17,500
TOTAL		**613**	**1,930**	**$8,285,653**	**$162,500**

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Phase 2 – MSCN Business Plan

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Business Plan Scope

A subset of Phase I recommendations + Bus electrification at MSCN

Energy Efficiency

ECM Description	Electrical Savings (kWh)	Electrical Demand Savings (kW)	Natural Gas Savings (Therms)
Lighting and Lighting Controls Upgrades	214,820	52	0
MSCN Packaged Unit Replacement	34,077	6	30
MSCN New Chillers	4,754	1	0

Solar PV Systems

kW-DC	kW-AC	DC/AC	Produced Energy (kWh/first year)
519	402	1.29	762,584

Battery Energy Storage Systems

Battery Size kW	Battery Capacity kWh	Solar PV (kW-AC)
200	840	400

Battery Electric Buses and Charging Systems

Charger Type	Charger Quantity	Charge Window (hour)	Minimum Charger Rating (kW)	Battery Capacity (kWh)
ABB 150	10 (2 phases)	8	44	466

Business Plan – Objectives and Methodology

Objective:

Identify the best financial mechanism for installation of the scope

Methodology:

Identified four financial options suitable for the scope of work

Created a cash flow analysis for each option to identify the net present value of the investment

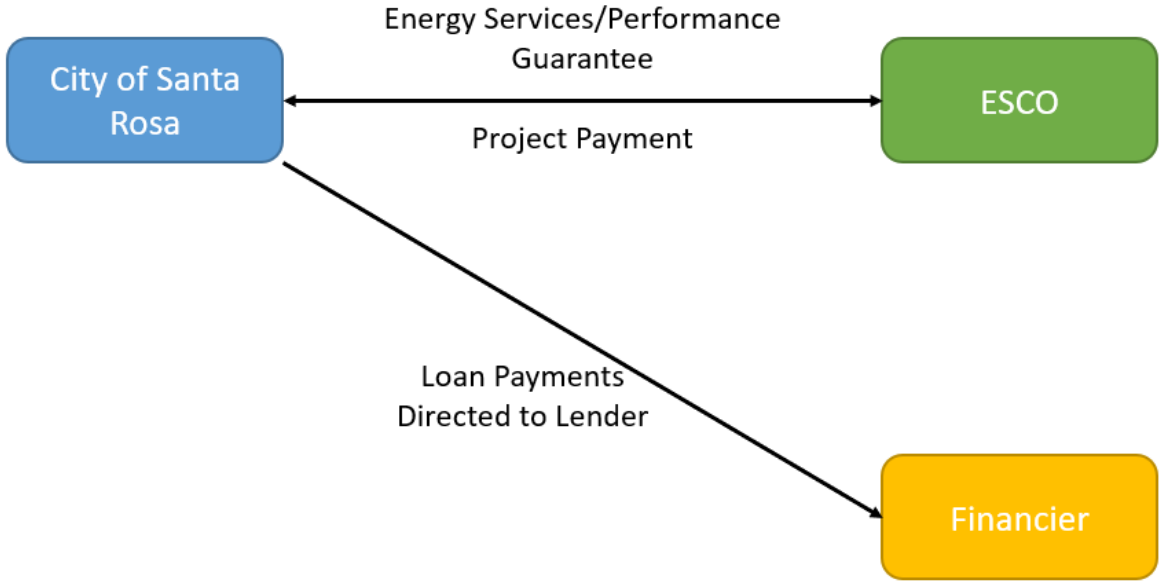
Studied complexities, risks, and advantages of each of the financial options

Business Plan – Types of Financial Mechanisms

Energy Savings performance Contract

City and the ESCO

- Energy Services Company (ESCO) conducts Investment grade audit (IGA)
- ESCO provides a comprehensive energy efficiency and renewable energy packages of measures
- City signs a design-build performance contract with the ESCO firm
- Contract includes performance guarantee and the payback schedule
- City pays the project fees to the ESCO per the contract



