FCRTA
Fresno County
Rural Transit Agency

*Accessible EV **Mobility** & **Infrastructure** For All*

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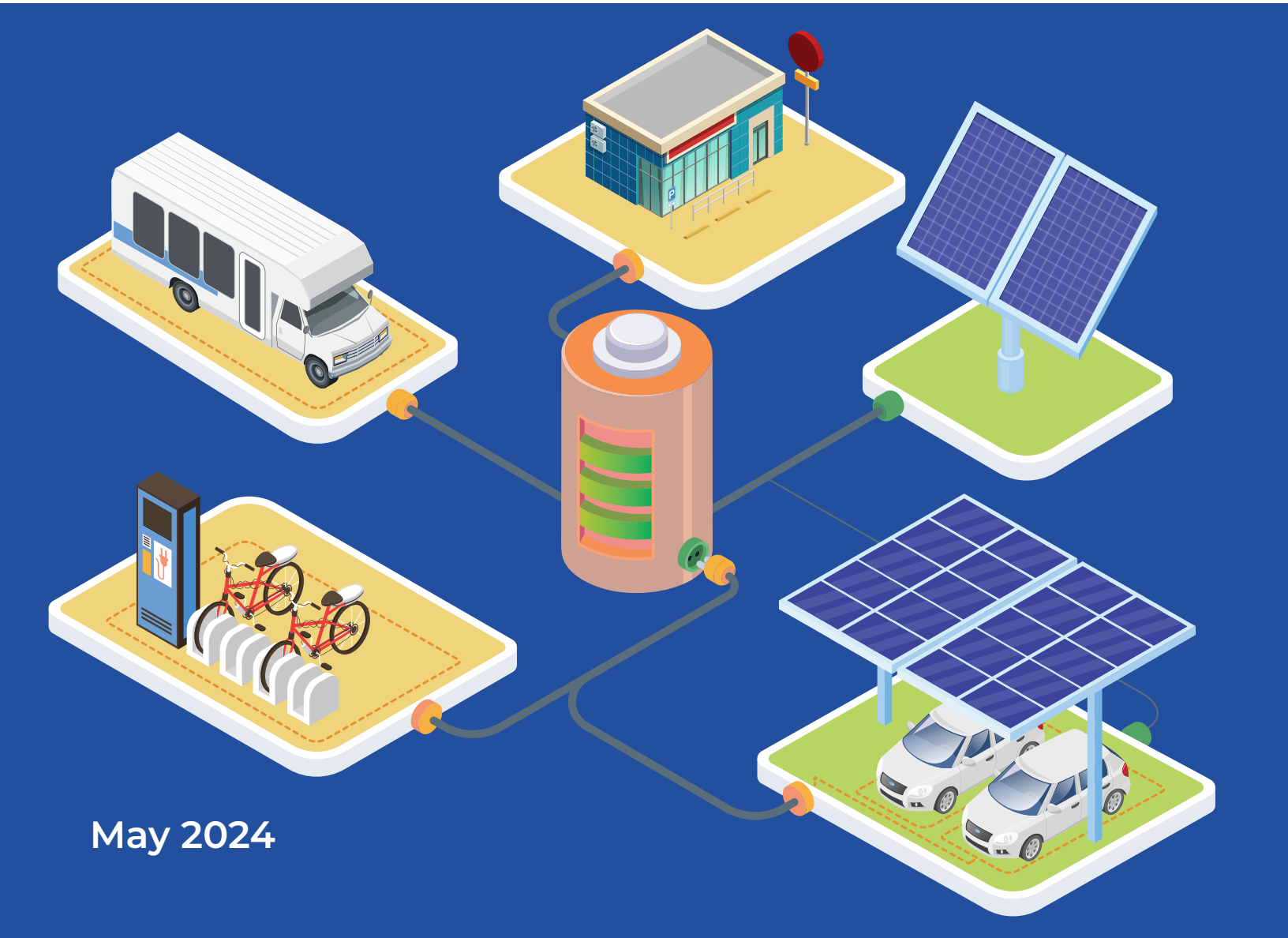
Fresno County Rural Transit Agency

Fresno County Microgrid & Multimodal Resiliency Hub Feasibility Study



May 2024

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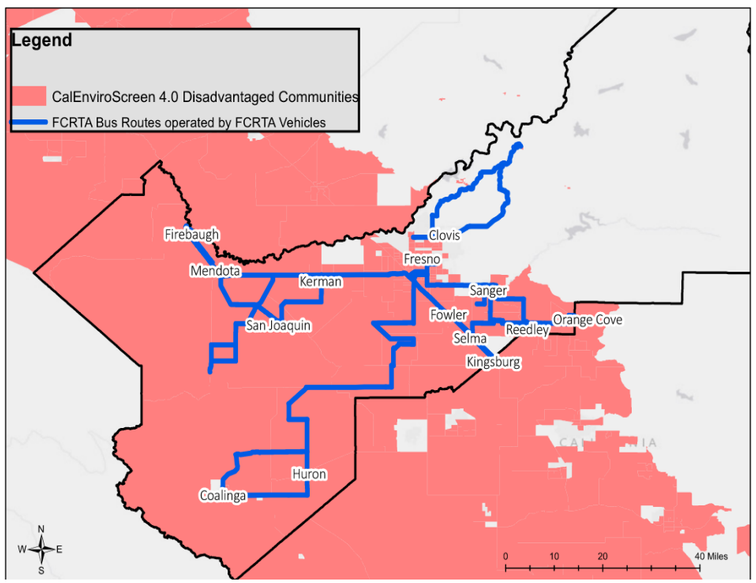
About FCRTA

The Fresno County Rural Transit Agency (FCRTA) provides public transit services to the rural communities of Fresno County. FCRTA covers almost 6,000 square miles across the County to serve communities up to 60 miles away from the City of Fresno – the County seat and main urban center.

FCRTA has four main service types: inter-city bus service, intra-city bus service, rural dial-a-service, and micro transit service. It operates 26 transit sub-systems in 13 rural incorporated cities and 39 unincorporated communities. FCRTA provides regular fixed-route services, which follow designated routes and schedules, reservation-based, demand-responsive service, and on-demand microtransit service that offers curb-to-curb transportation.

According to CalEnviroScreen 4.0, 72 percent of the census tracts in FCRTA's transit service area are considered disadvantaged (see Figure E-1). Many of FCRTA's riders are transit-dependent due a disability or lack of income to afford a vehicle.

Figure E-1: FCRTA Service Area



FCRTA's goal is to convert to a 100% zero emissions vehicle fleet

Project Background

The State of California's Innovative Clean Transit (ICT) regulation requires that starting in 2029, 100 percent of all transit agencies' new bus purchases must have zero emissions, with the goal of completing the transition by 2040. FCRTA has set an even more ambitious goal of transitioning to a zero-emissions vehicle fleet by 2030. FCRTA has worked diligently toward its fleet conversion goal, having deployed 33 electric vehicles (EVs) to date.

FCRTA has experienced many challenges in deploying EVs, including:

- Lack of EV charging infrastructure in Fresno County
- Power grid capacity limitations
- Vehicle range limitations exacerbated by the long distances FCRTA vehicles travel daily
- Lack of backup power during a power outage
- Costly electrical bills, vehicles, and infrastructure
- Vehicle availability and supply chain issues

To address these challenges and provide a reliable energy source for its fleet transition, FCRTA plans to deploy microgrids/distributed energy resources throughout Fresno County. The microgrids will include solar-powered EV charging and backup power, resulting in energy cost savings, and power supply during emergencies. The microgrids will also serve as multimodal community resiliency hubs, providing backup power to support critical infrastructure in rural communities. The microgrids will also provide transportation and amenities to serve communities during emergencies and on a day-to-day basis.

Project Goals

Expand Transit
Increase transportation service and access in rural, disadvantaged communities.

Invest in Disadvantaged Communities
Leverage microgrid investments to redevelop vacant and underutilized land in rural, disadvantaged areas into multimodal community resiliency hubs, promoting economic development and improving quality of life.

Reduce Transportation Emissions
FCRTA to a 100 percent zero-emissions fleet to improve air quality in disadvantaged communities and meet State of California requirements.

Encourage Electric Vehicle Adoption
Build EV charging stations for residents, increasing the personal EV adoption rate.

Leverage Investments
Leverage microgrid investments to redevelop vacant and underutilized land in rural, disadvantaged areas into multimodal community resiliency hubs, promoting economic development, improving quality of life, and supporting residents during emergencies.

Cost Savings
Lower energy costs that can be reinvested into FCRTA services.

Increase Resiliency
Create a more resilient Fresno County by providing backup power for FCRTA's operations and critical emergency services during power outages and emergencies such as wildfires.

Support Other Transit Agencies
Provide a blueprint for other rural transit agencies to deploy microgrids to support fleet transition to low or zero emissions.

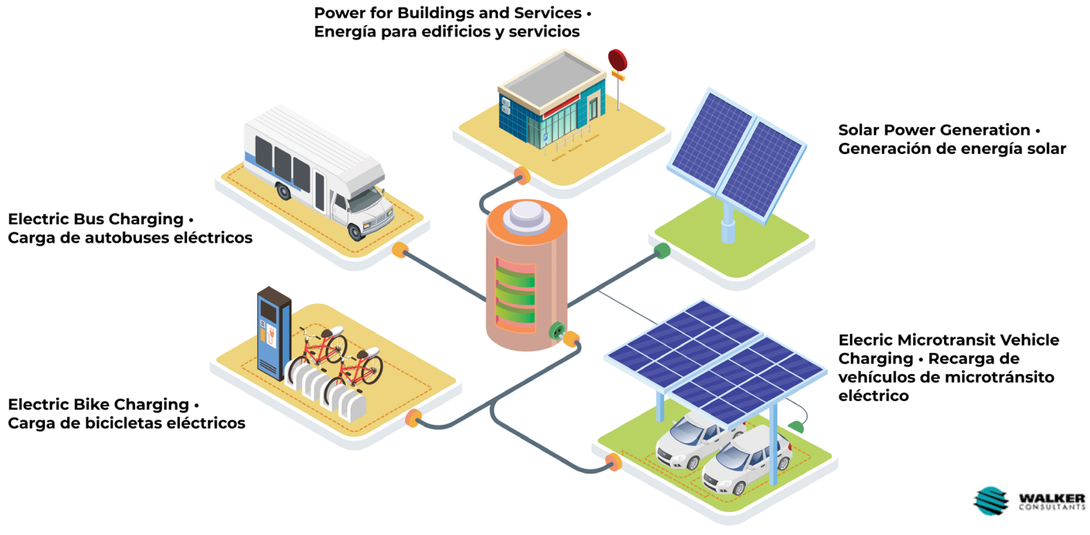
What is a Microgrid?

Transit agencies are experiencing power grid capacity challenges as they transition to a 100 percent zero emissions fleet (electric vehicle fleet). One solution to this energy challenge is a microgrid. A microgrid is defined by the following:

- A local, mini energy system powered by a sustainable, renewable resource such as solar or wind.
- Has an energy storage system typically contained in a backup battery.
- Maintains a connection to and ability to pull power from the central grid, but can also operate independently on “island mode” using the solar and battery supply.
- Supported by an intelligent management system that efficiently using a combination of solar, battery, or central grid power to produce energy savings and increase reliability.

Microgrids • Microgrids

Small, independent power systems that use sustainable energy to power everything from electric buses to mobile phones • Pequeños sistemas de energía independientes que utilizan energía sostenible para alimentar todo, desde autobuses eléctricos hasta teléfonos móviles.



What is a Multimodal Resiliency Hub?

Microgrids can have significant upfront capital costs for infrastructure that do not necessarily translate to more transit riders, which is a primary goal for any transit agency. This is why FCRTA seeks to leverage the microgrid investment to support multimodal transportation options and community amenities at the microgrid site. A multi-modal resiliency hub sits on the same land as the microgrid with amenities such as community gardens, electric bike share, vehicle charging, food trucks, composting, Wi-Fi, outdoor parks, and cell phone charging.

During emergencies and power outages, the multi-modal community resiliency hub provides backup power to critical infrastructure (buildings such as city hall, police station, fire station, and health care facilities), heating and cooling centers, information, and medical support. Importantly, the hubs could be developed on vacant and underutilized land in rural, disadvantaged areas, providing an economic and quality of life benefit to the community.

This is more than just about the energy; FCRTA’s goal is to leverage the investment to partner with the community to create a real asset.

Features of Resiliency Hubs • Características de los centros de resiliencia

English description • Spanish description

Multimodal Resiliency Hub Prototype

The following designs illustrate how leveraging the microgrid investment into building a multimodal community resiliency hub at the microgrid site has the potential to transform the site and the surrounding community.

As the San Joaquin example designs show, the hubs can convert the existing vacant site into a community hub that provides transportation amenities such as e-bike share, electric vehicle charging, rideshare, bus service, and microtransit. Space for food vendors supports local businesses and community gardens and gathering areas provide a “town square” atmosphere. Other amenities include Wi-Fi, phone charging, and wayfinding and signage.

The site is powered by microgrid solar panels and battery storage, which are tied to the central grid and supported by an intelligent energy management system to provide energy efficiency and resiliency. For full details of the site hub analysis, see page 105.

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

Existing Conditions

Grid Conditions

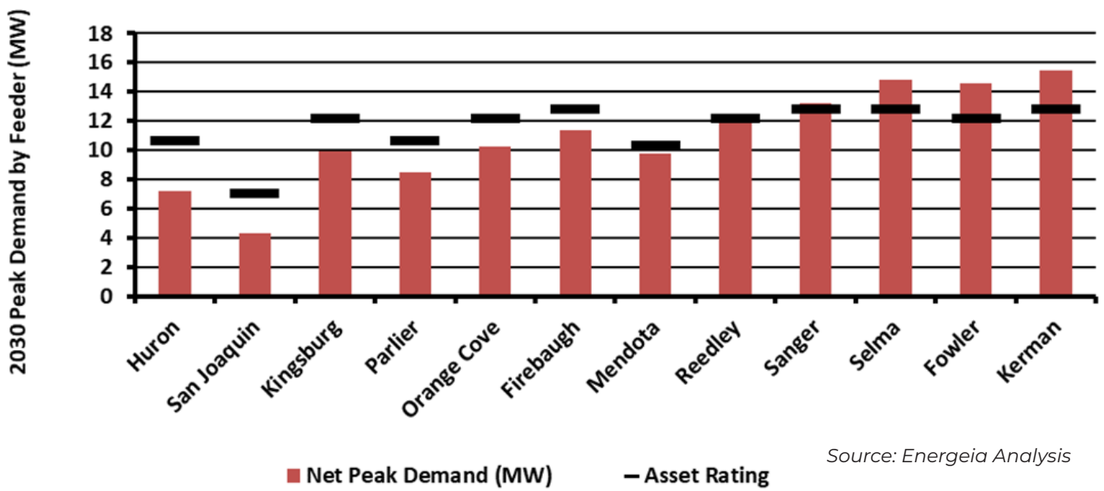
To understand the state of the electric grid in Fresno County, an updated analysis of Fresno's distribution infrastructure charging hosting capacity was performed, focusing on the challenges and opportunities related to the use of microgrids to enhance resilience for rural transit operations. Findings show:

- Multiple feeders are forecast to reach or exceed their respective nameplate ratings by 2030 including Reedley, Sanger, Fowler, Kerman, and Selma, the location of the most recently developed maintenance facility.
- Selected feeders serving unincorporated communities were analyzed to identify potential feeder constraints. Cantua Creek, Lanare, Laton, Tombstone, and Riverdale feeders were all forecast to be constrained in 2030.
- Grid reliability at the customer level, reported as Customer Average Interruption Duration Index (CAIDI), is increasing in severity, reaching a peak in 2021.
- Microgrid sites serving FCRTA's transit fleet will not fall within high wildfire threat and PSPS zones, though they are classified as Disadvantaged and Vulnerable Communities.

Figure E-2 shows the transit route analysis developed to quantify energy needs and charging capacity requirements by site, assuming 100% transit electrification by 2030, based on vehicle miles traveled (VMTs), vehicle types, and route operation schedules. Several sites need additional grid capacity to manage FCRTA's existing service, and others has some power availability, but FCRTA would be limited to expand EV transit service. Figure E-3 displays grid capacity in unincorporated communities, showing gaps in many areas of Fresno County.

These results are important criteria in determining microgrid site costs and benefits, as FCRTA's transit electrification plan will increase grid peak demand in the short term, and microgrids could potentially alleviate grid constraints using grid peak demand shaving optimization via an energy management system to mitigate infrastructure upgrades and grid interconnection barriers.

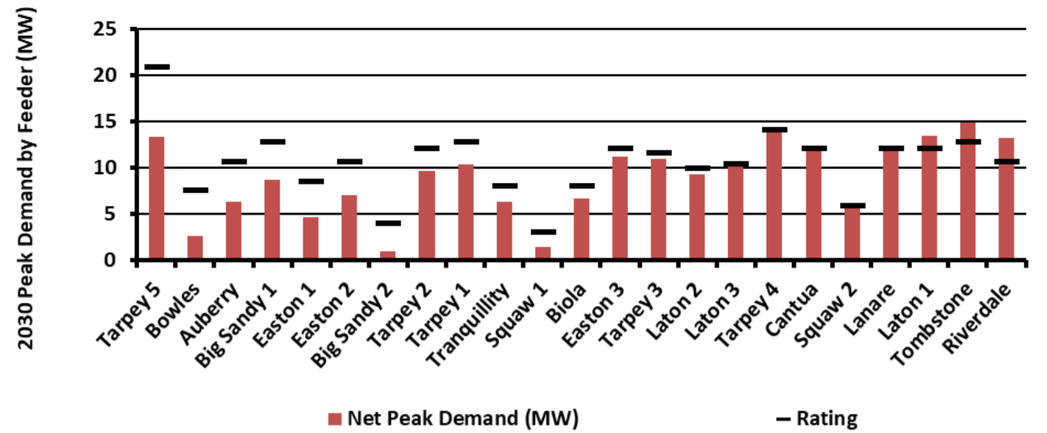
Figure E-2: Feeder Headroom vs. Required Charging Capacity by Maintenance Facility



Source: Energeia Analysis

Existing Conditions

Figure E-3: Distribution Feeder Headroom by Unincorporated Community

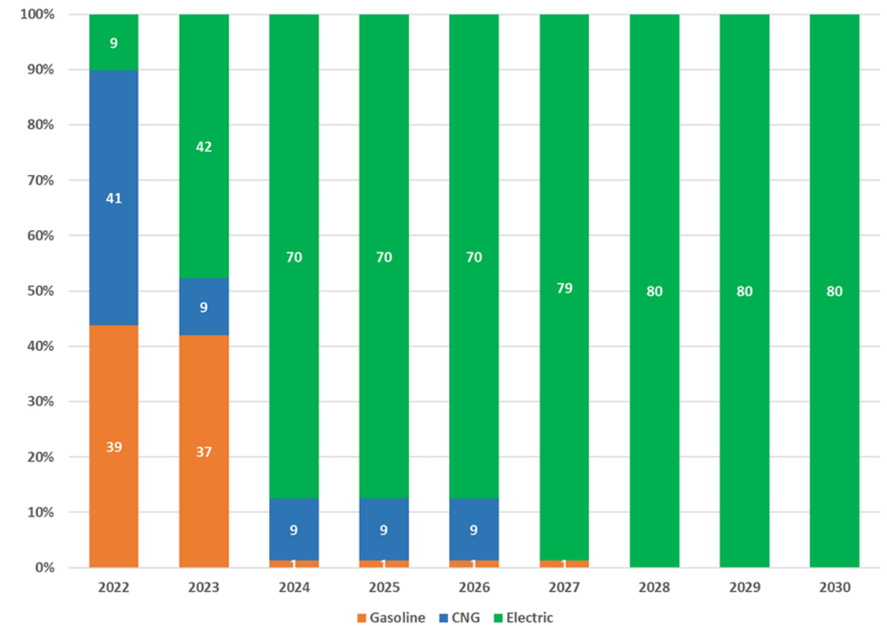


Source: Energeia Analysis

FCRTA's Vehicle Fleet

The State of California's ICT regulation requires each transit agency to prepare a ZEB Rollout Plan to be approved by the California Air Resources Board (CARB). As part of this microgrid feasibility study, FCRTA completed its ZEB Rollout Plan, which shows how FCRTA will convert to a 100% EV fleet by 2030. FCRTA's fleet transition schedule is shown in Figure E-4. FCRTA deploys its bus fleet from 13 different bus depots owned and operated by local governments. FCRTA has installed EV charging stations and solar infrastructure at the bus depots. FCRTA has also deployed additional charging infrastructure in the communities it serves.

Figure E-4: FCRTA Fleet Transition Schedule



Agency Review and Benchmarking

To inform FCRTA's microgrid initiative, the Project Team reviewed two transit-serving microgrids operated by the Montgomery County Department of Transportation (MCDOT) and Martha's Vineyard Transit Authority (VTA) Fleet Electrification. The Project Team also reviewed the fleet electrification efforts of MCDOT, VTA, and the Antelope Valley Transit Authority (AVTA).

Montgomery County Department of Transportation (MCDOT)

The Brookville Smart Energy Depot is a solar bus charging microgrid infrastructure project that supplies renewable energy to MCDOT's growing electric bus fleet. The Brookville Smart Energy Deport consists of solar panels, a battery energy storage system, natural gas generators, and an electric bus charging system.

Source: Alphastruxture

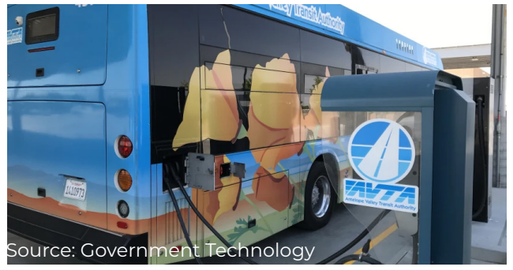
Martha's Vineyard Transit Authority (VTA)

VTA built a solar-powered microgrid with battery energy storage located at VTA's existing bus depot/operations center in the town of Edgartown, MA. The microgrid has solar panels, battery energy storage, a diesel generator, and EV charging stations.

Source: Enel North America

Antelope Valley Transit Authority (AVTA)

AVTA has been a leader in transitioning to electric vehicles, having purchased 89 electric vehicles to-date. AVTA has also deployed an energy management system.



Source: Government Technology

Key Lessons Learned:

- It is important to gain buy-in from everyone in the organization to transition to EVs, including from operating staff, operating company, mechanics, and drivers.
- An energy management system at the microgrid is critical to manage charging schedules and ensure buses charge during non-peak times, saving costs.
- An Energy as a Service (EaaS) model, which shifts ownership of energy-related assets from customer to supplier, can result in more predictable ongoing costs and little up-front cost.
- To promote resiliency, a microgrid should be able to operate either independently or connected to the grid or to a generator.
- A challenge of electrification efforts is that the technology landscape is changing, including batteries, buses, grids, and energy management systems.

Community and Stakeholder Engagement

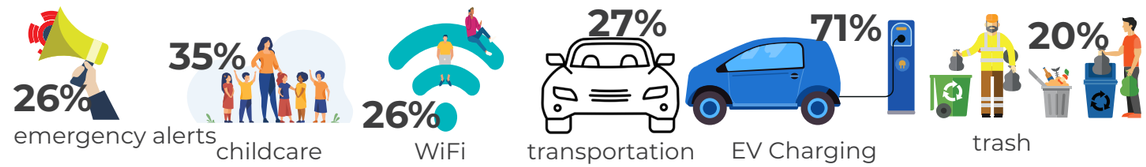
Three main outreach activities informed the plan:
1. Website and informational materials
2. Stakeholder Advisory Committee
3. Community survey
4. Five Community popup events

Findings

78 people indicated they would be interested in taking a leadership role with the resiliency hub

Community members are experiencing a lack of access to basic necessities and amenities. Figure E-5 shows the percent of survey respondents that reporting lacking access to these amenities and Figure E-6 shows amenities respondents are interested in seeing at the hubs.

Figure E-5: Percent of Survey Respondents that Lack Access to Amenities



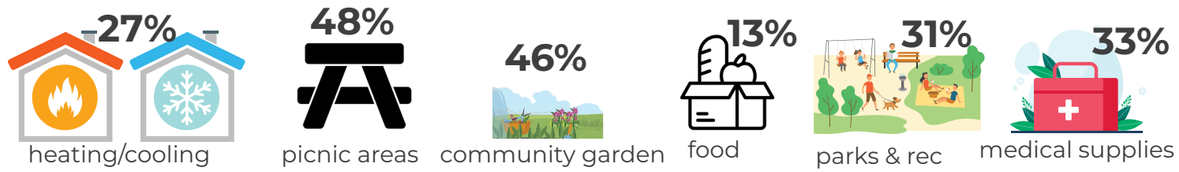
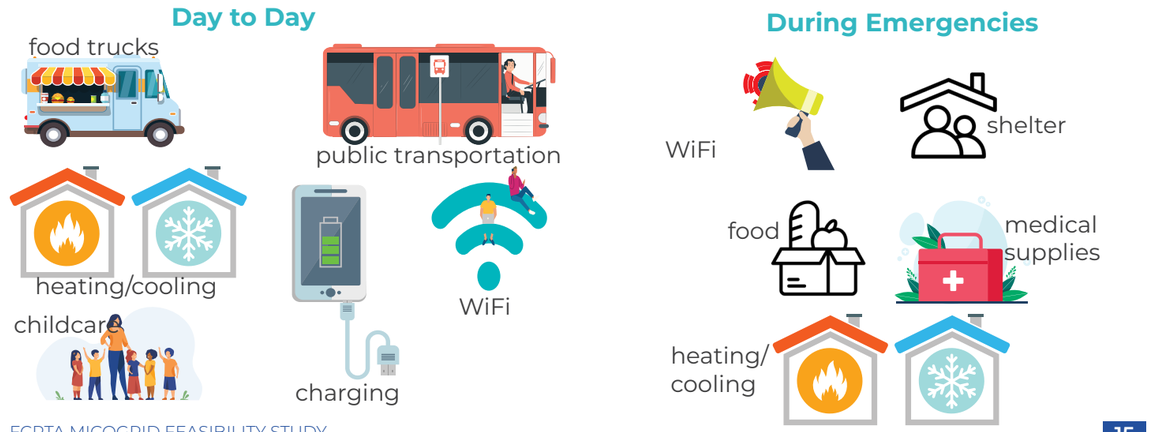


Figure E-6: Top Amenities Community members are Interested in at Resiliency Hubs



Site Selection Process

The project team developed a tiered-based scoring methodology to determine five sites for further study, considering the following qualitative and quantitative reviews.

Tier I Quantitative Review

Tier I quantitative review includes several factors the project team evaluated for each site:

- Transit system operational goals
- Energy assessment and ability to meet FCRTA's fleet requirements
- Partnership potential
- Equity factors

Findings show that the 13 cities in FCRTA's service areas rank higher due to their existing needs for vehicle charging and partnership support. Cities with grid constraints, such as Fowler, also rank high. Unincorporated areas rank somewhat lower than the cities, mainly due to the limited ability to provide a solid supportive partnership infrastructure and reduced need for FCRTA vehicle charging at the specific location.

Tier II Qualitative Review

Based on the Tier I quantitative review, the project team selected the top-ranking cities and unincorporated areas for a Tier II qualitative review. Tier II ranking criteria included several qualitative factors:

- Site readiness
- Geographic equity
- Transit equity
- Community input

Based on the Tier II qualitative review, the project team selected five cities and unincorporated area sites for further study:

San Joaquin - A city, FCRTA Board member, and strong partner. The city can contribute land, which is currently an undeveloped dirt lot with no building on-site. Transit service in San Joaquin is regular but limited. New microtransit service could serve the surrounding areas of Cantua Creek, Three Rocks, and El Porvenir. The microgrid presents an opportunity to provide significant resiliency to the community.

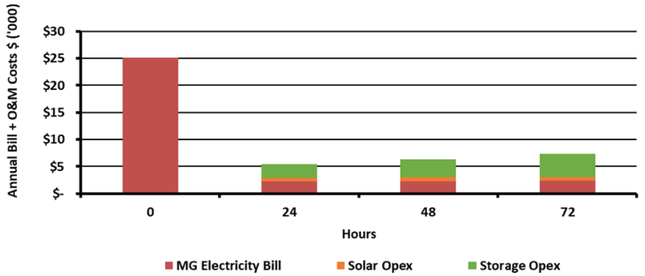
Fowler – A city, FCRTA Board member, and strong partner. The grid is over capacity. The city can contribute land, which is currently an undeveloped dirt lot adjacent to a parking lot and library. Fowler has regular fixed-route transit service and is on a route FCRTA is studying the feasibility of providing more frequent and reliable service in the form of Bus Rapid Transit on State Route 99.

Parlier – A city, FCRTA Board member, and strong partner. The city can contribute land, currently a developed parking lot with paving and lighting, next to the on-site police station. Parlier has regular transit service, but it is limited to weekdays during the day. FCRTA is studying the feasibility of providing more frequent and reliable service in the form of Bus Rapid Transit as a spur off of a State Route 99 route. There is strong support from the Parlier community; more surveys were completed in Parlier than in all of the other cities and unincorporated areas combined.

Biola – An unincorporated area. The Biola Community Services District is a strong FCRTA partner and can contribute land; the site is infrastructure-ready, with paving, lighting, an electric vehicle charger, and a security gate. The Community Services District building is on site. FCRTA currently serves Biola and the surrounding areas with microtransit service Monday through Friday on-demand and Saturday with 24-hour advanced reservation.

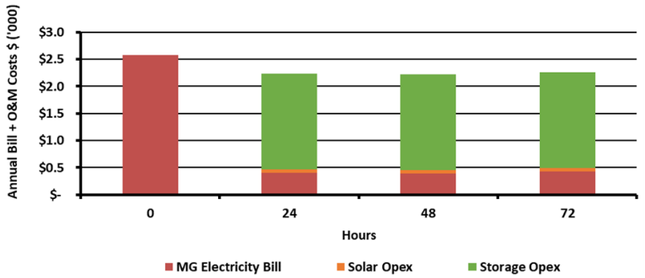
Lanare – An unincorporated area where the grid is forecasted to be constrained. A microgrid could alleviate the burden of frequent outages on the community. The community can contribute land, a parking lot that is infrastructure ready, next to the community center. Lanare has limited transit service and presents the potential for a microtransit hub, serving the surrounding areas of Laton, Riverdale, and Five Points.

Annual Costs Compared to Utility Bill



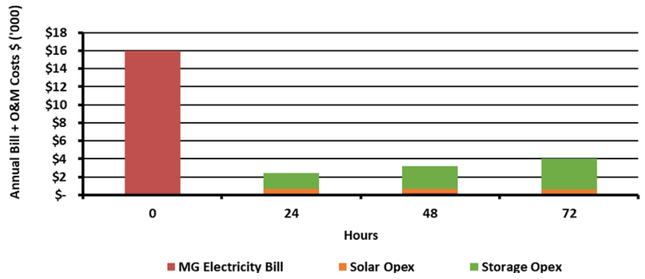
San Joaquin

Microgrid would reduce annual costs by $18,000-$20,000



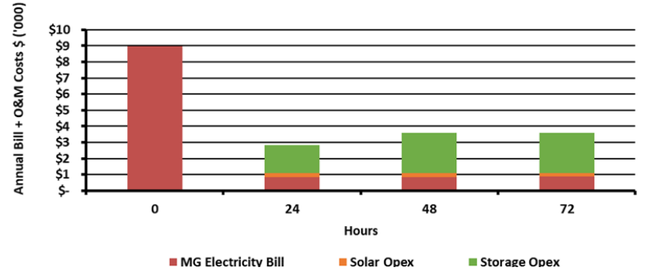
Fowler

Microgrid would reduce annual costs by $2,000



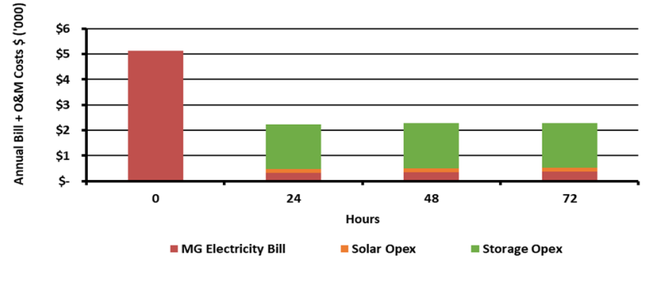
Parlier

Microgrid would reduce annual costs by $12,000-$14,000



Biola

Microgrid would reduce annual costs by $6,000



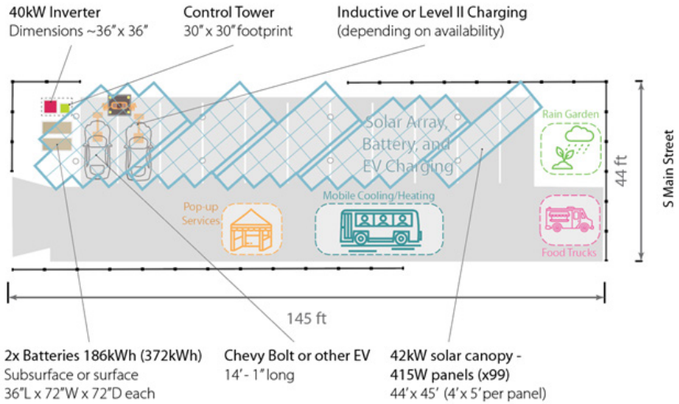
Lanare

Microgrid would reduce annual costs by $3,000

Site Assessments and Microgrid Concepts

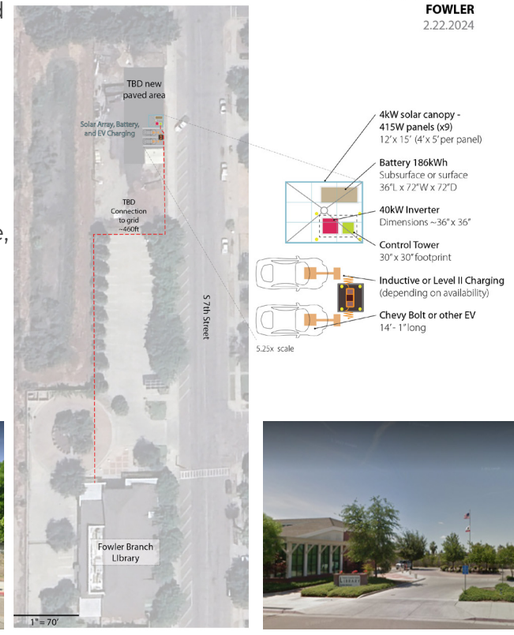
San Joaquin

Owner: City of San Joaquin
Existing Use: Vacant Site
Civil issues: Clay soils
Vehicles: 2 battery electric sedans
EV Chargers: 2 Level II or inductive
Hub Type: Permanent hub, power supply to on-site critical infrastructure
Power Reliability: 24 hours
Cost Estimate: $1.6-$1.9M
Hub Amenities Manager: City of San Joaquin



Fowler

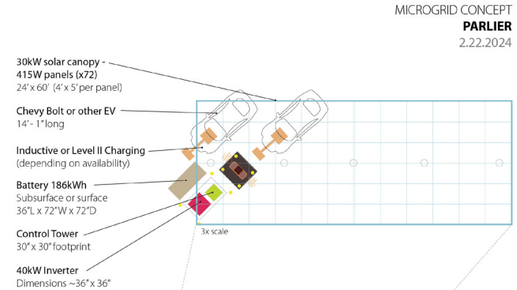
Owner: City of Fowler, Building owned by Fresno County
Existing Use: Parking lot serving adjacent library, city storage yard.
Civil issues: No major issues
Vehicles: 2 battery electric sedans
EV Chargers: 2 Level II or inductive
Hub Type: Permanent hub, power supply to on-site critical infrastructure, including library
Power Reliability: 24 hours
Cost Estimate: $1-$1.25M
Hub Amenities Manager: City of Fowler

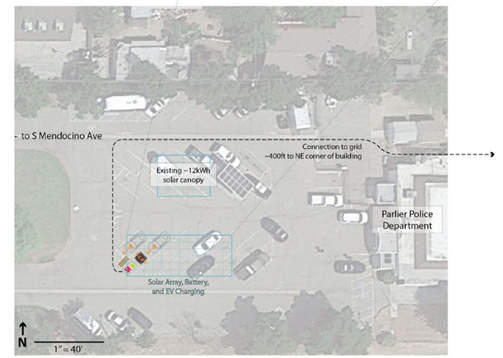


Site Assessments and Microgrid Concepts

Parlier

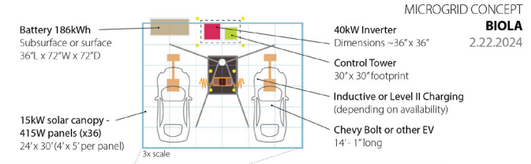
Owner: City of Parlier
Existing Use: Parlier Police Department with 10,500 square foot (sf) building, parking lots to the west adn east, green space.
Civil issues: No major issues
Vehicles: 2 battery electric sedans
EV Chargers: 2 Level II or inductive
Hub Type: Permanent hub, power supply to on-site critical infrastructure, including Police Department
Power Reliability: 24 hours
Cost Estimate: $600,000-$700,000
Hub Amenities Manager: City of Parlier





Biola

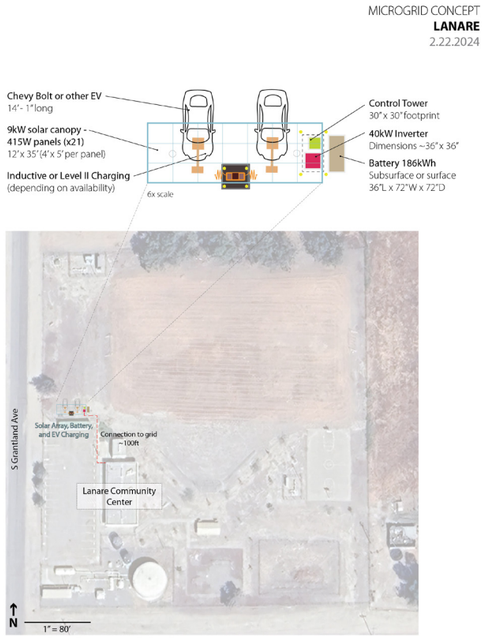
Existing Use: Biola Community Services District office and parking lot.
Civil issues: No major issues
Vehicles: 2 battery electric sedans
EV Chargers: 2 Level II or inductive
Hub Type: Permanent hub, power supply to on-site critical infrastructure, including Community Services District building
Power Reliability: 24 hours
Cost Estimate: $500,000-$575,000
Hub Amenities Manager: Biola Community Services District



Site Assessments and Microgrid Concepts

Lanare

Owner: Lanare Community Services District
Existing Use: Lanare Community Center, parking lot.
Civil issues: No major issues
Vehicles: 2 battery electric sedans
EV Chargers: 2 Level II or inductive
Hub Type: Permanent hub, power supply to on-site critical infrastructure , including Community Center
Power Reliability: 24 hours
Cost Estimate: $525,000-$650,000
Hub Amenities Manager: Lanare Community Center



Transit Operational Analysis and Multimodal Evaluation

Transit Dependency Factors

- The five microgrid communities all have at least a 20 percent poverty rate. As car ownership is expensive, residents in these communities need a more affordable mode of transportation.
- All of the communities except for San Joaquin had a disability rate of 10 percent or higher. In three communities, seniors comprise greater than 10 percent of the population. Seniors and persons with disabilities may be unable to drive. Therefore, they need an ADA-accessible mode of transportation.
- All five communities have fewer than one car per person of driving age, meaning many households share a car(s), and with few transit options, this limits their access to jobs, healthcare, and quality of life opportunities.

Origin/Desination Analysis

San Joaquin: Roughly two-thirds of trips occur in or around the San Joaquin, Three Rocks, Cantua Creek, and Kerman areas.

Fowler: Slightly less than half of trips to and from Fowler occur in the Fowler area.

Parlier: Roughly two-thirds of trips to and from Parlier occur in the Parlier and Reedley areas.

Biola: Roughly one-third of trips occur in the Biola and Kerman areas.

Lanare: Over one-third of trips to and from Lanare occur in the Riverdale and Lanare areas.

Transit Operational Analysis and Multimodal Evaluation

Existing Transit Provided

San Joaquin

- Inter-city on-demand service from San Joaquin and Tranquility to connections in Kerman on Mon, Wed, and Fri. Service from San Joaquin to Cantua Creek, Three Rock, Halfway, Porvenir, and to connections in Kerman Tues and Thurs.
- Local in-city on-demand service

Fowler

- Two fixed routes: between Kingsburg, Fowler, and Reedley, and between Kingsburg and Fresno.
- Local in-city on-demand service.

Parlier

- Fixed route from Sanger to Reedley College and Kingsburg to Reedley.
- Fixed-route between Kingsburg, Fowler, and Reedley.
- Local in-city on-demand service.

Biola

- Rural dial-a-ride service for lifeline destinations (e.g., medical appointments).
- Same-day microtransit service.

Lanare

- Fixed route between Coalinga and Fresno.
- Rural dial-a-ride service for lifeline destinations (e.g., medical appointments).

Transit Recommendation

As the origin/destination analysis demonstrates, people are making many trips within their community and the immediate surrounding areas, and fewer trips further away. Residents have indicated there is a lack of convenient public transit. During the community pop-up event in Parlier, participants indicated that public transportation is one of the top five items of importance at resiliency hubs. Further, given the high poverty rates in these communities, it is difficult for residents to afford to own a vehicle. If they do, they pay a significant portion of their income in vehicle costs. Many residents share a vehicle with family members or friends, which limits access.

FCRTA plans to expand microtransit service countywide to provide access to more rural communities. Upon installation of the microgrids, microtransit service is recommended to be operated out of all five microgrid communities. Vehicles would be stored and operated out of each microgrid site. The service should allow riders to access both local destinations and destinations throughout Fresno County.

Additional Mobility Recommendations

EV Carshare

EV carshare service at each hub can help to fill gaps in service coverage. Through community outreach conducted as part of FCRTA's microtransit studies, many rural residents have reported not owning a vehicle. Given the high poverty rate in rural communities, vehicle ownership can comprise a significant portion of the household budget. Car share service can provide residents access to an EV without needing to own and maintain a vehicle. The carshare service would be a membership-based car reservation subscription service. People could reserve a car on-demand through a website, cell phone app, or by calling a hotline.

Electric Bike Share/Bike Library System

As discussed in the origin/destination analysis, many trips stay local within each microgrid community. Biking provides a zero-emission transportation alternative that has a relatively low cost of administration compared to microtransit or EV charshare. Bikeshare in rural communities can be operated in the form of a community library, where riders can take out a bike, just like they would a library book.

Site Framework Criteria and Ranking

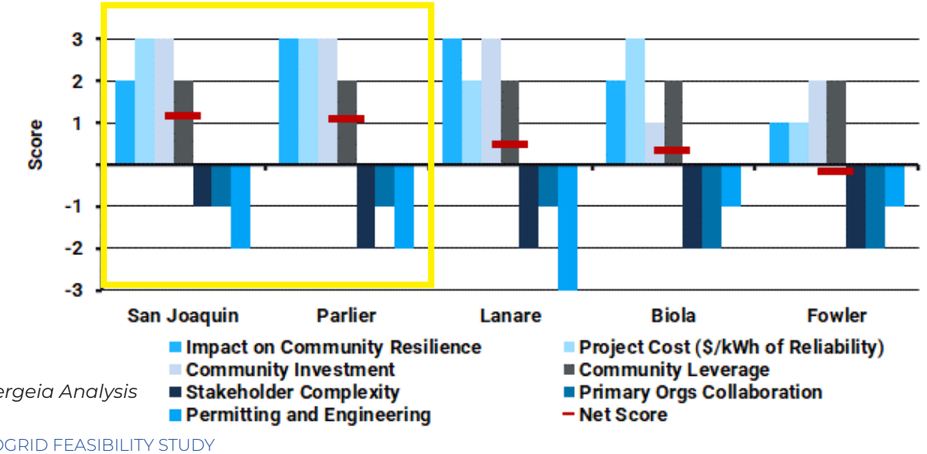
The project team created a site criteria framework (Figure E-7) in consultation with FCRTA

Figure E-7: Site Framework Criteria

	Rating		
Benefit	**1 = Low Benefit**	**2 = Medium Benefit**	**3 = High Benefit**
Impact on Community Resilience	Low/No Positive Impact (0-1 Buildings Supported)	Medium Positive Impact (2-3 Buildings Supported)	High Positive Impact (3+ Buildings
Project Cost (Cost of Customer	>$1000/kWh	$500-1000/kWh	<$500/kWh
Investment in Community to Date	High level of FCRTA support in the past (>1 FCRTA investment)	Moderate level of FCRTA support in the past (1 FCRTA investment)	Little or no FCRTA support in the past (0 FCRTA
Leverage from Community	Minimal expected engagement, likely challenges garnering community resources	Moderate expected engagement, reasonable ability to leverage community resources	High expected engagement, high ability to leverage community
Risk	**1 = Low Risk**	**2 = Medium Risk**	**3 = High Risk**
Stakeholder Complexity	0-1 Stakeholders Involved / Strong Relationships	2-4 Stakeholders Involved / Moderate Relationships	4+ Stakeholders Involved / No/Weak
Primary Organization Collaboration	1-2 Orgs Involved / Strong Relationships	3-5 Orgs Involved / Moderate Relationships	6+ Orgs Involved / No/Weak
Permitting and Engineering	Straightforward permits, manageable engineering requirements	Extensive specialized permitting required, reasonable engineering requirements	Anticipated challenges obtaining permits, extensive engineering requirements

Based on the site criteria, San Joaquin and Parlier were the top scoring sites, as shown in Figure E-8.

Figure E-8: Site Criteria Rankings



Source: Energeia Analysis

Priority Site Cost-Benefit Analysis

Benefits Modeled in Financial Analysis

- Site Electricity Bill Savings
- Transit Value of Reliability
- Community Value of Reliability
- Resource Adequacy Services
- Inflation Reduction Act Tax Credits
- CARB Low Carbon Fuel Standard Credits
- PG&E Power Saver Rewards Program
- CEC Demand-Side Grid Support Credits
- Community Charging Savings
- Community Health and Environmental Benefits

Costs Modeled in Financial Analysis

- Parking Lot Infrastructure
- Interconnection and Panel Upgrades
- Conduit and Trenching
- Solar PV
- Battery Storage
- Level 2 Chargers

Cost-Benefit Analysis Results

Estimated net benefit of over $200,000 for Parlier and over $500,000 for San Joaquin over a 20-year period (breakdown in Figure 7).

Figure E-9: Cost-Benefit Analysis Results for Phase I Sites

	Parlier	San Joaquin
Benefits		
Solar PV Savings	+ $350,539	+ $411,972
Battery Storage Savings	+ $463,003	+ $1,382,201
Federal Credits	+ $127,028	+ $155,990
State Credits	+ $48,896	+ $48,896
PG&E Credits	+ $1,299	+ $19,133
Health & Environmental Benefits	+ $215,904	+ $1,317,471
Costs		
Site Capex	- $265,724	- $1,021,453
Energy System Capex	-$452,866	- $822,796
Energy System Opex	-$48,470	- $65,403
Total Project Cashflows		
20-Year Net Present Value	**$254,010**	**+ $554,847**
IRR	**7.36%**	**+ 6.06%**

Funding and Ownership Structure

Model 1: FCRTA/Community-Built and Owned Model

Public resources, such as local, state, and federal grants, loans, bonds, can fund/finance agency- and community-owned microgrids. FCRTA would work with a community partner and be responsible for funding the project. FCRTA would also oversee all aspects of the construction management process, including the design, bid, and build. It would likely partner with a local government for site operations and maintenance. FCRTA and the community partner would jointly own the microgrid.

Model 1 Conclusion
Unlikely the best alternative for the FCRTA. While FCRTA and the community would retain control, there are risks related to costs, additional staffing, and mission drift. There would also be significant administration time and resources required. A small, rural agency does not have staff solely dedicated to real estate and capital projects or architects, engineers, finance, and energy experts to develop construction documents, plans, and contracts.

Model 2: Design-Bid-Build or Design-Build

A design-bid-build is a traditional procurement process where FCRTA would hire a designer to prepare plans, drawings, and documents. FCRTA would then invite construction contractors to bid to build the microgrid project based on those designs. FCRTA would hire a general contractor to manage the project. The general contractor would act as an intermediary between the designer and the construction contractor. In a design-build process, FCRTA would hire one contractor, a design-builder, to provide both design and construction for the microgrid project.

Model 2 Conclusion:
May be realistic if grant funding is available. However, FCRTA would need to hire a capital project manager or facilities manager to oversee contractors and to manage day-to-day site operations. The project would also be unique in that FCRTA would fund and oversee design and construction in coordination with a community partner, but the partner, not FCRTA, would own the land.

Model 3: Power Purchase Agreement

A third-party, private sector developer designs, constructs, owns, operates, and maintains the microgrid and all equipment (vehicle chargers, solar panels, battery) on behalf of FCRTA and the community partner. In return, FCRTA and community partner purchase power generated at the site for an agreed period and cost.

The private developer creates a special purpose entity that acts as the owner of the microgrid and the energy system, which they own for the duration of the contract. This entity also typically funds all or most upfront and ongoing costs. To bring in additional revenue, when the system produces excess power, the private owner can sell it back to the local utility. It can also leverage state and federal tax credits, which are returned to FCRTA and the community partner through reduced energy costs, and charge a fee for public electric vehicle charging. PPAs are usually long-term agreements between 10 and 25 years or longer.

Model 3 Conclusion:
Possible solution. This model would have low or no FCRTA upfront capital costs or operations costs, energy cost predictability, and energy cost savings. FCRTA could focus on its core transit mission while still supporting the conversion of its fleet to electric. A PPA would allow FCRTA to leverage local tax credits in the form of lower energy rates, which it cannot currently do as a public agency.

FCRTA would not be responsible for design, construction, or operations, which would limit its control. Due to the complex nature of these agreements, outside advice would likely be needed. FCRTA's microgrid projects are smaller than the PPA projects that have been built, so interest from the private market may not materialize.

Next Steps

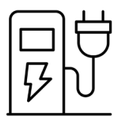
Based on the site selection criteria and priority site assessment, the project team recommends that FCRTA pursue Phase I microgrid and community multimodal resiliency hubs in San Joaquin and Parlier.

Partnerships. Expand partnerships with the cities of Parlier and San Joaquin to create a task force to pursue project development and funding.

Ownership and funding model. Determine the appropriate model for funding and ownership structure.
a. FCRTA/Community-owned
b. Design-build or Design-bid-build
c. Power Purchasing Agreement

Identify a funding pathway. Regardless of the funding structure, there will likely be necessary public or grant funding to support implementation. Potential funding sources are included in the call-out box.

Due diligence. If pursuing a Power Purchasing Agreement, retain appropriate advisors to perform due diligence on developers and investors, as well as opportunities for small, rural microgrids.



Coordination with the Electric Vehicle Charging Master Plan and Energy Management System Plan. FCRTA is set to embark on an electric vehicle charging master plan and energy management system plan. Coordinate microgrid activities with each of these efforts.

Phase II. The Phase II sites may have funding and implementation opportunities (Lanare, Biola, and Fowler). FCRTA is active in all three locations, and can leverage these partnerships as funding opportunities arise.

Potential Funding Sources

-FTA Grants for Bus and Bus Facilities (5339(b))

-State of California Transit and Intercity Rail Capital Program (TIRCP)

-Fresno County Measure C

-Fresno County Measure C New Technology

-Clean Vehicle Fueling Infrastructure Program

-Clean Mobility Options (CMO) Mobility Project Vouchers

-Innovative Charging Solutions for Medium- and Heavy-Duty

01 | Introduction

01 Introduction

About FCRTA

The Fresno County Rural Transit Agency (FCRTA) provides public transit services to the rural communities of Fresno County. FCRTA covers almost 6,000 square miles across the County to serve communities up to 60 miles away from the City of Fresno, the County seat and main urban center. Most communities FCRTA serves are disadvantaged, and many FCRTA riders are transit dependent.

FCRTA has four main service types: inter-city bus service, intra-city bus service, rural dial-a-service, and micro transit service. It operates 26 transit sub-systems in 13 rural incorporated cities and 39 unincorporated communities in Fresno County. FCRTA provides regular fixed-route services, which follow designated routes and schedules, reservation-based, demand-responsive service, and on-demand micro transit service that offers curb-to-curb transportation.

Project Background

The State of California's Innovative Clean Transit (ICT) regulation requires that all public transit agencies gradually transition their fleets to zero-emissions technologies. Starting in 2029, 100 percent of all transit agencies' new bus purchases must have zero emissions, with the goal of completing the transition by 2040. To improve air quality in disadvantaged communities, FCRTA has set an even more ambitious goal of transitioning to a zero-emissions vehicle fleet by 2030. FCRTA has worked diligently toward its fleet conversion goal, having deployed 33 electric vehicles (EVs) to date.

FCRTA has experienced many challenges in deploying EVs, including:

- Lack of EV charging infrastructure in Fresno County
- The significant power required by EV charging infrastructure
- Power grid capacity limitations
- Vehicle range limitations exacerbated by the long distances FCRTA vehicles travel daily
- Lack of backup power during a power outage
- Costly electrical bills, vehicles, and infrastructure

To address these challenges and provide a reliable energy source for its fleet transition, FCRTA plans to deploy microgrids/distributed energy resources throughout Fresno County. The microgrids will include solar-powered EV charging and backup power, a zero-emission EV charging option, energy cost savings, and power supply during emergencies. The microgrids will be distributed throughout Fresno County, enabling FCRTA to charge mid-route or during bus layovers, increasing the reliability of the transit service and permitting the transition to an EV fleet. California's energy system is vulnerable to climate change impacts, such as increased temperatures and more extreme weather events. Therefore, having a reliable, stored energy source will be critical to ensure that FCRTA can provide dependable transit service.

The microgrids will also serve as multimodal community resiliency hubs, providing backup power to support critical infrastructure in rural communities and transportation and amenities to serve the local communities during emergencies and on a day-to-day basis.

Project Objectives

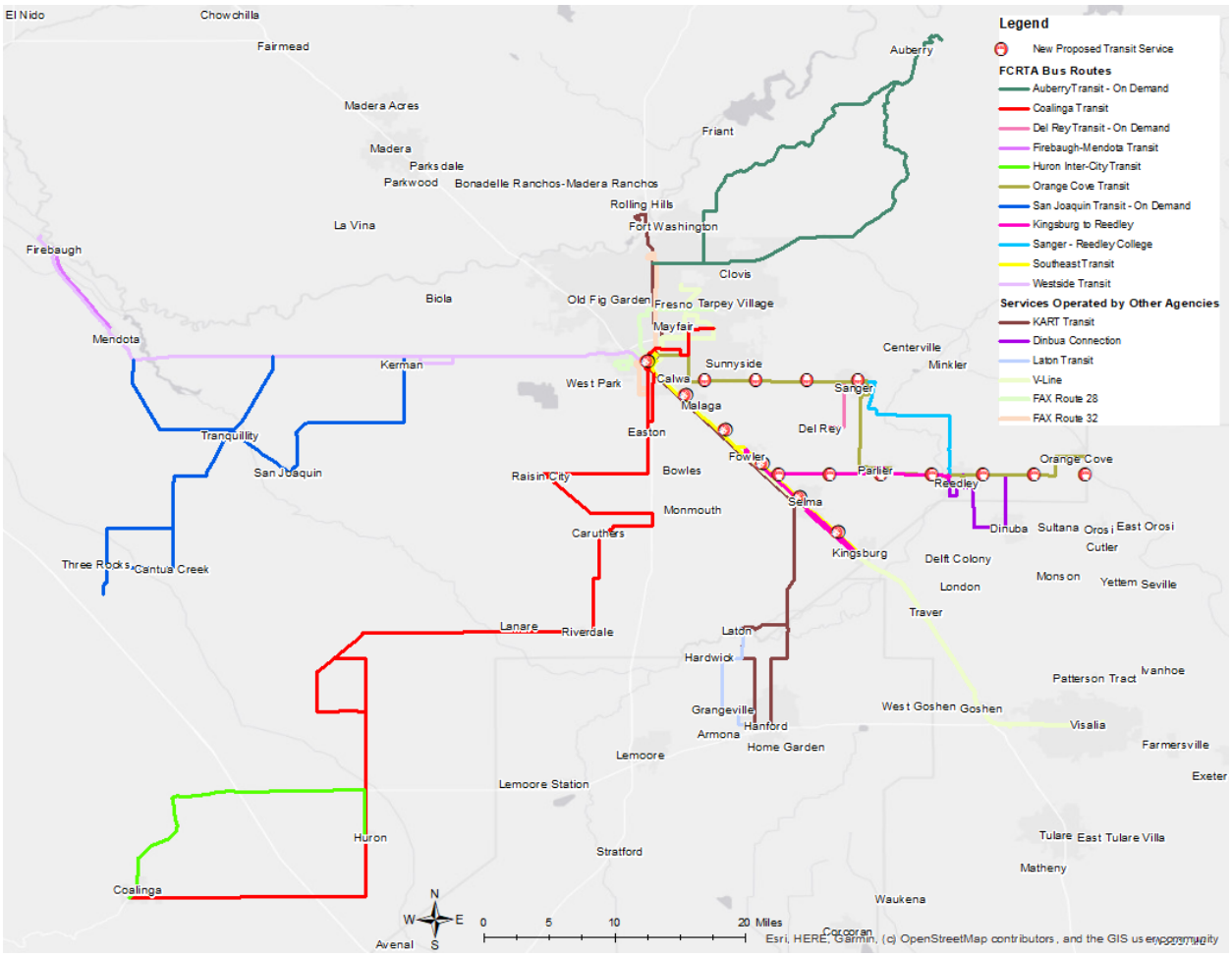
The microgrid/multimodal community resiliency hub project has the following key objectives:

- Increase transportation service and access in rural, disadvantaged communities by enabling FCRTA to expand its EV microtransit service.
- Leveraging microgrid investments to redevelop vacant and underutilized land in rural, disadvantaged areas into multimodal community resiliency hubs, promoting economic development and improving quality of life.
- Transition FCRTA to a 100 percent zero-emissions fleet, improving air quality in disadvantaged communities.
- Build EV charging stations for residents, increasing the personal EV adoption rate in Fresno County.
- Create multimodal community resiliency hubs with amenities and services that will benefit residents during emergencies and on a daily basis.
- Create a more resilient Fresno County by providing backup power for FCRTA's operations and critical emergency services during power outages and emergencies such as wildfires.
- Provide a blueprint for other rural transit agencies to deploy microgrids to support fleet transition to low or zero emissions.

Study Area

FCRTA plans to build a network of microgrids throughout Fresno County, exploring the feasibility of five initial sites. Figure 1 on page 29 shows FCRTA's service area and the communities it serves. The Project Team undertook a detailed site selection process to select the five initial sites.

Figure 1: FCRTA Service Area



What is a Microgrid?

Many of the transmission towers we rely on for electric power were built in the 1950s with a life expectancy of approximately 50 years. This outdated infrastructure struggles to keep up with today's challenges, such as extreme weather due to climate change and increasing electricity demand from new technology and electric vehicles. Microgrids are a solution to reduce reliance on the electrical grid to ensure critical uses such as emergency response and medical facilities have reliable access to power.

A microgrid is a local grid that uses distributed energy resources (DERs) and energy storage assets to provide power to a specific use. Microgrids are small independent power systems that create and store energy from a renewable source such as solar or wind. The microgrid pulls energy from solar or wind power generation to power buildings, transit vehicles, e-bikes, electric cars, cell phones, etc. It also stores energy in a backup battery.

In a transit context, microgrids typically have on-site solar panels to generate energy, battery storage to store the solar power, electric vehicle charging infrastructure, and an energy management system to monitor microgrid performance and optimize energy use so that power is always available for electric vehicle charging needs using the least cost option (grid, solar, or battery). There are only a few transit microgrids in the country, and most are located in suburban and urban areas and on land owned and

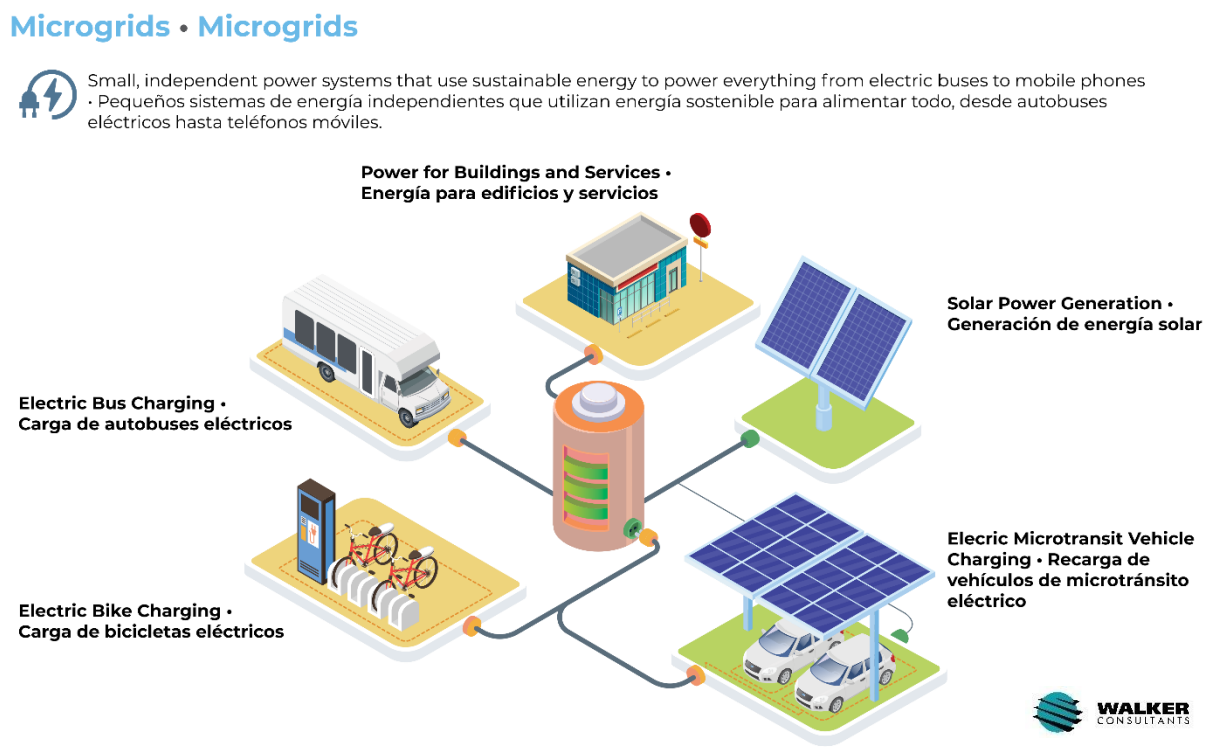
operated by the agency. No transit microgrids are operated by rural agencies in rural areas, which adds more complex challenges. In the FCRTA context, it must partner with local governments and likely fund and build the microgrids on land owned by another government or entity.

Microgrids can operate in three main ways:

- Remote or off-the-grid microgrids operate in places without access to the main electricity grid. They run on solar or wind energy and always operate in island mode.
- Grid-connected microgrids are connected to the grid but can operate in island mode by utilizing solar and battery power to provide energy.
- Networked microgrids are a system of microgrids that work together to serve a geographic area.

Figure 2 illustrates how the microgrid works and the types of uses it can power.

Figure 2: Microgrids Diagram



Source: Walker Consultants

A key advantage of a microgrid is that it can disconnect from the utility grid and continue to generate power, increasing resiliency. Microgrids also reduce energy demand by storing self-generated energy during times of low power demand. Further, the energy management system provides tools to manage, reduce, conserve, and optimize electricity consumption. This reduction in energy demand can significantly reduce operational costs by reducing demand charges (chargers levied by utilities based on peak power draw during a billing period).

What is a Multimodal Community Resilience Hub?

Microgrids make sense because the power grid cannot support our energy needs, especially as transit agencies are required to transition to a 100 percent low or zero emissions fleet (electric vehicle fleet). They are a way to provide less expensive, sustainable power. However, there can be significant upfront capital costs for infrastructure that do not necessarily translate to more transit riders, which is a primary goal for any transit agency.

This is why FCRTA seeks to leverage the microgrid investment further to support multimodal transportation options and community amenities at the microgrid site. A multimodal resiliency hub sits on the same land as the microgrid with amenities such as community gardens, electric bike share, vehicle charging, food trucks, composting, Wi-Fi, outdoor parks, and cell phone charging.

During emergencies and power outages, the multimodal community resiliency hub provides backup power to critical infrastructure (buildings such as city hall, police station, fire station, and health care facilities), heating and cooling centers, information, and medical support. Importantly, the hubs could be developed on vacant and underutilized land in rural, disadvantaged areas, providing an economic and quality of life benefit to the community.

This is more than just about the energy; FCRTA's goal is to leverage the investment to partner with the community to create a real asset.

Figure 3 illustrates the potential features of multimodal resiliency hubs.

Figure 3: Features of Multimodal Resiliency Hubs

Source: Walker Consultants

The designs on pages 32 and 33 illustrate how leveraging the microgrid investment into building a multimodal community resiliency hub at the microgrid site has the potential to transform the site and the surrounding community. As the San Joaquin example designs show, the hubs can convert the existing vacant site into a community hub that provides transportation amenities such as e-bike share, electric vehicle charging, rideshare, bus service, and microtransit. Space for food vendors supports local businesses and community gardens and gathering areas provide a "town square" atmosphere. Other amenities include Wi-Fi, phone charging, and wayfinding and signage. The site is powered by microgrid solar panels and battery storage, which are tied to the central grid and supported by an intelligent energy management system to provide energy efficiency and resiliency.

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

Organization of this Plan

This Microgrid/Distributed Energy Resources Feasibility Study included the following key steps in its development, and this report is organized as follows:

1. Existing Conditions: A review of existing conditions, including a review of FCRTA's transit system, plans related to electrification, relevant policies related to air quality and electrification, and energy data collection and needs assessment.
2. Microgrid Technology Review: A review of microgrid technology and related elements.
3. Agency Review: An overview of the policies and implementation of zero-emissions bus fleets and distributed energy resource charging systems/infrastructure in three (3) public transit agencies to apply the key lessons learned and best practices to FCRTA.
4. Community and Stakeholder Outreach: An analysis of the community and stakeholder outreach efforts conducted, including six (6) community pop-up events in rural communities, a community survey, and an Advisory Committee.
5. Transit Operational Analysis and Multimodal Evaluation: Review FCRTA's transit routes to ensure they are integrated with the microgrids and explore additional service options using microgrid power.
6. EV Bus Rollout Plan: A summary of the EV Bus Rollout Plan required by the State of California's Innovative Clean Transit (ICT) regulation for all California Transit Agencies. The Plan includes a technology portfolio, current bus fleet composition and future bus purchases, facilities, and infrastructure modification needs, providing service in disadvantaged communities, workforce training plan, potential funding sources, and start-up and scale-up challenges.
7. Site Analysis and Design and Design Includes the Project Team's methodology for choosing the five sites. This section also includes an assessment of each of the five sites, including energy and readiness assessment, civil assessment, integration with FCRTA transit service, design review and necessary modifications, site design, and cost assessment.
8. Framework Criteria and Ranking: A review of the process by which the Project Team narrowed the list of five sites to two priority sites (Phase I) for further study and analysis.
9. Priority Site Assessments: A detailed cost-benefit analysis of the Phase I sites.
10. Funding and Ownership Structures. A review of three funding models and the potential for site implementation.
11. Next Steps: A review of the recommendations and next steps for the project, including implementation strategy, funding strategy, Phase II sites, operational scale, energy management system, and charging master plan.

02 | Existing Conditions

02 Existing Conditions

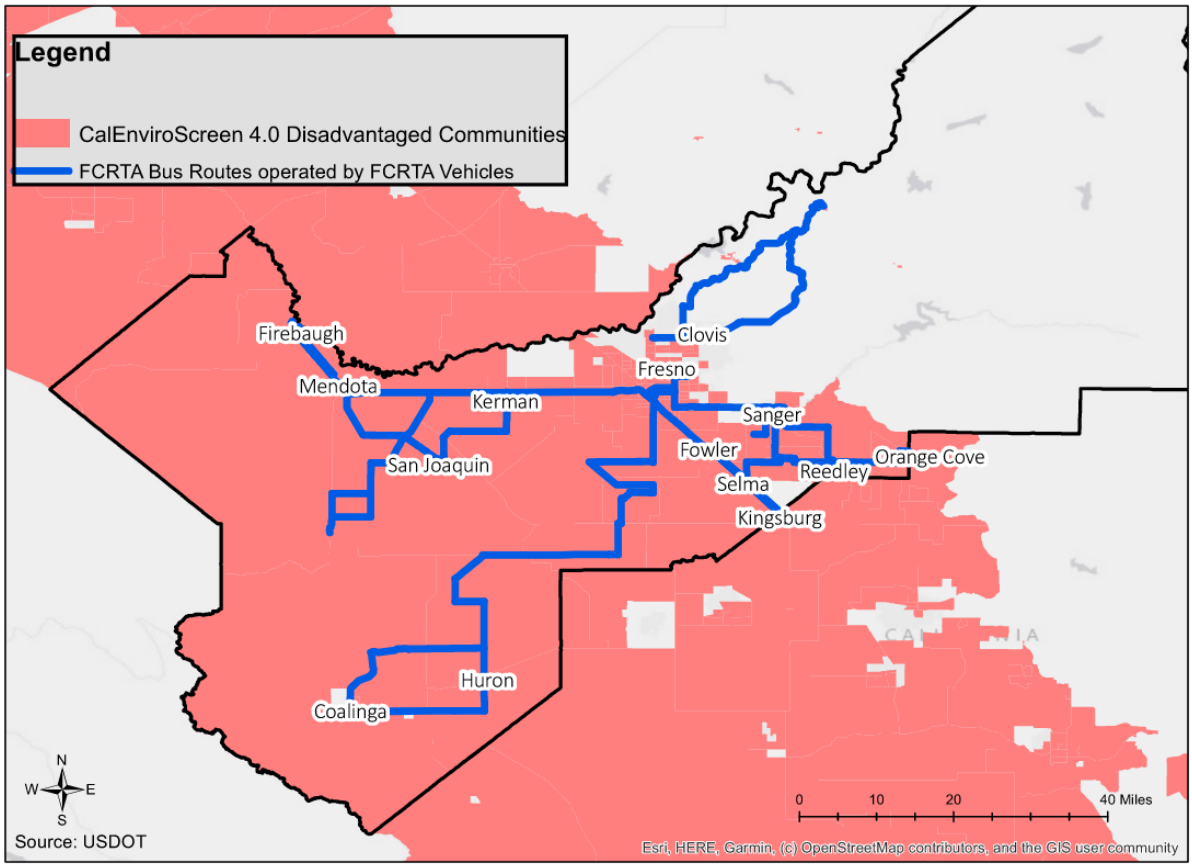
FCRTA Setting

FCRTA provides public transit services to the rural communities of Fresno County. FCRTA covers almost 6,000 square miles across the County and serves communities up to 60 miles away from the City of Fresno, the County seat and main urban center.

According to the U.S. Census, Fresno County's poverty rate is 19.5 percent, which is approximately 1.5 times higher than the national poverty rate of 12.8 percent. The County's per capita income is $28,766, compared with $38,332 for the United States. The County is one of the most polluted counties in the nation. According to the American Lung Association, the County has an F grade for both ozone and particle pollution.

A majority of the communities in FCRTA's transit service area are disadvantaged. According to CalEnviroScreen 4.0, a tool released by the California Office of Environmental Health Hazard Assessment on behalf of the California Environmental Protection Agency, 72 percent of the census tracts in FCRTA's transit service area are considered disadvantaged (see Figure 4).

Figure 4: CalEnviroScreen 4.0 Disadvantaged Communities Map



Source: CalEnviroScreen 4.0

FCRTA Existing Services

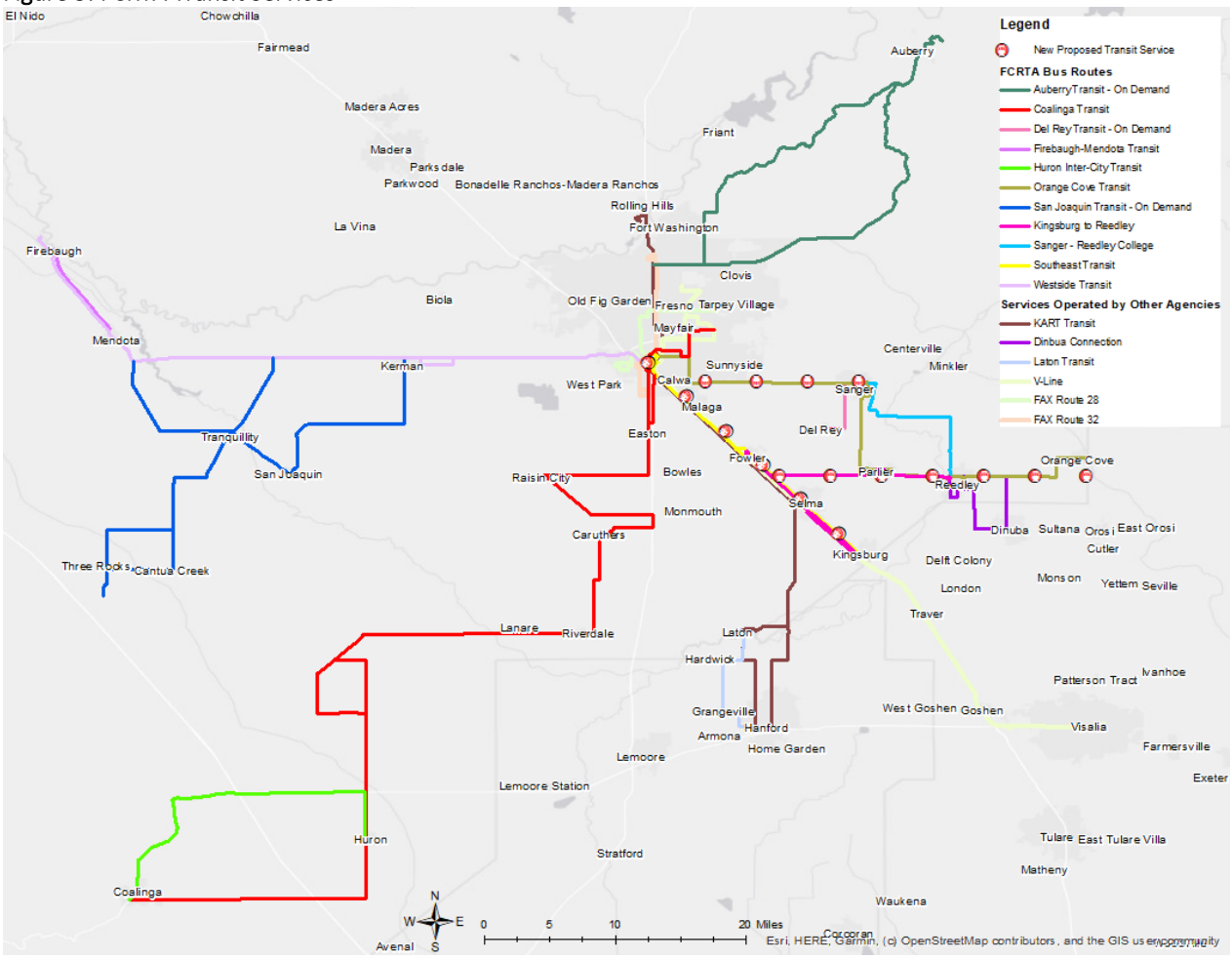
FCRTA operates 26 transit sub-systems in 13 rural incorporated cities and 39 unincorporated communities in Fresno County. FCRTA provides regular fixed-route services, which follow designated routes and schedules, and reservation-based, demand-responsive service that offers curb-to-curb transportation.

FCRTA has four main service types: inter-city bus service, intra-city bus service, rural dial-a-service, and micro transit service:

- Inter-city service: The inter-city service connects cities, major towns, and the Fresno metro area. Inter-city bus service includes fixed-route service on a published schedule with designated stops and flex-route services, allowing short deviations with advanced requests.
- Intra-city service: The intra-city bus service provides mobility options within cities and communities for internal trips and to feed inter-city bus connection services. Intra-city bus service includes demand-responsive service with real-time dispatching.
- Rural Dial-a-Ride: The rural dial-a-ride service is a demand-response service that provides a mobility option for residents in unincorporated areas to access lifeline services (e.g., medical appointments).
- EV Micro Transit: FCRTA provides electric vehicle (EV) microtransit service to address gaps in service coverage. The service is beginning in Biola with plans to expand to other communities.
- SR 99: FCRTA is studying a potential Bus Rapid Transit service along the SR 99 corridor with potential spurs to Sanger and Orange Cove that would provide faster, more reliable transit for these communities.

Figure 5 shows FCRTA's inter-city transit services and potential SR 99 transit service.

Figure 5: FCRTA Transit Services



Existing Grid Conditions

The main existing grid conditions of interest to this study are:

- **Depot Charging Headroom by Feeder** – Based on feeder capacity and peak demand forecasts from PG&E.
- **Grid Reliability** – Based on reliability metrics such as SAIDI and SAIFI, which measure the number and duration of outages.
- **Wildfire Risk** – Impacts on SAIDI and SAIFI, but is an emerging threat to reliability where it exists.
- **Disadvantaged and Vulnerable Communities** – Bus electrification will reduce local community exposure to tailpipe and GHG emissions.

The study's findings are detailed below for each key existing condition factor, except for feeder-level reliability, which is not included due to the lack of available data from PG&E. Average interruption index metrics have been included at the Fresno division level.

Grid Infrastructure and Transit Charging Capacity Analysis

To understand the current state of the electric grid in Fresno County, an updated analysis of Fresno's distribution infrastructure charging hosting capacity was performed, focusing on the challenges and opportunities related to the use of microgrids to enhance resilience for rural transit operations.

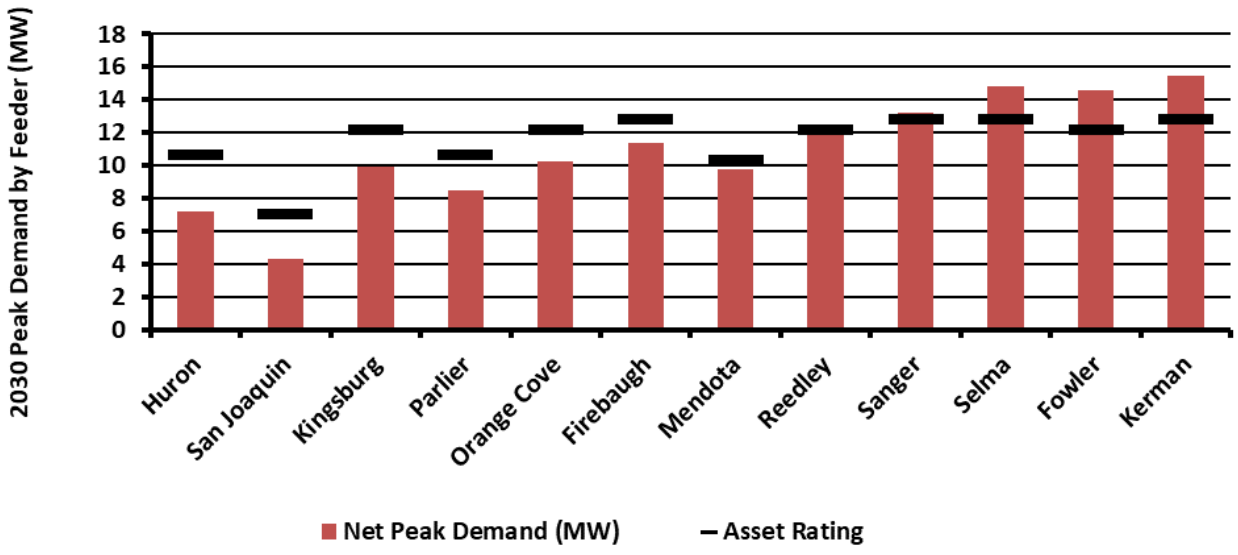
An updated distribution feeder peak demand forecast was developed based on updated forecasts of building electrification, passenger transport electrification, and solar photovoltaics (PV) and battery storage adoption from the California Energy Commission (CEC) Integrated Energy Policy Reports (IEPR) and PG&E's Grid Needs Assessment (GNA) and Integrated Capacity Analysis (ICA) data sets, which are updated on an annual basis. The forecasts do not specifically include FCRTA's charging demand.

Figure 6 below shows the updated distribution feeder peak demand forecast in 2030 to align with FCRTA's fleet electrification horizon against the current infrastructure nameplate rating in megawatts (MW) for the feeders serving FCRTA's maintenance facilities. It is important to note that the Coalinga facility is not shown, as PG&E has not published detailed data for this feeder in its GNA and ICA.

Key findings included that multiple feeders, including Reedley, Sanger, Fowler, Kerman, and Selma, the location of the most recently developed maintenance facility, are forecast to reach or exceed their respective nameplate ratings by 2030.

These results are important criteria in determining microgrid site costs and benefits, as FCRTA's transit electrification plan will increase grid peak demand in the short term, and microgrids could potentially alleviate grid constraints using grid peak demand shaving optimization via an energy management system to mitigate infrastructure upgrades and grid interconnection barriers.

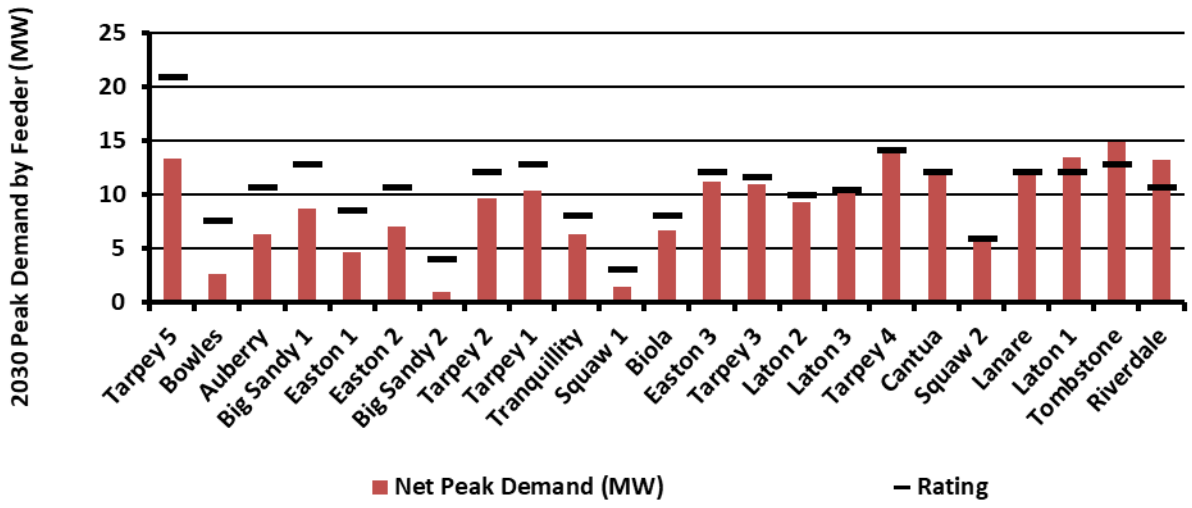
Figure 6: 2030 Distribution Feeder Headroom by FCRTA Maintenance Facility



Source: Energeia Analysis

Additionally, selected feeders serving unincorporated communities were analyzed to identify potential feeder constraints. Cantua Creek, Lanare, Laton, Tombstone, and Riverdale feeders were all forecast to be constrained in 2030.

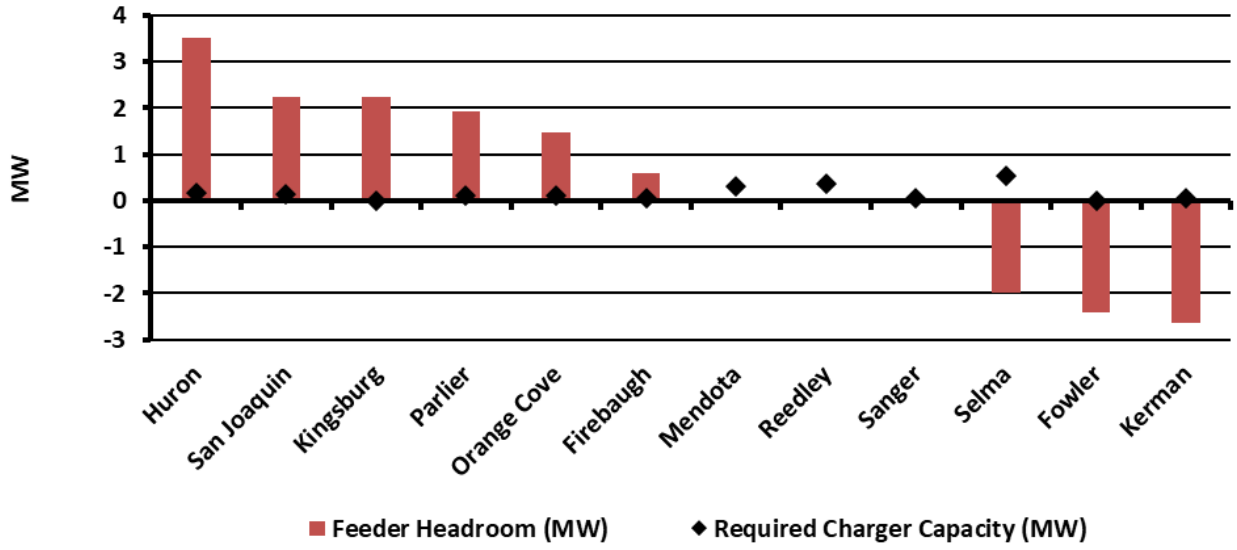
Figure 7– 2030 Distribution Feeder Headroom by Unincorporated Community



Source: Energeia Analysis

An updated transit route analysis was then developed to quantify energy needs and charging capacity requirements by site, assuming 100% transit electrification by 2030, based on vehicle miles traveled (VMTs), vehicle types, and route operation schedules.

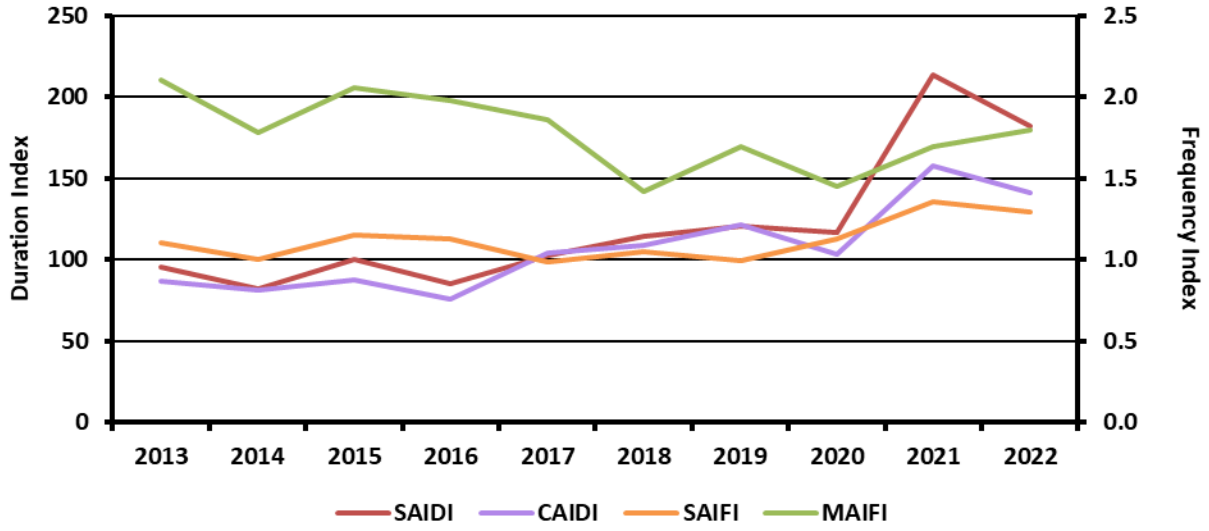
Figure 8: 2030 Feeder Headroom vs. Required Transit Charger Capacity by Maintenance Facility



Grid Reliability Analysis

Figure 9 below shows PG&E's reliability indices (System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), Momentary Average Interruption Frequency Index (MAIFI), and Customer Average Interruption Duration Index (CAIDI)), including Major Event Days (MED) from 2013 to 2022 for the Fresno division. MEDs are typically system interruptions related to low-probability, high-impacts events, including natural disasters. The data suggests that reliability at the customer level, reported as CAIDI, is increasing in severity, reaching a peak in 2021. It is important to note that the data below includes MEDs and is, therefore, a more accurate reflection of the actual customer reliability experience than data that does not incorporate MEDs.

Figure 9: Fresno Division Historical Outage Duration and Frequency Metrics



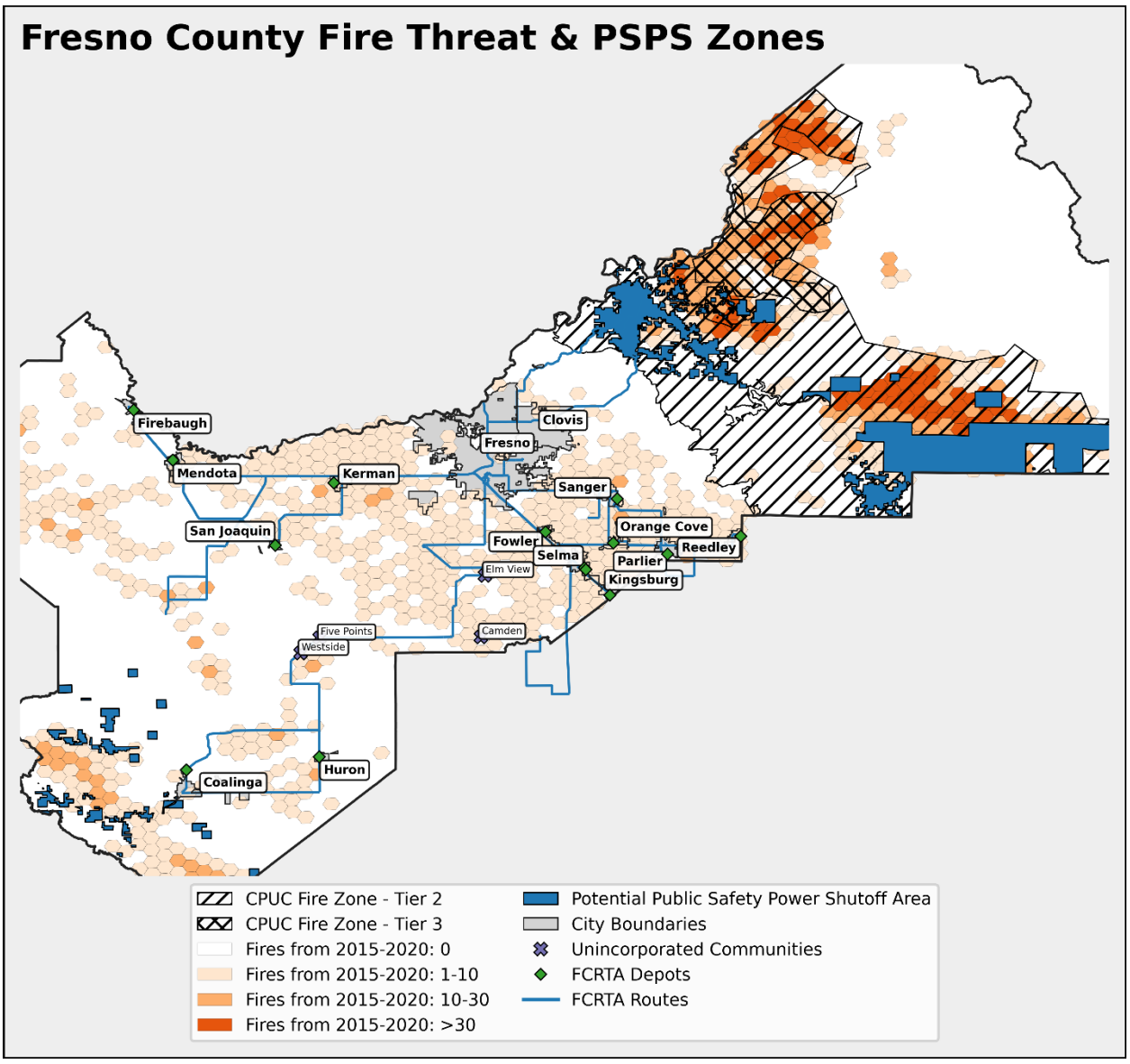
Source: Energeia Analysis

Wildfire Risk Analysis

Furthermore, an updated analysis of PG&E's historical and forecasted Public Safety Power Shutoff (PSPS) areas, the California Public Utility Commission's (CPUC) fire threat zones, and US Forest Services wildfire history data was conducted to develop a spatial understanding of key areas of vulnerability that may be disproportionally impacted by reliability events and could therefore relatively benefit from additional resilience in Fresno County.

The map below indicates that microgrid sites servicing FCRTA's transit fleet will not fall within high wildfire threat and PSPS zones.

Figure 10: Fresno County Fire Threat and PSPS Zones



Source: CPUC (2022), PG&E (2023), USFS (2020), Energeia Analysis

Along with reducing tailpipe and GHG emissions from the transition of FCRTA's bus fleet to electricity, renewables-based microgrids can alleviate some of these burdens on rural communities in Fresno, as discussed in the following section.

EV Fleet and Infrastructure

To meet State of California goals for low and zero-emissions transit fleets, FCRTA aims to transition to a 100 percent electric vehicle (EV) fleet by 2030 and is working diligently toward that goal, having deployed 33 EVs to date. FCRTA has installed infrastructure to support its EV transition, including solar equipment and EV chargers. Figure 11 provides a general timeline of FCRTA's EV fleet transition.

Figure 11: Timeline of FCRTA's EV Transition

Table 1

Table 1 summarizes FCRTA's current vehicle fleet composition with its electric vehicles highlighted.

Table 1: FCRTA Current Vehicle Fleet Composition

Number of Vehicles	Engine Model Year	Vehicle Model	Fuel Type	Vehicle Type
4	2007	Bluebird	CNG	Bus
12	2008	GMC Glaval Titan	CNG	Cutaway
15	2009	GMC Glaval Titan	CNG	Cutaway
4	2009	Chevrolet Uplander	Gasoline	Cargo Van
38	2013	Chevrolet Arboc	Flexible Fuel	Cutaway
2	2014	Ford 4-Wheel Van	Gasoline	Passenger Van
2	2014	Ford F-450	Gasoline	Serv. Truck
6	2016	Zenith Ram 3500	Electric	Passenger Van
8	2016	El Dorado	CNG	Bus
2	2016	Ford E-350	CNG	Cutaway
1	2017	Ford Villager	Gasoline	Bus
5	2018	Proterra	Electric	Bus
1	2018	Big Rex Trailer	N/A	Trailer
14	2019	Chevrolet Bolt	Electric	Car
2	2019	BYD K95 35-Ft	Electric	Bus
4	2020	Chevrolet Bolt	Electric	Car
2	2021	BYD K7M-ER 30-Ft	Electric	Bus
5	2022	Chrysler Voyager	Gasoline	Passenger Van
127	Total Vehicle Fleet			

Source: Fresno County Rural Transit Agency

Currently, FCRTA operates electric vehicles on the following routes/transit service:

- Fowler Transit demand-response (Zenith Van)
- Parlier Transit demand-response (Zenith Van)
- Rural Transit demand-response (Chevy Bolts)
- Biola Microtransit (Chevy Bolts)
- Southeast Transit fixed-route (BYD bus)

FCRTA deploys its bus fleet from 13 different bus depots owned and operated by local governments. FCRTA has installed EV charging stations and solar infrastructure at the bus depots. FCRTA has also deployed additional charging infrastructure outside of the bus depots in the communities it serves. Table 2 summarizes FCRTA's current charging infrastructure.

Table 2: FCRTA EV Charging Infrastructure

Division/ Facility Name	Address	Main Function	Type(s) of Infrastructure	Additional Charging Infrastructure Locations (outside of the bus yard)
Coalinga	27500 Phelps Ave Coalinga	Bus Yard	2 Plug-in Chargers	1 Envision Arc Solar Charger located at the Downtown Parking Lot, 245 North 6th Street, Coalinga 1 BYD Charger and 1 Solar Tree at 779 East Polk Street, Coalinga
Firebaugh	1890 7th St Firebaugh	Bus Yard		1 Envision Arc Solar Charger located at Firebaugh City Hall, 1133 P Street, Firebaugh
Fowler	231 S. 5th St Fowler	Bus Yard	1 JuiceBox 40 Level III Charger	1 Envision Arc Solar Charger located at Fowler Branch Library, 306 South 7th Street, Fowler
Huron	36311 Lassen Ave Huron	Bus Yard	Envision Arc Solar Charger	
Kerman	15201 W California Kerman	Bus Yard		2 Envision Arc Solar Chargers located at Kerman Community Center, 15100 West Kearney Blvd., Kerman, CA, and 850 S. Madera, Kerman
Kingsburg	1200 Kern St Kingsburg	Bus Yard		1 Envision Arc Solar Charger located at Kingsburg Branch Library, 1399 Draper Street, Kingsburg
Mendota	1300 2nd St. Mendota	Bus Yard	2 Juicebox 75 Level II Chargers	1 Envision Arc Solar Charger located at Mendota City Hall, 643 Quince Street, Mendota
Orange Cove	802 2nd St Orange Cove, CA 9.646 Bus Yard	Bus Yard		2 Envision Arc Solar Charges located at Orange Cove City Hall, 633 6th Street, Orange Cove 1 BYD Charger and 1 Solar Tree located at 1705 Anchor Avenue, Orange Cove
Parlier	8770 Mendocino Parlier	Bus Yard		2 Envision Arc Solar Chargers located at Parlier City Hall, 1100 East Parlier Avenue, Parlier and Police Department, 8770 S. Mendocino Ave. Ste A, Parlier, CA 3 JuiceBox 40 Level III Chargers at an unknown address
Reedley	1108 S I Street, Reedley	Bus Yard		2 Envision Arc Solar Chargers located at Reedley Public Works, 845 G Street, Reedley and Reedley Airport, 4557 Frankwood Ave., Reedley, CA 10 JuiceBox Level II Chargers located in the parking lot behind Reedley City Hall
San Joaquin	21956 W Railroad Ave San Joaquin	Bus Yard		1 Envision Arc Solar Charger located at San Joaquin City Hall, 21900 West Colorado Avenue, San Joaquin
Sanger	1864 Industrial Way Sanger	Bus Yard		1 Envision Arc Solar Charger located at Sanger Civic Center, 1700 7th Street, Sanger
Sanger	3537 S Academy Sanger	Bus Yard		1 JuiceBox Level II Charger at an unknown address
Selma	1325 Nebraska Ave, Selma	Bus Yard	1 Juicebox 75 Level II Chargers located (not yet installed) 2 Proterra Chargers	1 BYD Bus Charger, 1 Proterra Charger, 2 JuiceBox 40 Level III Chargers, 1 JuiceBox 40 Level II Charger at 1870 Dockery Avenue, Selma 4 Proterra Chargers at Glacier Lot, Selma

Source: Fresno County Rural Transit Agency and Walker Consultants.

Electrification Challenges

FCRTA experiences the following critical challenges to its fleet electrification efforts:

1. Costs and Funding
   Zero-emission vehicle deployment has significant capital costs and unknown operating and maintenance costs. The cost of EVs is greater than gasoline or diesel-powered buses, in addition to the charging infrastructure and ongoing energy and maintenance costs, ranging from monthly electricity bills to cleaning solar panels. Further, costly upgrades to the grid capacity at FCRTA's maintenance yards will likely be necessary to support charging infrastructure. Support from the federal and state governments and the utility companies will be required. Most funding is only granted competitively, a resource-intensive effort for small rural agencies.