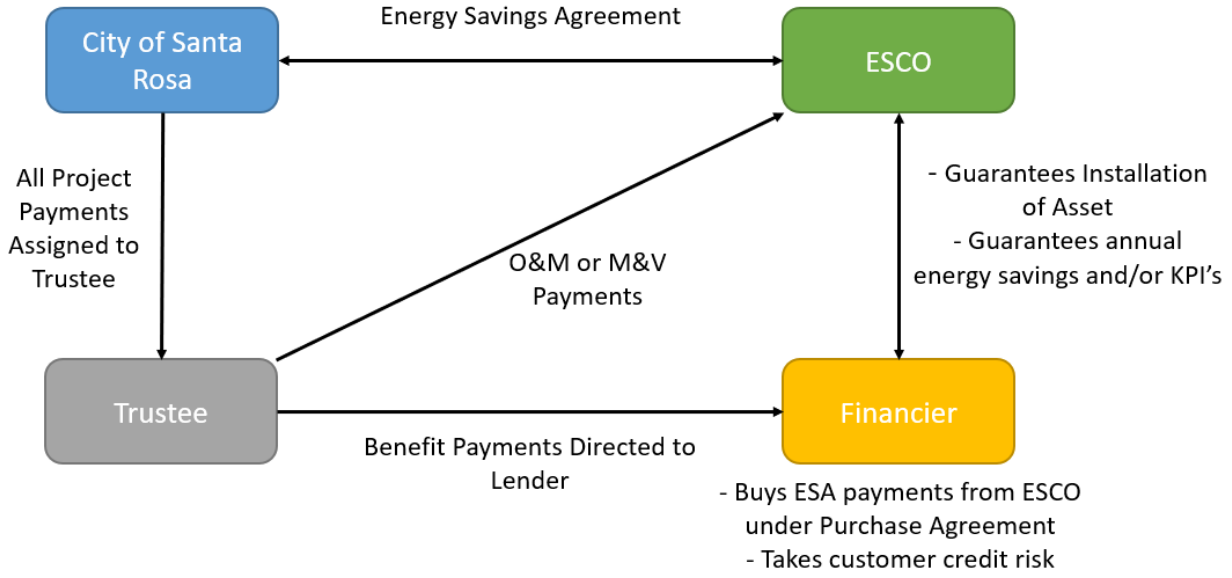
City and the Financier

- City works with a financier to secure a tax-exempt lease financing
- City pays the loan payments

Business Plan – Types of Financial Mechanisms

<u>Energy as a Service (EaaS) or Energy Savings Agreement (ESA)</u>

- Energy savings agreement similar to previous option
  - Payment obligations tied to the project performance
- Project fees are paid to the Trustee, ESCO works directly with the Financier
- In general, a more complex contract structure and
- Contract fees are usually higher reflecting the higher risk for the financier



Business Plan – Types of Financial Mechanisms

<u>Power Purchase Agreement (PPA)</u>

- Developer will perform the design, permitting, financing and installation of the solar PV and the battery storage system with little to no upfront cost
- Developer will sell the generated power to the City at an agreed upon fixed rate
  - This rate will be lower that the City's utility rate and therefore offsets the cities utility costs while the developer earns income on the difference
- Developer can take advantage of the tax credits that otherwise the City would not be eligible for.
  - Developer can incorporate these tax credits to the agreed upon rate to share the benefits with the City
- Developer will be responsible for the operation and maintenance of the systems.
- At the end of the PPA term, City may choose to
  - extend the PPA,
  - have the developer remove the equipment,
  - or purchase the equipment from the developer at a fair market value.