2. Trade in Battery Replacement Program
   The most critical and expensive part of an electric vehicle is the battery. Batteries degrade over time based on use and exposure, making battery replacement costly and not always possible.

3. Technology Advancement and Range Limitations
   Battery Electric Buses are new to the market, and their performance is unproven, especially in rural areas. These vehicles have not been operating long enough to comprehend their performance and reliability. FCRTA buses travel long distances to serve the rural Fresno County communities, which are many miles apart. FCRTA has mitigated this issue in the short term by having vehicle spares available to account for any range issues. However, this increases FCRTA's spare ratio, which can be challenging when applying for grant funding.

4. Electrical Grid Capacity
   Battery Electric Buses require significant power to charge, straining the electrical grid. FCRTA conducted an Electrical Grid Analysis study, which showed that certain areas of Fresno County will require grid upgrades.

5. Lack of Vehicle Types and Supply Chain Issues
   There is a lack of vehicle types (smaller battery electric buses and cutaways) that meet FCRTA's needs. Operating large 30+ foot battery electric buses is impractical to serve small rural communities in Fresno County. Further, there are issues with purchasing equipment to support EV infrastructure. For example, switch gears have a two-year waiting period, and many grants have a minimum vehicle weight requirement of 14,000 pounds, which smaller transit vans do not meet.

FCRTA Existing Initiatives and Capital Projects Related to Electrification

FCRTA has completed or is in the process of completing several initiatives that support its EV transition and complement the microgrid/resiliency hub feasibility study.

Electrical Grid Analysis Study (2022)

FCRTA prepared an Electrical Grid Analysis Study to identify the impacts of the anticipated increased electrification of the electric grid system and the unique challenges faced by FCRTA. The report provides an actionable framework for FCRTA and rural Fresno County communities to understand the current and future state of the electric grid infrastructure and pursue innovative, integrative, and inclusive strategies to adapt to a changing energy and climate system while meeting the needs of vulnerable communities.

The following key strategies are recommended in the Electrical Grid Analysis Study:

- Development of a shared charging infrastructure and models with other public agencies.
- Redundant infrastructure that integrates solar and storage.
- Resilience hubs that can be leveraged for transportation, grid, and resilience benefits, particularly in unincorporated communities, and economic opportunities.

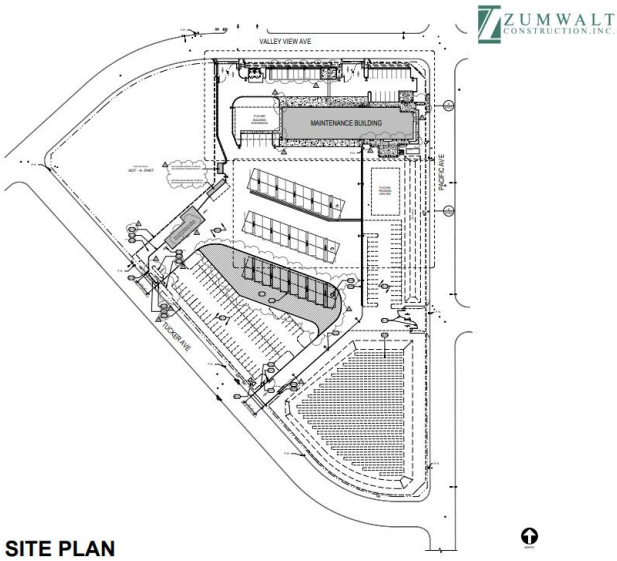
Based on these findings, FCRTA is undertaking a microgrid feasibility study to help fill gaps in the power system so it can operate its fleet.

Selma Maintenance Facility (under construction)

FCRTA is constructing a new maintenance facility known as the Selma Maintenance Facility Project. This project involves developing a 7.5-acre vacant lot in Selma, California, for dispatch and vehicle maintenance operations that serve rural Fresno County and accommodate future transit needs. Figure 12 shows the Selma Maintenance Facility design. The facility will include a maintenance shop equipped to service natural gas and battery electric buses, light-duty electric vehicles, and vans.

Figure 12: Planned Selma Maintenance Facility

Source: Zumwalt Construction, Inc.



The project will include an office building split evenly between a centralized dispatching and supervisor's offices and a training facility for technician training in advanced transit vehicle technology (electric and solar). Also included is a bus wash that would apply conservation and operations best practices, such as on-site recycled water, a reverse osmosis final rinse water system, and bus air dryers. A wash pad with a canopy for handwashing cars and vans will also be installed along with tire storage and canopy and a new covered hazardous material storage with concrete curb containment.

The project includes (1) 250kw Wave inductive charger, two (2) BYD 80kw chargers, twenty seven (27) Witricity wirecless chargers and two (2) Chargepoint L2 chargers will serve electric buses, transit vans, and cars located under solar carports. The project will require installing approximately 50-80 bus ports with solar roofs. The project will also need the installation of approximately 1.3 to 2.0 megawatts (MW) of on-site solar power and a minimum of 500 kilowatt-hours (kWh) of battery storage to support electric vehicle charging.

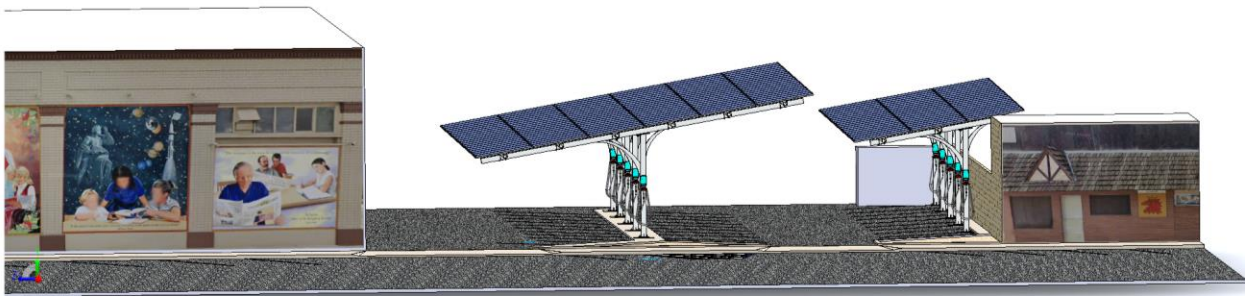
FCRTA intends for the on-site solar, battery storage, and electric vehicle chargers to be connected into a single integrated system comprehensively managed by an onsite energy management control system and/or microgrid system to minimize impact to . the electric utility grid for bus charging and reduce electric utility demand charge costs for FCRTA. The chargers, solar, and battery storage will be separate from the building power supplies.

Kingsburg and Fresno Resiliency Hubs (2023-2024)

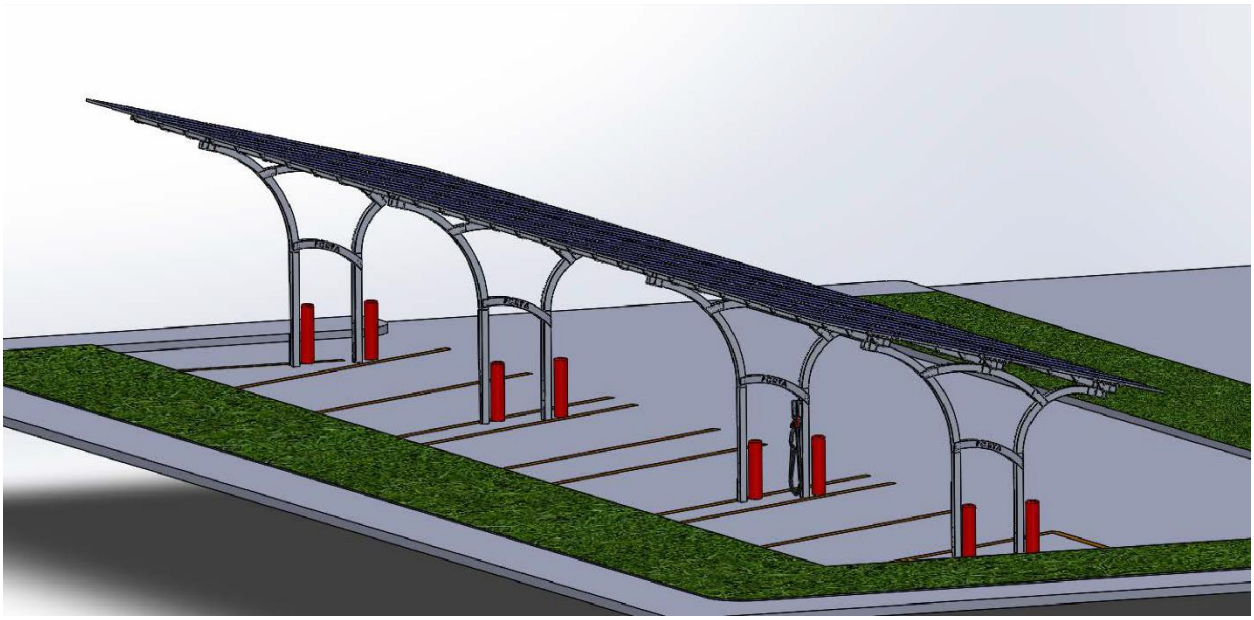
FCRTA plans to install two resiliency hubs in the cities of Kingsburg and Fresno (Chinatown neighborhood), featuring solar carports with Level 2 EV charging stations. The City of Fresno/Chinatown resiliency hub will also feature wireless inductive charging stations enabling FCRTA to quickly power electric buses en route. The resiliency hubs will allow FCRTA to reduce reliance on the electrical grid by producing the energy needed for the charging infrastructure. The hubs are strategically located in Kingsburg and Chinatown in Fresno, providing mid-route charging opportunities for FCRTA's vehicle fleet. Figure 13 shows preliminary concept drawings of the resiliency hubs.

Figure 13: Kingsburg and Fresno Resiliency Hubs Preliminary Concept Drawings

Kingsburg



Fresno (Chinatown)



Source: Lean Solar

Micro Transit Service

FCRTA is stretched to provide regular, fixed-route services to all areas of need throughout Fresno County. Operations are expensive because FCRTA must cover a 6,000-square-mile area of sparsely populated, low-density communities many miles away from one another and from services located in the City of Fresno. Due to farebox recovery requirements, it is challenging to implement new transit routes. As a result,

communities are left with gaps in access. While new mobility has provided more transportation options for people in urban and some suburban areas, transportation network companies (TNCs such as Uber and Lyft) and bike and scooter share are virtually non-existent in rural areas due to unlikely profit due to the low-density demand. The service that is provided is often infrequent.

Social service organizations and non-governmental organizations across Fresno County have expressed the need for transportation so their residents/clients can travel to jobs, healthcare appointments, training, and other quality-of-life locations. While some organizations provide limited transportation services, most lack the resources necessary to provide transportation or lack the funding to reach their entire client base. The lack of transportation results in a high number of missed appointments, a lack of access to essential needs, and a lack of access to education and employment opportunities, which perpetuates the poverty cycle in many of these rural, disadvantaged communities.

As part of FCRTA's Electric Vehicle Micro Transit/Rideshare/Carshare Rural Transit Expansion Plan (July 2020), an analysis of both population centers and location of potential origins and destinations of rural transit trips demonstrated that on-demand micro transit services can be implemented along loosely defined service corridors. The concept identified service corridors as conduits for aggregation of trips, like the trunk of a tree, to organize and coordinate trips that may occur between points along the trunk or between points that are off the trunk, on branches connected to the trunk, at a distance of roughly no more than five miles apart. The point is to create a system of connections that can be used to aggregate trips and share rides, as well as serve as a first/last mile to fixed-route service, to allow the service to operate cost-effectively.

As of October 2022, FCRTA is piloting microtransit service in the unincorporated community of Biola. A local driver has been hired through FCRTA's transit operator, to operate the service. The service is available Monday through Saturday from 7:00 a.m. to 7:00 p.m. Rides are available upon request, except for Saturday, which requires a 24-hour advanced registration.

Related Policies

Several policies and legislation supporting zero-emission vehicle technology have been implemented at the federal, state, and local levels. The following lists a sample of goals, policies, and actions:

- President Biden established a goal of net-zero carbon emissions by 2050.
- The **Bipartisan Infrastructure Law** invests $7.5 billion in EV charging, $10 billion in clean transportation, and over $7 billion in EV battery components, critical minerals, and materials.
- In 2019, the **Innovative Clean Transit (ICT) regulation**, which the California Air Resources Board implements, states that starting in 2029, public agencies will be limited to the purchase of zero-emission buses only, with a goal of complete transition to zero-emission buses by 2040.
- The **California Transportation Plan (CTP) 2030** Recommendation Element 8 "Advance zero-emission (ZEV) Technology and Supporting Infrastructure."
- The **California State Transportation Agency (CalSTA) Climate Action Plan for Transportation Infrastructure (CAPTI)** Framework in a Rural Context Action "Deploying zero-emission vehicle charging or fueling infrastructure – including for battery electric, fuel cell (hydrogen) electric, and other zero-emission vehicle technologies."
- **The California Department of Transportation's (Caltrans) Strategic Plan goal is** to "Lead climate action" by implementing the stated mitigation to "Reduce greenhouse gas emissions from the transportation sector."

- California Air Resources Board Advanced Clean Cars II rule establishes a year-by-year roadmap so that by 2035, 100% of new cars and light trucks sold in California will be zero-emissions vehicles, including plug-in hybrid electric vehicles.

The Fresno Council of Governments (FCOG) Regional Transportation Plan/Sustainable Communities Strategy Policy 10 "Incentivize and support efforts to improve air quality and minimize pollutants from transportation."

03 | Microgrid Technology Review

03 Microgrid Technology Review

This section describes an overview of microgrids, including:

- Key Microgrid Drivers – Summary of key benefits and value drivers for microgrid adoption.
- Microgrid System and Key Elements – Potential energy system components that contribute to a functional microgrid.
- Microgrid Optimization Process – Optimizing for each site's least-cost microgrid resiliency solution.

Key Microgrid Drivers

FCRTA offers safe, reliable, cost-effective, and environmentally friendly transport to its rural communities.

Maintain Transit Reliability

The continued reliability of the rural public transit service, as it transitions from fossil fuels to electricity, is crucial, not just for daily commuting but also for securing a dependable evacuation route during emergencies and enhancing the safety and mobility of rural communities.

Given Fresno's susceptibility to power disruptions, often due to California's wildfire season and increasing propensity for heat waves, microgrids stand out as a key energy resilience solution, ensuring that transit services can maintain uninterrupted operation during grid outages or Public Safety Power Shutoffs (PSPS), a common preventative measure during high wildfire risk periods.

Reduced GHG and Tailpipe Emissions

Using renewable energy sources for the microgrid, emphasizing solar PV, also aligns with Fresno County's environmental and sustainability goals.

By transitioning to cleaner energy sources for its transit operations, the county can significantly reduce its tailpipe and greenhouse gas emissions and reliance on fossil fuels. This is especially pertinent in Fresno, where rural areas may face challenges with air quality due to agricultural activities and emissions from traditional internal combustion engines. Zero-emission microgrids can thus improve air quality, offering health and environmental benefits to the County's residents.

Keep Transit Costs as Low as Possible

Furthermore, the energy management capabilities afforded by microgrids enable FCRTA to maximize cost savings while maintaining the transit system's overall sustainability.

Community Leverage

Surplus resources from microgrids can significantly enhance community resilience by serving as community resiliency hubs, offering crucial support during emergencies or power outages. These resources can power essential services such as emergency shelters, hospitals, and community centers, ensuring safety and continuity. Microgrids can contribute to community benefits by enabling electric

vehicle charging stations, supporting local energy initiatives, and reducing overall energy costs, thereby promoting sustainability and self-reliance.

Microgrid System and Key Elements

A microgrid is a localized group of electricity sources and loads that normally operates connected to and synchronously with the traditional centralized electricity grid but can also disconnect to "island mode" and function independently as physical and economic conditions dictate. This enables the microgrid to generate local energy, enhance reliability, reduce energy costs, and supply emergency power during grid outages. Microgrids typically feature several key components that enable its functionality and associated services:

- Loads – Sources of energy consumption that require backup reliability in the event of an outage
- Resources – Sources of energy generation or conservation that provide backup reliability
- Microgrid Control System – A dynamic system that operates the microgrid, including managing resource generation, storage, and load shedding
- Interconnection Switch – An interconnection with the broader electricity grid

Loads

In a microgrid, loads vary in criticality, e.g., their ability to reduce power consumption in island mode. Critical loads, essential for operations or safety, are prioritized during power shortages. Flexible loads can be adjusted or temporarily shut off to manage energy demand. This strategic control of load consumption ensures the microgrid meets reliability targets, effectively balancing energy supply and demand.

Resources

A microgrid can use a range of different resources to deliver its targeted level of reliability.

Flexible and Sheddable Load

Microgrids with flexible or sheddable loads, e.g., water heating, will incorporate these resources into their dispatch engine to ensure real-time tracking of demand and supply while in microgrid mode.

Thermal and Chemical Generation

Thermal resources, such as reciprocating engines and microturbines, and chemical resources, such as fuel cells, can provide dispatchable electricity that follows load in real time.

These resources can be used in a zero-carbon solution using renewable natural gas (RNG) or diesel for reciprocating engines and green hydrogen or RNG for fuel cells.

Renewable Generation

Microgrids can use a range of renewable resources. However, solar photovoltaic (PV) panels are the most common, which capture solar energy and convert it into electricity. This renewable source is typically complemented by battery storage systems that store excess energy during peak demand periods or when solar power generation is low, such as overnight or in cloudy weather.

For this study, only solar PV and battery storage configurations were modeled, partly due to uncertainties around the supply and pricing of zero carbon fuels and fuel cell generators.

Batteries

Microgrids commonly include lithium-ion batteries for energy storage due to their high energy density and efficiency, making them well-suited for applications requiring compact, powerful storage solutions. Alternatively, redox flow batteries offer advantages for microgrid applications, such as longer lifespan and scalability, making them ideal for long-duration storage and heavy usage scenarios.

Control System

A microgrid energy management system (EMS) binds these components together by intelligently managing the generation, storage, and flexible and/or sheddable loads within the microgrid to optimize for net cost and reliability.

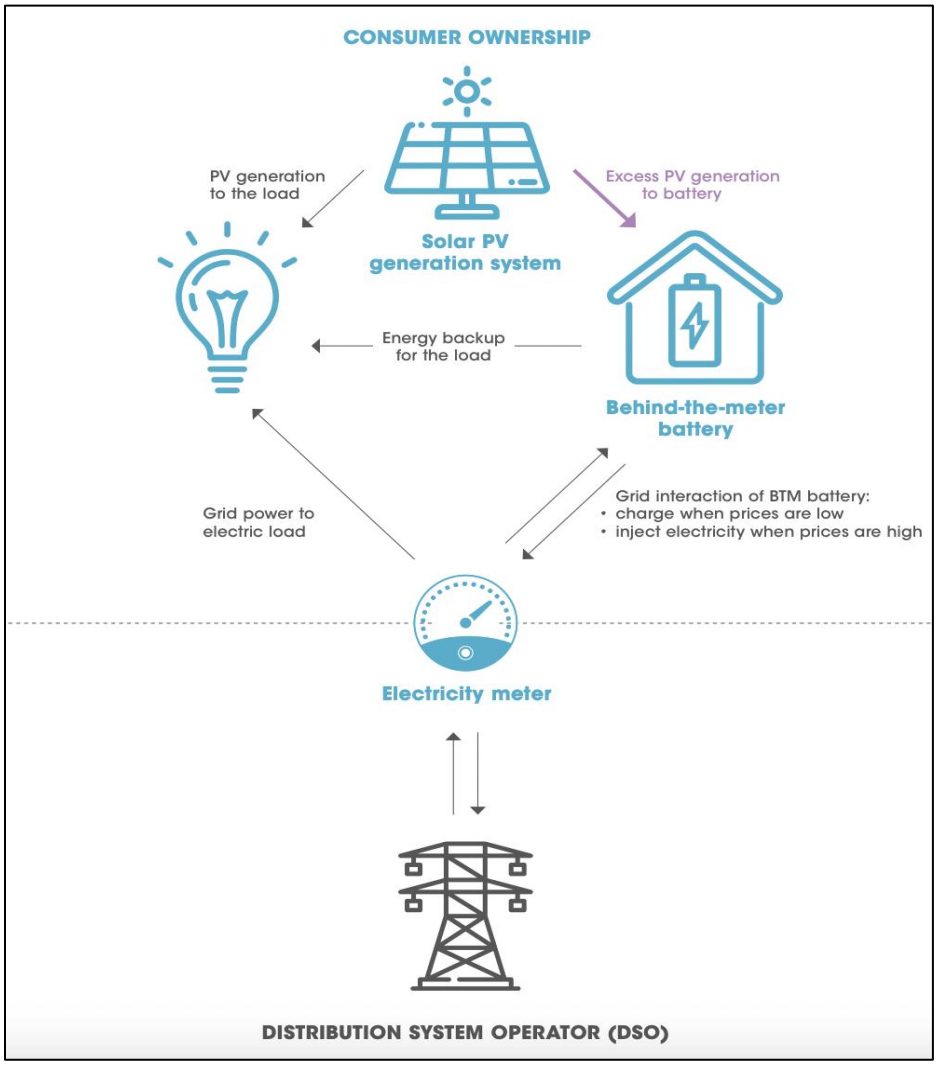
The EMS switches between energy sources based on availability, demand, costs, and operational priorities, ensuring that the energy system has the necessary energy to operate while minimizing environmental impacts and net costs.

Additionally, the EMS can be key in maximizing revenue and minimizing costs by engaging with external energy markets and programs, balancing financial optimization with operational needs.

Grid Interconnection

Microgrids are generally categorized into two types: behind-the-meter (BTM) and front-of-the-meter (FTM). BTM microgrids are connected on the customer side of the meter and primarily serve to provide backup power for specific facilities or operations. They may also be used to reduce the customer's energy costs and emissions. In contrast, FTM microgrids are connected on the utility side and can only offer grid services such as resource adequacy services, wholesale energy market engagement, and enhanced grid resilience. The figure below describes typical energy dynamics in a BTM microgrid configuration.

Figure 14: Behind-the-Meter Battery and Solar PV Interactions



Source: International Renewable Energy Agency (2022)

Microgrid Solution Optimization

This section describes the process for optimizing a least-cost microgrid configuration while maintaining backup reliability, including:

- Reliability Requirement – Analysis of FCRTA's transit reliability needs and load, including any additional community loads included in the microgrid.
- Solar PV Rooftop, Parking, and Vacant Space – Analysis of available space for solar PV, which limits the maximum capacity to be included.
- Solar PV – Battery Storage Co-Optimization – Optimizing for the least-cost resource mix to provide resilience.

- Monetization of Surplus Energy System Assets – Leveraging surplus energy to maximize the revenue potential of the microgrid assets.

- Health and Environmental Impacts – Quantifying the health impacts of reduced CO2 emissions from electrified transport.

Reliability Requirement

The key driver of each site's optimal microgrid energy system configuration is the reliability requirement, e.g., the energy needs of the FCRTA's transit operations and the critical loads to which it applies.

This was estimated by calculating the maximum annual operational need in terms of operating hours without the grid for transit and other critical site load's 8,760 load profile.

Three reliability levels were considered for this study, 24, 48, or 72 hours, to align with current state regulatory and funding requirements, and then translated into battery energy storage requirements expressed in kilowatt-hours (kWh) of potentially unserved energy during outage events.

Solar PV Rooftop, Parking, and Vacant Space

The next step in the study's microgrid solution optimization process involved quantifying available space for solar PV. An online area capture tool was used to estimate available rooftop, parking space, and/or open space for solar PV in square footage terms. This was then translated into a maximum solar PV spatial capacity by site in kilowatts (kW).

Solar PV – Battery Storage Co-Optimization

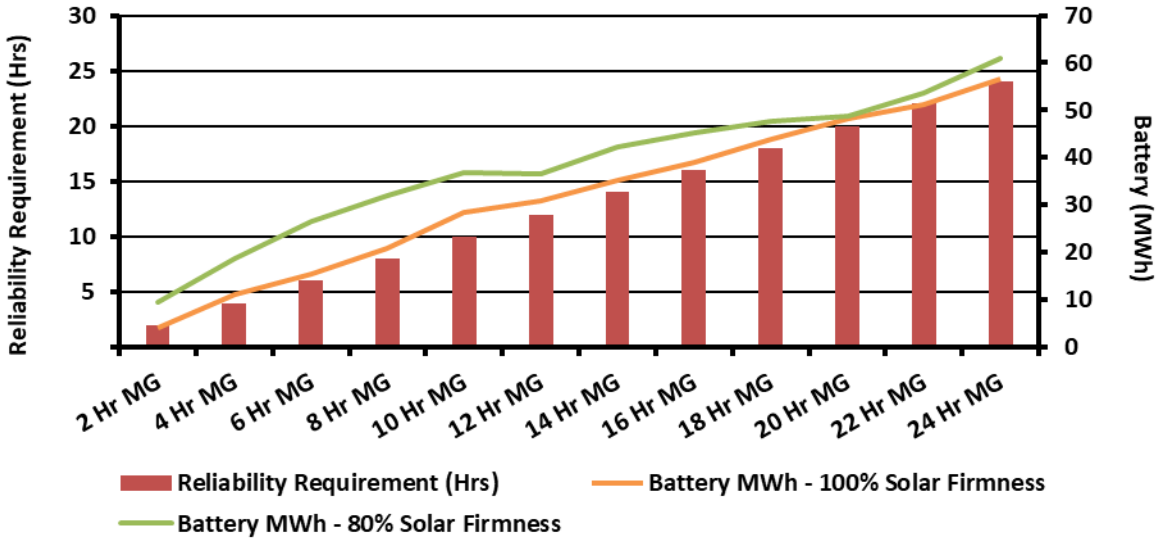
With the maximum solar PV capacity and reliability requirements in hand, each site's solar PV and battery storage capacity were co-optimized to produce a least-cost resource configuration by site.

The optimization function minimized overall annualized costs, including capital and operational costs, while ensuring the microgrid's capability to meet the transit fleet's charging needs. It did this by balancing the capital investment in solar and storage technologies against the operational savings achieved through reduced utility bill costs and grid services revenues.

A key assumption in this optimization process is solar firmness, or solar dependability, which is the amount of solar that can be depended on to contribute to the reliability requirement in percentage terms. This is analogous to effective load carrying capacity (ELCC) for utility-scale renewable generation resources.

An 80% solar firmness was assumed for this study, given Fresno County's relatively high reliance on solar generation. The impact of varying solar firmness is illustrated below. Larger battery sizing is required to provide the same amount of outage resilience for 80% solar firmness compared to 100% firmness.

Figure 15: Optimal Microgrid (MG) Battery Sizing by Reliability Requirement and Solar Firmness



Source: Energeia Analysis

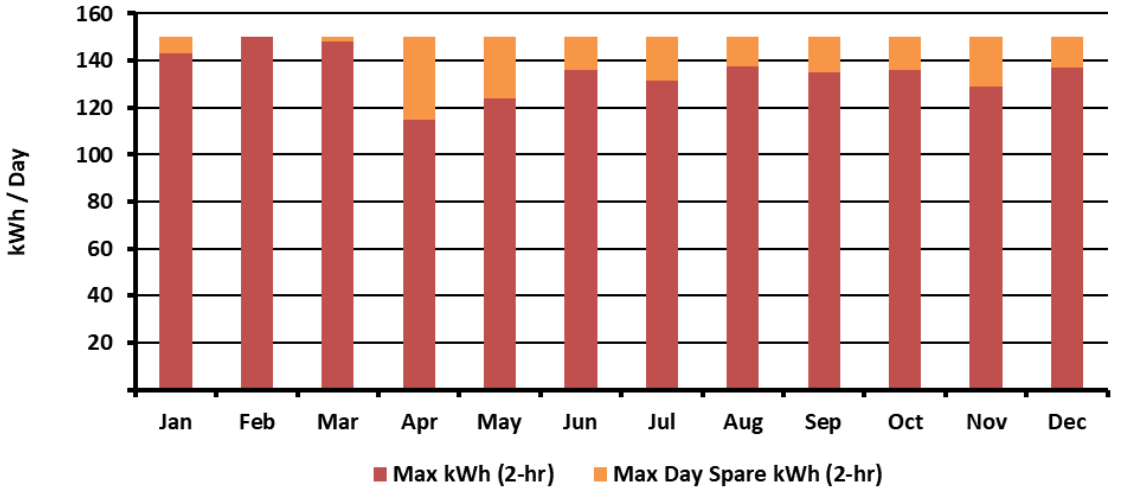
Monetization of Surplus Energy and/or Capacity

A key additional benefit of microgrids is monetizing surplus energy assets, particularly excess battery storage capacity.

Battery storage is often oversized compared to kWh requirements due to fixed kWh step sizes, depending on the battery vendor or capital investment available. It is generally sized to meet the worst possible reliability conditions, and there will be excess capacity at other times of the year.

Figure 16 below illustrates how surplus dispatchable energy resources can vary over the year depending on the types and timing of supported loads in each microgrid.

Figure 16: Daily Average Surplus Resource by Month for a 2-Hour Battery Storage System



Source: Energeia Analysis

Excess capacity and/or energy can be dispatched either back to the grid or through participation in resource adequacy and demand response-like programs.

These revenue streams can help offset microgrid costs, while also aiding in the balancing of the grid, showcasing the microgrid's role in enhancing wider grid reliability and resilience.

In addition to the benefit of enhanced reliability, the key potential benefits and revenue streams addressable by surplus energy and/or capacity relevant to this study included:

1. CA Independent System Operator (CAISO) and transmission demand response programs,
2. Certified renewable energy credits,
3. Resource adequacy services,
4. CA Air Resource Board (CARB) low carbon fuel standard (LCFS) credits,
5. CEC demand-side grid support (DSGS) crediting program, and
6. CAISO wholesale market arbitrage, including ancillary services and
7. Value of customer reliability (VCR) for transit and community infrastructure.

All the above, except for VCR, can provide a revenue stream.

VCR is an estimated value of providing backup resources based on the cost of a typical outage by an electricity customer segment. This is not a direct cash flow but an important and quantifiable community benefit to include in this analysis.

Health and Environmental Impact Quantification

The health and environmental benefits from abated tailpipe and CO2 emissions are key additional but non-cash flow generating benefits that the study considered for a complete, community-based view.

An emissions free electric transit fleet will significantly reduce greenhouse gas and tailpipe emissions, improving air quality and public health in rural Fresno County. The microgrid enables electrified transit, without it, FCRTA would not be able to deliver the same level of reliability.

The health benefits of reduced GHG and tailpipe emissions can be estimated using well established State and Federal guidelines from the CEC and the US Environmental Protection Agency (EPA), detailed in the cost-benefit analysis, despite not being direct cash flows.

04 | Agency Review and Benchmarking

04 Agency Review and Benchmarking

The following section details learnings from three case studies of transit agencies that are working toward zero emissions fleets and microgrid-powered systems. The three agencies included in this review include:

- Montgomery County Brookville Smart Energy Bus Depot
- Antelope Valley Transit Authority Bus Electrification and Wireless Inductive Charging
- Martha's Vineyard Transit Authority Fleet Electrification

Montgomery County Brookville Smart Energy Bus Depot

About the Transit Agency

The Montgomery County Department of Transportation (MCDOT) operates transit services in Montgomery County, MD, the most populous county in Maryland. MCDOT operates four different types of transit services:

- Ride On Neighborhood Bus System
- Ride On Extra, which has limited stops
- Flex on-demand service
- FLASH bus rapid transit (BRT)

The MCDOT Division of Transit Services plans, schedules, and manages the bus system, which consists of 375 county-owned and operated buses. The system is designed to complement other county transit services, including Washington Metropolitan Area Transit Authority's Metrobus and Metrorail and the Maryland Transit Administration's MARC commuter rail, and MTA commuter bus systems. Annual ridership in FY 2022 was approximately 10M.[1]

Microgrid Background

The Montgomery County Office of Energy and Sustainability led the development of the Brookville Smart Energy Depot, a solar bus charging microgrid infrastructure project that supplies renewable energy to MCDOT's growing electric bus fleet. The Brookville Smart Energy Depot opened on October 31, 2022, to meet the following key objectives:[2]

- Provide resilient and reliable delivery of electrical power to support the transit schedule
- Reduce GHG in support of the County's emission reduction goals to achieve net-zero greenhouse gas emissions by 2035
- Deliver a cost-effective solution while providing an innovative approach to managing core competencies

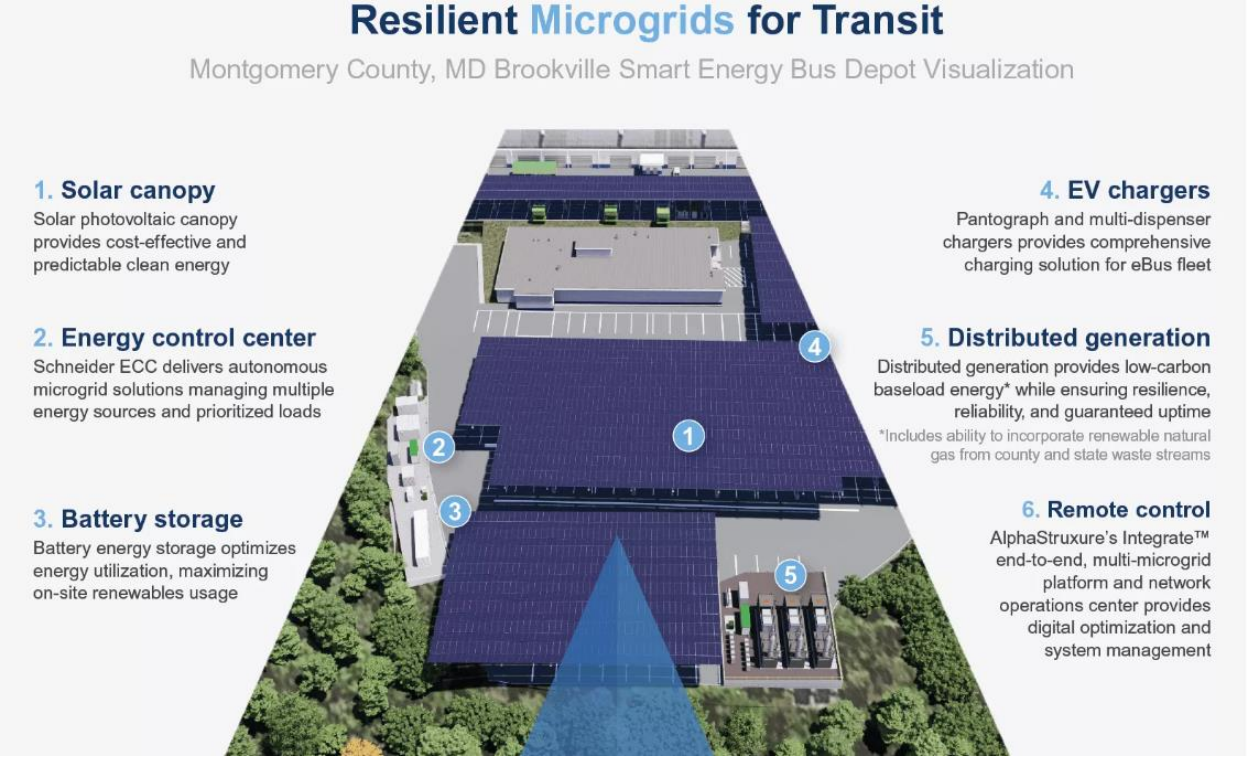
[1] Ridership data from https://www.montgomerycountymd.gov/dot-transit/dashboard/index.html
[2] Source: Montgomery County, MD Office of Energy and Sustainability https://www.montgomerycountymd.gov/dgs-oes/MGP-BrookvilleDepot.html

The Brookville Smart Energy Depot consists of the following components:

- 2MW of solar photovoltaic panels installed on top of canopies
- 4MW of battery energy storage system
- Natural gas generators to support the transition to green, renewable natural gas
- Electric bus charging system (chargers, dispensers, and charge management)

The Brookville Smart Energy Depot is designed to support up to 44 electric buses, with the ability to expand to up to 70 buses. A rendering of the Brookville Bus Depot Microgrid is shown in Figure 17.

Figure 17: Brookville Bus Depot Microgrid Rendering



Source: Alphastruxure

The microgrid uses the vendor Mobility House's smart charging and energy management system called ChargePilot to coordinate vehicle charging with the microgrid's charging capacity to ensure vehicle readiness for the next day's routes. ChargePilot also ensures that EV charging responds to load balancing and peak shaving commands from the microgrid controller, saving operating costs.

Project Partners

Some of the partners that Montgomery County partnered with for the project include:

- ARUP was the design and build engineer for the infrastructure
- AlphaStruxture is the private partner of Montgomery County who built and owns the infrastructure
- SunPower designed and built the project's photovoltaic canopies
- Mobility House provided the smart charging and energy management system

- Carlyle Global Infrastructure Opportunity Fund and Schneider Electric provide the equity and financing.

Ownership and Financing

Through a competitive bidding process, Montgomery County entered into a public-private partnership agreement with AlphaStruxture (a joint venture between Schneider Electric and Carlyle) to design, build, finance, own, and operate the microgrid. AlphaStruxture owns, operates, and maintains the equipment throughout the lifecycle, making it responsible for long-term outcomes regarding resilience, reliability, greenhouse gas (GHG) emissions reductions, and cost stability. Montgomery County's Climate Action Plan has a goal to reduce GHG emissions by 80% by 2027 and 100% by 2035.

In exchange for constructing and owning the equipment, Montgomery County pays AlphaSruxture through a 25-year Energy as a Service agreement (EaaS), which helps to ensure predictable operating expenses (energy costs) for the County. A set price is agreed upon with annual escalation over 25 years, regardless of fluctuations in energy prices by factors such as geopolitics. There are no upfront costs to the County, and the agreement is structured to take advantage of environmental credits, tax credits, and other incentives to mitigate these upfront costs. The County pays for energy through a commodity charge per kilowatt hour, regardless of what type of energy is being used. The Maryland Energy Administration provided the County with a $300,000 grant to help fund the solar canopies.

Operational Strategies to Preserve Battery Life

Montgomery County Department of Transportation keeps the buses above 20 percent of battery life, which requires developing a charging strategy. Figure 18 shows bus charging at Brookville Bus Depot.

Figure 18: Bus Charging at Brookville Bus Depot Microgrid

Source: Alphastruxture

Results

As a result of the future transition of 70 diesel buses to electric, powered by the on-site clean energy microgrid, lifetime emissions will be reduced by 62 percent, equivalent to more than 160,000 tons of GHG reduction over the next 25 years.[3]

Lessons Learned

The following lessons learned can be applied to FCRTA:

- A turnkey Energy as a Service solution that acknowledges a transit agency does not need to build and own everything:
    - The market is evolving, and the manufacturers and technology companies are fast changing; bringing on the specific market expertise will support the transit agency; however, it is important the transit agency have a solid understanding of the market to develop a partnership agreement that benefits all and ensures the public good.
    - A public-private partnership offsets the risk to the private entity, not the transit agency.
    - The financial approach eliminates the upfront cost for the County.
- The Energy as a Service (EaaS) model can result in more predictable ongoing costs for FCRTA and little to no up-front costs.
- The energy management system can ensure charging occurs during off-peak times, reducing costs and giving greater control and flexibility for fleet operations and dispatch because the agency can avoid charging during peak times or pulling energy from the microgrid.
- The microgrid can operate either independently or connect to the grid, ensuring uninterrupted bus services. This also allows for charging when a bus battery is depleted, or the local electric utility is down.
- FCRTA or the microgrid developer should plan to own these assets for 20 to 30 years.
- A challenge for electrification efforts is that the technology landscape is changing, including batteries, buses, grids, and energy management systems.

Antelope Valley Transit Authority Bus Electrification and Wireless Inductive Charging

About the Transit Agency

Antelope Valley Transit Authority (AVTA) is the transit agency serving the cities of Palmdale, Lancaster, and Northern Los Angeles County. AVTA contracts with MV Transportation to operate services. AVTA is a Joint Powers Authority formed under an agreement between the County of Los Angeles and the cities of Lancaster and Palmdale.

AVTA's service area comprises 1,200 square miles and operates a network of 13 local transit routes, six commuter routes, and three supplemental school routes for the local high schools. AVTA's transit system had approximately 1.2 million riders in FY 2022.[4]

[3] *MCDOT Ride On Newsletter.* November 2022.
[4] Ridership from American Public Transportation Association.

Background

AVTA has been a leader in transitioning to electric vehicles. The following summarizes AVTA's fleet transition timeline:

- 2004: AVTA became the first public transit operator to install a 100kW photovoltaic (PV) solar panel system at its facility
- 2009: Expanded and completed a solar panel project, funded by the American Recovery and Reinvestment Act (ARRA), which generated approximately 75 percent of the power used by the AVTA facility
- 2013: Used ARRA funds to add solar canopies to parking lots and bus yard at the AVTA facility
- 2014: Began piloting electric buses, beginning with two 40' buses
- 2016: Began electric bus conversion with 29 vehicles
    - A $24.4 million grant awarded to AVTA from the CalSTA, plus matching AVTA and federal funds of $15 million to fund the vehicle conversion
- 2017: Installed two wireless inductive charging stations at transfer centers
    - 87 hard-wire conductive charging stations at garages with a 1.5-megawatt generator
    - Purchased the first 60' articulated electric bus
- 2020: Electrifies the entire fleet of 85 buses
- 2020: Added eight GreenPower EV Star electric vans and launched a Microtransit pilot program in the rural Los Angeles County communities in the eastern part of the service area.
- 2021: Purchased the first battery-electric commuter coaches
- 2023: Purchased 43 acres of land to construct a solar field to transition the fleet to zero emissions, including 18 megawatts of solar and 6 megawatts of battery storage

Currently, AVTA's transit fleet consists of all-electric buses, including the following:

- 57 zero-emission buses
- 8 battery electric support vehicles
- 24 battery-electric commuter coaches

Similar to Montgomery County, AVTA has an energy management system provided by Mobility House (ChargePilot) to optimize charging schedules based on variables, including bus routes and the price of electricity. AVTA's bus depot has a 1.5 megawatt backup generator as backup if the electrical grid is out.

Inductive Charging

Some AVTA routes have up to 290 miles range requirement, and battery electric buses (AVTA) have a limited range between 155 and 220 miles. AVTA has deployed 12 250 kilowatt inductive chargers over their 100 square mile service area, with three pads located at each of their four transit centers. The inductive chargers can add up to 25 miles of range to a 40-foot bus in 10 minutes. Using the inductive chargers, AVTA does in-route charging at scheduled stops.

AVTA considered overhead pantograph charging as an in-route charging solution, but AVTA was concerned about maintenance crews working off of the ground, making inductive charging a safer option.

Project Partners

Some of the project partners that AVTA has worked with on its electrification efforts include:

- WAVE by Ideanomics, who installed the inductive charging stations
- Build Your Dreams (BYD) supplied the electric buses.
- Motor Coach Industries (MCI) supplied electric coach buses

Funding Sources

AVTA has utilized various federal, state, and local funding sources to implement its electrification efforts. Figure 19 summarizes the funding sources AVTA has utilized.

Figure 19: Antelope Valley Transit Authority Zero Emission Funding Sources

Appendix A: FUNDING SOURCES

AVTA gratefully acknowledges the following funding that made our drive to zero a reality:

AVTA's Journey to Electrification Funding Sources

FEDERAL	**$52,063,517**
BUILD	$8,683,489
FTA Formula (Sect. 5307, 5337, 5339)	$34,374,728
5307 Formula through MTA	$2,884,769
Low or No Emission	$6,120,531
STATE	**$44,258,639**
Heavy Duty Vehicle Incentive Program	$11,179,000
Low Carbon Transit Operations	$466,252
VW Mitigation	$2,340,000
PTMISEA	$3,049,203
SB1 - STA/SGR	$3,735,200
Transit & Intercity Rail Capital Program	$23,488,984
LOCAL	**$459,872**
AVAQMD	$265,794
Measure R	$194,078
AVTA	**$8,004,019**
Capital Reserve	$8,004,019
TOTAL	**$104,786,047**

Source: AVTA Where the Future Lives Today Zero Emission Transit Made Easy

Results

As a result of AVTA's bus electrification efforts:

- AVTA has experienced cost savings from switching from diesel to electric: [5]
    - AVTA reported the fuel cost per mile to run diesel buses as of January 2022 was $1.05 per mile driven versus the electric fuel cost of $0.51 per mile.
    - AVTA monetizes its reduction in fossil fuel usage through California's Low Carbon Fuel Standard, which generates credits when the carbon intensity scores have a deficit compared to state benchmarks. When AVTA tracks its fuel reduction and sells the credits, the incentive covers the cost of the electricity, and the agency gets paid $0.15.mile.
- While there is an upfront cost for inductive charging, some of this has been repaid through savings from the need to purchase fewer buses and buses with smaller battery packs, as well as savings on depot charging. The inductive charging stations have also reduced range anxiety for drivers and helped prevent service disruption to the community.
- In January 2023, AVTA celebrated achieving 10 million miles driven by its all-electric fleet, which represents:[6]
    - 2.5 million gallons of diesel fuel avoided, which results in a net savings in fuel costs of $3.4 million after paying for electricity
    - 59.4 million pounds of CO_2 reduced
    - 187,900 pounds of particulate matter reduced
- AVTA's Journey to Electrification publication (2021) reports the following additional benefits: [7]
    - Improved miles between service interruptions metric from 11,200 miles to 16,000 miles
    - Improved fleet availability metric from 89% with their diesel fleet to 97% with their all-electric fleet.
    - Antelope Valley Air Quality Management District tracks 8-hour ozone standards, which allow for a measurement of no more than 70 parts per billion. In 2003, there were 92 days over the limit. In 2014, AVTA started the electrification efforts, and in 2018, AVTA started putting the electric fleet into service. By 2019, ozone dropped to 18 days over the limit; in 2020, it was 13 days over the limit, and in 2021, it was six days over the limit. AVTA attributes the decline to AVTA's buses.

As a result of the installation of the inductive chargers, WAVE reported:[8]

- Standard operating range in an 8-hour shift was doubled (assuming a standard operating range of a BYD K9 bus)
- Over 400 miles were added during 16 hours of operation.
- Between January 2019 and June 2022, 2.4 million range extension miles were delivered to the system.

Lessons Learned

The following lessons learned can be applied to FCRTA:

[5] Source: https://www.canarymedia.com/articles/clean-fleets/how-one-california-transit-agency-electrified-its-fleet-18-years-ahead-of-schedule
[6] Source: https://www.avta.com/avta-passes-ten-million-miles-of-zero-emission-bus-operations
[7] Source: https://www.avta.com/avtas-journey-to-electrification-1.php
[8] *WAVE Wireless Charging Propels AVTA to Zero-Emission Milestone.* Case Study prepared by WAVE.

- For AVTA, inductive charging provided a cost-effective alternative to having extra buses or buying buses with larger batteries. More buses with larger batteries and greater charging needs can present logistical challenges for transit agencies.
- Inductive charging does require additional operator training to ensure the bus correctly lines up with the charger for optimal charge.
- AVTA installed 250 kilowatt inductive charging stations, which is lower than some other inductive charging stations. AVTA feels the power is sufficient and helps avoid the risk of overheating the battery, which can be exacerbated by the Antelope Valley's hot summer days.
- It is important to be strategic with charging infrastructure, review the route system first, and install charging infrastructure at transfer centers where many buses are passing or located.
- AVTA has seen benefits to fleet electrification, including more miles between service interruptions, greater fleet availability, and improved air quality.
- AVTA relied on various federal, state, and local funding sources to implement their fleet electrification efforts.
- Getting operators on board early with the electrification process and equipment is important.
- AVTA's engaged local leadership, including utilities, elected officials, and electrical contractors, was key in its electrification efforts.
- One of the biggest hurdles that AVTA faced was managing charging. AVTA began using spreadsheets to determine when specific buses should be charged, then switched to an energy management system.
- Schedule charging around peak electricity demand to control pricing.

Martha's Vineyard Transit Authority Fleet Electrification

About the Transit Agency

Martha's Vineyard Transit Authority (VTA) serves the six towns on the island of Martha's Vineyard, located off the coast of Massachusetts. The 100-mile service area consists of rural and suburban communities. VTA currently operates a fleet of 32 buses. VTA's operations contractor is Transit Connection, Inc (TCI)

VTA offers fixed route and paratransit services. Fixed route service varies throughout the year, depending on seasonal travel demand. VTA's ridership in FY 2022 was approximately $772,000/year, most of which occurs in the summer months when the population increases five-fold.[9] The VTA's peak season of operation typically runs May through October, with 14 routes that travel island-wide. Ridership is significantly lower in the winter months, as the service mainly targets the island's 20,600 year-round residents on the island.

Background

VTA cited the following key reasons for transitioning from diesel to electric buses:

[9] Ridership data from VTA Annual Report FY 2022.

- Diesel buses are expensive to maintain on the island, given the difficulty in getting materials
- There is a lack of skilled labor available to maintain diesel buses
- Concerns with the reliability of the diesel buses, as they would break down on routes
- Concerns with emissions related to diesel buses
- Electric buses are quieter than diesel buses
- Electric buses can have lower fuel costs, especially when charged by solar energy

VTA began its electrification efforts in 2018 and has purchased 15 electric buses, which comprise approximately half of the fleet. VTA plans to transition to an all-electric fleet by 2027.

Microgrid

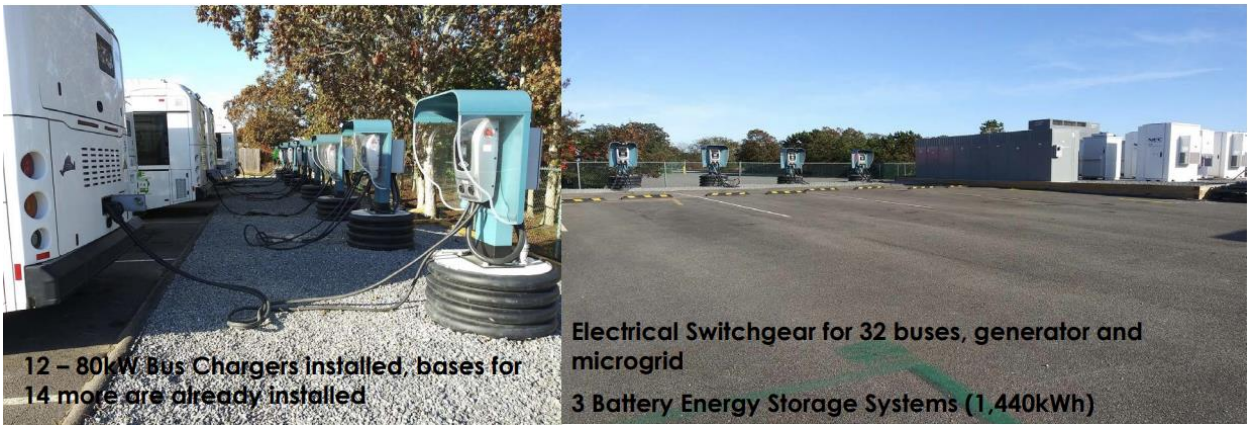
With its electric bus transition, VTA had to address the issue of reliability, sustainability, and cost-effective charging for the buses. Martha's Vineyard relies on imported fossil fuels to power vehicles, which translates into higher fuel and energy costs; and also contributes to GHG emissions and noise pollution and makes the island vulnerable to power outages during major adverse weather events. VTA could use diesel or gas generators When the grid is unavailable or when electricity is at peak rates. Still, these options would go against their cost savings and sustainability objectives. Therefore, VTA built a solar-powered microgrid with battery energy storage. The microgrid is located at VTA's existing bus depot/operations center in the town of Edgartown, MA. The microgrid has the following key features:

- 700 kilowatt DC solar photovoltaic array
- 1,400 kilowatt hour Battery energy storage
- Diesel generator as backup to ensure resilient power is available during nighttime hours and if battery energy storage is depleted
- 16 vehicle charging stations (20 more to be added in the future)

The microgrid uses a solar energy management system, which allows algorithms and forecasts to balance and optimize energy costs, carbon emissions, and resilience. It also calculates the buses' energy needs for the next day and plans the charging of the fleet accordingly. If the grid goes out, the microgrid can use its battery energy storage, solar, and backup onsite diesel generators to charge the fleet. This ensures that buses are fully charged for the scheduled start the next morning.

VTA established a public-private partnership through a 20-year purchase power agreement (PPA) with a solar vendor (Enel X) to construct the solar panels with no up-front costs to VTA (other than technical assistance). Half of the $4 million project was funded through the partnership between Enel X and VTA, and the Federal Transit Administration, the Massachusetts Department of Transportation, and the Massachusetts Clean Energy Center funded the other half. Enel X owns the solar and battery storage equipment and VTA pays them back a fixed rate for power produced over the next 20 years, which is 30 percent less expensive than the cost of grid power on the island. For additional revenue streams, Enel X will sell some of the electricity created by the solar panels back to the electrical grid, revenue that Enel X and VTA will share, which Enel X believes will add up to $1 million over its operating life.

Figure 20: Martha's Vineyard Transit Authority Microgrid



Source: Enel North America (top image), Martha's Vineyard Transit Authority (bottom images).

Inductive Charging Stations

VTA buses run 200-300 miles per day, and electric buses typically have a capacity of 150 miles per battery charge in the summer and 75 miles per charge in the winter. VTA also installed inductive charging stations at Church Street in Edgartown and West Tisbury Town Hall to address the electric bus range issues. Without en-route charging, the buses must be taken out of service for regular charging at the bus yard. With en-route charging, buses can charge while passengers board and exit the vehicle at the charging location, enabling the buses to stay in service for their 200-300 daily mile circuit without detouring to be

charged or replaced at VTA's bus depot. The inductive charging stations will allow the VTA to be all-electric.

Project Partners

Below are some of the project partners Martha's Vineyard has worked with on its electrification efforts:

- ARUP Group and Vermont Energy Investment Corporation on the planning, design, and engineering of the microgrid and inductive charging stations
- BYD electric buses
- Momentum Dynamics inductive charging
- PXiSE developed the microgrid algorithms and forecasts to balance and optimize energy costs, carbon emissions, and resiliency
- Enel X is the solar vendor who purchased the solar panels at the microgrid.

Funding Sources

VTA has utilized the following funding sources for its electrification efforts:

- FTA Low or No Emissions program
- Massachusetts Department of Transportation grant

Operational Strategies to Preserve Battery Life

VTA has implemented the following measures to help conserve battery life during their operations:

- VTA's practice is not to let the buses run below 20 percent battery life. VTA receives a notification when the charge is lower.
- VTA stressed that bus operators have a significant impact on vehicle performance. If operators are heavy on acceleration or don't allow for regenerative braking time, that will result in inefficient battery use. Therefore, the buses have been programmed to a maximum speed of 45mph, and the maximum acceleration between 0-15mph is within four or five seconds.

As a result, VTA is getting what the vehicle manufacturer has stated is the useable range during the summer months.

Chittick Report and Rebuttal

A report was prepared by Jane Chittick (referred to as the Chittick report), a former member of the VTA/Church Street Committee and former appointed and elected town and county official. Some of the key opposition points/challenges referenced in the report are as follows:

- Questioned the useful life and efficiency of inductive chargers.
- Critiqued the transition to all electric buses, given the limited battery range available. Instead, the author advocated for clean diesel and hybrid electric vehicles.
- Critiqued the high cost of purchase and installation of the inductive chargers.

The VTA/Church Street Review Committee issued a rebuttal to the Chittick report, making the following key points:

- All-electric buses are cleaner running, less expensive, and quieter to operate than diesel buses.
- The buses on Martha's Vineyard do not travel at 45mph or more for sustained periods, which is necessary to flush out the particulate filters on diesel buses. As a result, diesel and hybrid buses require substantially more maintenance on Martha's Vineyard than in places where buses can exceed 45mph for a sustained period of time. The report cites a cost savings of $8,000/year/bus to operate an electric bus versus a diesel bus.
- In VTA's experience operating both diesel and electric buses, VTA has found electric buses more reliable than diesel buses.
- Regarding the critique of the Chittick report regarding the useful life of inductive charging stations, the rebuttal report cites research into inductive charging stations in Genoa and Turin, Italy, who have been using inductive charging stations since 2002. Therefore, a 12-15 year useful life is likely a reasonable estimate.
- Martha's Vineyard is subject to severe erosion and rising sea levels, underscoring the urgency of reducing fossil fuels.

Results

- VTA has reported that maintenance costs have been lower for electric buses than diesel buses. While the maintenance interval for electric buses is more frequent than diesel buses, most of the time is spent doing inspections rather than changing oil or parts.
- VTA has found electric buses to be more reliable than diesel buses.
- ARUP cites the following:[10]
    - In the first year of service, ARUP reports $50,000 savings in fuel costs with an expected $100,000 annual savings once the entire system is in place.
- The Altas case study cites the following:[11]
    - The VTA is projected to save $4M through reduced bus operation costs, solar, and battery storage over the next ten years with its current electric fleet.
    - With electrification, the VTA fleet will drive 300,000 fewer miles per year using fossil fuels, reducing GHG emissions.
    - Once the fleet transitions to 100% electric, it will reduce CO2 emissions by 36,000 tons over ten years.

[10] *The ARUP Journal Issue 2 2022*

[11] https://www.veic.org/clients-results/case-studies/martha-s-vineyard-offers-reliable-and-clean-transportation-through-electrification

Lessons Learned

The following lessons learned can be applied to FCRTA:

- VTA stressed that it is important to get buy-in from everyone in the organization to transition to electric vehicles, including operating staff, operating company, mechanics, and drivers.
- VTA entered into a 20-year purchase power agreement with the solar vendor (Enel X), which established a set cost/KW hour, enabling VTA to budget for its electricity costs for the next 20 years.
- VTA also has a revenue share agreement with Enel X such that when energy is returned to the grid, Enel X and VTA will share the battery's revenue.
- VTA is exploring using bus batteries to promote resiliency in communities during power outages, starting with West Tisbury.
- Inductive charging is key to enabling VTA to transition to a fully electric fleet, given the limited battery range, particularly in winter months. The inductive charging stations allow VTA to save on operating costs by avoiding the need to swap out buses mid-day.
- The energy management system at the microgrid is critical to ensuring buses are charged during non-peak times, saving costs and ensuring buses are charged properly for the next day's services.

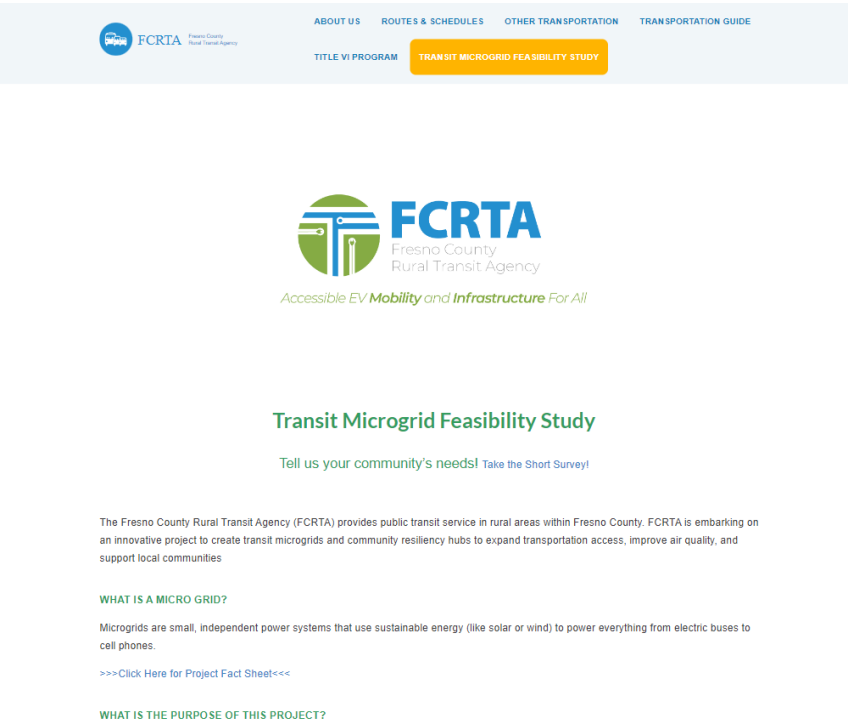
05 | Community and Stakeholder Input

05 Community and Stakeholder Input

Community and stakeholder input supports two primary project goals:

1. Provide an educational component for the community about FCRTA's transit system and microgrids' opportunities, benefits, and challenges. This is a critical component to engage the community and stakeholders about new energy technology and how they can directly benefit.
2. Learn from the community to gather input to help shape the plan.

Three main outreach activities informed the plan:



1. Website and informational materials. See Appendix on page 196 for the project fact sheet. All materials were posted on a project webpage linked to FCRTA' website.
2. Stakeholder Advisory Committee to share technical progress and gain feedback on information recommendations. See Appendix on page 196 for meeting minutes.
3. Community survey to gain input on travel needs, costs, resiliency factors, microgrid site criteria and locations, EV charging needs, and multimodal hub features.
4. Community popup events at multiple sites in coordination with local events to meet the community where they are and provide interactive information sharing to gain input on the study.

Community Survey

FCRTA issued a survey to gather feedback on future microgrid/resiliency hubs. The survey was designed to gauge residents' preparedness for potential disasters, their current access to necessities and amenities, what items they would like to see at future microgrids/resiliency hubs, their ownership of electric vehicles, their access to electric vehicle charging, and their willingness to pay for electric vehicle charging.

The survey was available to take in person at community pop-up events that occurred in Reedley, Firebaugh, Parlier, Kerman, Huron, and Fowler on March 14-16, 2023. Surveys could also be completed online using the Survey Monkey platform. The survey was publicized on the project website and to local governments through the Advisory Committee, members posted on their websites and other channels. Hard copy survey responses were manually entered in the Survey Monkey platform.

Overall, FCRTA received 394 survey responses, of which 188 were completed in English and 206 in Spanish.

Key Findings

The following summarizes key findings from the survey:

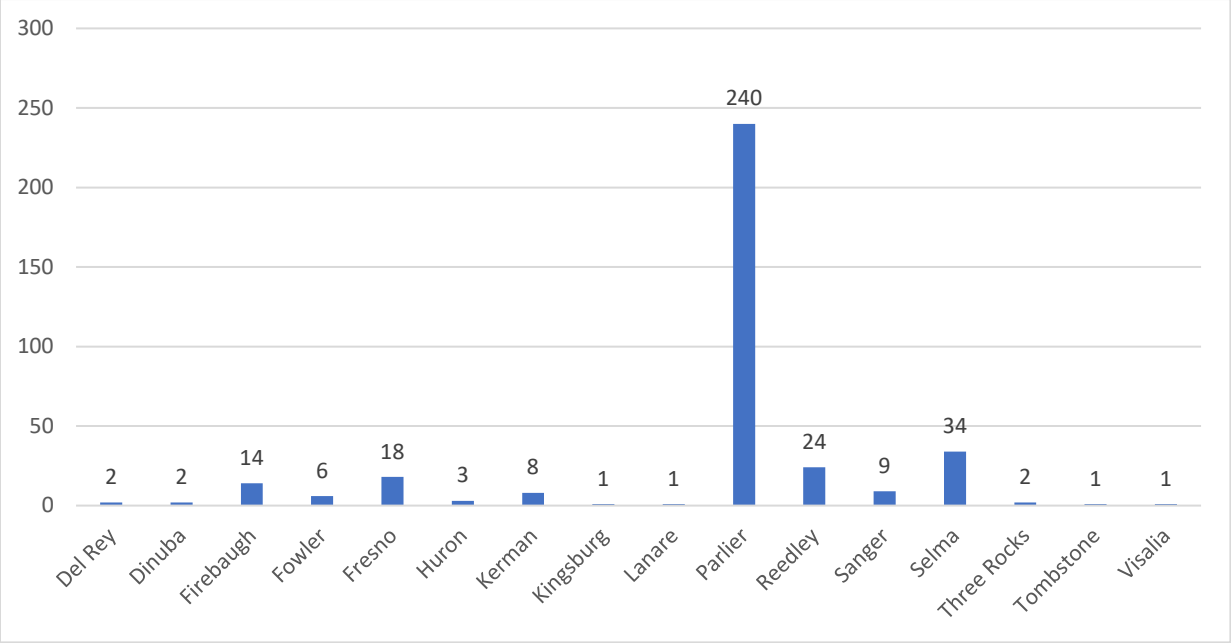
- A majority of the survey respondents live in Parlier, with responses from other communities including Del Rey, Dinuba, Firebaugh, Fowler, Fresno, Huron, Kerman, Kingsburg, Lanare, Parlier, Reedley, Sanger, Selma, Three Rocks, Tombstone, and Visalia.
- **While some respondents feel prepared for potential disasters, more do not.** Of the listed disasters, respondents feel the least prepared for wildfires and the most prepared for pandemics.
- **Community members are experiencing a lack of access to specific necessities and amenities on a daily basis**:
    - 13 percent do not have access to **food**
    - 27 percent do not have access to **transportation**
    - 71 percent do not have access to **electric vehicle charging**
    - 26 percent do not have access to **Wi-Fi/internet**
    - 20 percent do not have access to **trash/recycle receptacles**
    - 48 percent do not have access to **picnic benches/lunch areas**
    - 46 percent do not have access to **community gardens**
    - 27 percent do not have access to **heating/cooling**
    - 35 percent do not have access to **childcare**
    - 33 percent do not have access to **medical supplies**
    - 31 percent do not have access to **parks and recreation space**
    - 26 percent do not have access to **emergency alerts and information**
- **Many community members need additional assistance in the event of a disaster.** 43 percent of respondents indicated they or their neighbors need additional assistance (e.g., are elderly, dependent on medical equipment, etc.) in the event of a disaster.
- **During disasters**, the top five items respondents indicated should be included at Resilience Hubs are **emergency food/clean water/pet food, shelter, medical supplies, indoor heating/cooling, and emergency alerts and information**.
- On a **day-to-day basis**, the top five items respondents indicated should be included at Resilience Hubs are **access to food vendors or food trucks, Wi-Fi/internet, indoor heating/cooling, childcare, and retail stores**.
- **Most respondents (91 percent) indicated that they do not own an electric vehicle,** and most respondents are not considering purchasing an electric vehicle (81 percent).
- **Community members lack access to electric vehicle charging but expressed modest interest in the provision of charging in their community.** Most respondents (80 percent) lack access to electric vehicle (EV) charging. Still, when asked if the provision of EV charging would incentivize them to purchase an EV, 26 percent said "yes," and 15 percent said "yes, but only if it were free to charge my vehicle."
- **Community members expressed some willingness to pay for EV charging:** approximately one-third of respondents (33 percent) would be willing to pay for electric vehicle charging.
- **78 respondents indicated they would be interested in taking a leadership role** with the resiliency hub, and 18 respondents provided their contact information.

Detailed responses are provided in the following section.

Question 1: What city or community do you live in?

In total, 366 survey respondents indicated their city or community, and 28 respondents skipped this question. The vast majority of respondents (240 respondents) indicated that they live in Parlier. Parlier's high survey response rate can be attributed to the high attendance at the community pop-up event held in Parlier on March 14, 2023, and the large number of surveys completed at this event. Other communities with over ten responses include Selma (34 responses), Reedley (24 responses), Fresno (18 responses), and Firebaugh (14 responses). Figure 21 summarizes the city or community in which respondents live.

Figure 21: City or Community Survey Respondents Live



Source: Walker Consultants.

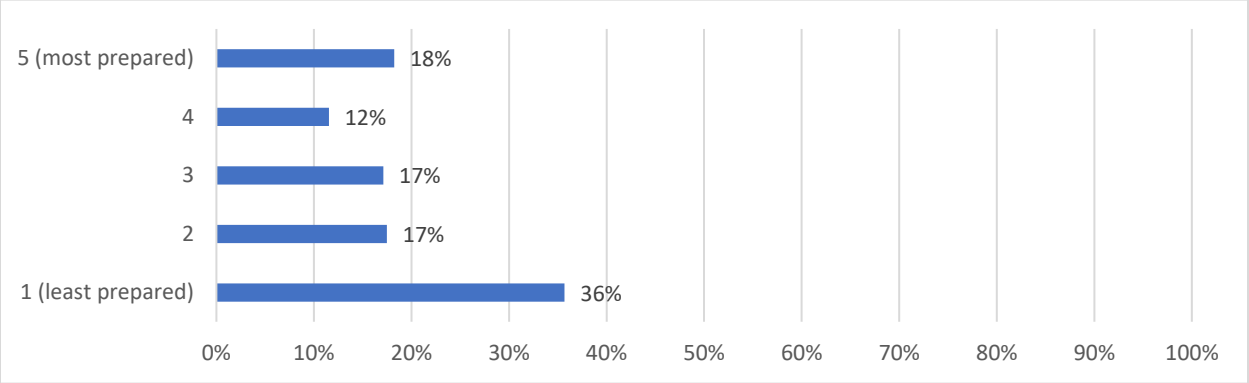
Question 2: On a scale of 1-5, with 1 being the least prepared and 5 being the most prepared, how prepared do you feel for the following potential disasters?

Overall, 292 respondents submitted a complete answer to this question, and 102 respondents skipped the question. The following sections summarize the percentage of respondents that answered 1-5 for each disaster type.

Wildfires

On a scale between 1-5, 53 percent of respondents selected either a "1 (least prepared)" or a "2" when asked about how prepared they feel for wildfires, 30 percent selected a "4" or a "5," and 17 percent selected a "3." Figure 22 summarizes respondents' preparedness for wildfires.

Figure 22: Survey Respondent's Preparedness for Wildfires

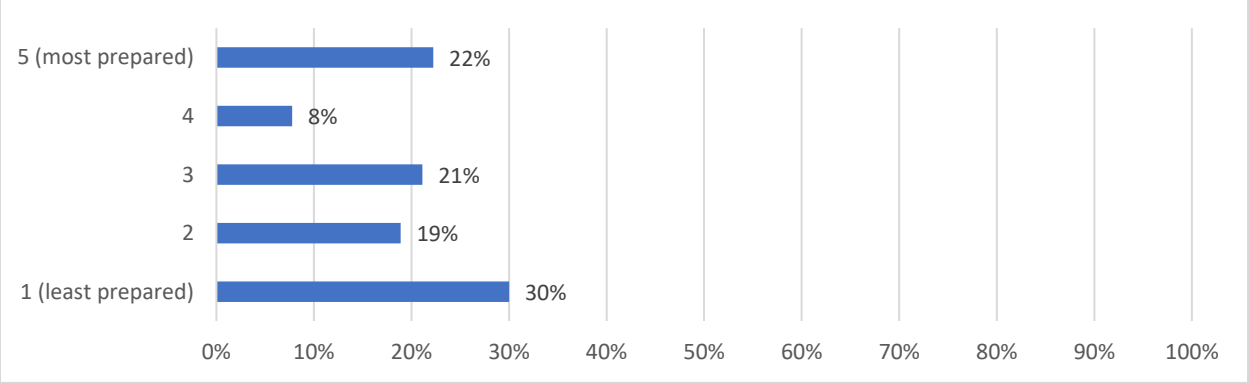


Source: Walker Consultants.

Smoke

On a scale between 1-5, 49 percent of respondents selected either a "1 (least prepared)" or a "2" when asked about how prepared they feel for smoke, 30 percent selected a "4" or a "5," and 21 percent selected a "3." Figure 23 summarizes respondents' preparedness for smoke.

Figure 23: Survey Respondent's Preparedness for Smoke

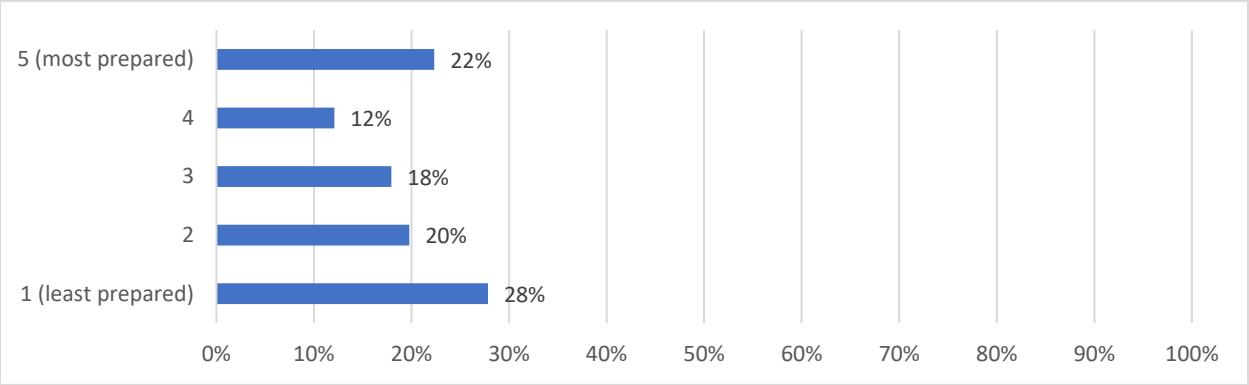


Source: Walker Consultants.

Drought

On a scale between 1-5, 48 percent of respondents selected either a "1 (least prepared)" or a "2" when asked about how prepared they feel for drought, 34 percent selected a "4" or a "5," and 18 percent selected a "3." Figure 24 summarizes respondents' preparedness for drought.

Figure 24:Survey Respondents Preparedness for Drought

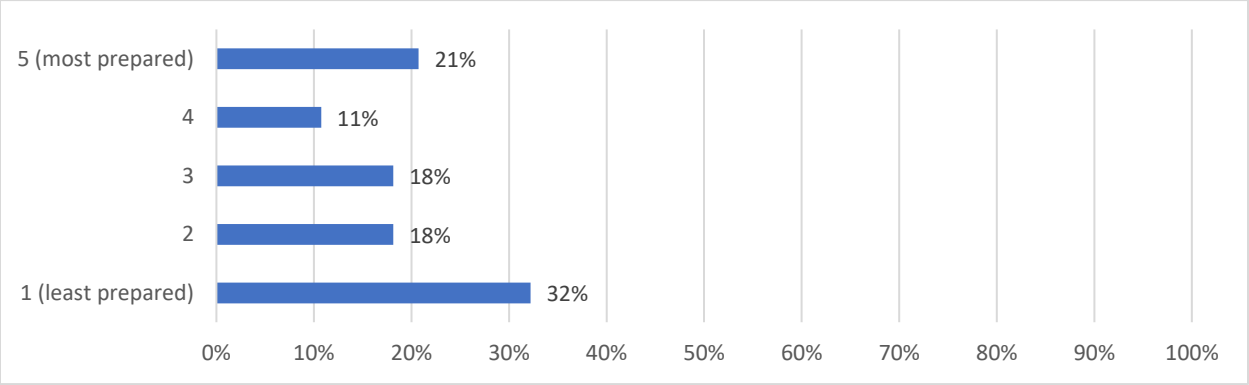


Source: Walker Consultants.

Earthquake

On a scale between 1-5, 50 percent of respondents selected either a "1 (least prepared)" or a "2" when asked about how prepared they feel for earthquakes, 32 percent of respondents selected a "4" or a "5," and 18 percent selected a "3." Figure 25 summarizes respondents' preparedness for earthquakes.

Figure 25: Survey Respondent's Preparedness for Earthquakes

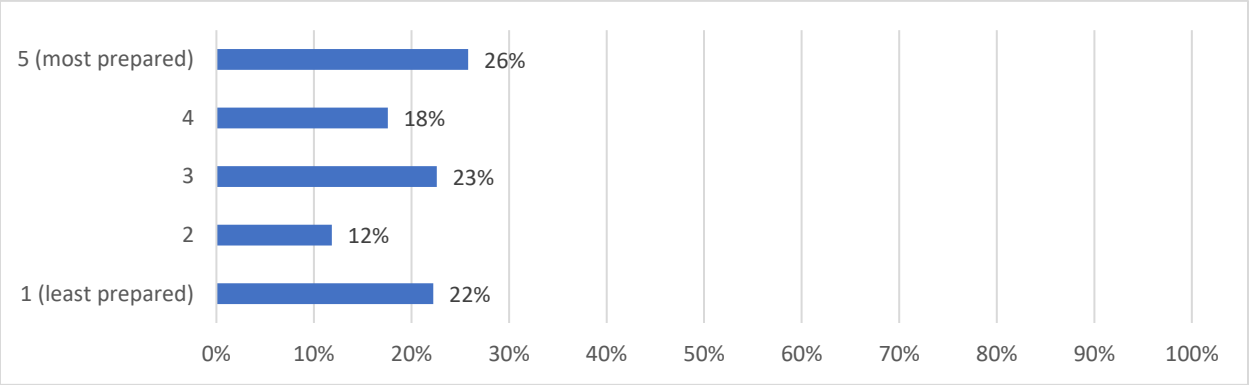


Source: Walker Consultants.

Pandemic

On a scale between 1-5, 34 percent of respondents selected either a "1 (least prepared)" or a "2" when asked about how prepared they feel for pandemics, 43 percent selected a "4" or a "5," and 23 percent selected a "3." Figure 26 summarizes respondents' preparedness for pandemics.

Figure 26: Survey Respondent's Preparedness for Pandemics

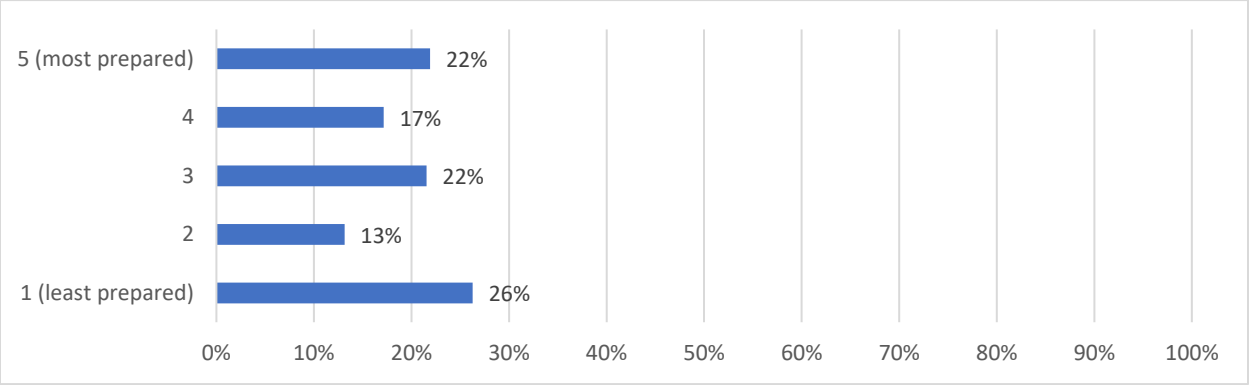


Source: Walker Consultants.

Power Outages

On a scale between 1-5, 39 percent of respondents selected either a "1 (least prepared)" or a "2" when asked about how prepared they feel for power outages, 39 percent selected a "4" or a "5," and 22 percent selected a "3." Figure 27 summarizes respondents' preparedness for power outages.

Figure 27: Survey Respondents Preparedness for Power Outages

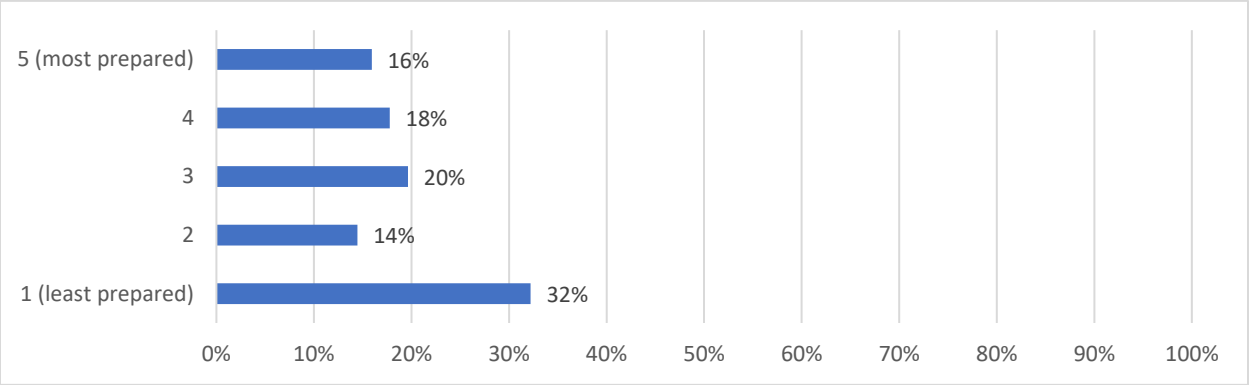


Source: Walker Consultants.

Intense Storm

On a scale between 1-5, 46 percent selected either a "1 (least prepared)" or a "2" when asked about how prepared they feel for intense storms, 34 percent selected a "4" or a "5," and 20 percent selected a "3." Figure 28 summarizes respondents' preparedness for intense storms.

Figure 28: Survey Respondent's Preparedness for Intense Storms



Source: Walker Consultants.

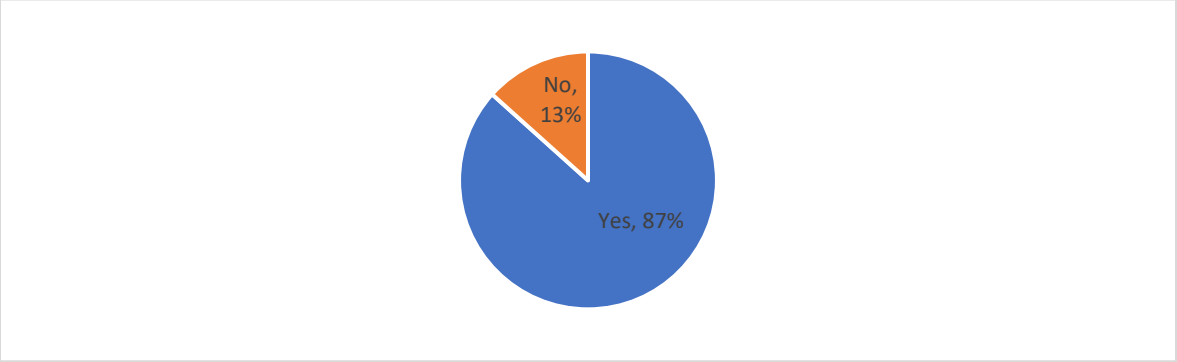
Question 3: During a typical day, select how easily accessible the following are for you:

Easily accessible: Yes
Not easily accessible: No
Respondents were asked to indicate whether certain necessities and amenities are accessible on a typical day. In total, 330 respondents completed answers to Question 3, and 64 respondents skipped this question or provided an invalid response.

Access to Food

In terms of access to food on a typical day, 87 percent of respondents indicated they do have access to food, and 13 percent indicated they do not have access to food. Figure 29 summarizes respondents' access to food.

Figure 29: Survey Respondent's Access to Food

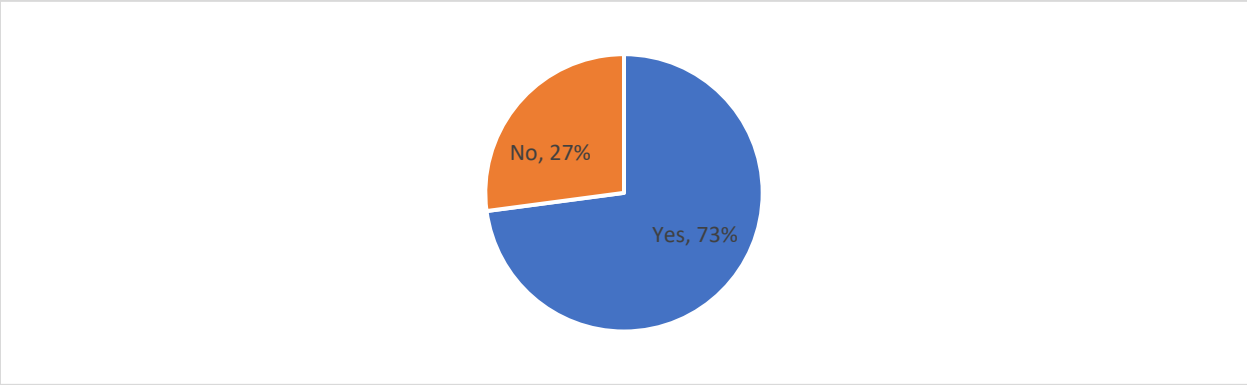


Source: Walker Consultants.

Access to Transportation

In terms of access to transportation on a typical day, 73 percent of respondents indicated they do have access to transportation, and 27 percent indicated they do not have access to transportation. Figure 30 summarizes respondents' access to transportation.

Figure 30: Survey Respondent's Access to Transportation

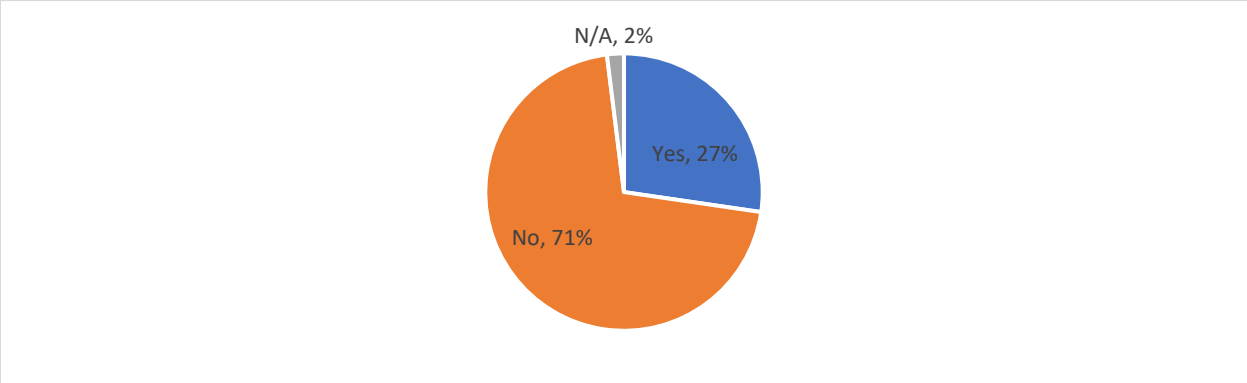


Source: Walker Consultants.

Electric Vehicle Charging

In terms of access to electric vehicle charging on a typical day, 27 percent of respondents indicated they do have access to electric vehicle charging, and 71 percent indicated they do not have access to electric vehicle charging. Figure 31 summarizes respondents' access to electric vehicle charging.

Figure 31: Survey Respondent's Access to Electric Vehicle Charging

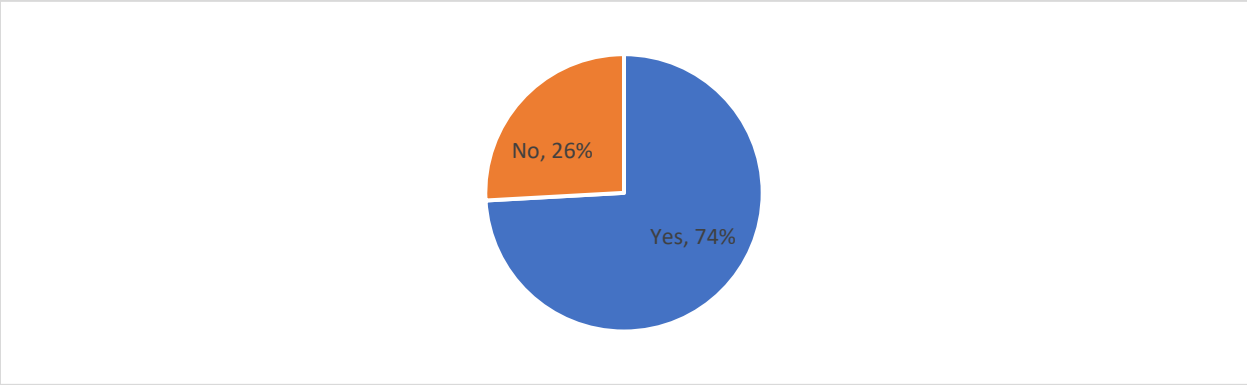


Source: Walker Consultants.

Wi-Fi/Internet

In terms of access to Wi-Fi/internet on a typical day, 74 percent of respondents indicated they do have access to Wi-Fi/internet, and 26 percent indicated they do not have access to Wi-Fi/internet. Figure 32 summarizes respondents' access to Wi-Fi/internet.

Figure 32: Survey Respondent's Access to Wifi/Internet

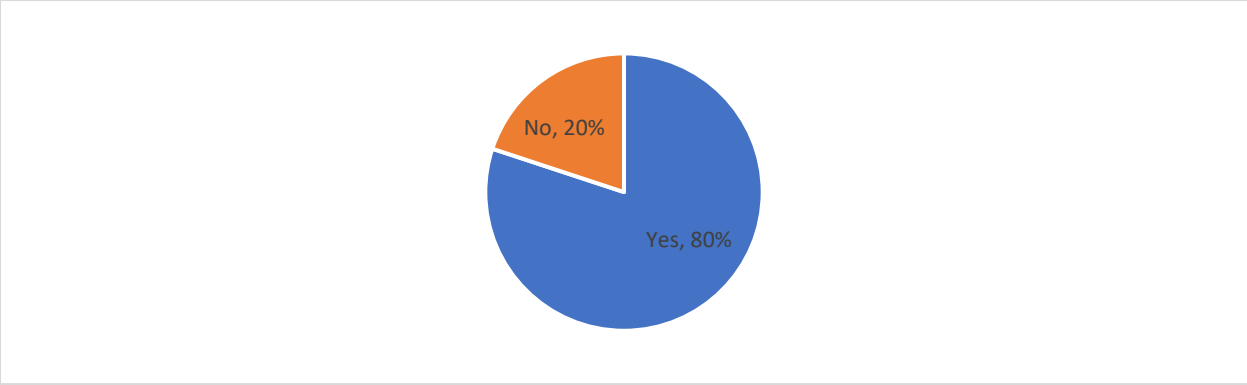


Source: Walker Consultants.

Trash/Recycle Receptacles

Regarding access to trash/recycle receptables on a typical day, 80 percent of respondents indicated they do have access to trash/recycle receptacles and 20 percent indicated they do not have access to trash/recycle receptacles. Figure 33 summarizes respondents' access to trash/recycle receptacles.

Figure 33: Survey Respondent's Access to Trash/Recycle Receptacles

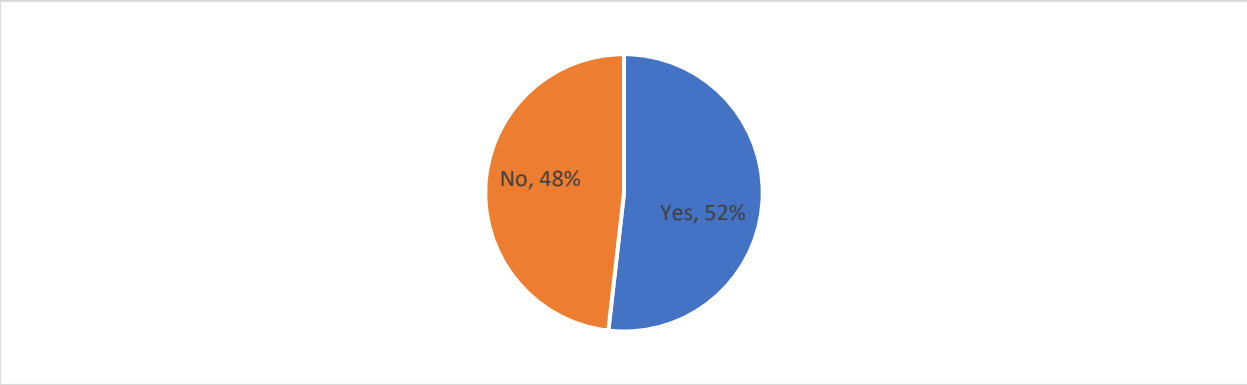


Source: Walker Consultants.

Picnic Benches/Lunch Area

Regarding access to picnic benches/lunch areas on a typical day, 52 percent of respondents indicated they do have access to picnic benches/lunch areas, and 48 percent indicated they do not have access to picnic benches/lunch areas. Figure 34 summarizes respondents' access to picnic benches/lunch areas.

Figure 34: Survey Respondent's Access to Picnic Benches/Lunch Areas

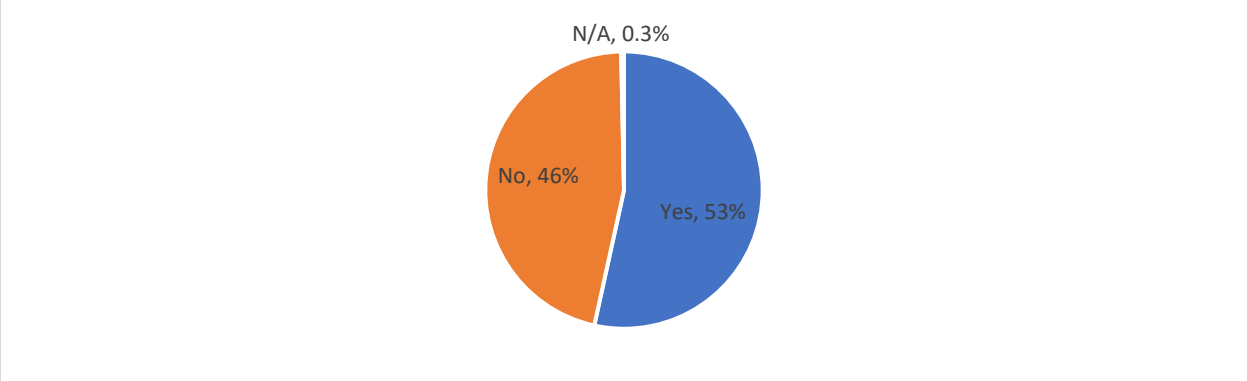


Source: Walker Consultants.

Community Gardens

Regarding access to community gardens on a typical day, 53 percent of respondents indicated they have access to community gardens, and 46 percent indicated they do not have access to community gardens. Figure 35 summarizes respondents' access to community gardens.

Figure 35: Survey Respondent's Access to Community Gardens

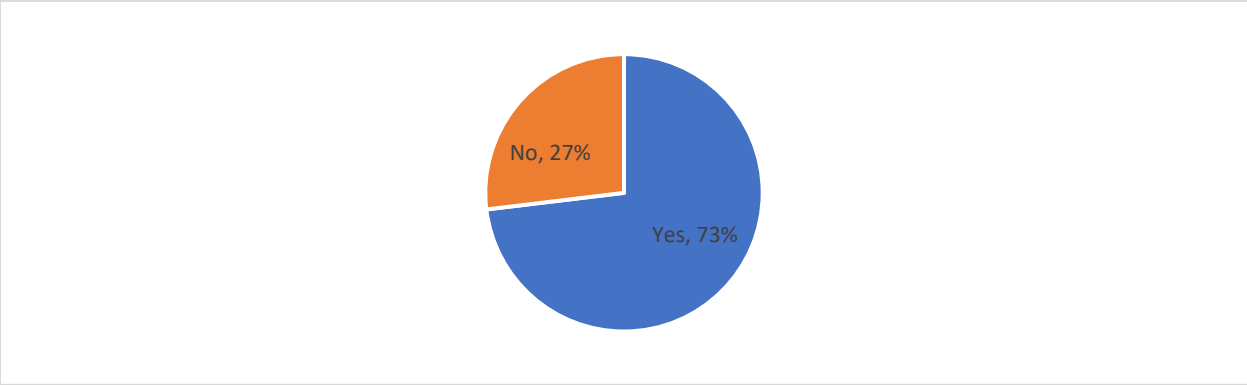


Source: Walker Consultants.

Indoor Heating/Cooling

In terms of access to heating/cooling on a typical day, 73 percent of respondents indicated they do have access to heating/cooling, and 27 percent indicated they do not have access to heating/cooling. Figure 36 summarizes respondents' access to heating/cooling.

Figure 36: Survey Respondent's Access to Heating/Cooling

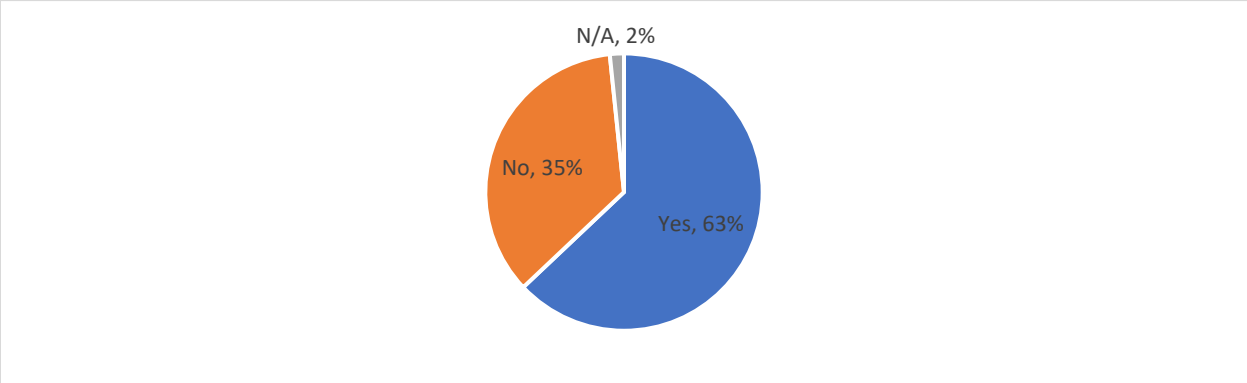


Source: Walker Consultants.

Childcare

In terms of access to childcare on a typical day, 63 percent of respondents indicated they do have access to childcare, and 35 percent indicated they do not have access to childcare. Figure 37 summarizes respondents' access to childcare.

Figure 37: Survey Respondent's Access to Childcare

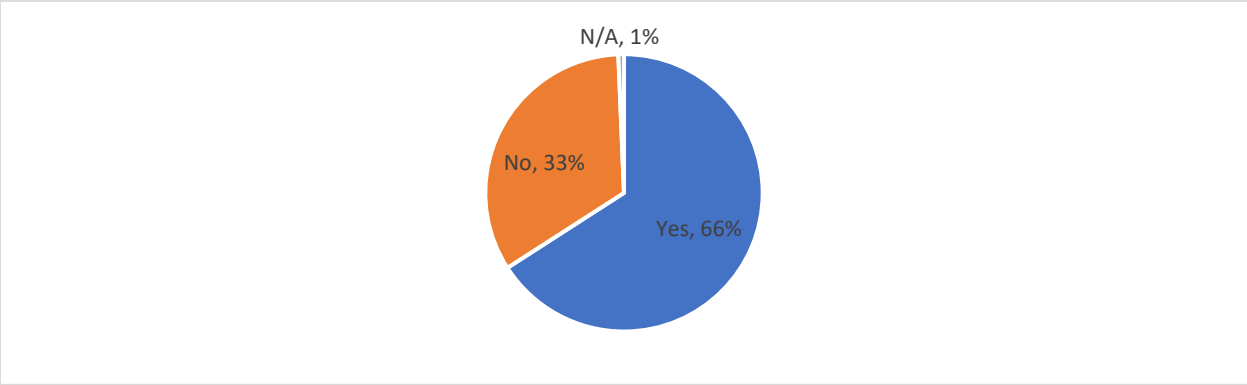


Source: Walker Consultants.

Medical Supplies

Regarding access to medical supplies on a typical day, 66 percent of respondents indicated they have access to medical supplies, and 33 percent indicated they do not have access to medical supplies. Figure 38 summarizes respondents' access to medical supplies.