Business Plan – Studied Options

Four combinations of the discussed finical mechanism studied

Scope	Loan	Self/Grant Fund	Service Contract Payment
Option 1 - ESPC + funded BEB EVSE			
Solar PV and Battery Storage	X		
Energy Efficiency	X		
Bus Electrification		X	
Option 2 - ESPC + PPA + funded BEB EVSE			
Solar PV and Battery Storage			X
Energy Efficiency	X		
Bus Electrification		X	
Option 3 – EaaS/ESA + funded BEB EVSE			
Solar PV and Battery Storage			X
Energy Efficiency			X
Bus Electrification		X	
Option 4 – PPA + funded EE and BEB EVSE			
Solar PV and Battery Storage			X
Energy Efficiency		NA	
Bus Electrification		X	

- BEB – Battery Electric Buses
- EVSE - Electric Vehicle Supply Equipment
- ESPC - Energy Savings performance Contract
- EE – Energy Efficiency
- PPA – Power Purchase Agreement
- EaaS – Energy as a Service
- ESA – Energy Service Agreement

Business Plan – Cash Flow Analysis

- ❑Cash flow analysis provides the net present value (NPV) of the investment
- ❑Considers capital costs, operating cost savings and expenses, contract fees, and escalation rates
- ❑Provides a comparison point for deciding between the different financial options

Capital Costs

Lighting and Lighting Controls Upgrades

Packaged Unit Replacement

New Chillers

New Boilers

Energy Efficiency Rebates and Incentives

Solar PV Install Cost

BESS Install Cost

BEB and EVSE implementation cost

Operating Expenses

Packaged Unit savings

Chiller Replacement savings

Boiler Replacement Savings

Lighting Retrofit Savings

Renewables Energy and Demand Cost Avoidance

NEM 2.0 Excess solar payment

BEB Charging Energy and Demand Cost

Fuel (Diesel) Cost Avoidance

Low Carbon Fuel Standard Credits

Maintenance and replacement

Energy Efficiency O&M savings

PV O&M Rate

BESS O&M Rate

BEB Replacement Cost (net)

EV O&M Avoided Cost

PV Panel Replacement Cost

PV Inverter Replacement Cost

BESS Replacement Cost

BEB Replacement Cost

EVSE Replacement Cost

Business Plan – Results and Recommendations

Comparison of the NPV between the different Options and a summary of the contract assumptions

EaaS/ESA has lowest net present value

Remaining options have similar NPVs

Contract fees and rates are based on market values and similar projects

- Exact rates should be collected from service providers before making a final decision

Results/Specifications	Unit	Option 1 – ESPC	Option 2 - ESPC + PPA	Option 3 - EaaS/ESA	Option 4 - PPA
NPV	$	$3,047,971	$2,997,932	$853,147	$2,794,438
Contract term	years	25	25	25	25
ESPC Scope	-	EE, PV, BESS	EE	-	-
PPA Scope	-	-	PV, BESS	-	PV, BESS
Self/Grant funded	-	BEB EVSE	BEB EVSE	BEB EVSE	BEB EVSE
Loan amount	$	$(3,751,062)	$(1,207,801)	-	-
Loan interest rate	%	5%	5%	-	-
Grant/Self fund	$	$2.4M	$2.4M	$2.4M	$2.4M
PPA Rate	$/kWh	-	$0.25	-	$0.25
Energy Service Agreement Fee	$/kWh	-	-	$0.28	-

Business Plan – Results and Recommendations

Risk level comparison of the different Options

Risk Type	Option 1 - ESPC	Option 2 - ESPC+PPA	Option 3 - EaaS/ESA	Option 4 - PPA
Contract complexity	Medium	Medium	High	Low
Accounting implications	High	Medium	Low	Low
Development/Implementation period	High	High	Medium	Low
Equipment ownership	High	High	Low	Low
Maintenance and operation	Medium	Medium	High	High
Performance Period	Low	Low	Low	Medium

Recommendations (MSCN Specific)

- PPA including both solar and BESS is the best option
- Energy Efficiency measures can be self funded
- Bus Electrification and infrastructure upgrades can be implemented with available grants and incentives

City-wide Recommendation

– To obtain maximum benefit from the phase 1 study, AECOM recommends that Santa Rosa considers city-wide solutions
  - Microgrids at MSCN/MSCS and Finley Community Center combined one contracting vehicle through third party financing
  - Whole city energy efficiency upgrades and solar PV/battery deployment using ESPC mechanisms

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Questions

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Thank you.

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