Figure 38: Survey Respondent's Access to Medical Supplies

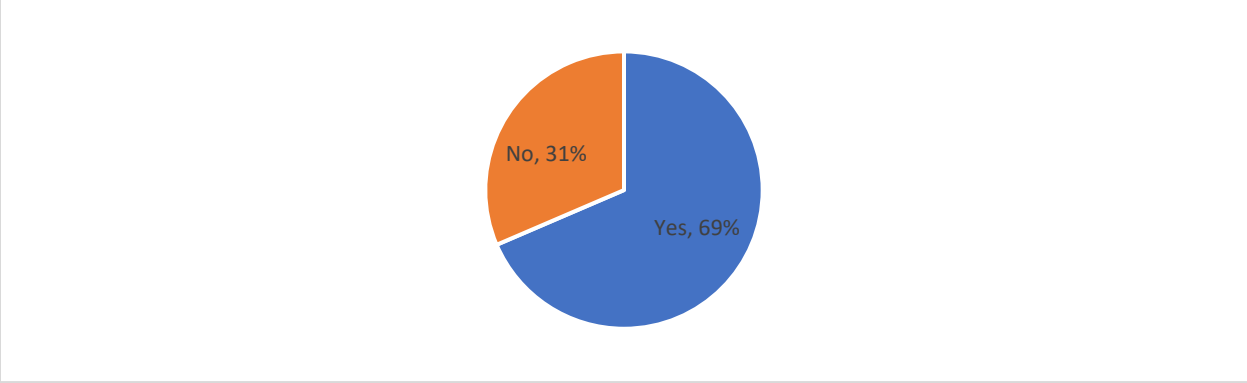


Source: Walker Consultants.

Parks and Recreation Space

Regarding access to parks and recreation space on a typical day, 69 percent of respondents indicated they do have access to parks and recreation space, and 31 percent indicated they do not have access to parks and recreation space. Figure 39 summarizes respondents' access to parks and recreation space.

Figure 39: Survey Respondent's Access to Parks and Recreation Space

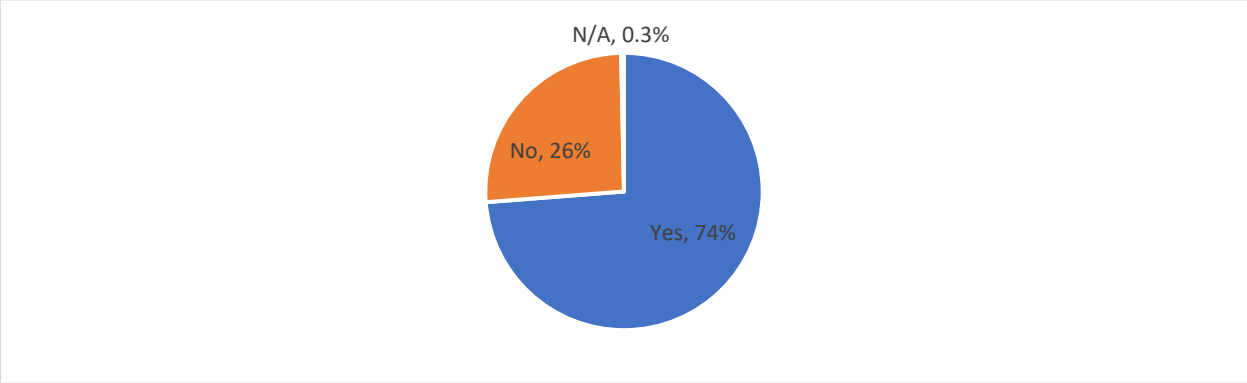


Source: Walker Consultants.

Emergency Alerts and Information

Regarding access to emergency alerts and information on a typical day, 74 percent of respondents indicated they have access to emergency alerts and information, and 26 percent indicated they do not have access to emergency alerts and information. Figure 40 summarizes respondents' access to emergency alerts and information.

Figure 40: Survey Respondent's Access to Emergency Alerts and Information

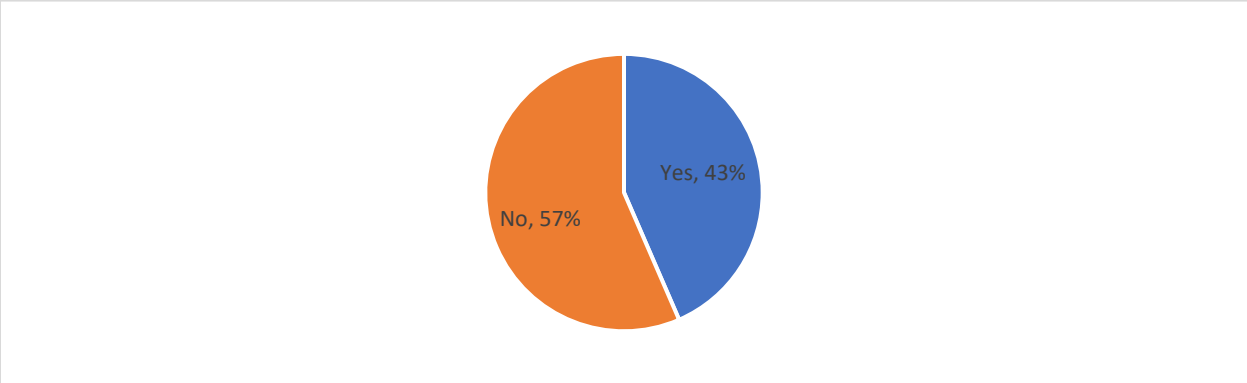


Source: Walker Consultants.

Question 4: In the event of a disaster, do you or your neighbors need additional assistance (e.g., are elderly, dependent on medical equipment, etc.)?

In total, 361 respondents responded as to whether they or their neighbors need additional assistance in a disaster and 33 respondents skipped this question. Of the respondents who responded to this question, 43 percent indicated that they or their neighbor do need additional assistance, and 57 indicated that they or their neighbor do not need additional assistance. Figure 41 summarizes survey respondents' need for additional assistance during a disaster.

Figure 41: Survey Respondents Need for Additional Assistance During a Disaster



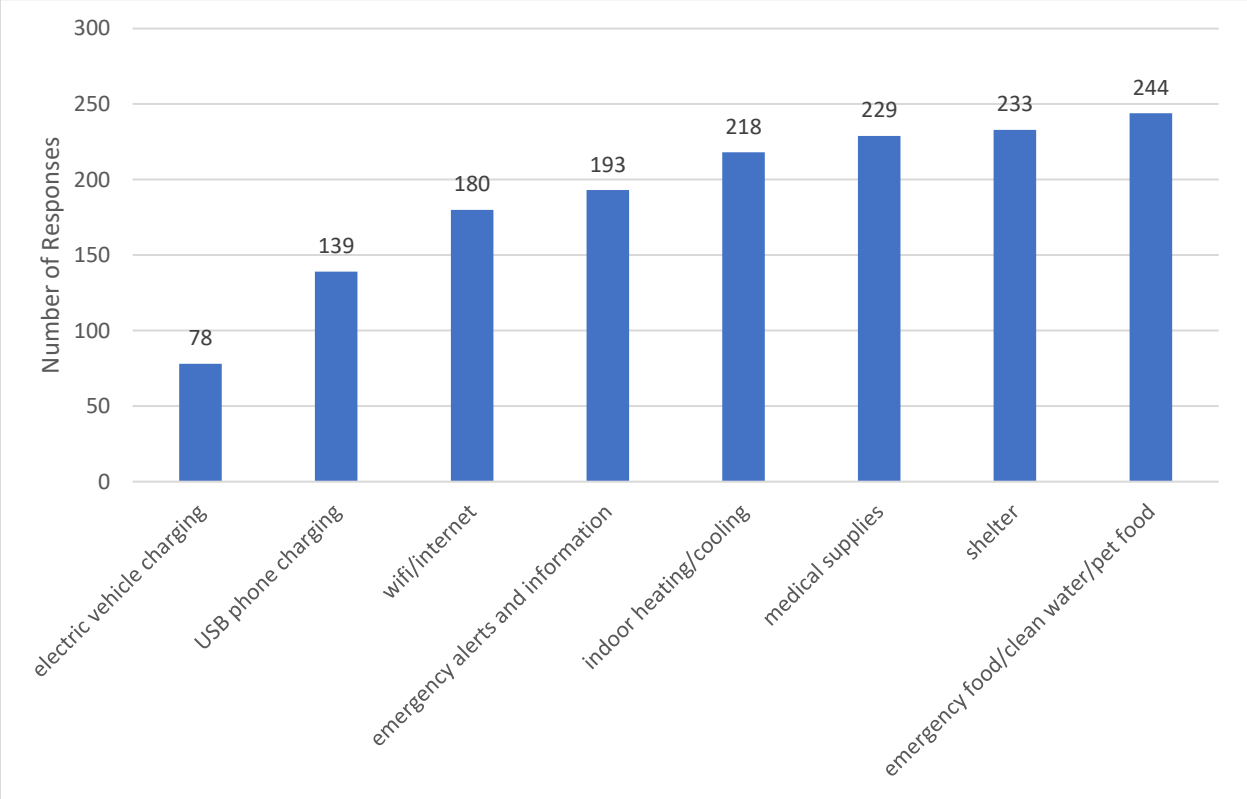
Source: Walker Consultants.

Question 5: The following items are typically provided at Resilience Hubs during disasters. Please choose the top five by importance to you:

In total, 366 respondents reported the top items of importance to provide at resilience hubs during disasters and 28 respondents skipped this question.

Overall, the top five items that respondents reported were emergency food/clean water/pet food, shelter, medical supplies, indoor heating/cooling, and emergency alerts and information. Closely behind emergency alerts and information (193 responses), 180 respondents reported Wi-Fi/internet. Respondents included two other suggestions, including "emergency transportation to and from the hubs, and language accessibility for resources" and "2-Phone campaigns (1 initial contact follow-up)." Figure 42 summarizes the top items of importance for respondents during disasters.

Figure 42: Survey Respondents Resilience Hubs Items of Importance – During Disasters

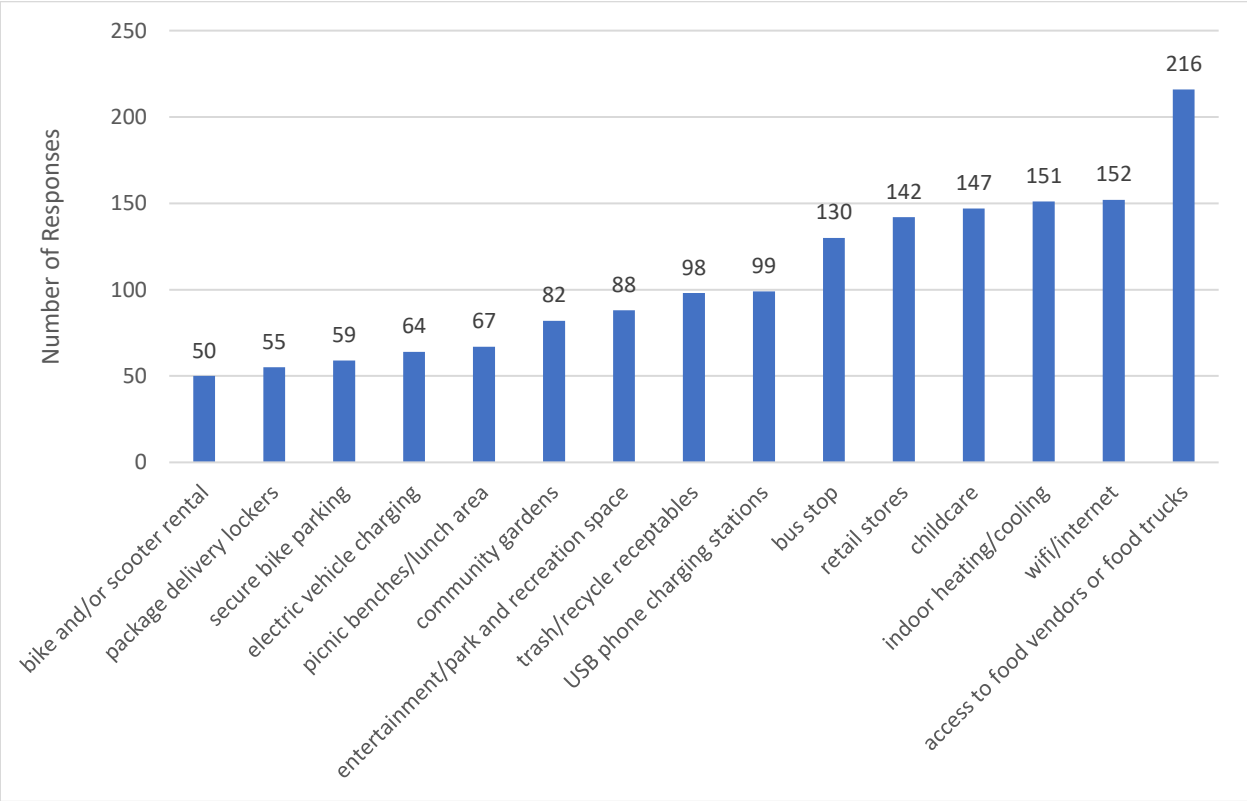


Source: Walker Consultants.

Question 6: The following items are typically provided at Resilience Hubs during day-to-day. Please choose the top five by importance to you:

In total, 361 respondents reported the top items of importance to provide at resilience hubs day-to-day, and 33 respondents skipped this question. The top five items that respondents reported were access to food vendors or food trucks, Wi-Fi/internet, indoor heating/cooling, childcare, and retail stores. Access to food vendors or food trucks had the most responses by far, with 216 responses, with the next highest selection, "Wi-Fi/internet," with 152 responses. Closely behind retail stores (142 responses), 130 respondents reported bus stops. Figure 43 summarizes the top items of importance for respondents day-to-day.

Figure 43: Survey Respondents Resilience Hubs Items of Importance – Day-to-Day

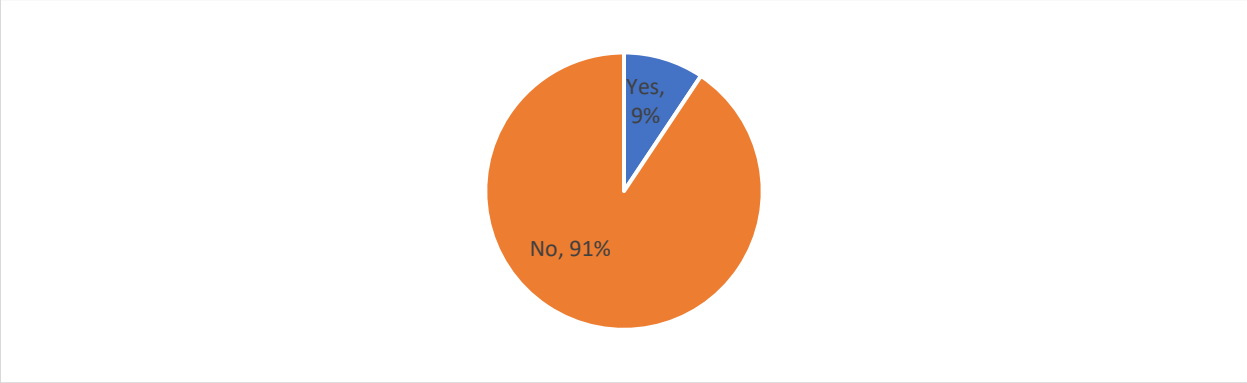


Source: Walker Consultants.

Question 7: Do you own a personal electric vehicle?

In total, 384 respondents answered the question of whether they own an electric vehicle (EV), and 10 respondents skipped this question. The majority (91 percent) of respondents indicated that they do not own an EV, and 9 percent of respondents indicated that they own an EV. Figure 44 summarizes survey respondents' EV ownership.

Figure 44: Survey Respondents' Electric Vehicle Ownership

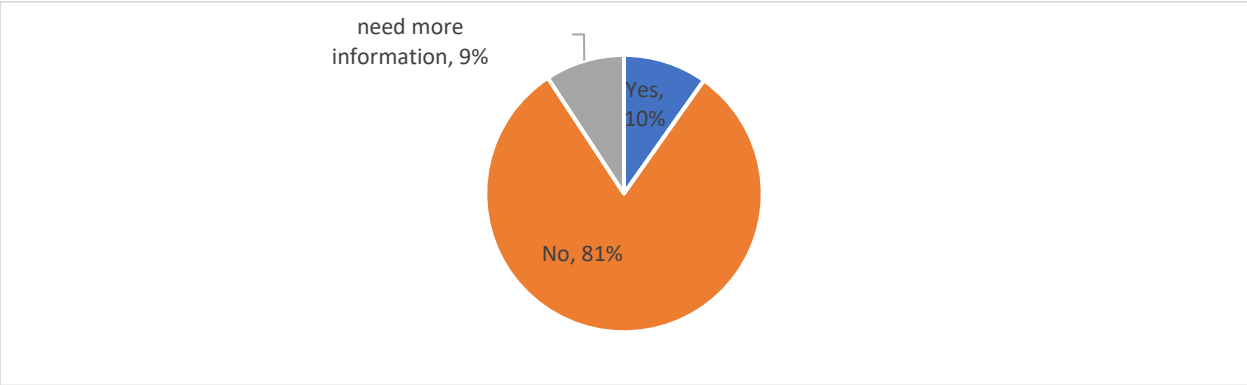


Source: Walker Consultants.

Question 8: Are you considering purchasing a personal electric vehicle?

In total, 378 respondents answered the question of whether they are considering purchasing an electric vehicle (EV), and 16 respondents skipped this question. The majority (81 percent) of respondents indicated that they are not considering purchasing an EV, 10 percent indicated they are interested in purchasing an EV, and 9 percent of respondents indicated that they need more information. Figure 45 summarizes whether survey respondents own EVs.

Figure 45: Survey Respondents' Consideration of Electric Vehicle Purchase

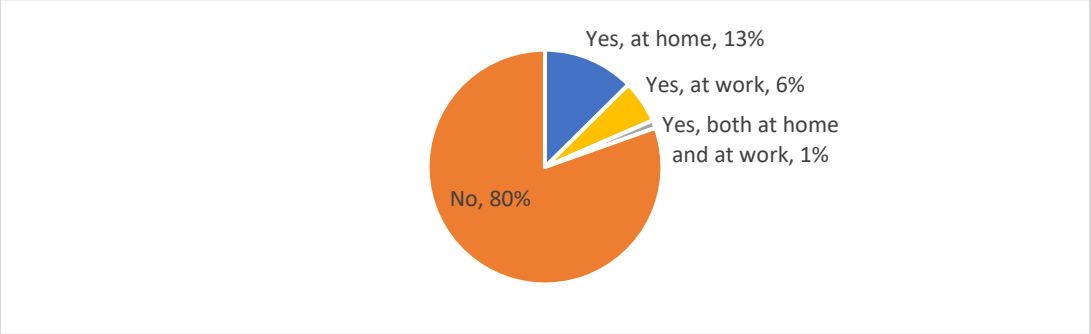


Source: Walker Consultants.

Question 9: Do you have access to electric vehicle charging at your residence or workplace?

In total, 373 respondents answered the question of whether they are considering purchasing an electric vehicle (EV), and 21 respondents skipped this question. The majority (80 percent) of respondents indicated that they do not have access to EV charging at their home or workplace, 13 percent indicated they have EV charging at home, 6 percent of respondents have charging at work, and 1 percent have charging both at home and at work. Figure 46 summarizes respondents' access to EV charging.

Figure 46: Survey Respondents' Access to Electric Vehicle Charging

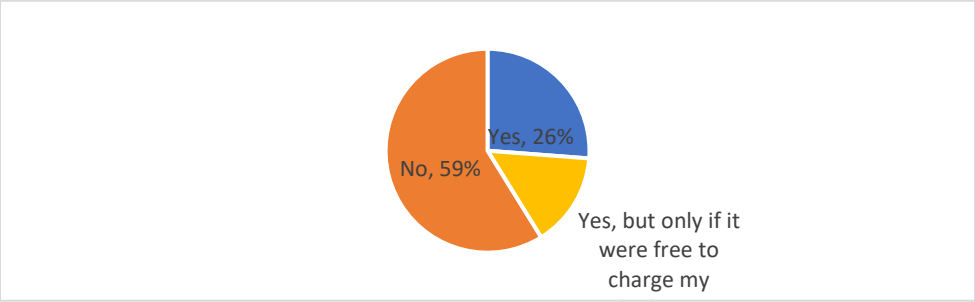


Source: Walker Consultants.

Question 10: If electric vehicle chargers were available in your community, would it incentivize you to purchase an electric vehicle?

In total, 374 respondents answered the question of whether having electric vehicle (EV) chargers available in their community would incentivize them to purchase an EV, and 20 respondents skipped this question. Over half of respondents (59 percent) indicated that having EV charging available in their community would not incentivize them to purchase an EV, 15 percent indicated they would be incentivized to buy an EV only if the charging was free, and 26 percent of respondents indicated that having EV charging would incentivize them to buy an electric vehicle. Figure 47 summarizes whether respondents would be incentivized to purchase EVs if charging was available in their community.

Figure 47: Whether Electric Vehicle Charging Incentivizes Purchase of Electric Vehicles

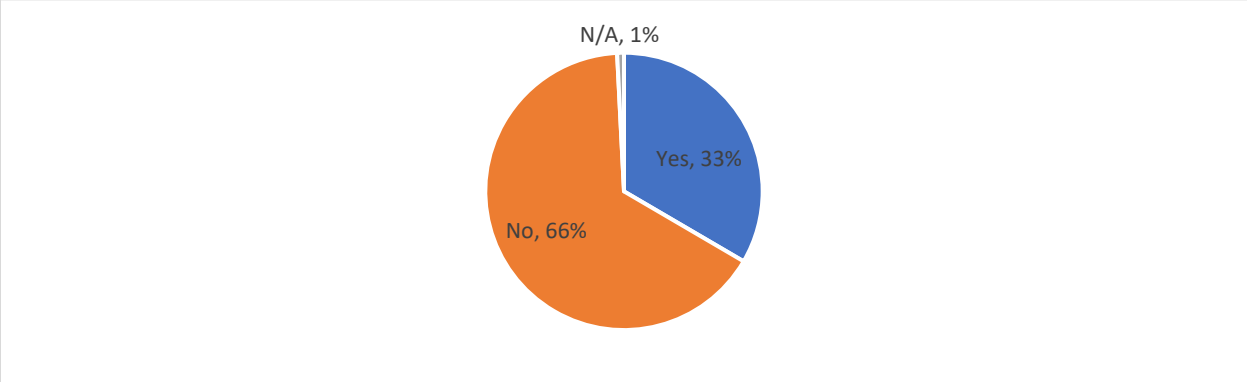


Source: Walker Consultants.

Question 11: During non-emergencies, would you be willing to pay to charge your electric vehicle?

In total, 377 respondents answered the question of whether they would be willing to pay to charge their electric vehicle (EV) during non-emergencies, and 17 respondents skipped this question. **Over half of respondents (66 percent) indicated that they would not be willing to pay to charge their EVs, and 33 percent indicated they would be willing to pay to charge their EVs**. Figure 48 summarizes whether respondents would pay to charge their EV during non-emergencies.

Figure 48: Survey Respondents' Willingness to Pay for Electric Vehicle Charging



Source: Walker Consultants.

Question 12: Would you be interested in taking a leadership role with the resiliency hub, such as planning local events or managing a community garden at the site?

Of the 363 survey respondents who responded to this question, **78 indicated they would be interested in taking a leadership role with the resiliency hub**. Of those 78 respondents, 18 respondents provided their contact information.

Community Pop-Up Events

The project team conducted in-person community outreach events to educate the community about microgrids and community resiliency hubs and inform the study. To reach the most people, the community pop-up events were designed to meet community members at locations where they are already gathering, such as food drives and farmer's markets. FCRTA held community pop-up events at the following locations:

- March 14, 2023: Parlier (Parlier City Hall) – 3:30 p.m. to 6:30 p.m.
- March 14, 2023, Fowler (Fowler City Hall) – 4:00 p.m. to 6:00 p.m.

- March 15, 2023, Reedley (Reedley City Community Center) – 4:30 p.m. to 7:00 p.m.
- March 15, 2023 Kerman (Kerman Farmer's Market) – 5:00 p.m. to 8:00 p.m.
- March 16, 2023: Firebaugh (Community Center) – 9:00 a.m. to 12:00 p.m.
- March 16, 2023 Huron (Huron Policy Department) – 3:00 p.m. to 6:00 p.m.

An event flier was created for each event in English and Spanish, with each flyer tailored to the event location, date, and time. An example of one of the event flyers is shown below.

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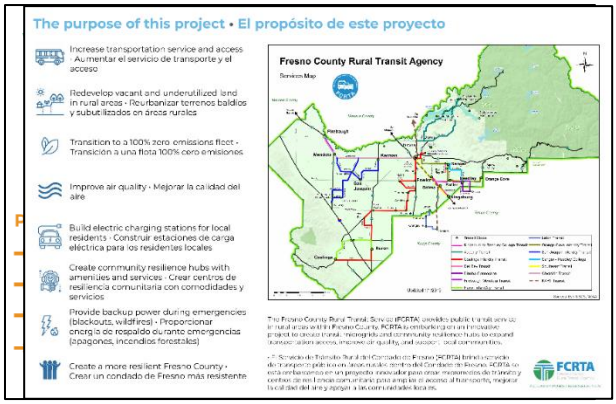
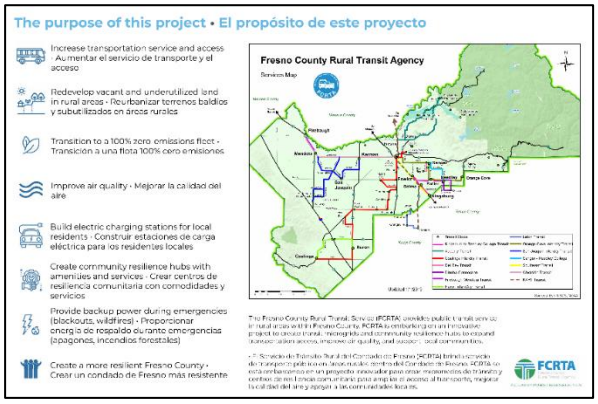
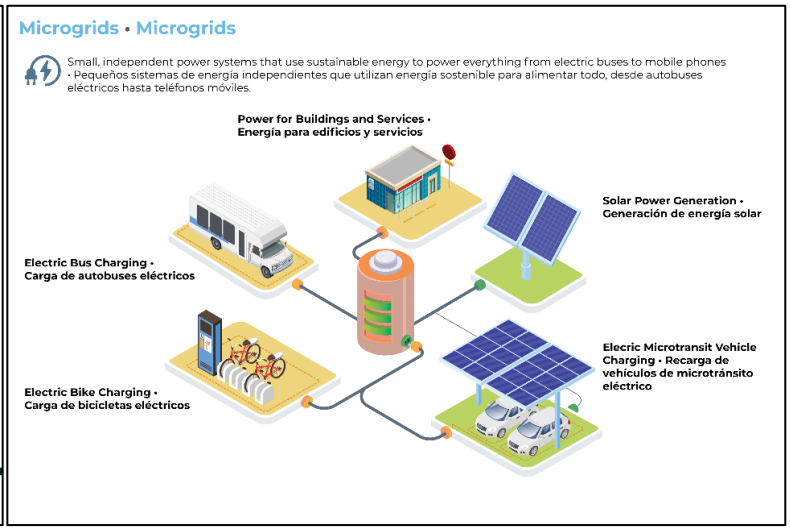
The informational materials shown in Figure 49 on page 96 were on display at the events. The purpose of the materials was to welcome participants, explain the purpose of the project, provide an overview of FCRTA's transit services, and educate participants about microgrids and resiliency hubs.

Figure 49: Community Pop-up Event Educational Materials







Event participants were provided an option to indicate their preferred amenities at mobility/resiliency hubs, as shown in Figure 50. Community members expressed interest in many of the amenities listed on the boards. The most frequent responses were:

- Wi-Fi
- Public transportation
- Phone charging
- Heating and cooling centers
- Community gardens
- Childcare
- Medical
- Alerts

Other suggestions not listed on the boards included a pharmacy, lighting, crosswalks, and work services.

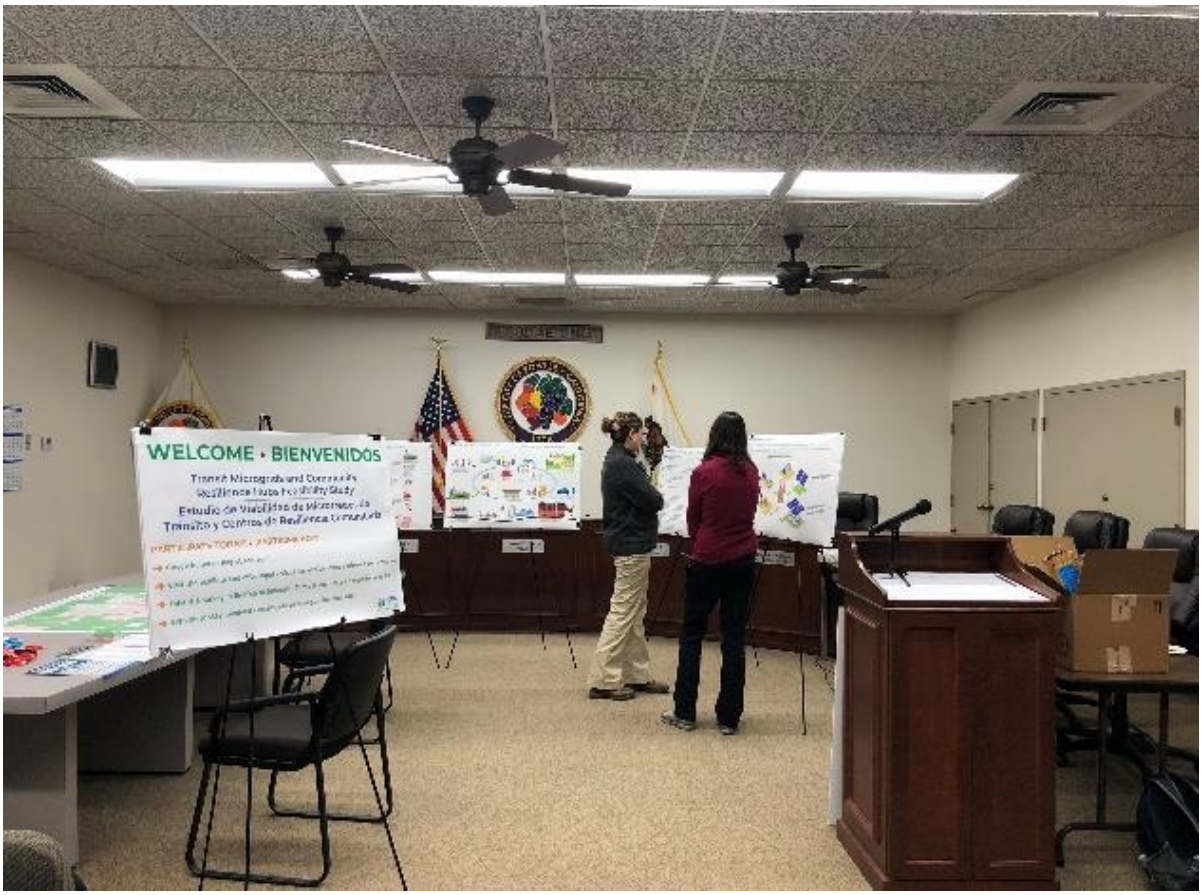
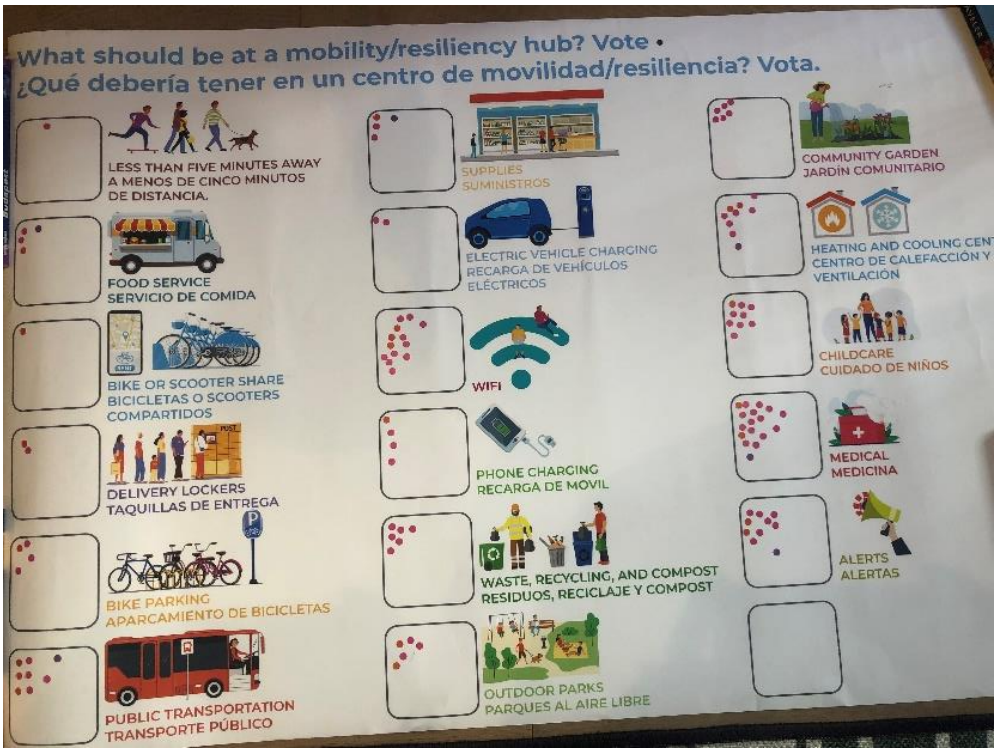
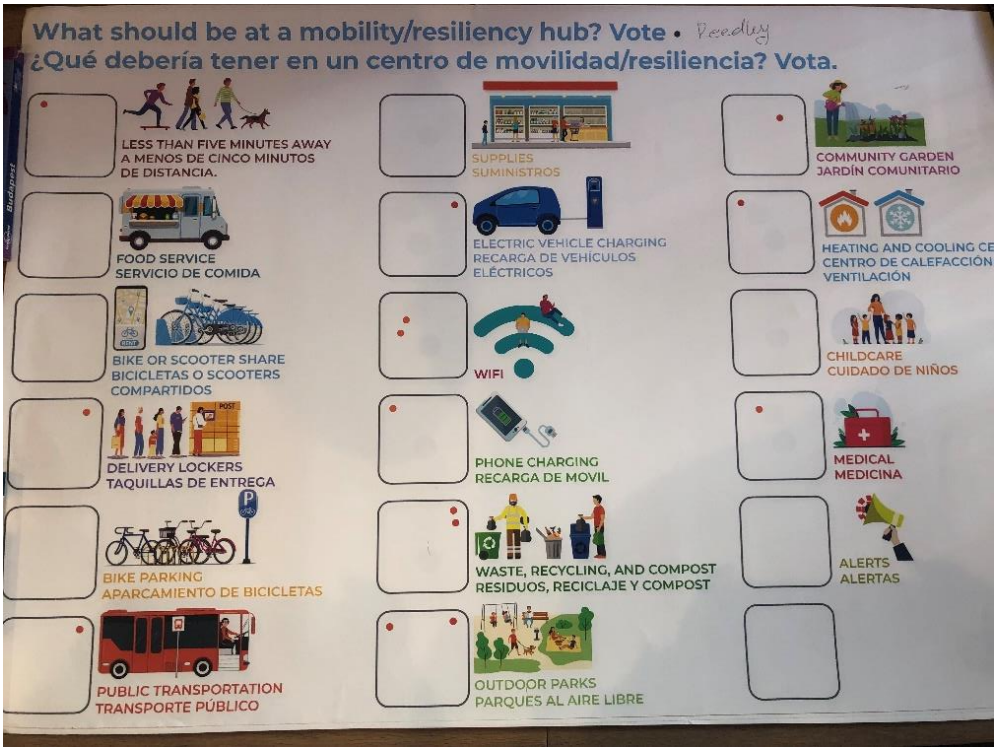


Figure 50: Participants' Mobility/Resiliency Hub Preferences

Parlier



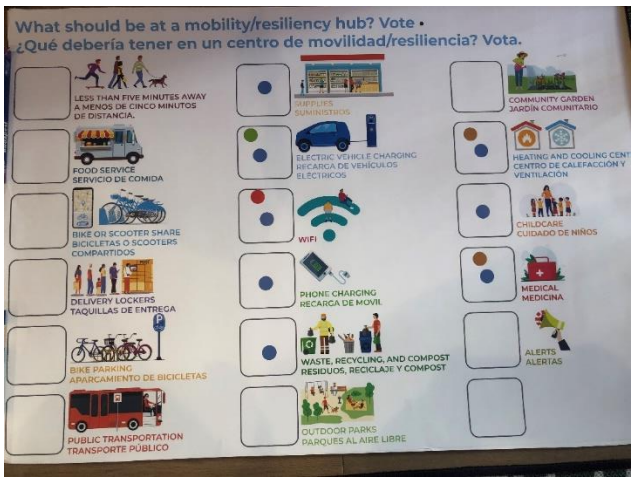
Reedley



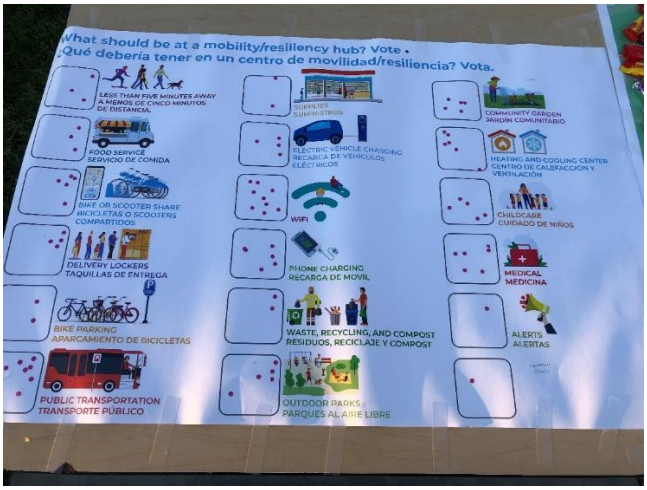
Participants' Mobility/Resiliency Hub Preference (continued)

Fowler

Huron



Kerman



To inform potential locations for a microgrid/resiliency hub, community members were asked to indicate on a map where in their community they frequently visit, as summarized in Figure 51. Overall, the most frequent responses were the following:

- Parks
- Shopping centers
- Health care centers
- Post Offices
- Library
- School
- Downtown core areas

The City where the most data was gathered was the City of Kerman and frequently visited locations in Kerman include Lions Park, Kerckhoff Park, the Post Office, Walmart, Trini's Park, and United Health. In Huron, areas frequently visited include the public library/adult school and also near Keenan Park and Huron Middle School. Fowler destinations were distributed throughout the City core area.

Figure 51: Participants' Frequently Visited Locations

06 | Fleet Transition Plan

06 Fleet Transition Plan

FCRTA Bus Rollout Plan

The State of California's Innovative Clean Transit (ICT) regulation was enacted on October 1, 2019. It requires that all public transit agencies gradually transition their fleets to zero-emission technologies. Starting in 2029, 100 percent of all transit agencies' new bus purchases must be Zero Emission Buses (ZEBs), with a goal of complete transition to ZEBs by 2040. The ICT regulation requires each transit agency to prepare a ZEB Rollout Plan to be approved by the California Air Resources Board (CARB). As part of this microgrid feasibility study, FCRTA completed its ZEB Rollout Plan on August 9, 2023 (approved Plan included in Appendix beginning on page 196.

Given the rural nature of FCRTA's services, the long distances FCRTA must travel to serve the rural communities of Fresno County, high operations and maintenance costs, and maneuverability challenges with large buses on rural roads, FCRTA is planning to decrease the size of vehicles used for service.

FCRTA plans to operate most of its intra-city on-demand services with electric passenger vans, with wheelchair accessibility (4 passengers, 2 wheelchairs). In looking at route ridership, FCRTA believes these vehicles would have sufficient capacity to accommodate FCRTA's needs while providing significant savings on purchase, operations, and maintenance costs.

FCRTA also intends to invest in 30-foot or smaller zero-emission buses (23-foot, if possible, based on manufacturing availability) that provide low-level-boarding accommodating designs to serve disabled patrons. Fleet conversion goals can vary depending on the type of services, such as microtransit, fixed route, or paratransit operations.

FCRTA will purchase buses with conventional technologies if the battery or fuel cell bus technologies are not available to meet FCRTA's needs at the time of purchase.

To meet the goal of a complete transition to zero-emission buses by 2030, FCRTA will need to replace 87 buses in their existing fleet (with a gross vehicle weight requirement greater than 14,000 pounds) by 2030. Buses phase out of their useful life benchmark (ULB) after 10 years or 150k miles (whichever comes first). Based on a review of FCRTA's operations, FCRTA has determined that only 78 vehicles must be replaced to accommodate its transit service needs.

Table 3 illustrates a schedule of new vehicle purchases that, if followed, will enable a complete conversion to battery electric buses by 2030. It should be noted that seven (7) of FCRTA's existing battery electric buses will meet their ULB before 2030, and those will need to be replaced by 2030.

Table 3: Replacement Vehicles for Buses over 14,000 pounds that will Exceed Useful Life by 2030

Year Bus Exceeds Useful Life	Bus Model	Fuel Type	Vehicle Type	# of Vehicles	Replacement Vehicle	# of Replacement Vehicles	Replacement Year
Exceeded	Bluebird	CNG	Bus	4	Not Replaced	0	N/A
Exceeded		CNG	Cutaway	27		30	2023

Exceeded	GMC Glaval Titan				Electric Passenger Van		
Exceeded	Chevy Arboc	Gasoline	Cutaway	2	Electric Passenger Van	2	2023
Exceeded	El Dorado	CNG	Bus	1	30-foot BEB	1	2023
2023	Chevy Arboc	Gasoline	Cutaway	36	Electric Passenger Van	28	2024
2026	El Dorado	CNG	Bus	7	30-foot BEB	7	2027
2026	Ford E350 Champ	CNG	Cutaway	2	Electric Passenger Van	2	2027
2027	Ford Villager	Gasoline	Bus	1	30-foot BEB	1	2028
2028	Proterra 40-foot	Electric	Bus	5	30-foot BEB	5	2029
2029	BYD K95 35-foot	Electric	Bus	2	30-foot BEB	2	2030

Source: Fresno County Rural Transit Agency

Table 4 shows the estimated costs of future electric bus purchases to convert FCRTA's fleet. The estimated costs are based on quotes received by FCRTA, applying a 3 percent annual price increase for both vehicle types.

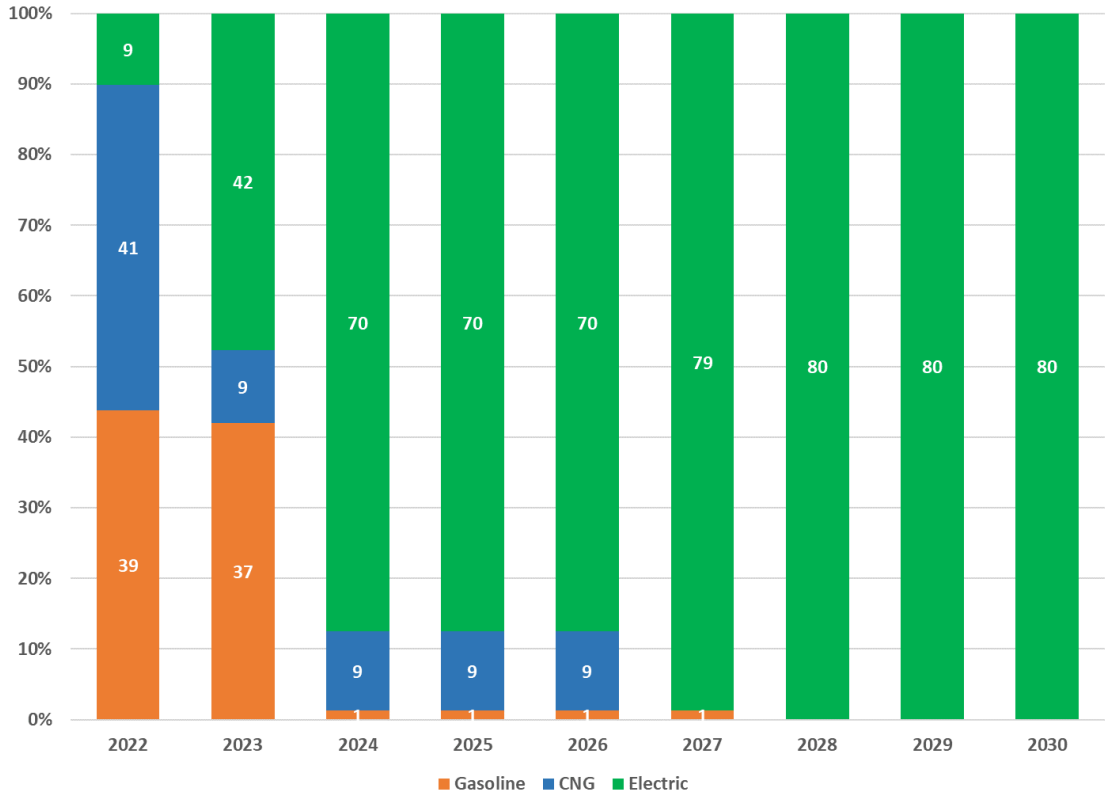
Table 4: Range and Estimated Costs of Future Zero Emission Vehicle Purchases

Timeline (Year)	Number of ZEBs	Bus Type(s)	Estimated Cost Per Vehicle	Total Estimated Cost
2023	32	Electric Passenger Van	$125,053	$4,001,681
2023	1	30-foot BEB	$727,920	$727,910
2024	28	Electric Passenger Van	$128,804	$3,606,515
2027	7	30-foot BEB	$819,280	$5,734,963
2027	2	Electric Passenger Van	$140,748	$281,495
2028	1	30-foot BEB	$843,859	$843,859
2029	5	30-foot BEB	$869,175	$4,345,873
2030	2	30-foot BEB	$895,250	$1,790,500
Total Estimated Cost				**$21,332,806**

Source: Fresno County Rural Transit Agency

FCRTA intends to procure new battery electric vehicles instead of converting aging buses to electric propulsion systems. This allows FCRTA to better calculate maintenance needs, charging times/utility rates, and a predictable understanding of bus ranges between each charging period. Figure 52 shows a fleet conversion schedule from 2022 to 2030. The schedule accounts for replacing CNG, diesel, and battery electric buses that will meet or exceed their ULBs by 2030. This conversion schedule allows FCRTA to allocate aging CNG and Gasoline buses to spare or training functions while deploying a larger BEB fleet for regular operational uses.

Figure 52: FCRTA 2030 Fleet Conversion Schedule (End of Year)



Source: Walker Consultants analysis of Fresno County Rural Transit Agency data.

07 | Site Selection

07 Site Selection

The project team developed a tiered-based scoring methodology to determine five sites for further study, considering the following qualitative and quantitative reviews.

Tier I Quantitative Review

Tier I quantitative review includes several factors the project team evaluated for each site.

- Transit system operational goals
    - FCRTA's current and future operations and need for vehicle charging. A site with an existing or planned zero emissions route that could charge at a microgrid site received a higher ranking.

- Energy assessment and ability to meet FCRTA's fleet requirements
    - Power grid capacity constraint to meet transit and community needs. A site at or over capacity received a higher ranking, as the microgrid could support additional power load.

- Partnership potential
    - FCRTA is a small agency focusing mainly on providing public transit services. A strong partner is needed to provide resources and manage the site. A site where FCRTA has a strong partnership with a local government or entity ranked to support site construction and management ranked higher. For example, cities in FCRTA's service area can provide more support overall through their planning and public works departments and, as Board members, can partner with FCRTA on projects through a memorandum of understanding. They may also have land to provide in-kind support. Many unincorporated areas have limited community institutions to support a partnership and ongoing maintenance and operations of the site. That does not rule out a microgrid in an unincorporated area; it is simply a factor for consideration, especially for Phase I development.

- Equity factors
    - CalEnviroScreen 4.0 Disadvantaged Areas or areas where vehicles would be stored to serve adjacent disadvantaged areas ranked higher. Virtually all FCRTA's service areas are considered disadvantaged or adjacent to a disadvantaged area.

Figure 53 shows the results of this review for cities and unincorporated areas. Findings show that the 13 cities in FCRTA's service areas rank higher due to their existing needs for vehicle charging and partnership support. Cities with grid constraints, such as Fowler, also rank high. Unincorporated areas rank somewhat lower than the cities, mainly due to the limited ability to provide a solid supportive partnership infrastructure and reduced need for FCRTA vehicle charging at the specific location.

Figure 53: Site Rankings Based on Tier I Criteria and Quantitative Factors

	Vehicle Charging	Transit Gaps	Energy Assessment	Partnership	Disadvantaged
	3 - Existing or planned ZEV route 1 - No planned ZEV route	3 - No current service 2 - Current rural, on-demand, or microtransit 1 - Current fixed-bus	3 - Grid is over capacity 2 - Grid is at capacity 1 - Grid has capacity	3 - High 2 - Medium 1-Low	3 - CalEnviroScreen 4.0 area (or adjacent) 1 - Not in a CalEnviroScreen 4.0 area
Cities					
Huron	3	1	1	3	3
Fowler	3	1	3	3	3
Firebaugh	3	1	1	3	3
Kingsburgh	3	1	1	3	3
San Joaquin	3	2	1	3	3
Mendota	3	1	2	3	3
Sanger	3	1	2	3	3
Orange Cove	3	1	1	3	3
Selma	3	1	3	3	3
Parlier	3	2	1	3	3
Reedley	3	1	2	3	3
Kerman	3	1	3	3	3
Coalinga	3	1	1	3	3
Unincorporated Areas					
Auberry	3	2	1	1	3
Big Sandy Rancheria	1	3	1	1	3
Biola	3	2	1	3	3
Bowles	1	3	1	1	3
Cantua Creek, El Provenir, Three Rocks	3	2	3	2	3
Caruthers	3	1	1	1	3
Centerville	1	3	1	1	3
Del Rey	3	1	1	1	3
Easton	3	1	1	1	3
Lanare	3	1	3	2	3
Laton	3	1	3	2	3
Malaga	3	1	1	1	3
Monmouth	1	3	1	1	3
Riverdale	3	2	3	1	3
Squaw Valley	1	3	1	1	3
Table Mountain Rancheria	1	2	1	1	3
Tarpey Village	1	3	1	1	3
Tombstone	1	3	3	2	3
Tranquility	2	3	1	1	3
West Park	1	3	1	2	3

Source: Walker Consultants

Tier II Qualitative Review

Based on the Tier I quantitative review, the project team selected the top-ranking cities and unincorporated areas for a Tier II qualitative review. Tier II ranking criteria included several qualitative factors that the project team explored to investigate the feasibility of developing a microgrid and multi-modal community resiliency hub based on a range of sites and considerations, including the following:

- Site readiness
    - The project team wanted to test a range of site readiness factors. This includes sites that are fully developed and infrastructure-ready (paving, lighting, adjacent building, etc.) and sites that are vacant and underdeveloped (such as dirt lots and sites with no adjacent buildings or infrastructure). This allowed the team to learn how various dynamics affect site readiness, including cost, ability to develop, and partnership needs.

- Geographic equity
    - A key factor in site selection was geographic equity across the County. The project team wanted sites both east and west of State Route 99.

- Transit equity

  - Even in areas where FCRTA has regular, fixed-route buses, service is limited. Fixed route service only runs during the day, and there is no service on weekends. Improving service across the County, where it is feasible, is one of FCRTA's goals.
  - It is important for FCRTA's service to have sites distributed across the county so that it has options to charge vehicles en route. This will permit FCRTA to expand its service.

- Community input
  - Participation in the community survey provided insights into where there is strong community support.

Based on the Tier II qualitative review, the project team selected five cities and unincorporated area sites for further study. Selected sites allow the project team to investigate various development factors. The five sites selected include:

- San Joaquin- A city, FCRTA Board member, and strong partner. The city can contribute land, which is currently an undeveloped dirt lot with no building on-site. Transit service in San Joaquin is regular but limited to two days a week. New microtransit service could be a hub, serving the surrounding areas of Cantua Creek, Three Rocks, and El Porvenir. The microgrid presents an opportunity to provide significant resiliency to the community.

- Fowler – A city, FCRTA Board member, and strong partner. The grid is over capacity. The city can contribute land, which is currently an undeveloped dirt lot adjacent to a parking lot and library. Fowler has regular fixed-route transit service and is on a route FCRTA is studying the feasibility of providing more frequent and reliable service in the form of Bus Rapid Transit on State Route 99.

- Parlier – A city, FCRTA Board member, and strong partner. The city can contribute land, currently a developed parking lot with paving and lighting, next to the on-site police station. Parlier has regular transit service, but it is limited to weekdays during the day. FCRTA is studying the feasibility of providing more frequent and reliable service in the form of Bus Rapid Transit as a spur off of a State Route 99 route. There is strong support from the Parlier community; more surveys were completed in Parlier than in all of the other cities and unincorporated areas combined.

- Biola – An unincorporated area. The Biola Community Services District is a strong FCRTA partner and can contribute land; the site is infrastructure-ready, with paving, lighting, an electric vehicle charger, and a security gate. The Community Services District building is on site. FCRTA currently services Biola and the surrounding areas with microtransit service Monday through Friday on-demand and Saturday with 24-hour advanced reservation.

- Lanare – An unincorporated area where the grid is forecasted to be constrained. A microgrid could alleviate the burden of frequent outages on the community. The community can contribute land, a parking lot that is infrastructure ready, next to the community center. Lanare has limited transit service and presents the potential for a microtransit hub, serving the surrounding areas of Laton, Riverdale, and Five Points.

Site Assessments

The following provides the site assessment and design for each of the five sites. The site assessment is based on a review of documents, drawings, regulations, building codes, and governmental structures at each site. A high-level civil review includes underlying utility infrastructure (e.g., power, water, and sewer locations), right-of-way access, traffic, and other on-site infrastructure. Grid capacity, energy, and peak demand needs were calculated based on the FCRTA vehicle fleet, charging needs, and grid capacity analysis.

A design review includes evaluating the site to accommodate FCRTA's vehicle fleet, carshare parking, bike share, charging infrastructure, and microgrid technology. It also includes modifications to support construction and implementation, such as infrastructure, technology, and passive security measures (lighting, access gates, etc.).

Cost estimates for site capital modifications and operations are at the preliminary planning level only, in 2023 dollars.

Biola: 4925 N. 7th Ave., Biola, CA 93606

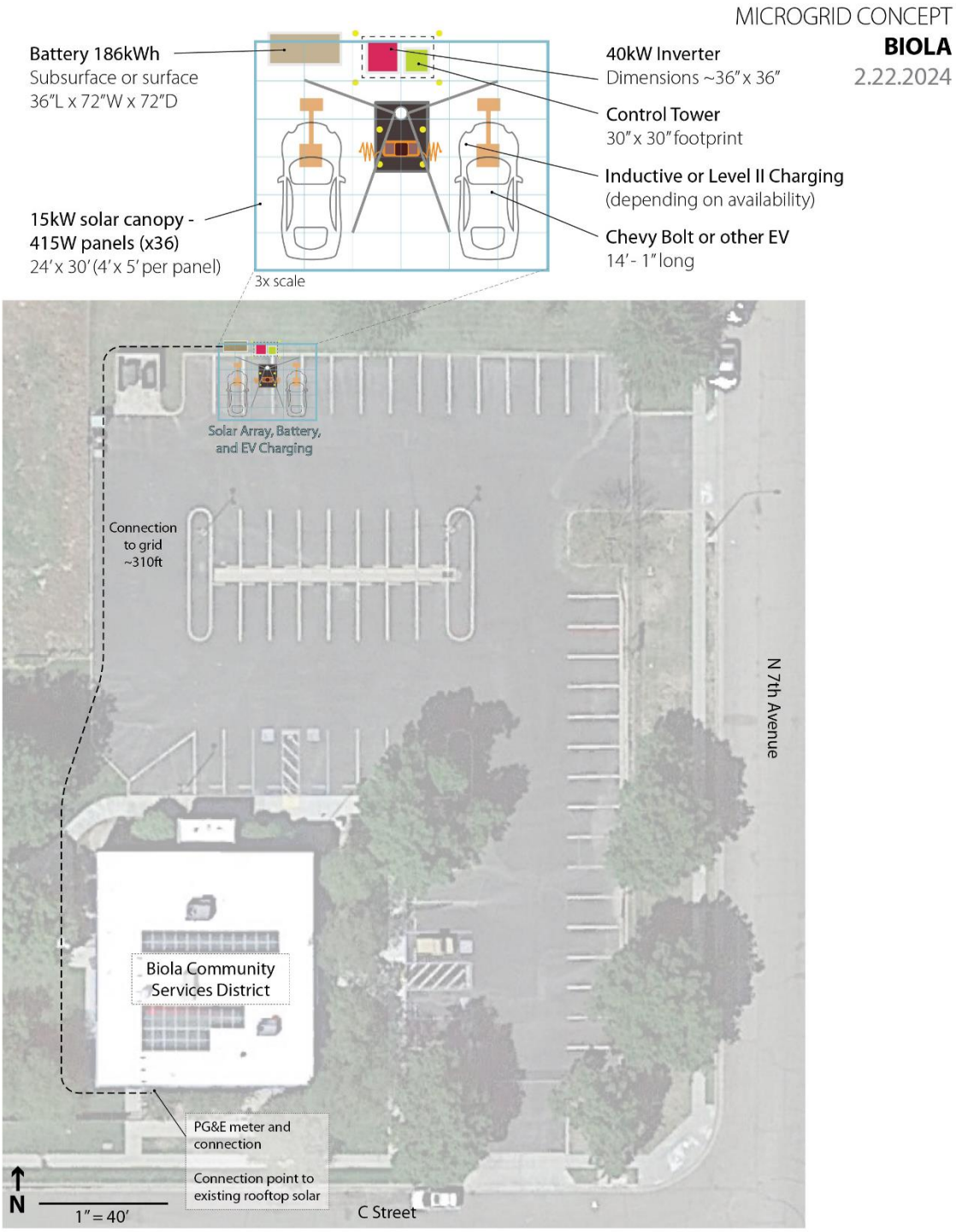
Figure 54: Biola Community Services District Site

Owner	Biola Community Services District
Current Zoning	Single Family Residential
Current Uses	5,000 square foot building serves as the Biola Community Service District's office and event center along with a 29,000 square-foot paved parking lot, including 62 parking spaces (58 standard, 4 accessible). The site also contains a trash enclosure in the northwest corner of the parking lot and a storm drain retention pond in the northwest corner of the property. The remainder of the property is a greenspace containing grass, trees, and various sitting areas with hardscape.
Civil Assessment	There are no major civil issues. The site is easily accessible from either of two approaches, N. 7th Ave. and C St. It is currently fenced with automatic gates at each drive approach. The site has electrical services with roof-top solar facilities, water service, and gas and electricity services for the existing building and parking lot lighting. The PG&E meter and connection are located on the south side of the building adjacent to 'C' Street. The site is in Flood Zone X, with minimal flood hazards per FEMA Community Map 06019C1525H, effective 2/18/2009. The site appears to drain well. There is a curb and gutter on the east side of the southern section of the parking lot and a concrete swale in the center of the northern portion of the parking lot. The swale in the center of the northern parking lot poses a potential conflict with the footings of a proposed solar array/shade structure at this location. The existing site is mostly developed with pavement and planter areas, but the general area is known to have clayey soils, which may require special design considerations for structural foundations.
Transit Service	On-demand and advanced reservation microtransit
Vehicles	Two battery electric sedans
Vehicle Chargers	Two Level II and/or inductive charging depending on availability
Microgrid/Multimodal Resiliency Hub Type	Permanent hub, power supply to on-site critical infrastructure • Community Services District building • Hub amenities are managed by the Community Services District
Microgrid Infrastructure	15 kW of solar photovoltaic panels and 186 kWh of battery storage
Power Reliability	24 hours
Site Infrastructure	Already paved with automated gates, lighting, striped parking stalls, and meter connection. EV chargers need to be installed. Electrical connections need to be installed for the charging stations and microgrid.

Cost Estimate	Total: $500,000 - $575,000*
	• **Parking lot infrastructure:** $0
	• **Connection to electrical service and site electrical needs:** $175,000 to $225,000
	• **Conduit and trenching:** $30,000 to $40,000
	  ○ If wi-fi or cellular are not available for communications, conduit and trenching for communications infrastructure may be necessary.
	• **Microgrid**
	  ○ Capital: $300,000
	  ○ Annual operating: $2,000 (energy and maintenance costs)

Source: Walker Consultants

Figure 55: Biola Example Site Design



Source: Walker Consultants

Lanare

Figure 56: Lanare Community Center Site

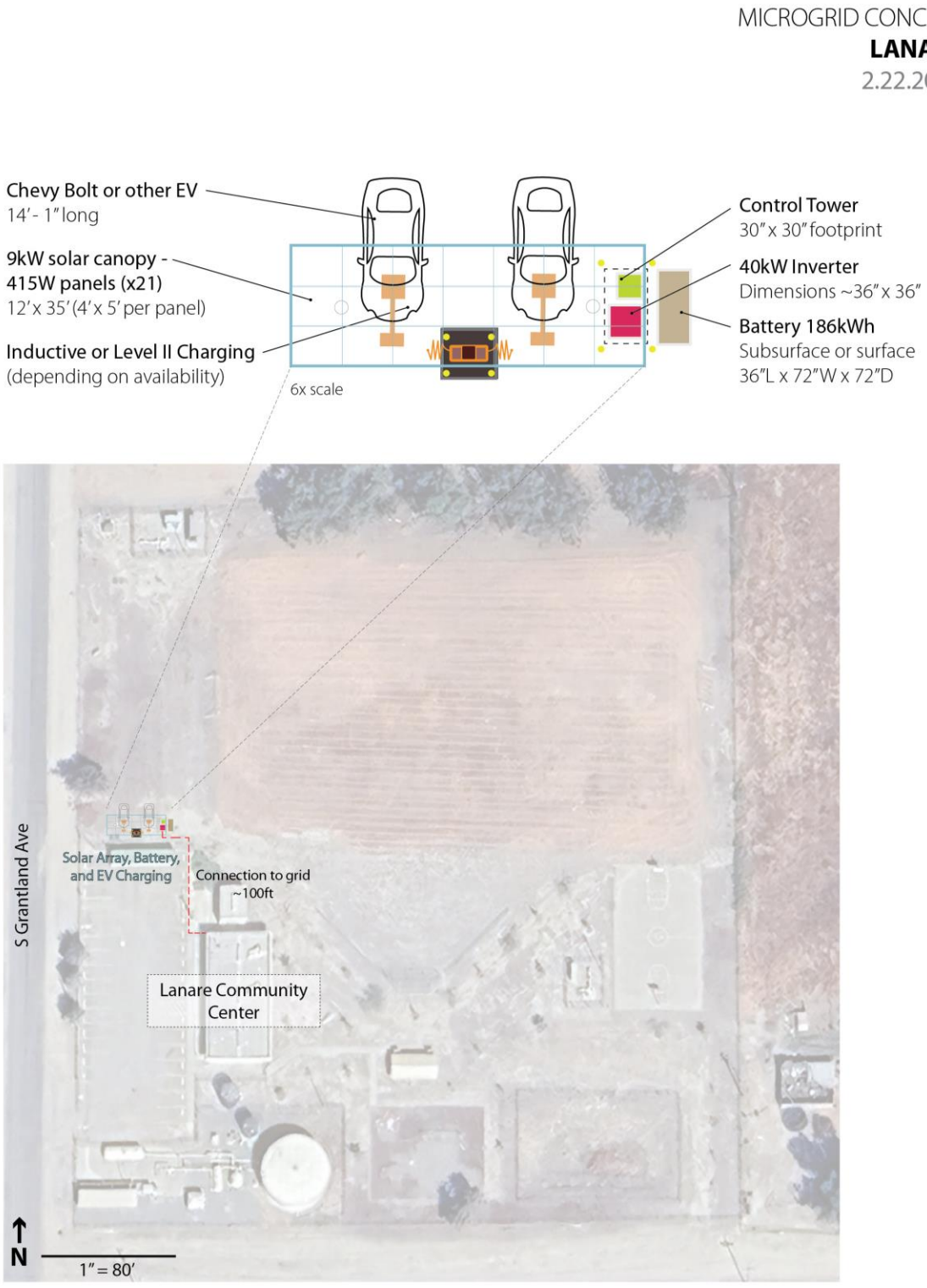
Address	20620 S Grantland Avenue, Riverdale, CA 93656
Owner	Lanare Community Services District
Current Zoning	AL20 – Limited Agricultural
Current Uses	The site contains an approximately 2,850 square foot (sf) building, which serves as the Lanare Community Center, an approximate 300 sf office district building, and 11,520 sf of paved parking lot, including 30 parking spaces (28 standard, 2 accessible). The site also contains water tanks and treatment facilities, a well site, a soccer field on the northern half, a basketball court in the northeast corner, a baseball backstop, a playground, and a 375 sf restroom building in the center of the site, and a drainage basin in the southeast corner. Presently, there is a temporary storage container on the north end of the parking lot. Approximately half of the site area is undeveloped. There is an unpaved, unnamed alley/road along the southern side of the site.
Civil Assessment	There are no major civil issues. The site is approximately seven miles west of State Route 41 at the intersection of Mt. Whitney Ave. The site is easily accessible from either of the two drive approaches from S. Grantland Ave. The site is currently fenced with manual rolling gates at each drive approach. Grantland Ave. is a two-lane county road, and the shoulder is often used for parking during community events at the site. There is also gated access off the unpaved road near the site's southeast corner. The site has electrical, water, and telephone/cable service to the existing buildings, groundwater wells, water treatment facilities, and parking lot lighting. The electrical service meter, transformer, and other equipment are located in the parcel's northwest corner.

	The site is in Flood Zone X, an area of minimal flood hazard per FEMA Community Map 06019C2875J, effective 1/20/2016. The site appears relatively flat, but the improved areas drain by surface flow towards Grantland Ave. There appears to be a grated storm drain inlet off the site's southwest corner, but it is unclear what this inlet connects to or where it drains. The site is only partially developed, so it is likely that the proposed batteries and other equipment could be located in the northern, middle, or eastern parts of the site. The general area is known to have subsurface soils with layers of sand underlain with thicker layers of clayey soils, which may require special design considerations for structural foundations. The site is designated as Public Facilities with uses for a community center in the Lanare Community Plan.
Transit Service	On-demand and advanced reservation microtransit
Vehicles	Two battery electric sedans
Vehicle Chargers	Two Level II and/or inductive charging depending on availability
Microgrid/Multimodal Resiliency Hub Type	Permanent hub, power supply to on-site critical infrastructure • Community Center • Hub amenities are managed by the Community Center
Microgrid Infrastructure	9 kW of solar photovoltaic panels and 186 kWh of battery storage
Power Reliability	24 hours
Site Infrastructure	Improved with parking and lighting. Fencing, automated gates, and EV chargers need to be installed. Electrical connections will need to be installed for the charging stations and microgrid.

Cost Estimate	Total: $525,000 - $650,000*
	• Parking infrastructure: $75,000 to $125,000
	• Connection to electrical service and site electrical needs: $150,000 to $200,000
	• Conduit and trenching: $50,000 to $65,000
	• If wi-fi or cellular are not available for communications, conduit and trenching for communications infrastructure may be necessary
	• Microgrid
	  • Capital: $250,000
	  • Annual operating: $2,000 (energy and maintenance costs)

Source: Walker Consultants

Figure 57: Lanare Example Site Design



Source: Walker Consultants

Parlier

Figure 58: Parlier Police Department Site

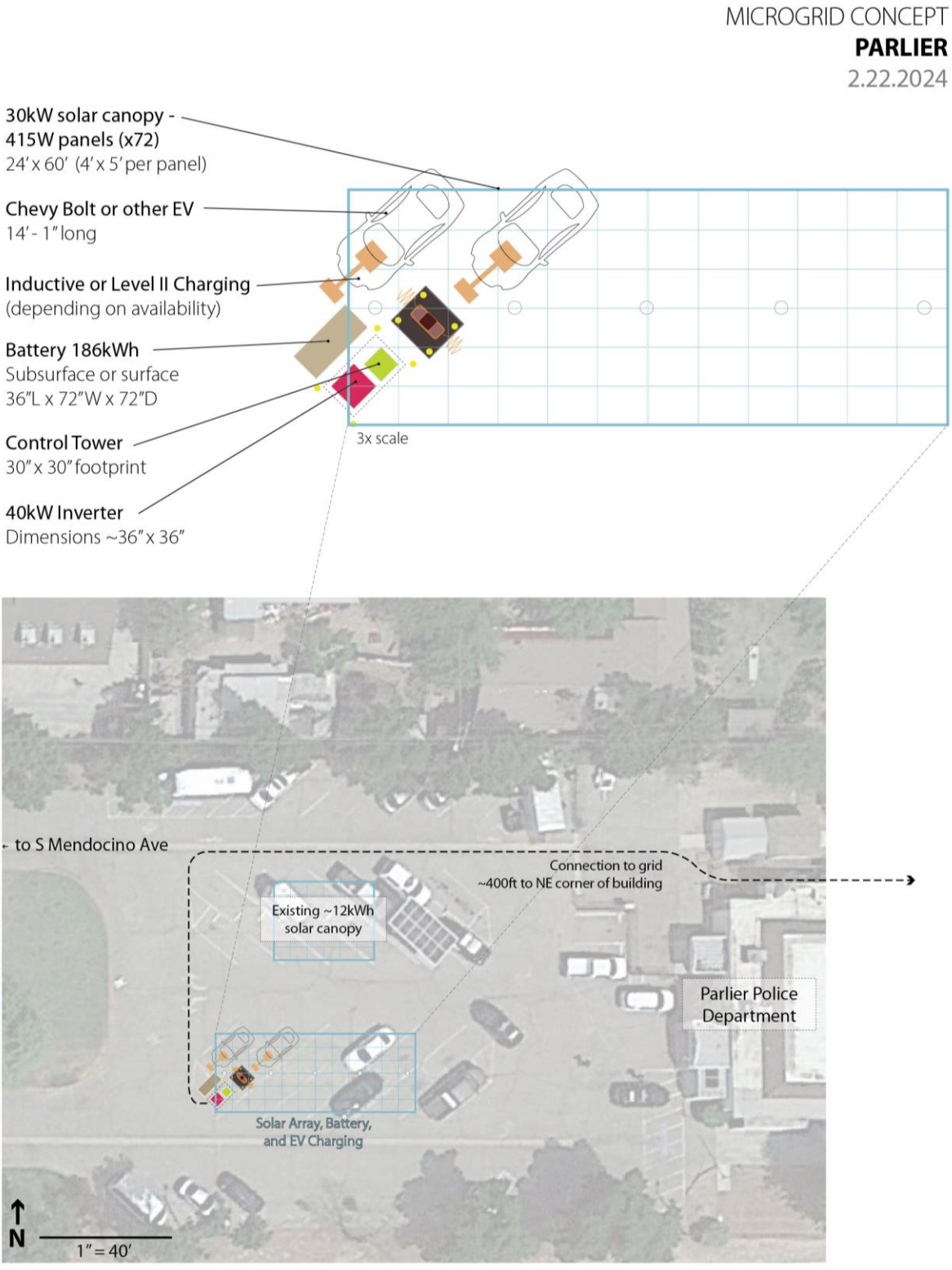
Address	8770 S. Mendocino Avenue, Parlier, CA 93648
Owner	City of Parlier
Current Zoning	PF – Public Facilities
Current Uses	The existing site is the location of the Parlier Police Department on a 2.34-acre parcel owned by the City of Parlier. The site contains an approximately 10,500 square foot (sf) building that acts as their community police department, a 22,500 sf paved parking lot to the west, which includes approximately 42 parking spaces (40 standard, 2 accessible) and an approximately 8,000 sf newly constructed paved parking lot to the east which includes about 32 parking stalls (30 standard, 2 accessible). The site also contains an approximately 8,500 sf green space area on the west portion of the property.
Civil Assessment	There are no major civil issues. The site is approximately six miles east of State Route 99 at the intersection of Manning Avenue. The site is easily accessible from either of the two drive approaches along S. Mendocino Ave. The eastern part of the site is fenced, while the western part of the property is open. Mendocino Avenue is a two-lane, divided road that appears to be fully developed. There is also a drive approach off of Tuolumne Street that provides access to the adjacent out lot to the south of the subject property, which is currently owned by a separate entity. The site has electrical, water, and telephone/cable services for the existing buildings, as well as temporary EV charging, photovoltaic shade structures, and parking lot lighting. The electrical service meter, transformer, and other equipment are located on the northeast corner of the building. The site is in Flood Zone X, with minimal flood hazards per FEMA Community Map 06019C2660H, effective 2/18/2009. The site appears to be relatively flat, but the improved areas drain by surface flow from east to west towards S. Mendocino Avenue. There is an existing storm drain inlet on the northwest corner of Mendocino Avenue and Tuolumne Street, which appears to connect to a public storm drain system located in Tuolumne Street. The site is almost fully developed, though the planned use of the existing parking lot is still being determined once the new parking lot is usable. It is likely that the proposed batteries and other equipment could be located on the western part of the site with existing open green space.
Transit Service	On-demand and advanced reservation microtransit
Vehicles	Two battery electric sedans

Vehicle Chargers	Two Level II and/or inductive charging depending on availability
Microgrid/Multimodal Resiliency Hub Type	Permanent hub, power supply to on-site critical infrastructure • Parlier Police Department • Hub amenities are managed by the City of Parlier
Microgrid Infrastructure	30 kW of solar photovoltaic panels and 186 kWh of battery storage
Power Reliability	24 hours
Site Infrastructure	Improved with parking and lighting. Fencing, automated gates, and EV chargers need to be installed. Electrical connections will need to be installed for the charging stations and microgrid.

Cost Estimate	Total: $600,000 - $700,000*
	• **Parking lot infrastructure:** $100,000 - $150,000
	• **Connection to electrical service and site electrical needs:** $150,000 to $200,000
	• **Conduit and trenching:** $20,000 to $25,000
	  ○ If wi-fi or cellular are unavailable for communications, conduit and trenching for communications infrastructure may be necessary.
	• **Microgrid**
	  ○ Capital: $325,000
	  ○ Annual operating: $2,500 (energy and maintenance costs)

Source: Walker Consultants

Figure 59: Parlier Example Site Design



Source: Walker Consultants

Fowler

Figure 60: Fowler Library Site

Address	No formal address; between 116 7th Street (Dataworks) and 312 7th Street (Library
Owner	The City of Fowler, Building owned by Fresno County
Current Zoning	M1 – Light Industrial
Current Uses	The site has an existing parking lot, a city storage yard, and a stormwater basin. The parking lot serves the adjacent Fresno County Library – Fowler Branch and consists of approximately 10,000 square feet of concrete pavement with striping for 36 standard parking stalls and two (2) solar powered electric vehicle charging stations (EVCS). The parking lot's perimeter is green space consisting of trees and ground cover. Chain-linked and barbed wire fencing separates the parking lot from the basin, and a block wall separates the library parcel from the basin.

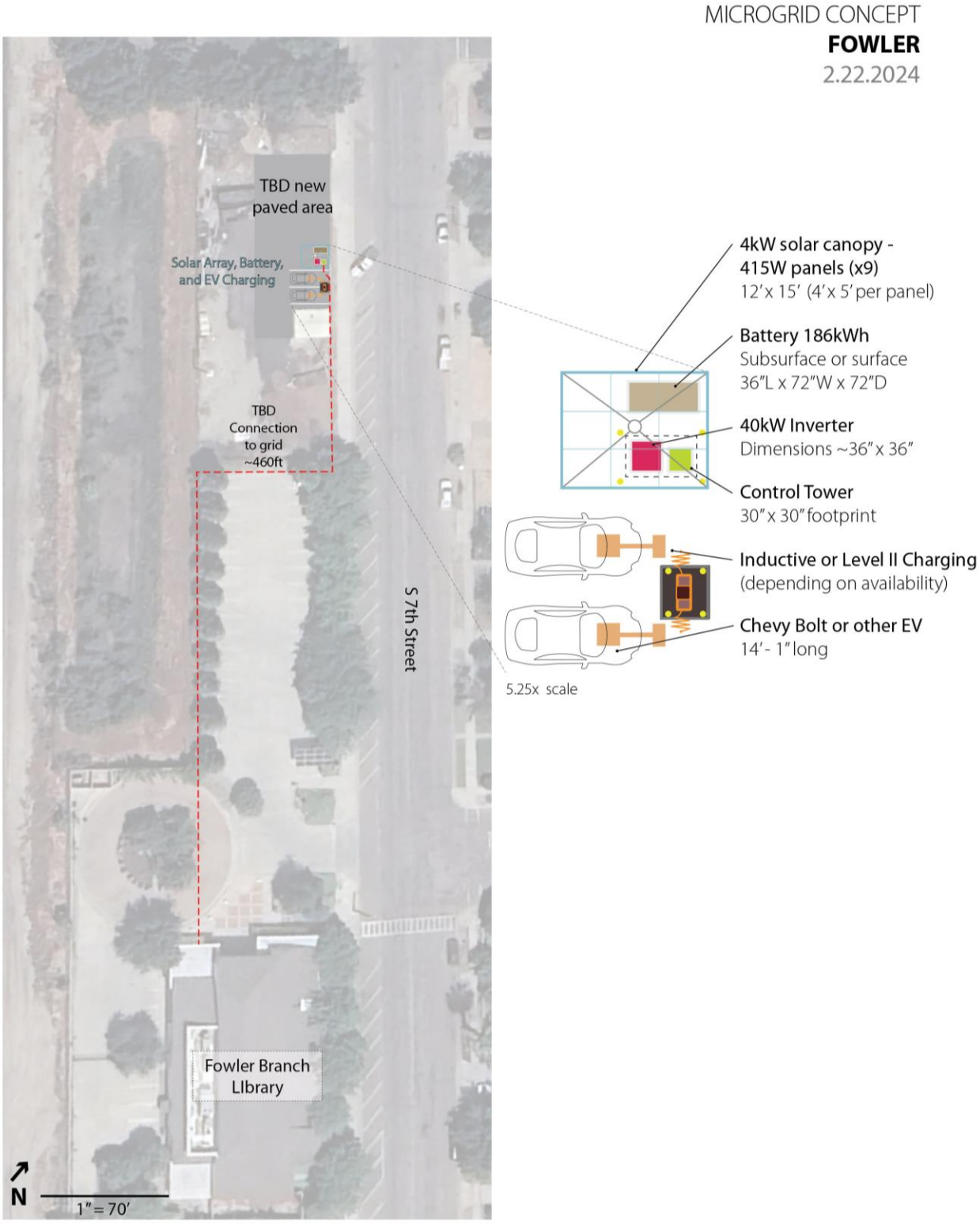
	The City storage yard is located just northwest of the library parking lot. It has perimeter chain-linked and barbed wire fencing around the entire site, and the only permanent on-site improvement is a single site light on a wooden pole, which is fed from overhead electrical wiring from a site light on the parking lot. The stormwater basin is located southwest of the existing parking lot and storage yard and receives stormwater from the municipal storm drain system on 7th Street.
Civil Assessment	There are no major civil issues. The parking lot site is accessible from a single drive approach off S. 7th St. and is not fenced. The storage yard is accessible from a single drive approach off S. 7th St., and the yard is currently fenced with a manual gate at the drive approach. The City has preliminary designs for a secondary driveway extending from the northwest end of the parking lot through a portion of the yard and connecting to a new drive approach off 7th St. Golden State Boulevard, a major regional arterial, is parallel to and on the opposite side of the railroad tracks to the southwest of the site, accessible from both Merced St. and Vine St. The nearest on-/off-ramp to State Route 99 is approximately ½-mile away from the site at Merced St. The parking lot site has electrical service for site lighting and the building, communication lines, and water service for irrigation. The library parcel's water supply is near the building's southeast corner. All utilities stub off underground main lines in 7th St. The storage yard site does not appear to have any site utilities of its own; electrical power for the one site light is fed from the parking lot. The site is in Flood Zone X, an area of minimal flood hazard per FEMA Community Map 06019C2143H, effective 2/18/2009. The improved site appears to have adequate surface drainage out to 7th St. The storage yard has no formal drainage improvements but can be graded to drain to 7th St. There are curb inlets to the municipal storm drain system off the northeast corner of the storage yard and at the intersection of 7th St. and Vine St. It doesn't appear that any of the site drains directly to the adjacent stormwater basin. The existing site is partially developed with concrete pavement and planter areas, but the general area is known to have sandy soils, which typically don't require special design considerations for structural foundations.
Transit Service	On-demand and advanced reservation microtransit
Vehicles	Two battery electric sedans
Vehicle Chargers	Two Level II and/or inductive charging depending on availability
Microgrid/Multimodal Resiliency Hub Type	Permanent hub, power supply to on-site critical infrastructure • Public Library • Hub amenities are managed by the City of Fowler
Microgrid Infrastructure	4 kW of solar photovoltaic panels and 186 kWh of battery storage

Power Reliability	24 hours
Site Infrastructure	The City storage yard is assumed to be converted into a parking lot. It needs to be graded and paved with parking space striping, fencing and automated gates, lighting, EV chargers, and electrical connection installed.

Cost Estimate	Total: $1M - $1.25M*
	• Parking infrastructure: $500,000 to $650,000
	• Connection to electrical service and site electrical needs: $225,000 to $275,000
	• Conduit and trenching: $30,000 to $40,000
	  ○ If wi-fi or cellular are not available for communications, conduit and trenching for communications infrastructure may be necessary
	• Microgrid
	  ○ Capital: $250,000
	  ○ Annual operating: $2,000 (energy and maintenance costs)

Source: Walker Consultants

Figure 61: Fowler Example Site Design



Source: Walker Consultants

San Joaquin

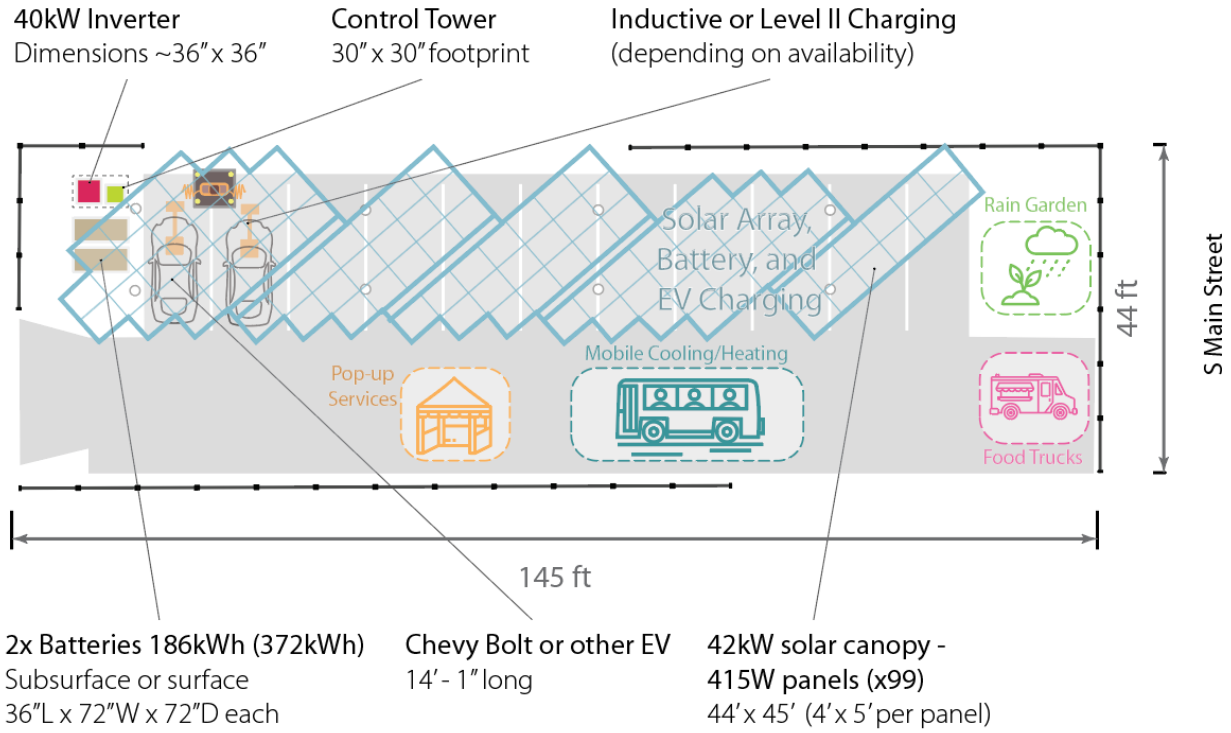
Figure 62: San Joaquin Main Street Site

Address	No formal address; on South Main Street APN 033-093-15t
Owner	City of San Joaquin
Current Zoning	C-MS Main Street Commercial
Current Uses	Vacant lot
Civil Assessment	The site is accessible from the existing alley that runs along the southeast boundary of the site and Main Street. It is not secure, and there is no perimeter fencing. Manning Ave., a major arterial, runs just south and intersects W. Colorado Ave. at a four-way stop sign. This is anticipated to be the main route to the project site. Water and sewer services appear to be available and located in the alley. Aerial electrical lines run down the alley, and it may be assumed that distribution is available at this site. There are no signs that the property currently has existing utility services. An electrical meter or point of connection could not be identified. However, the existing power pole in the south corner of the property appears to be the most likely location for an electrical point of connection. The site is in Flood Zone X, an area of minimal flood hazard per FEMA Community Map 06019C2550H, effective 2/18/2009. The undeveloped property appears to slope from southeast to northwest and has no stormwater drainage facilities onsite. The site is entirely undeveloped and various layouts could be considered. The general area is known to have clayey soils, which may require special design considerations for structural foundations.
Transit Service	On-demand and advanced reservation microtransit
Vehicles	Two battery electric sedans
Vehicle Chargers	Two Level II and/or inductive charging depending on availability
Microgrid/Multimodal Resiliency Hub Type	Permanent hub, power supply to on-site critical infrastructure • Hub amenities managed by the City of San Joaquin
Microgrid Infrastructure	42 kW of solar photovoltaic panels and 372 kWh of battery storage
Power Reliability	24 hours
Site Infrastructure	Since the site has not been improved, it will need grading and paving with parking space striping, fencing and gates, lighting, EV chargers, and electrical connection.

Cost Estimate	Total: $1.6M - $1.9M*
	• **Parking infrastructure:** $800,000 to $1
	• **Connection to electrical service and site electrical needs:** $150,000 to $200,000
	• **Conduit and trenching:** $20,00 to $25,000
	  ○ If wi-fi or cellular are not available for communications, conduit and trenching for communications infrastructure may be necessary
	• Microgrid
	  ○ Capital: $600,000
	  ○ Annual operating: $3,500 (energy and maintenance costs)

Source: Walker Consultants

Figure 63: San Joaquin Example Site Designs



Source: Walker Consultants

The following designs illustrate how leveraging the microgrid investment into building a multimodal community resiliency hub at the microgrid site has the potential to transform the site and the surrounding community. As the San Joaquin example designs show, the hubs can convert the existing vacant site into a community hub that provides transportation amenities such as e-bike share, electric vehicle charging, rideshare, bus service, and microtransit. Space for food vendors supports local businesses and community gardens and gathering areas provide a "town square" atmosphere. Other amenities include Wi-Fi, phone charging, and wayfinding and signage. The site is powered by microgrid solar panels and battery storage, which are tied to the central grid and supported by an intelligent energy management system to provide energy efficiency and resiliency.

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

Example prototype of the San Joaquin Microgrid and Multimodal Community Resiliency Hub *(for illustrative purposes only)*

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08 | Site Energy Assessments

08 Site Energy Assessments

This section describes the microgrid optimization modeling process for each of the five selected sites.

- Parlier
- San Joaquin
- Lanare
- Biola
- Fowler

The site selection process also involved engagement with community planners and managers to align each selected site and its site assumptions with each community's goals and zoning plans. Recommended sites from city stakeholders fostered community engagement and emphasized the importance of community partnership in the process.

Although PG&E microgrid programs for FTM microgrids were considered, ultimately, all microgrid sites were configured as BTM to streamline the planning process and manage utility engagement costs and barriers. FTM microgrid configurations require more comprehensive interconnection processes and engineering requirements that are likely to prolong the planning and implementation of these transit and community resilience hubs and potentially delay the community benefits they bring.

Each site's key data were configured in a microgrid optimization model to identify the optimal resource mix by reliability requirement. Microgrid battery storage and solar PV costs were estimated using a combination of the National Renewable Energy Laboratory's (NREL) Annual Technology Baseline (ATB) and existing vendor prices from FCRTA engagements at other sites. The ATB's small commercial renewables pricing forecast was used for all sites. Battery storage capital costs also included a 10-year operational license to an energy management system. Microgrid resource costs used in the optimization are described in Table 5 below.

Table 5: Microgrid Resource Key Assumptions

Resource	Capex		Opex	Lifetime
	$/kWh	$/kW	$/kW/year	year
Solar PV	$ -	$ 3,614	$ 17	20
Battery Storage	$ 1,172	$ -	$ 58	10

It is important to note that each site's battery storage was limited to stackable, 186 kWh step changes in size to align with products in the local market, resulting in significant step changes in cost if kWh reliability requirements exceeded a 186-kWh increment.

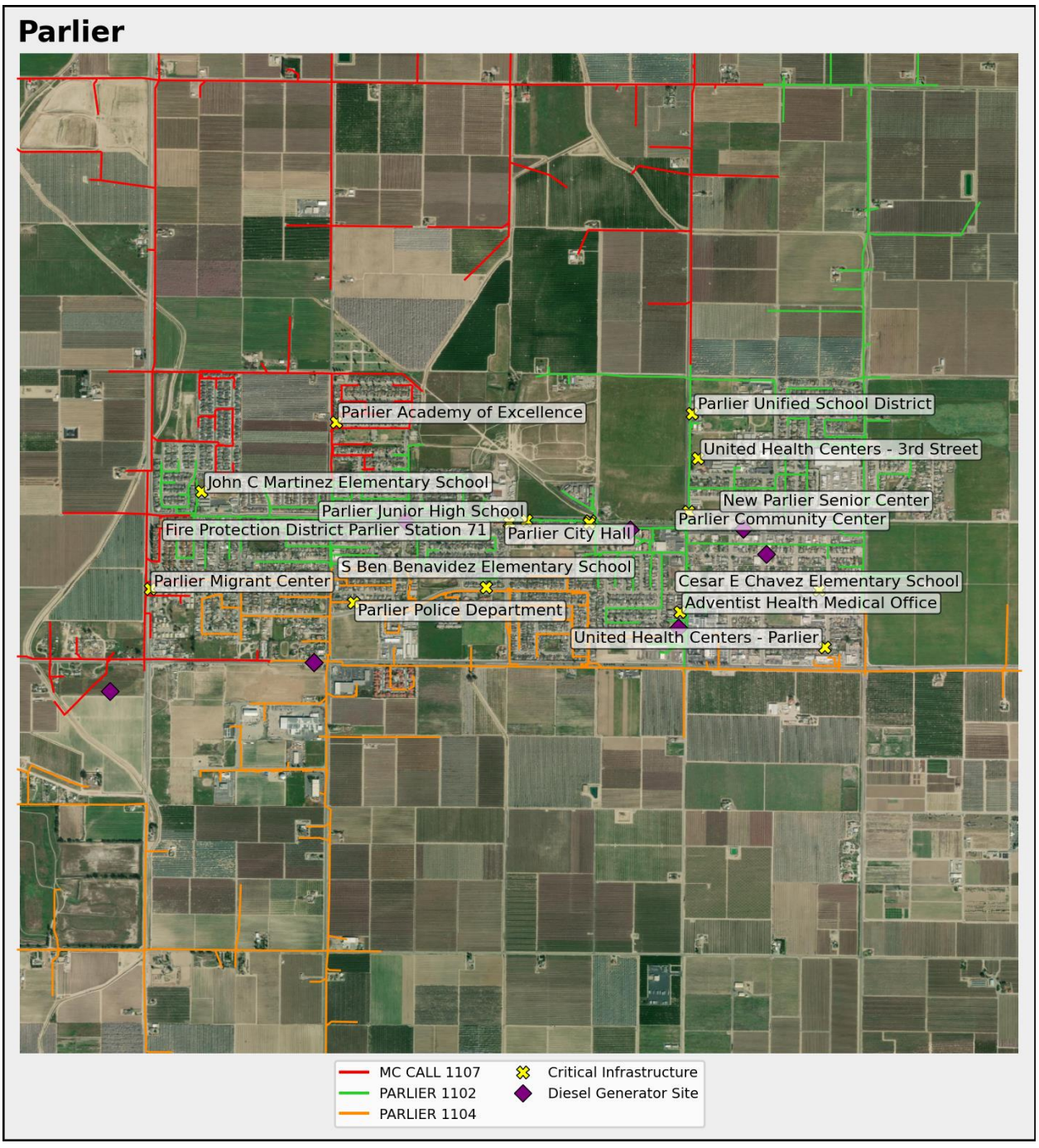
The following sections describe site-specific details, selected energy system sizing results, and cost results, categorized into:

- Financial Impacts – Annual operating expenses compared to business-as-usual transit operation expenditures
- Economic Impacts – Annual operating expenses, including upfront investment costs annualized over the lifetime of the microgrid resources
- Investment Impacts – Total upfront capital investment costs of microgrid resources

Parlier

Through engagement with City stakeholders, the Parlier Community Center and Police Department were considered as resilience hub site candidates due to infrastructure criticality and vacant space for microgrid resources and parking. A microgrid that included both sites was also considered, however the sites are served by different distribution feeders, shown below, making interconnection challenging. Neither feeder was forecasted to be constrained in the forecast period out to 2040.

Figure 64: Community View of Parlier



Source: Energeia Analysis, PG&E (2023)

The Parlier Police Department was ultimately selected for the site. Part of the reason was that its existing 12 kW of solar PV could contribute to the resilience hub's backup reliability requirement, potentially reducing upfront investment costs.

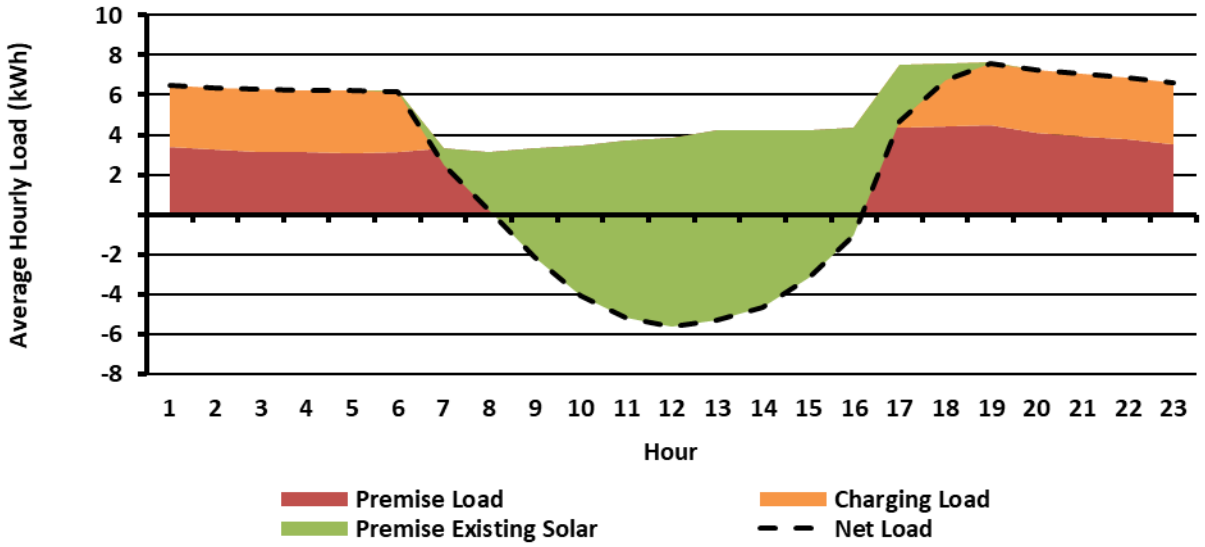
The selected Police Department lot is shown below, including its parking lot canopy of solar PV generation.

Figure 65: Zoomed View of Parlier Police Department

Source: Energeia Analysis, PG&E (2023)

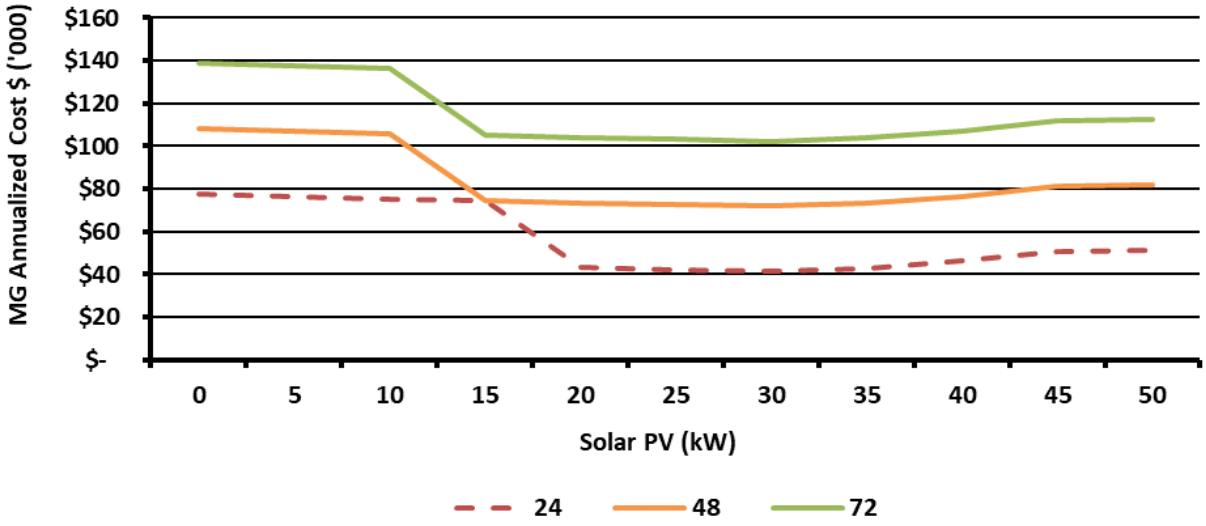
Based on the site's estimated FCRTA charging profile, Parlier Police Department load profiles, and existing solar PV, shown below in Figure 66, a solar-storage co-optimization analysis was undertaken, and the least cost solar PV sizing was identified across the three reliability levels, which is reported in Figure 67.

Figure 66: Parlier Resilience Hub Average Hourly Load Profile – Net of Existing Solar PV



Source: Energeia Analysis

Figure 67– Parlier Solar PV Sensitivity Analysis by Reliability Requirement



Source: Energeia Analysis

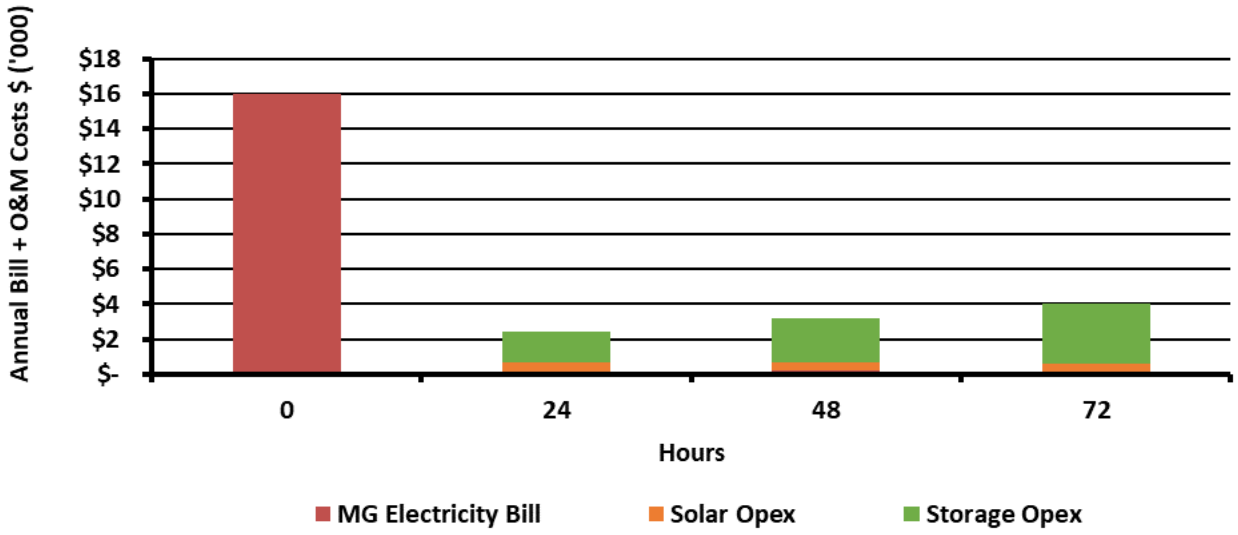
The above results show that the least-cost configuration was 30 kW of solar PV, however 20 kW was selected as it provides comparable reliability at a significantly lower upfront capital cost.

Financial Impacts

Under a business-as-usual (BaU) scenario without any microgrid resource, the estimated annual electricity bill was modeled to be ~$16,000.

Under a 20-kW solar PV system and 186, 372, or 558 kWh battery configuration for each reliability level, respectively, the estimated annual costs were reduced by ~$12-14,000, including ongoing operation and maintenance costs. This is what the site owner would see from the microgrid.

Figure 68: Parlier Annual Operating Costs by Reliability Requirement



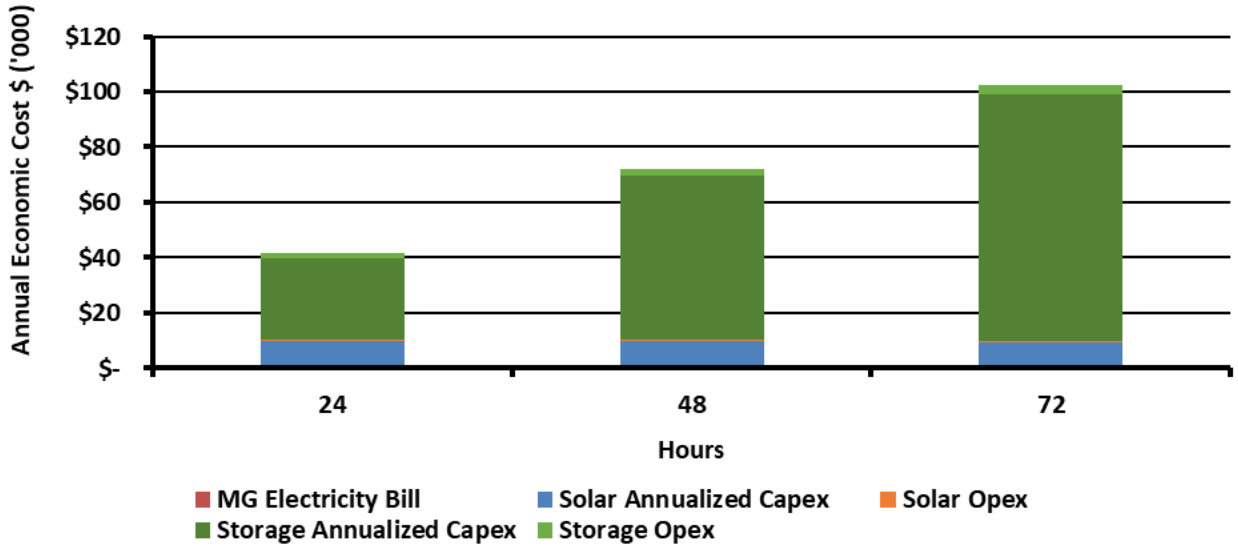
Source: Energeia Analysis

Economic Impacts

Economic impacts consider all economic costs and benefits on a levelized basis using annuitized capital costs and annual operating costs.

Economic microgrid costs ranged from ~$40,000 to over $100,000 on an annualized basis, with most of the cost coming from battery storage, as the reliability requirement in kWh provides backup for both FCRTA's transit fleet and the Parlier Police Department.

Figure 69: Parlier Annual Economic Costs by Reliability Level

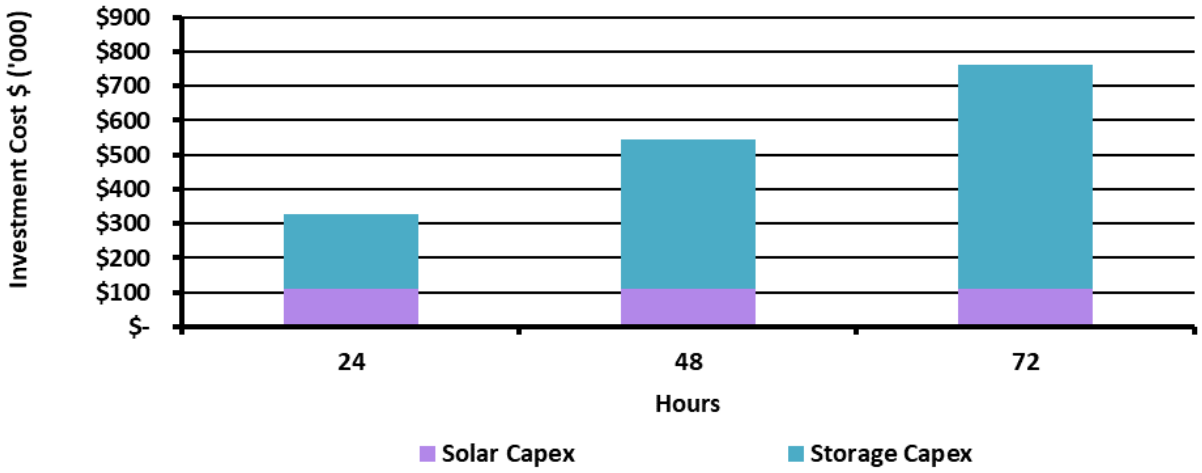


Source: Energeia Analysis

Investment Impacts

Total investment costs by reliability level increased over the range of reliability levels from ~$320 to $760,000.

Figure 70: Parlier Upfront Investment Costs by Reliability Level



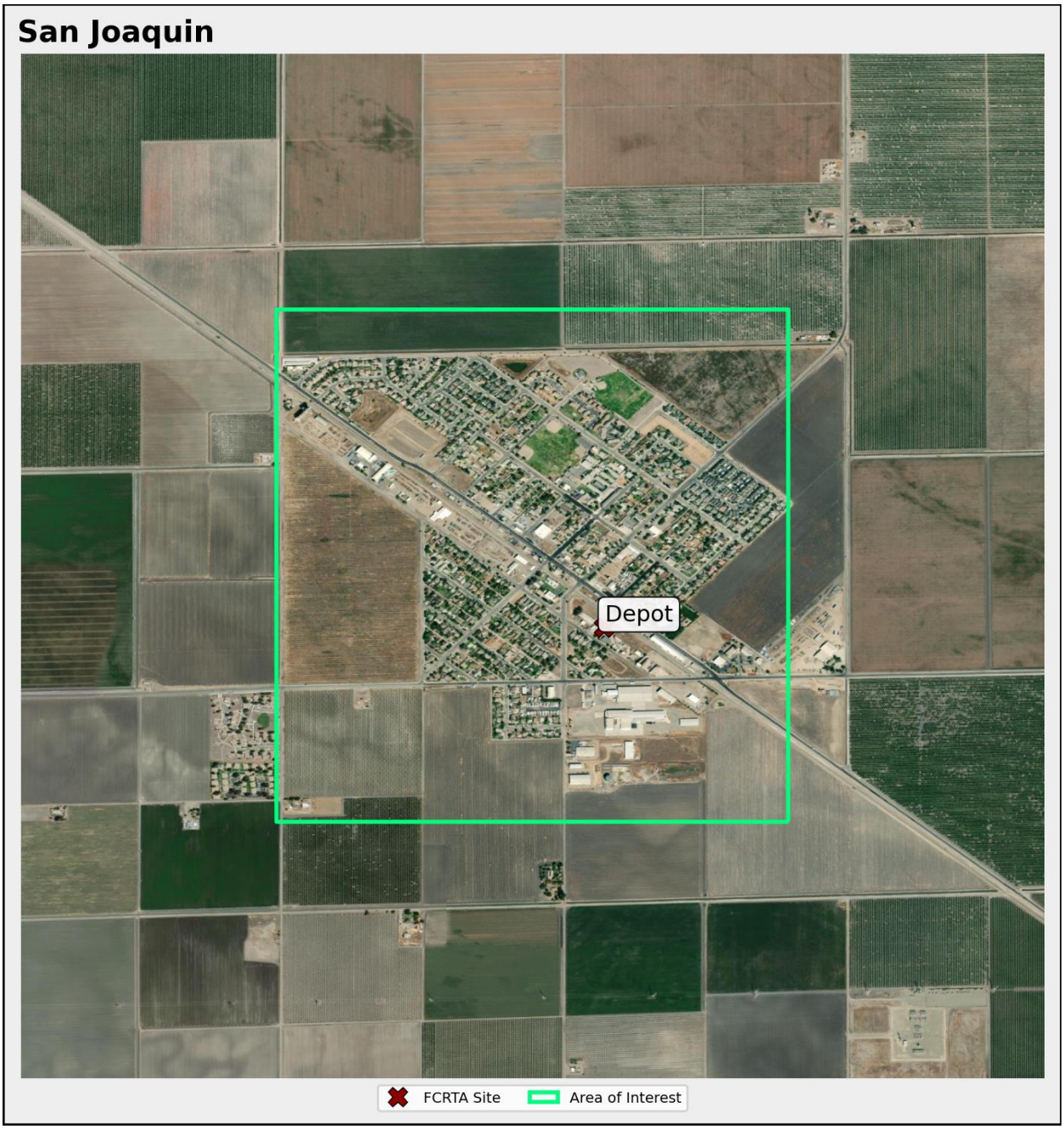
Source: Energeia Analysis

Each of the above financial and economic impact views were critical across all sites in understanding microgrid site value, as it was important to evaluate various funding scenarios and ownership structures later in the implementation plan development process.

San Joaquin

In San Joaquin, a vacant parcel of land was selected as a potential microgrid site through engagement with City stakeholders due to proximity to the San Joaquin Library and available space for microgrid resource and parking. A regional view of San Joaquin is shown in Figure 71 below.

Figure 71: Regional View of San Joaquin



Source: Energeia Analysis, PG&E (2023)

As shown below in Figure 72, feeder SAN JOAQUIN 1106, which serves the microgrid site, is constrained by approximately 2 MW in 2030. PG&E has indicated a planned capacity increase for this feeder, which is scheduled for May 2025, and microgrid resources could alleviate any additional constraints due to transport electrification. Feeder SAN JOAQUIN 1108 has approximately 4 MW of headroom and no forecasted constraint through 2040.

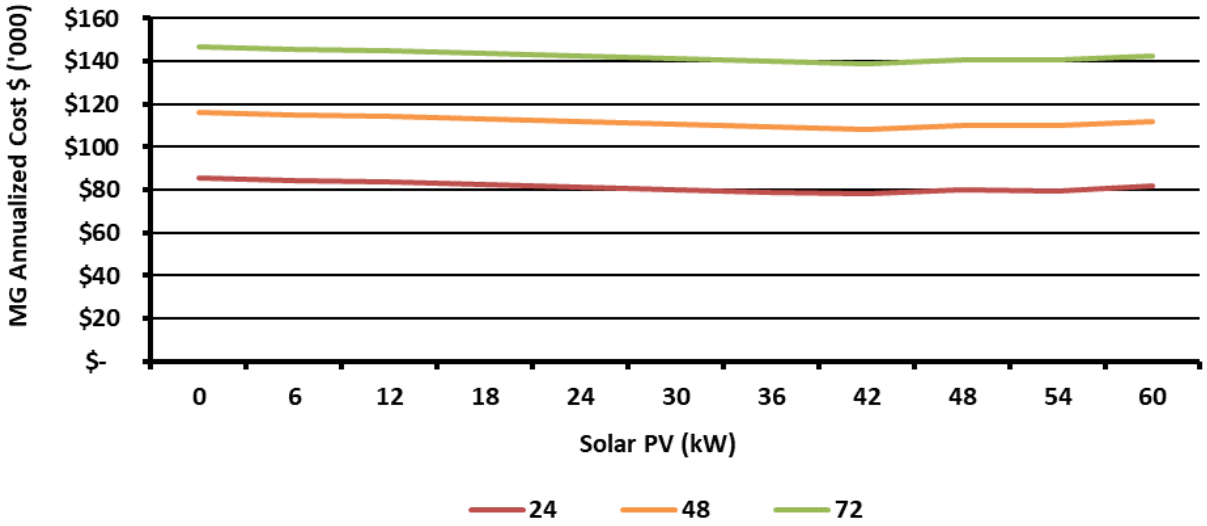
Figure 72: Community View of San Joaquin

Source: Energeia Analysis, PG&E (2023)

Due to interconnection and infrastructure constraints, the San Joaquin Library load was not included. This resilience hub site's least-cost solar PV sizing to support FCRTA fleet charging was 42 kW across all

reliability levels, as shown in Figure 73, which would shade 8-10 parking spaces in a parking canopy solar configuration. The battery configurations for this microgrid are 372, 588, and 744 kWh, respectively, across reliability levels.

Figure 73: San Joaquin Solar PV Sensitivity Analysis by Reliability Requirement

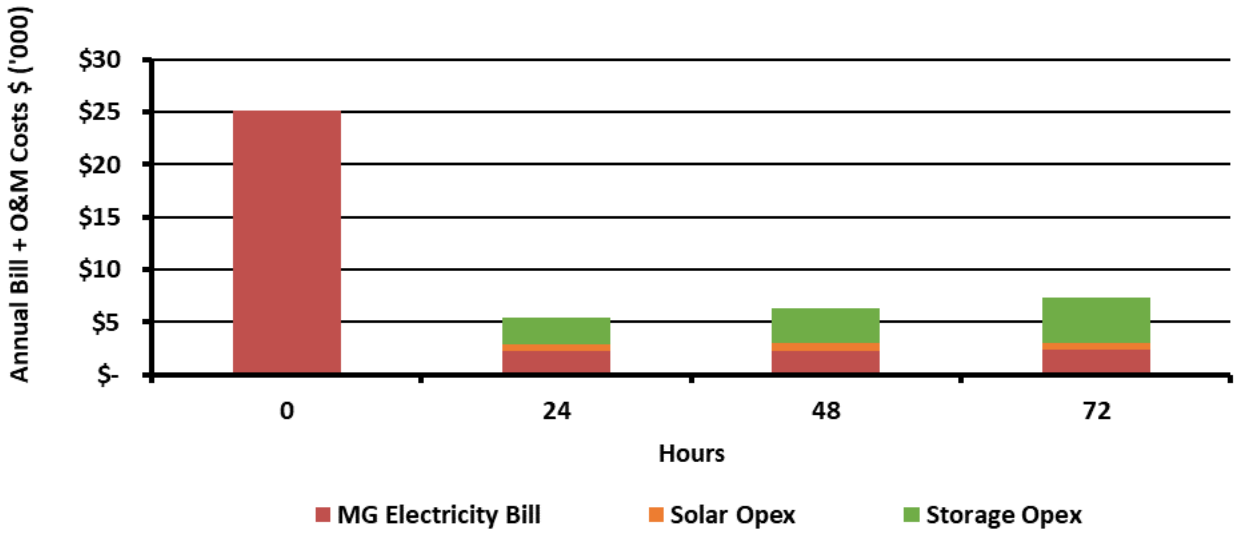


Source: Energeia Analysis

Financial Impacts

Under a BaU scenario without any microgrid resource, the estimated annual electricity bill was modeled to be $25,000. As seen in Figure 74, under a 42-kW solar PV system, the estimated annual costs were reduced by approximately $18-20,000, or 70-80%.

Figure 74: San Joaquin Annual Operating Costs by Reliability Requirement

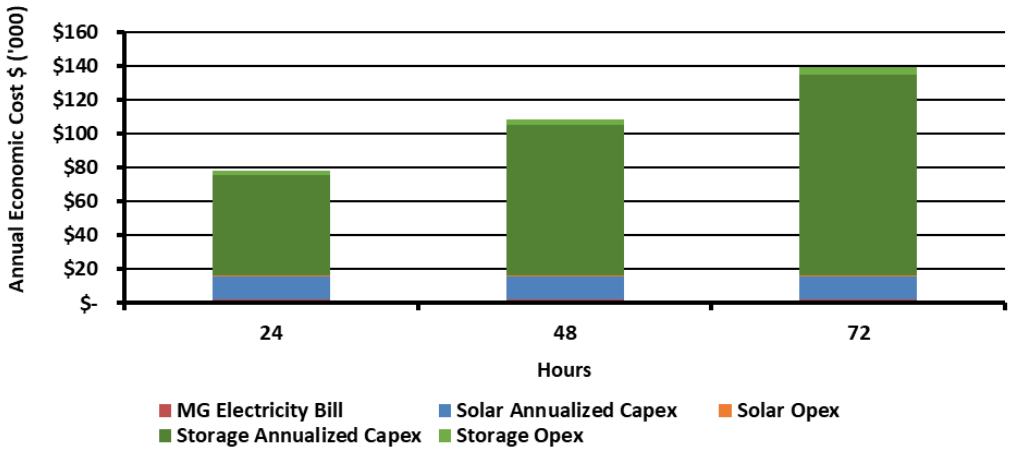


Source: Energeia Analysis

Economic Impacts

On an annuitized economic basis, the San Joaquin resilience hub would cost ~$79,000 for 24 hours of backup reliability and upwards of $140,000 for 72 hours of backup.

Figure 75: San Joaquin Annual Economic Costs by Reliability Level



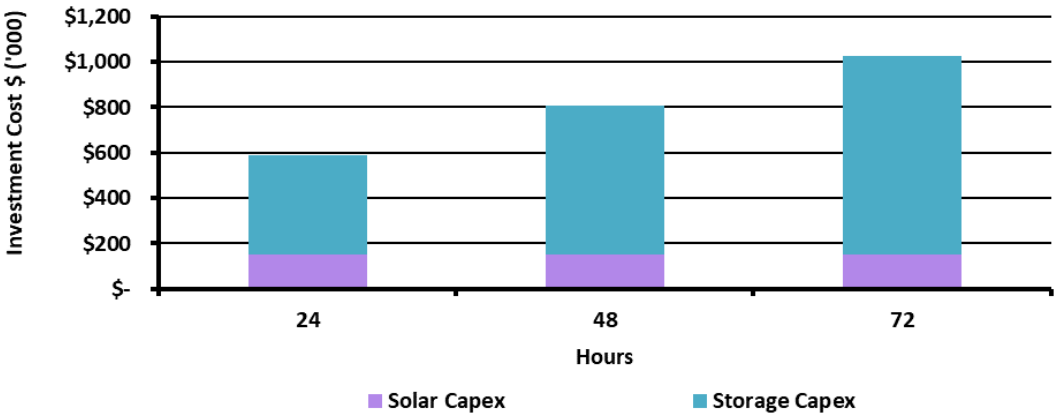
Source: Energeia Analysis

Investment Impacts

Total investment costs by reliability level increased over the reliability levels at a similar rate to the annualized costs, ranging from ~$600,000 to just over $1M, as shown in Figure 76 below.

Though larger solar PV and battery configurations do present higher capital investment costs, they also have the potential to provide greater community benefit through various resilience hub amenities such as on-site community charging.

Figure 76: San Joaquin Upfront Investment Costs by Reliability Level



Source: Energeia Analysis

Lanare

The Lanare Community Center was chosen as a potential microgrid site in the unincorporated community of Lanare, as it is a potential future micro transit site for FCRTA. This proposed resilience hub would support the critical infrastructure of the Community Center and FCRTA fleet charging.

As shown below in Figure 77, the Lanare Community is served by feeder CAMDEN 1104, which is forecasted to be constrained by 2030. Lanare is also subject to high outage susceptibility, making it a prime candidate for a microgrid to enhance community energy resilience.

Figure 77: Community View of Lanare

Source: Energeia Analysis, PG&E (2023)

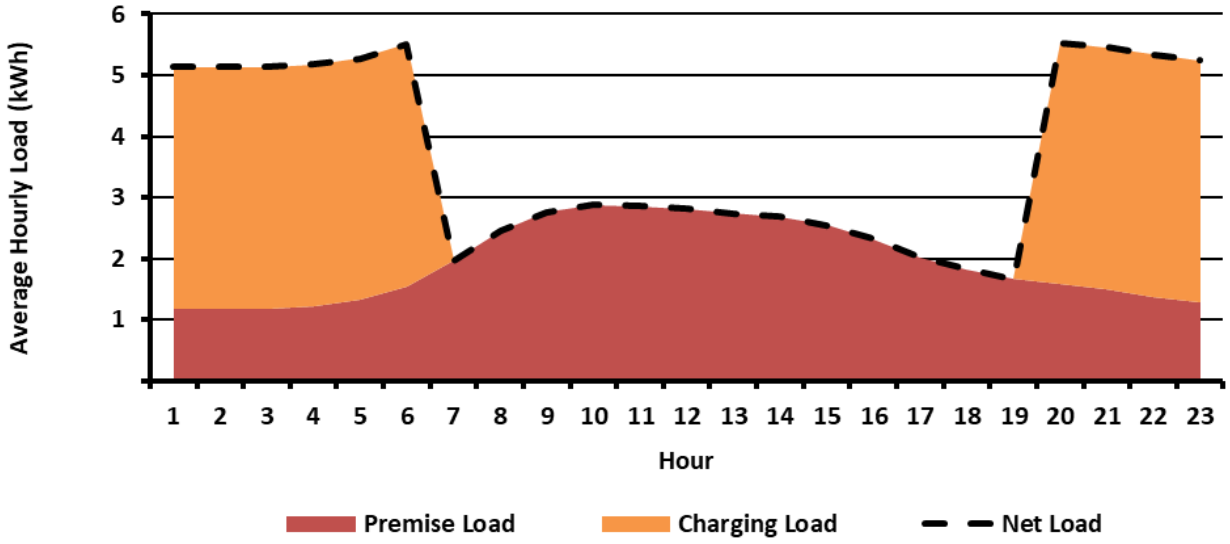
A zoomed in view of the potential microgrid site containing the Lanare Community Center is shown in Figure 78 below. A CARB-registered diesel generator is also included on this site, but was not included in the energy analysis, as accessibility, power output, and functionality are unknown.

Figure 78: Zoomed View of Lanare Community Center

Source: Energeia Analysis, PG&E (2023)

Based on the site's estimated transit charging profile and Lanare Community Center electricity needs, reliability requirements were estimated for 24, 48, and 72-hour backup requirements. An average day load profile, including both Lanare Community Center and FCRTA charging loads, is shown in the figure below. The charging profile illustrates a simple managed charging profile, showing vehicle charging during off-peak periods, e.g., overnight. This charging behavior can be implemented using an energy management system.

Figure 79: Lanare Resilience Hub Average Hourly Load Profile

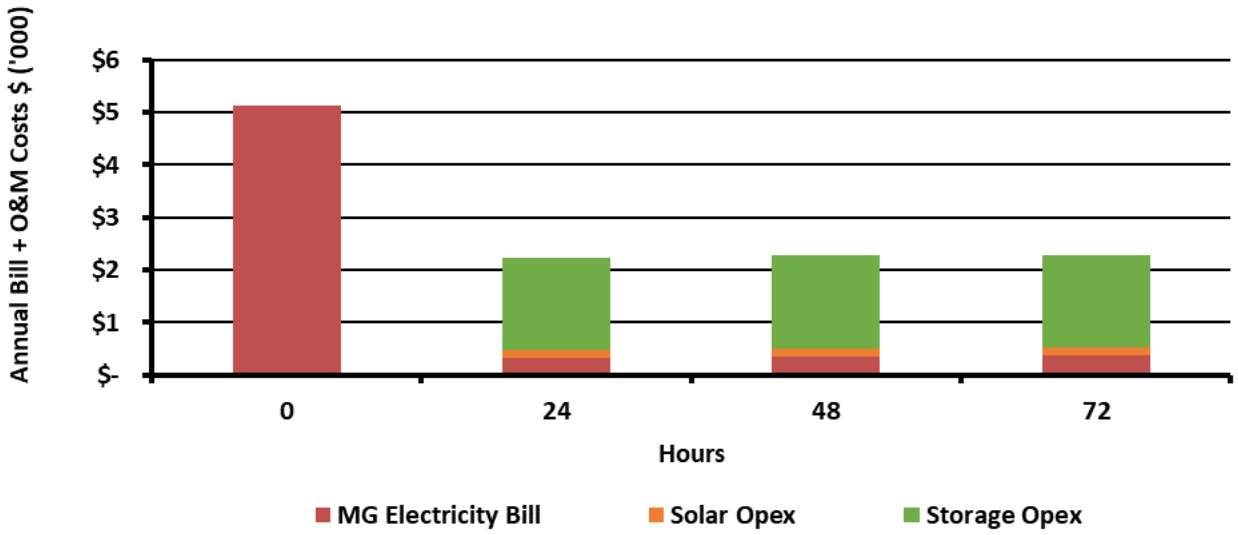


Source: Energeia Analysis

Financial Impacts

The site's annual electricity bill was estimated to be ~$5,000 with no solar PV or battery, as shown in Figure 80. Under a 9-kW solar PV system and 186 kWh battery, the estimated annual costs were reduced by ~$3,000, or greater than 60%, from BaU operations. The Lanare Community Center and future micro transit program could be supported by the smallest battery offered by FCRTA's existing vendor for all reliability levels. This may result in an energy surplus above the reliability requirement, which could be dispatched to create additional revenue, offsetting microgrid resource costs.

Figure 80: Lanare Annual Operating Costs by Reliability Requirement

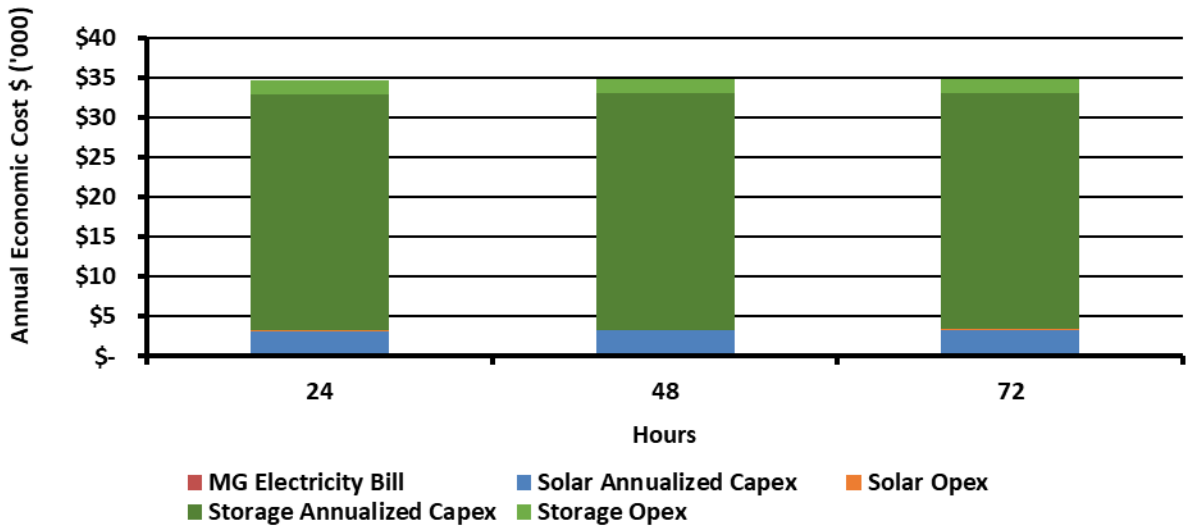


Source: Energeia Analysis

Economic Impacts

Annualized economic microgrid costs were ~$35,000 for all reliability levels, as seen in Figure 81, with most of the cost coming from battery storage.

Figure 81: Lanare Annual Economic Costs by Reliability Level

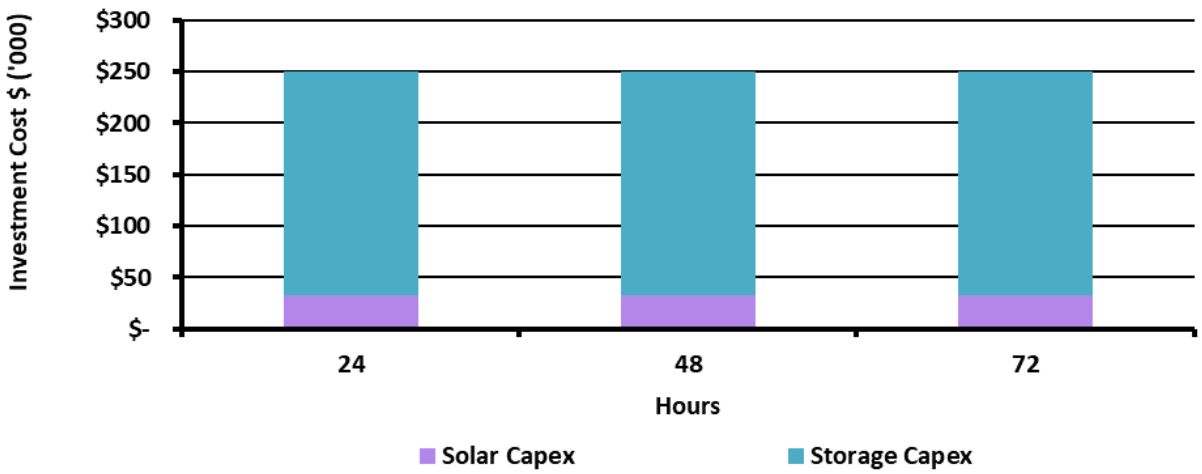


Source: Energeia Analysis

Investment Impacts

Total investment costs were ~$250,000 for all reliability levels, as shown in Figure 82, largely due to battery oversizing, with approximately ~$30,000 in cost from solar PV.

Figure 82: Lanare Upfront Investment Costs by Reliability Level



Source: Energeia Analysis

Biola

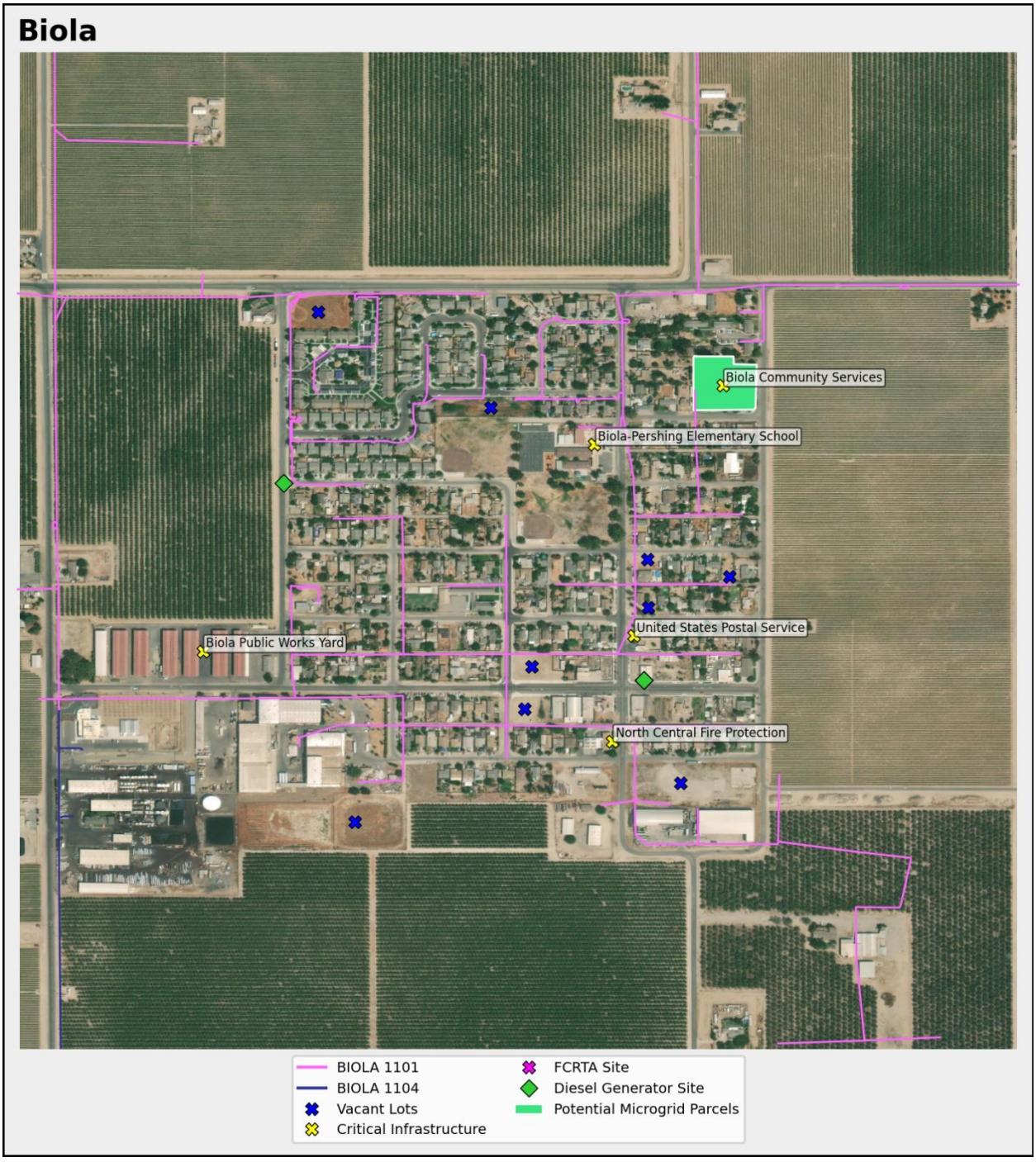
The Biola Community Services District (CSD) was selected as a potential microgrid site in Biola as it already incorporates distributed energy resources and level II chargers through its active micro transit program. A regional view of Biola is shown in Figure 83 below.

Figure 83: Regional View of Biola

Source: Energeia Analysis, PG&E (2023)

As shown in Figure 84, feeder BIOLA 1101 serving Biola Community Services is not currently constrained. There are also no constraints projected within the forecasting period extending to 2040.

Figure 84: Community View of Biola



Source: Energeia Analysis, PG&E (2023)

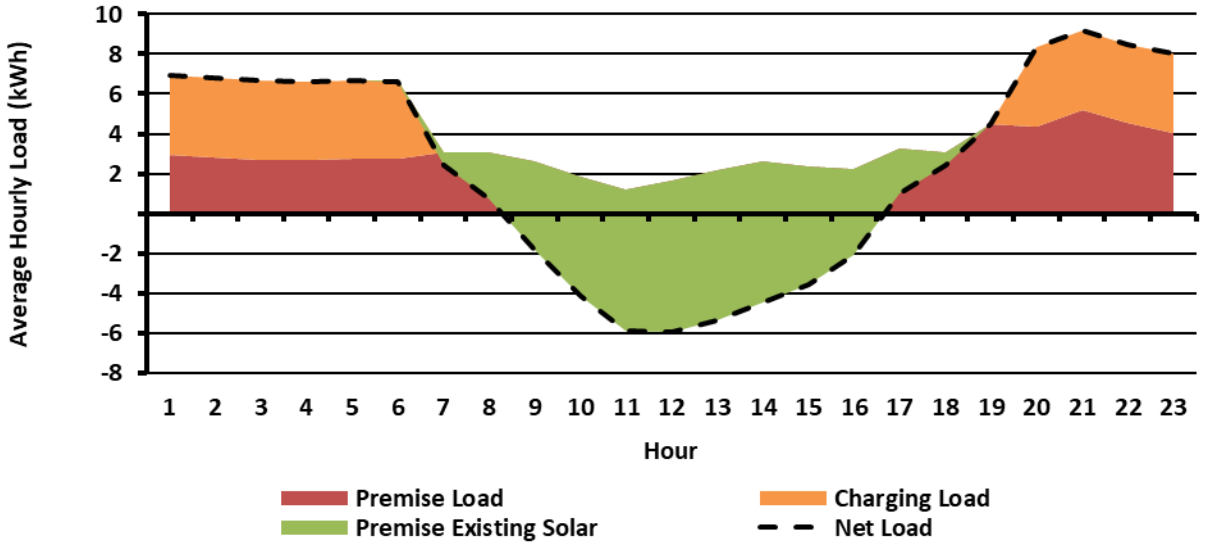
A zoomed view of the potential microgrid site containing the Biola Community Services is shown in Figure 85 below. The Biola CSD parking has already been developed, including an automated gate and lighting.

Figure 85: Zoomed View of Biola Community Center

Source: Energeia Analysis, PG&E (2023)

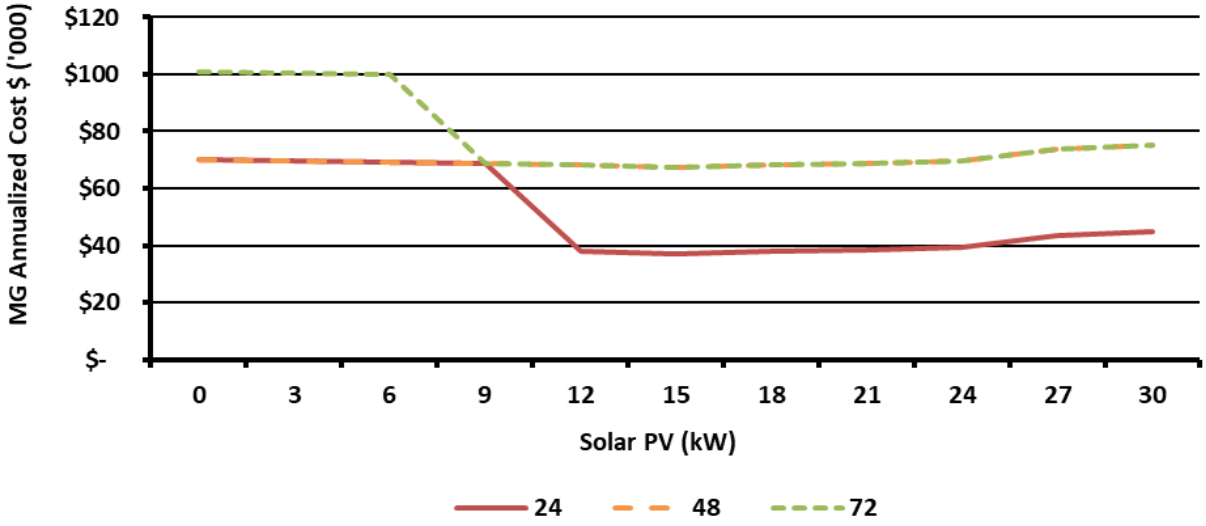
The battery and solar co-optimization, including the Community Center's existing 10 kW of onsite solar and the site's estimated micro transit charging profile, is shown below in Figure 86 and Figure 87. The least-cost configuration was 15 kW of additional solar PV, for a total of 25 kW. Only the incremental 15 kW was included in the capital investment cost analysis.

Figure 86: Biola Resilience Hub Average Hourly Load Profile – Net of Existing Solar PV



Source: Energeia Analysis

Figure 87: Biola Solar PV Sensitivity Analysis by Reliability Requirement

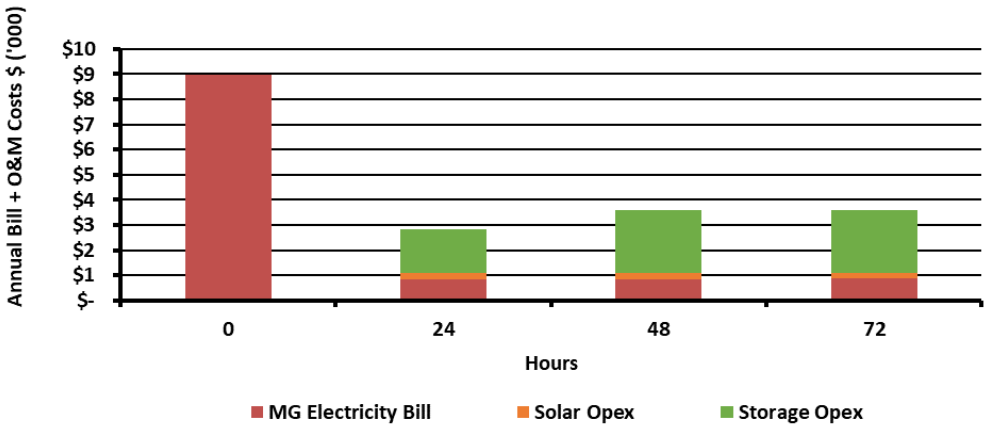


Source: Energeia Analysis

Financial Impacts

Under a BaU scenario, the estimated annual electricity bill was modeled to be ~$9,000. Under a 15-kW solar PV system and 186 kWh battery configuration for 24-hour reliability, the estimated annual costs were reduced by ~$6,000, including ongoing operation and maintenance costs. For a 15-kW solar PV system and 372 kWh battery configuration, providing up to 72-hour backup reliability, the estimated annual costs were reduced by ~$5,500. Like the analysis conducted for Lanare, the relatively small charging load resulted in the same resource sizing for 48 and 72 hours of reliability.

Figure 88: Biola Annual Operating Costs by Reliability Requirement

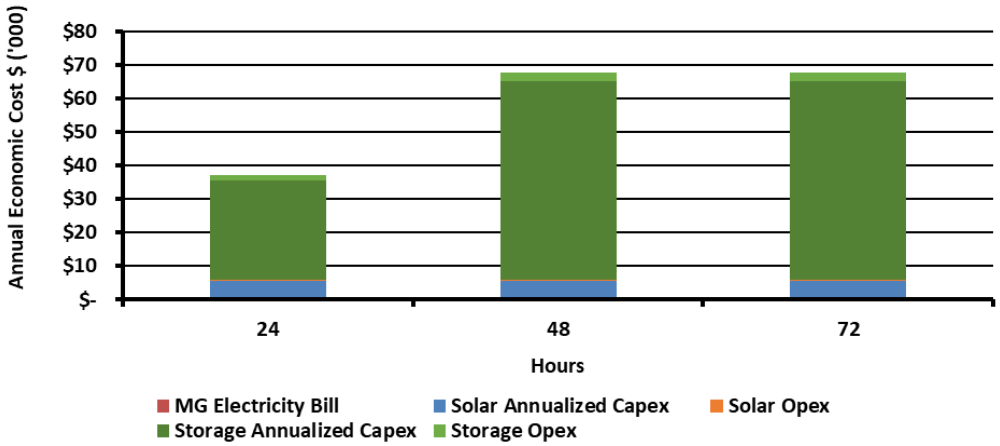


Source: Energeia Analysis

Economic Impacts

Annualized economic microgrid costs were ~$37,000 for 24 hours of reliability, as seen in Figure 89, with most of the cost coming from battery storage. Reliability for 48 and 72 hours would cost ~$68,000 on an annuitized capex and operational cost basis.

Figure 89: Biola Annual Economic Costs by Reliability Requirement

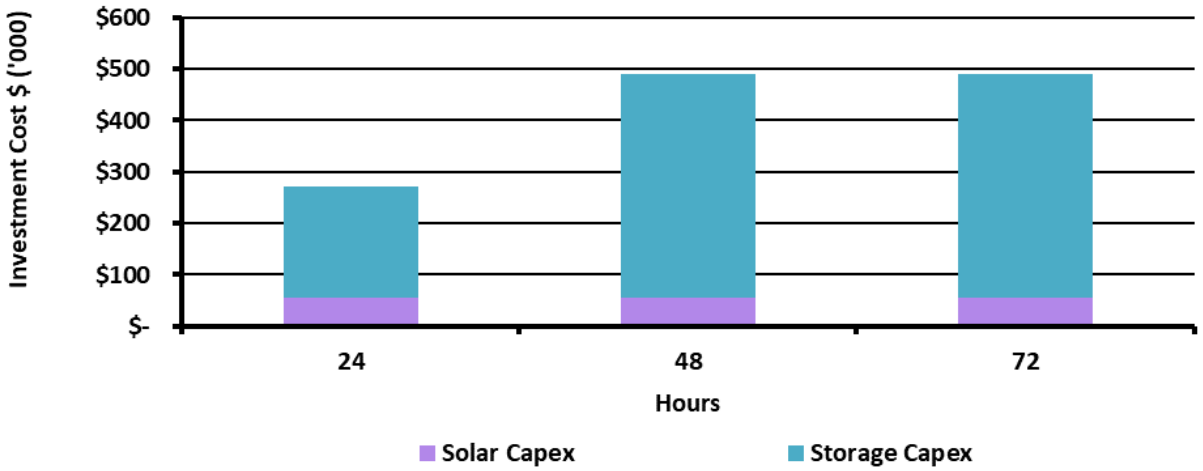


Source: Energeia Analysis

Investment Impacts

Total Biola microgrid investment costs were modeled to be ~$275,000 for 24-hour reliability and ~$500,000 for 48- and 72-hour reliability, as shown in Figure 90.

Figure 90: Biola Upfront Investment Costs by Reliability Level



Source: Energeia Analysis

Fowler

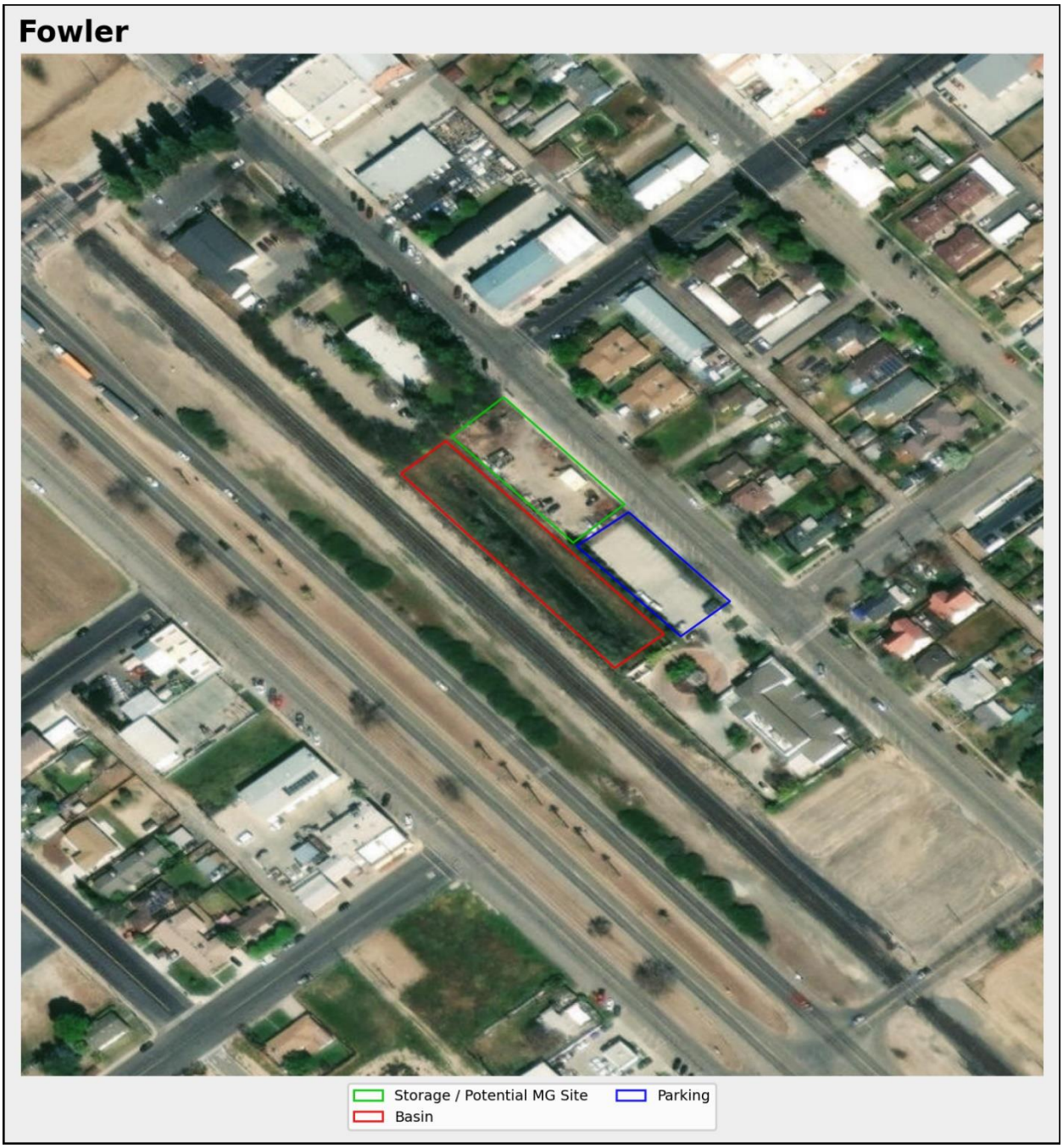
Nearby to State Route 99, a parcel was recommended by the City of Fowler due to its proximity to the Fowler Branch Library and vacant space for a resilience hub. As seen in Figure 91, MC CALL 1103 serves the potential microgrid site and is estimated to be constrained in 2028, with no PG&E upgrades currently planned. A microgrid could alleviate future grid constraints from transport electrification.

Figure 91: Community View of Fowler

Source: Energeia Analysis, PG&E (2023)

A zoomed in view of the potential Fowler microgrid site is shown in Figure 92 below. Presently, the potential site serves as storage for the City. There is also an existing parking plot and an empty basin nearby, which the City of Fowler hopes to develop into an active use area in the long term.

Figure 92: Zoomed View of Fowler Site

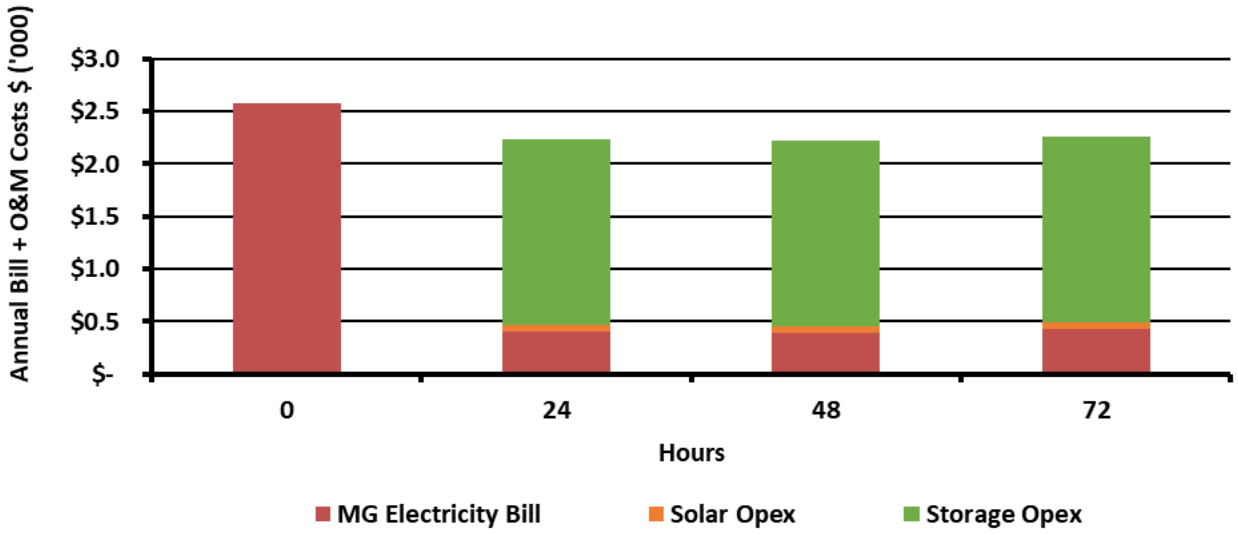


Source: Energeia Analysis, PG&E (2023)

Financial Impacts

The site's annual charging electricity bill was estimated to be $2,500 with no solar PV or battery, as shown in Figure 93. Under a 4-kW solar PV system and 186 kWh battery, the estimated annual costs were reduced by $2,000. The relatively small charging load required at this site results in the same resource sizing across all reliability levels. The resilience hub and transit vehicle charging site could be supported by the smallest 186 kWh battery from FCRTA's existing vendor.

Figure 93: Fowler Annual Operating Costs by Reliability Requirement

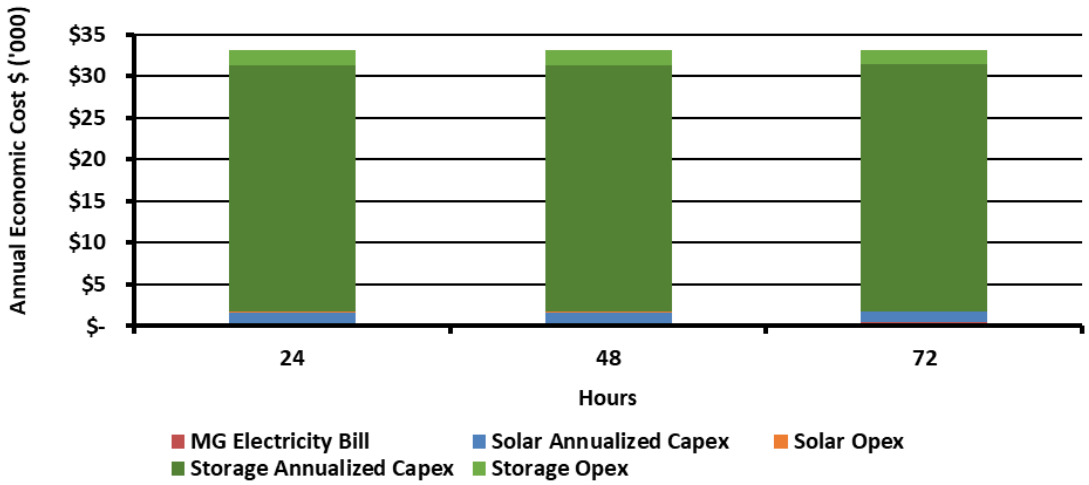


Source: Energeia Analysis

Economic Impacts

Annualized economic microgrid costs were estimated to be $33,000 for all reliability levels, as seen in Figure 94, with most of the cost coming from battery storage, which provides backup resilience.

Figure 94: Fowler Annual Economic Cost by Reliability Level

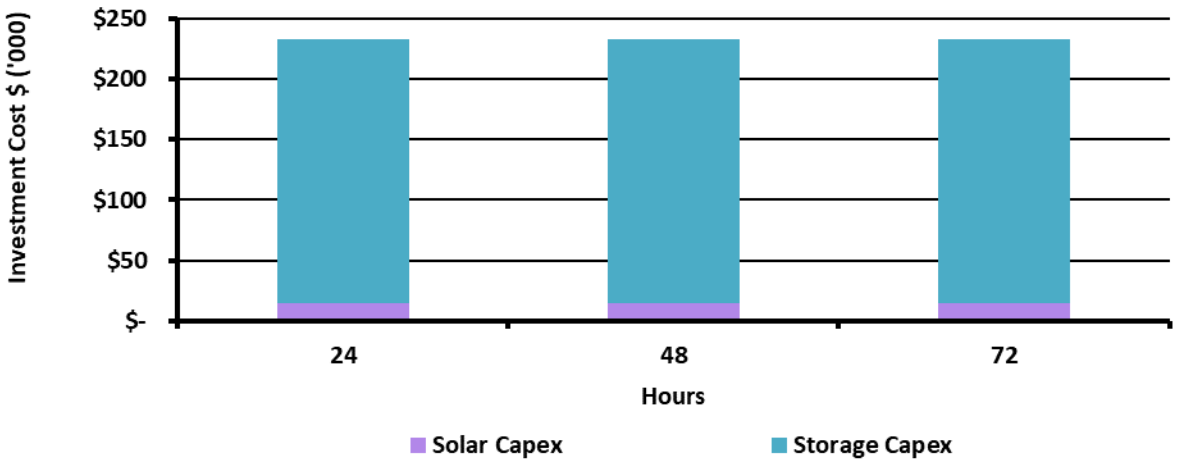


Source: Energeia Analysis

Investment Impacts

Annualized economic microgrid costs were estimated to be $33,000 for all reliability levels, as seen in Figure 95, with most of the cost coming from battery storage, which provides backup resilience.

Figure 95: Fowler Upfront Investment Costs by Reliability Level



Source: Energeia Analysis

9 | Transit Operational Analysis and Multimodal Evaluation

9 Transit Operational Analysis and Multimodal Evaluation

The microgrids are key in supporting FCRTA's transition to zero emissions vehicles. Importantly, FCRTA is leveraging the microgrid investment to provide resiliency and transportation benefits each community through building multimodal community resiliency hubs. The goal is to provide and support expanded transportation service and first and last mile connections at each hub. This section analyzes economic and transportation data of the five potential microgrid communities to understand transit dependency factors and travel behavior and recommend transportation services for each hub.

Transit Dependency Factors

Four key demographic characteristics indicate transit dependency. They include the presence of seniors (65 years old or older), people who are experiencing poverty (at or below the poverty line, as defined by the U.S. Census Bureau), people with disabilities, and people with fewer than one vehicle per household.

Key Findings:

- The five proposed microgrid communities all have at least a 20 percent poverty rate. As car ownership is expensive, residents in these communities need a more affordable mode of transportation.
- All of the microgrid communities except for San Joaquin had a disability rate of 10 percent or higher. In three communities, seniors comprise greater than 10 percent of the population. Seniors and persons with disabilities may be unable to drive. Therefore, they need an ADA-accessible mode of transportation.
- All five microgrid communities have fewer than one car per person of driving age, meaning many households share a car(s), and with few transit options, this limits their access to jobs, healthcare, and quality of life opportunities.

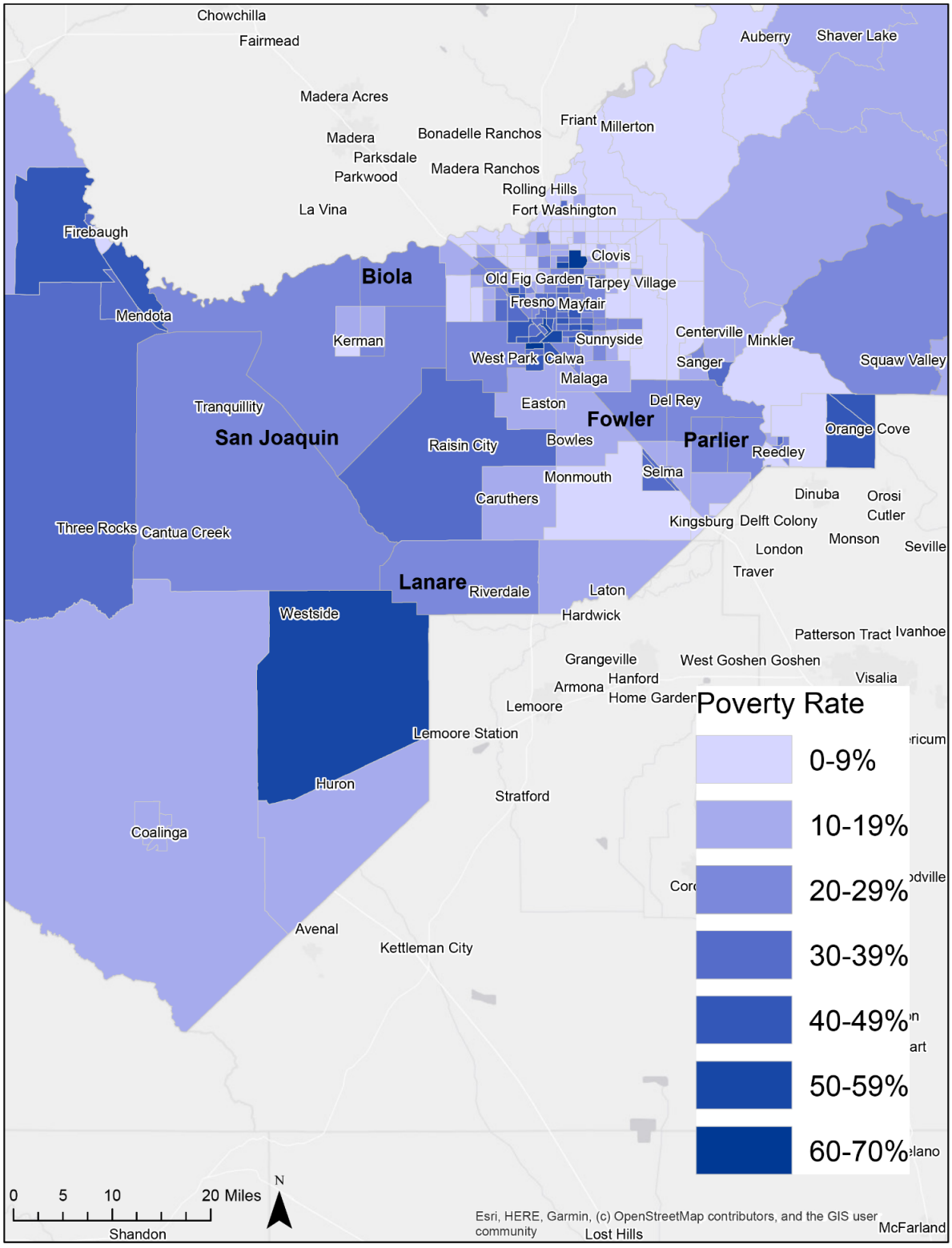
Poverty Rate

Figure 96 shows the poverty rate by Census tract.

Microgrid Communities Poverty Rates (% of the population – number of people below the poverty line)

- Biola – Census Tract 41: **25%**
- Parlier – Census Tract 85.03: **35%**
- Fowler – Census Tract 16: **23%**
- San Joaquin – Census Tract 82: **29%**
- Lanare – Census Tract 77: **21%**

Figure 96: Poverty Rate by Census Tract



Source: Data- US Census Bureau ACS 2021 5-year Estimates, Map – Walker Consultants.

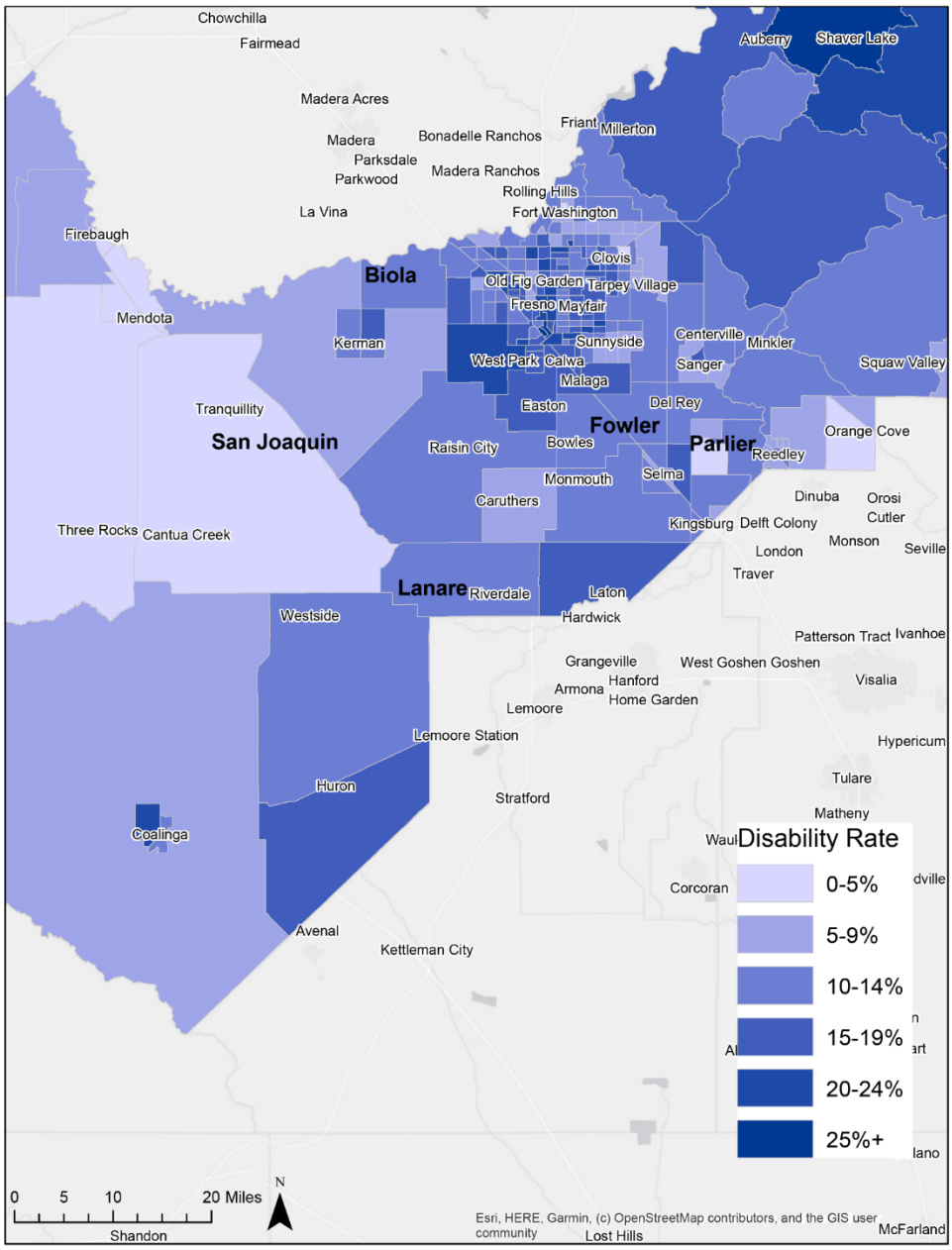
Disability Rate

Figure 97 shows the disability rate by census tract.

Disability Rates in Microgrid Communities

- Biola – Census Tract 41: **12%**
- Parlier – Census Tract 85.03: **10%**
- Fowler – Census Tract 16: **13%**
- San Joaquin – Census Tract 82: **5%**
- Lanare – Census Tract 77: **11%**

Figure 97: Disability Rate by Census Tract



Source: Data- US Census Bureau ACS 2021 5-year Estimates, Map – Walker Consultants.

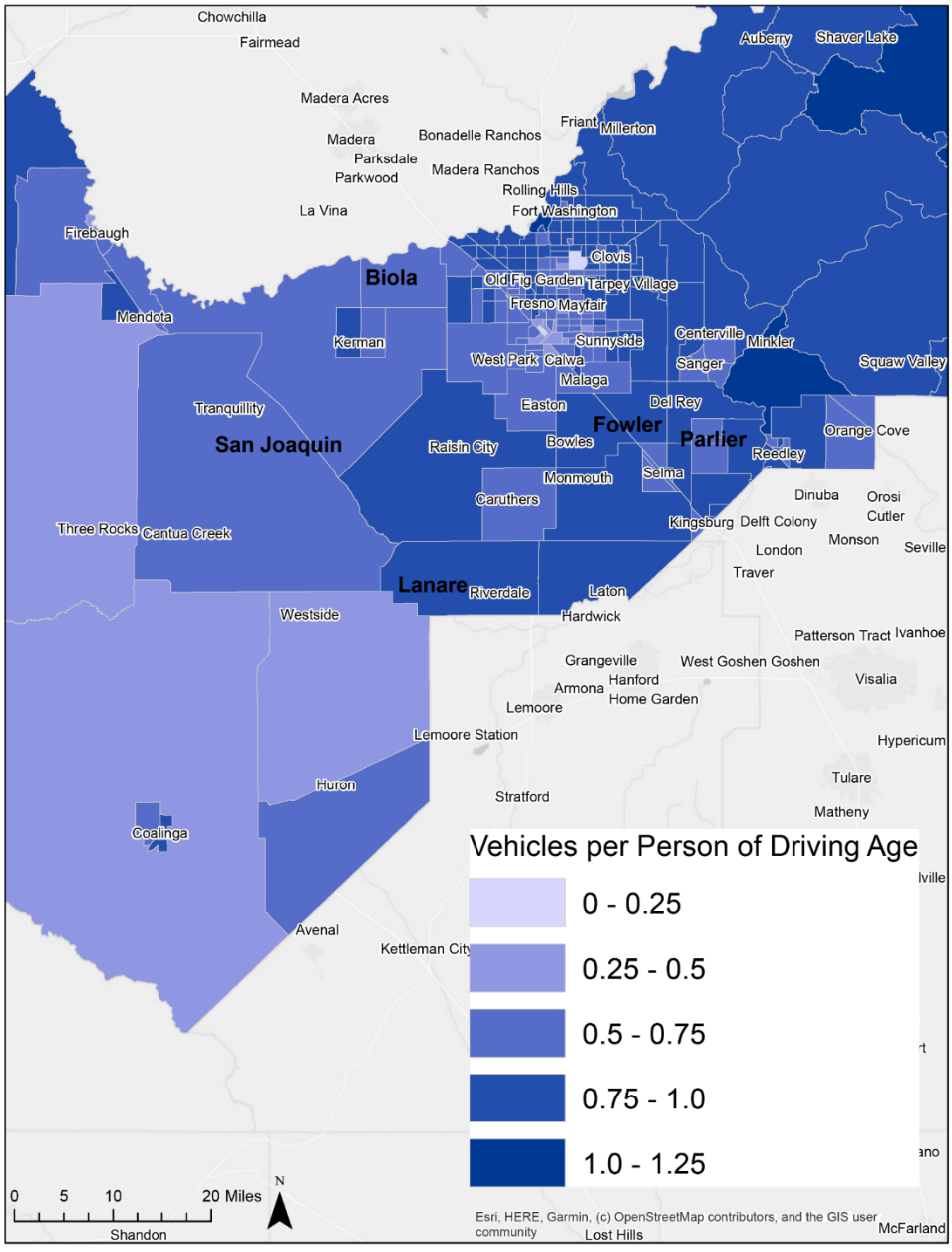
Vehicles per Person of Driving Age

Figure 98 shows the number of vehicles per person of driving age.

Vehicles per Person of Driving Age in Microgrid communities

- Biola – Census Tract 41: **0.7**
- Parlier – Census Tract 85.03: **0.7**
- Fowler – Census Tract 16: **0.8**
- San Joaquin – Census Tract 82: **0.7**
- Lanare – Census Tract 77: **0.8**

Figure 98: Vehicles per Person of Driving Age by Census Tract



Source: Data- US Census Bureau ACS 2021 5-year Estimates, Map – Walker Consultants.

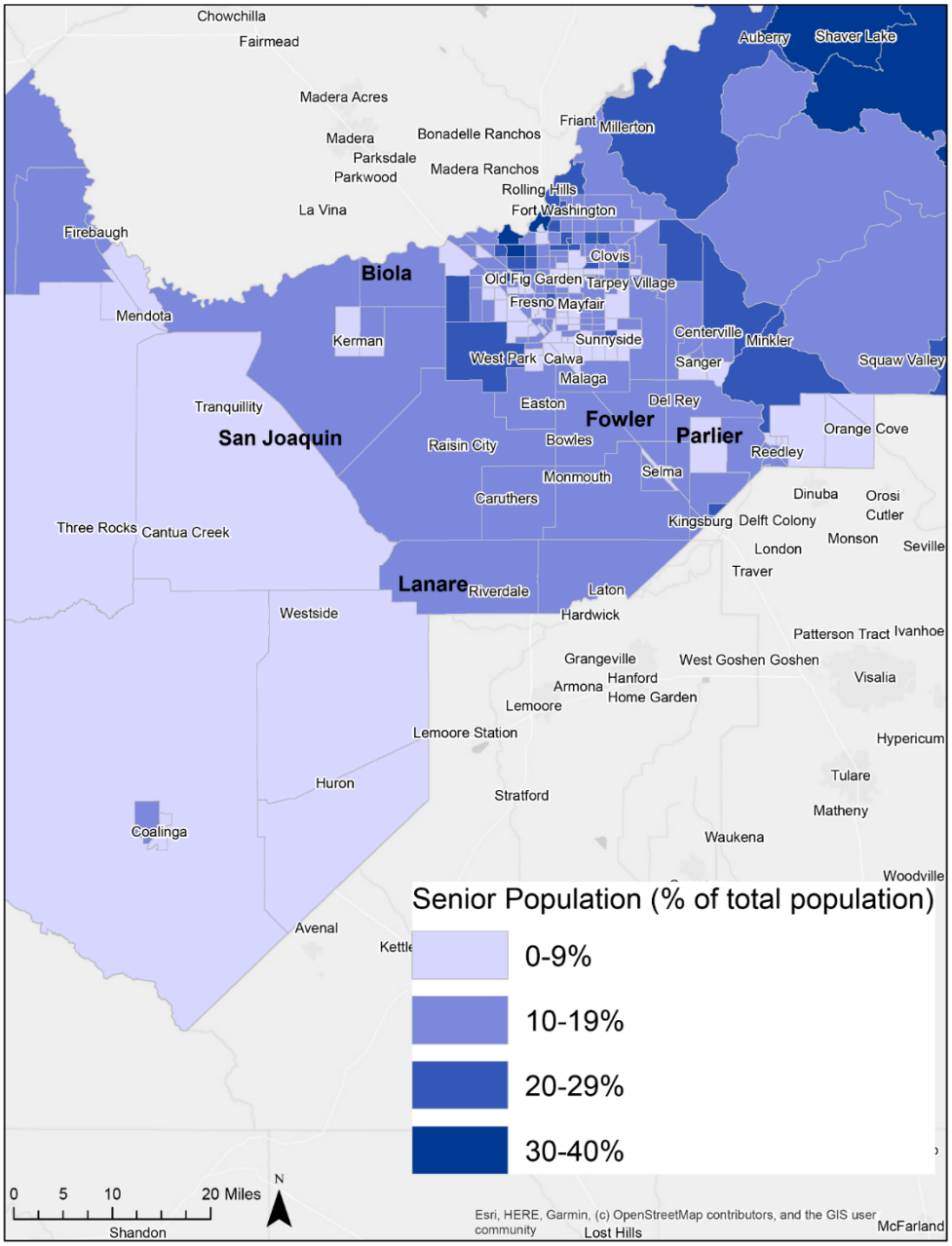
Senior Population

Figure 99 shows the percentage of the population who are seniors.

Senior Population (% of total population) in Microgrid Communities

- Biola – Census Tract 41: **10%**
- Parlier – Census Tract 85.03: **7%**
- Fowler – Census Tract 16: **17%**
- San Joaquin – Census Tract 82: **8%**
- Lanare – Census Tract 77: **11%**

Figure 99: Senior Population by Census Tract



Source: Data- US Census Bureau ACS 2021 5-year Estimates, Map – Walker Consultants.

Trip Origin/Destination Analysis

A review of where people travel to and from for each of the five proposed microgrid site communities informed the transit and multi-modal travel options analysis. Data is based on the Replica proprietary platform that tracks cell phone location to view trip origin/destination at the block group level.

Key Findings:

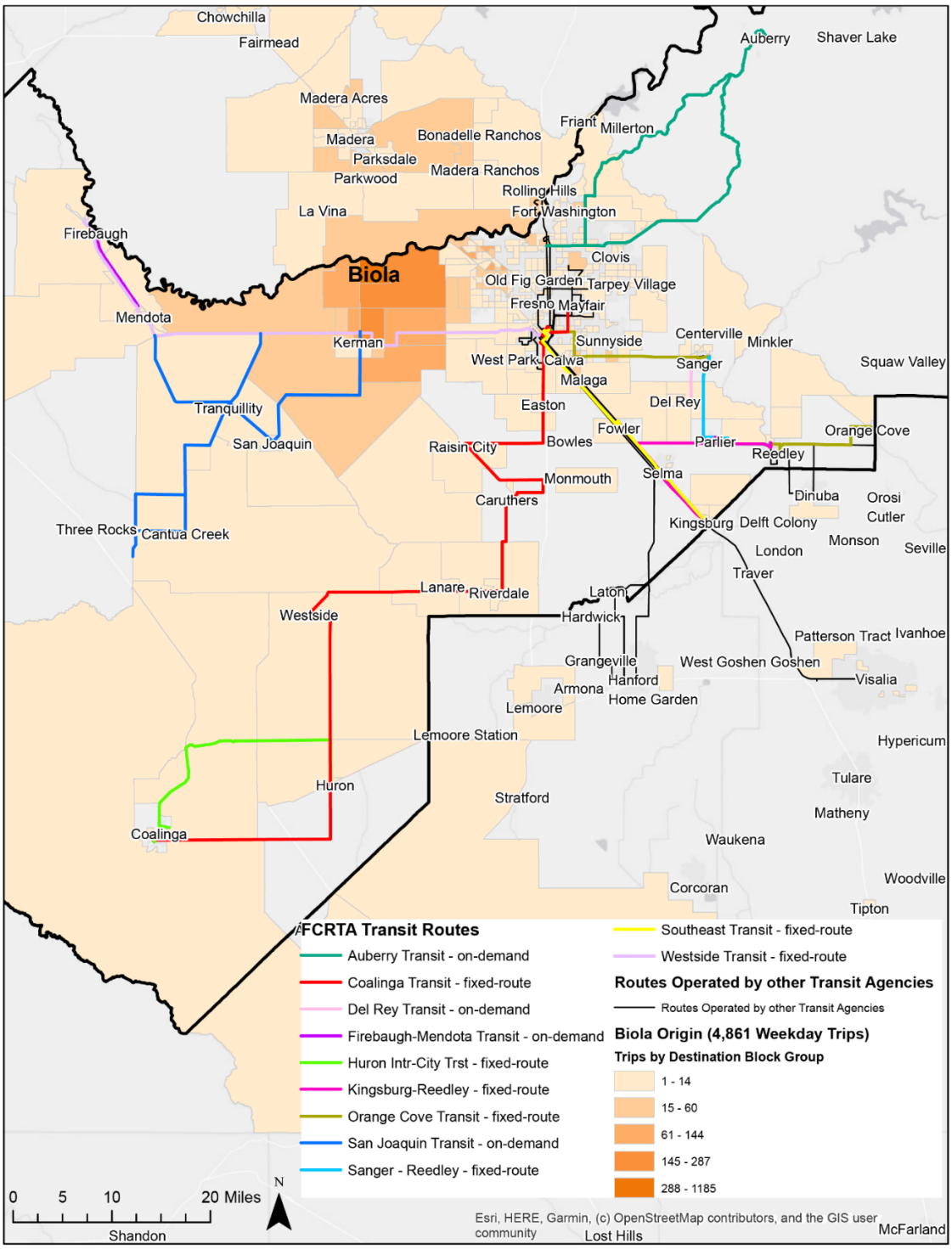
Overall in many of these communities, the majority of trips are occurring locally or within short distances.

- Biola:
  - Roughly one-third of trips to and from Biola occur in the Biola and Kerman areas.
  - The remainder of trips occur in various communities throughout Fresno County and outside of Fresno County.
- Lanare:
  - Over one-third of trips to and from Lanare occur in the Riverdale and Lanare areas.
  - The remainder of trips occur in various communities throughout Fresno County and outside of Fresno County.
- San Joaquin:
  - Roughly two-thirds of trips to and from San Joaquin occur in or around the San Joaquin, Three Rocks, Cantua Creek, and Kerman areas.
  - The remainder of trips occur to and from various communities throughout Fresno County and outside of Fresno County.
- Parlier:
  - Roughly two-thirds of trips to and from Parlier occur in the Parlier and Reedley areas.
  - The remainder of trips occur to and from various communities throughout Fresno County and outside of Fresno County.
- Fowler:
  - Slightly less than half of trips to and from Fowler occur in the Fowler area.
  - The remainder of trips occur to and from various communities throughout Fresno County and outside of Fresno County.

Biola

Figure 100 shows the number of trips by destination block group originating in Biola, showing a high concentration of local trips.

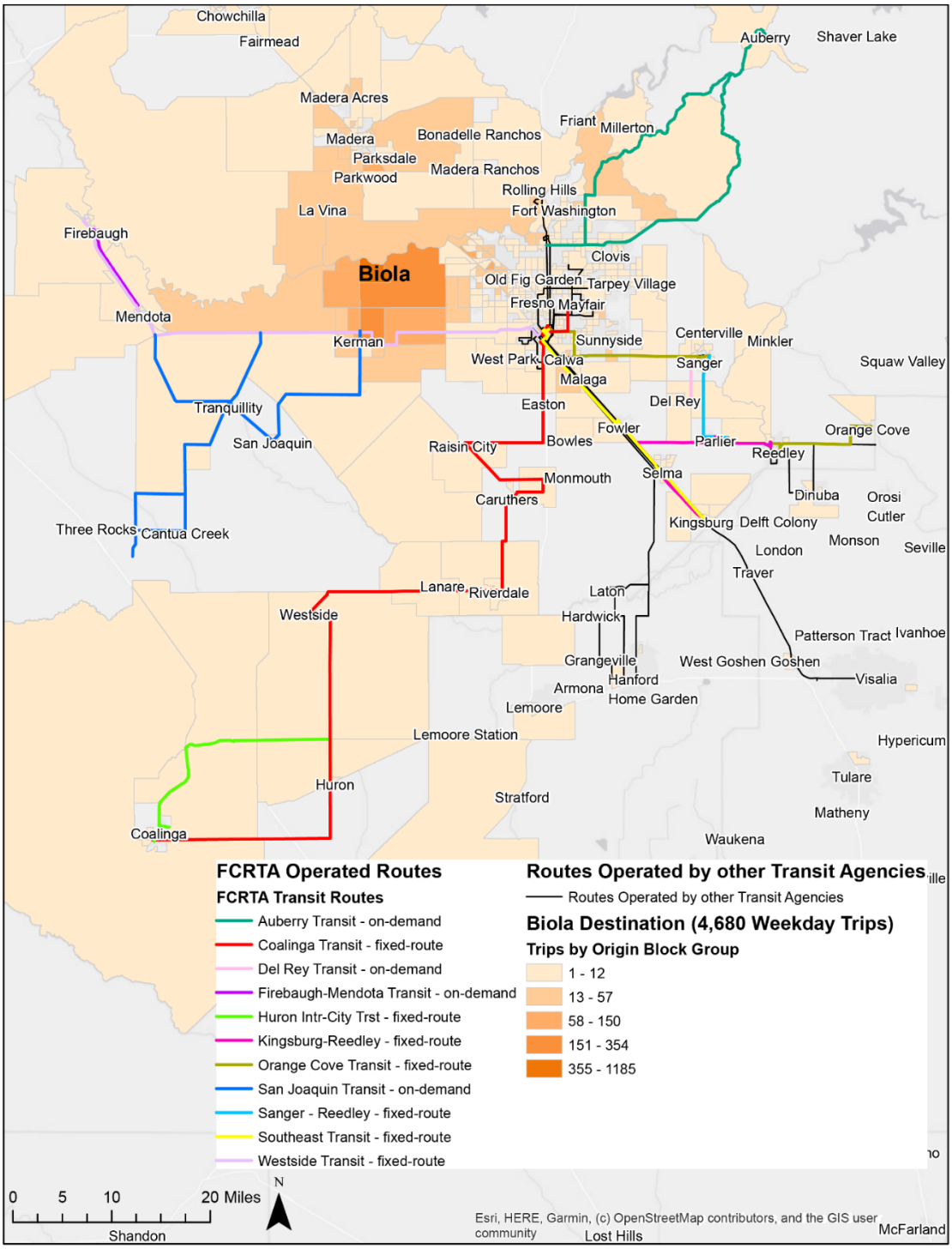
Figure 100: Destination of Trips that Originate in Biola



Source: Replica, Map: Walker Consultants.

Figure 101 shows the number of trips that end in Biola by origin block group, again showing a high concentration of local trips.

Figure 101: Origin of Trips that End in Biola

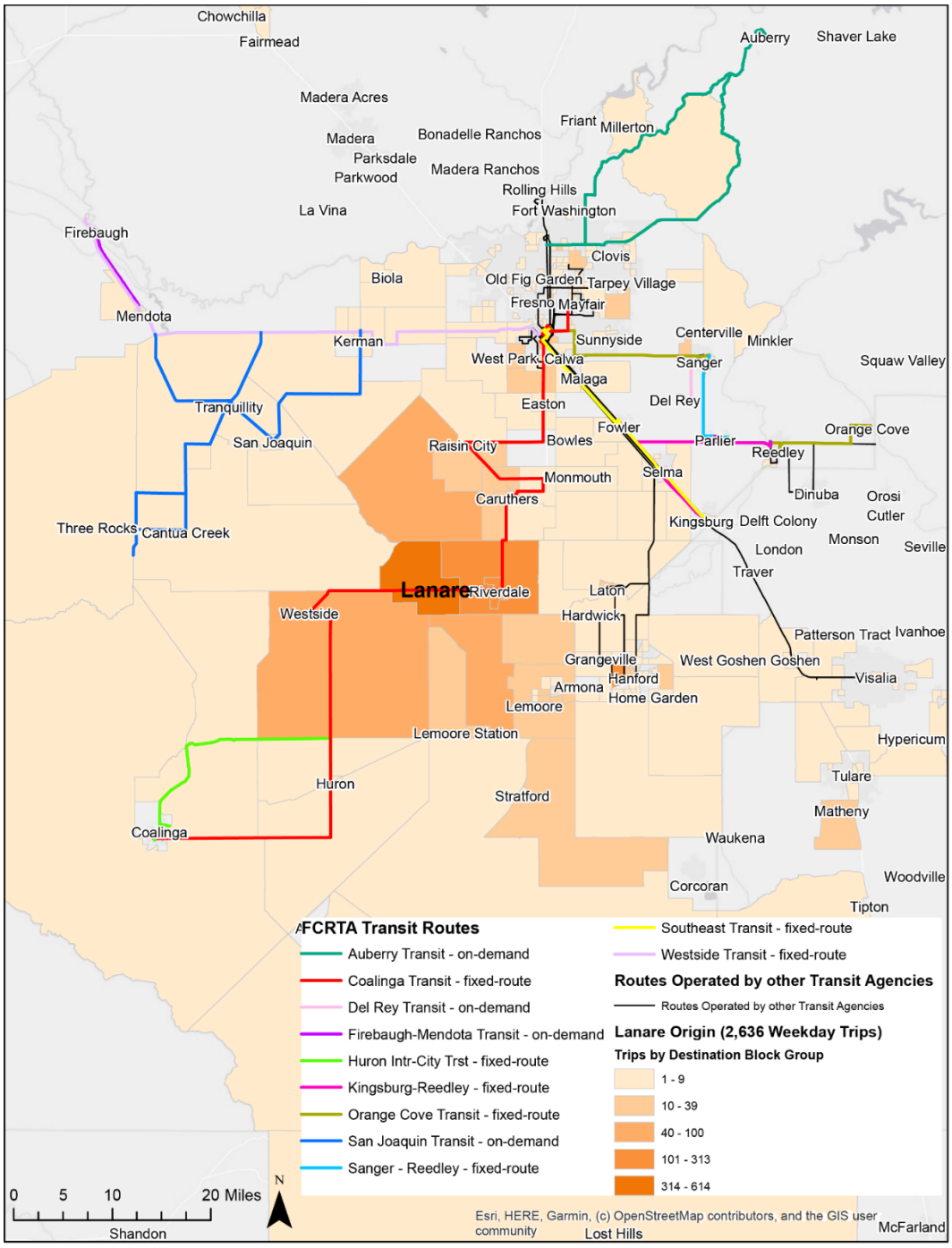


Source: Replica, Map: Walker Consultants.

Lanare

Figure 102 shows the number of trips by destination block group originating in Lanare, showing a concentration of trips within Lanare and the immediate surrounding communities.

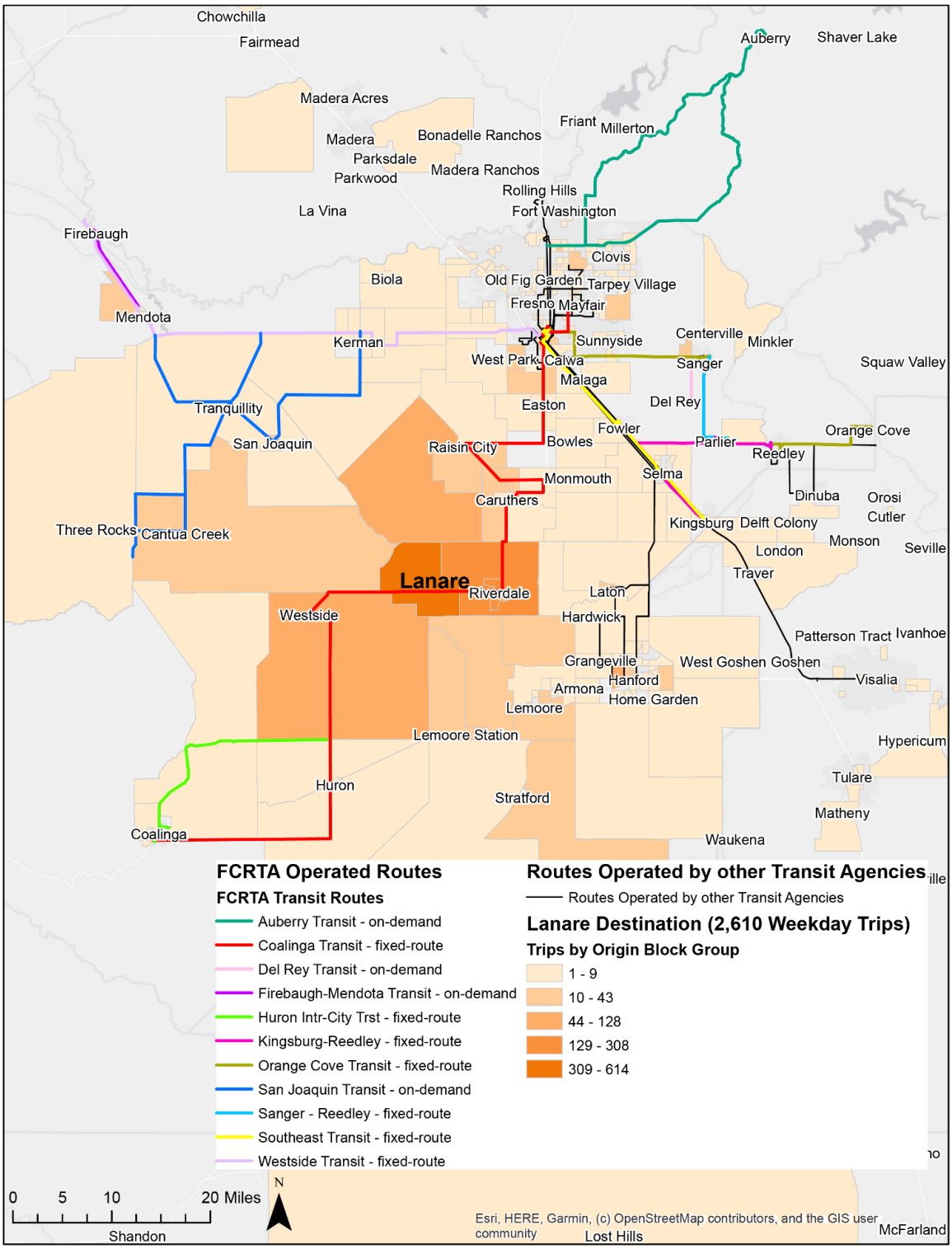
Figure 102: Destination of Trips that Originate in Lanare



Source: Replica, Map: Walker Consultants.

Figure 103 shows the origin of trips by block group that ends in Lanare, again showing a concentration of trips within Lanare and the immediate surrounding communities.

Figure 103: Origin of Trips that End in Lanare

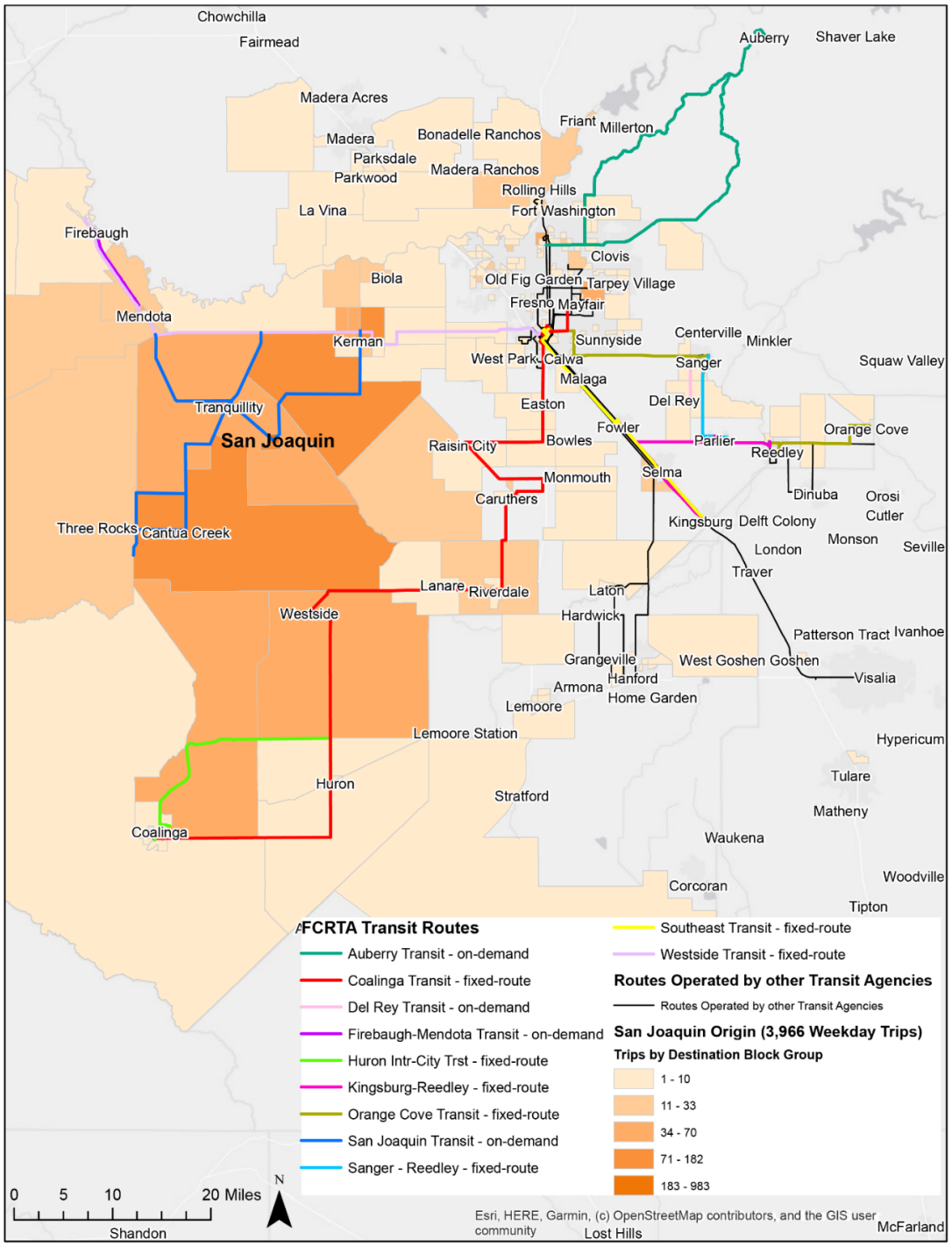


Source: Replica, Map: Walker Consultants.

San Joaquin

Figure 104 shows the number of trips by destination block group originating in San Joaquin, showing that most trips occur in and around San Joaquin.

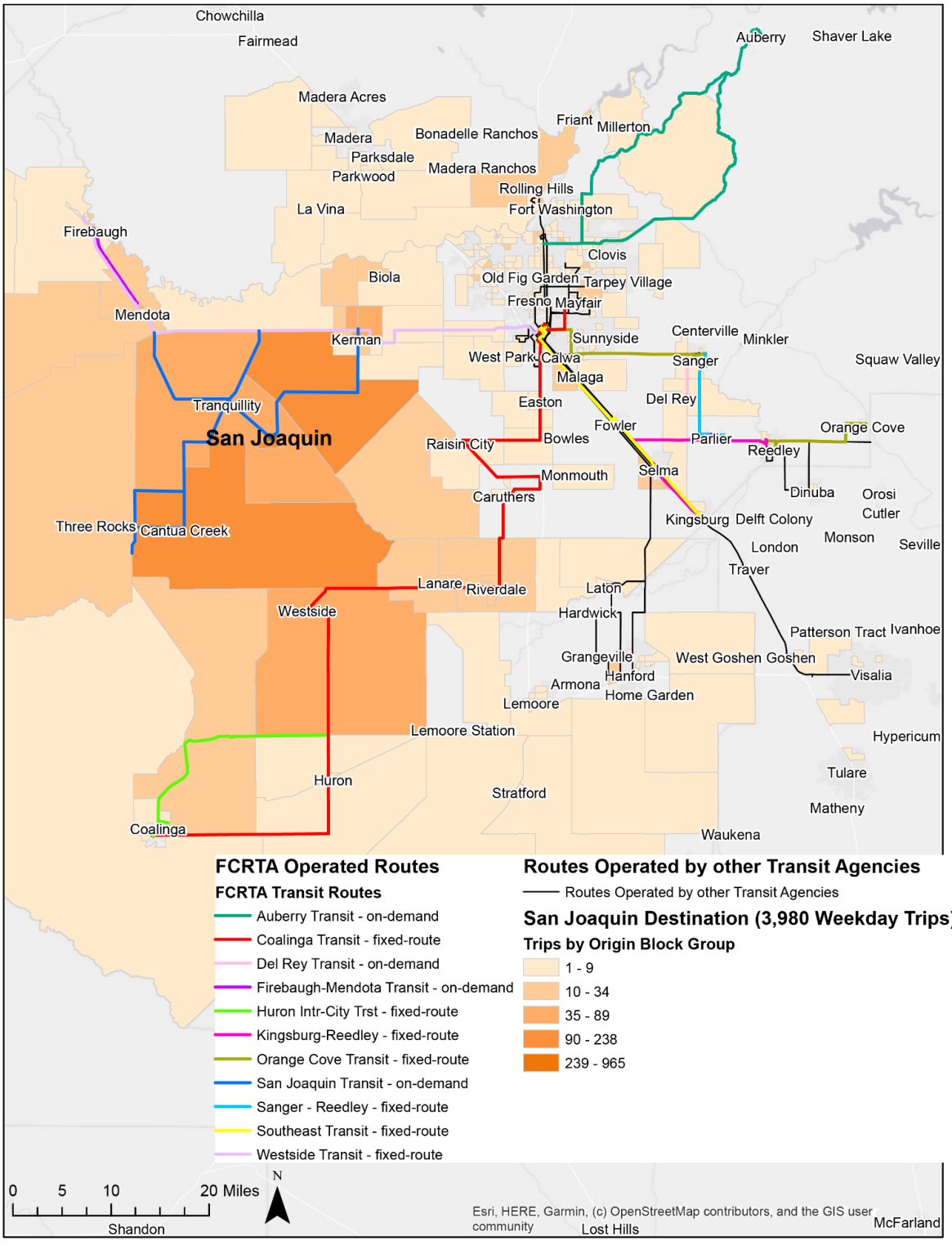
Figure 104: Destination of Trips that Originate in San Joaquin



Source: Replica, Map: Walker Consultants.

Figure 105 shows the origin of trips by block group that ends in San Joaquin, showing that most trips occur in and around San Joaquin.

Figure 105: Origin of Trips that End in San Joaquin

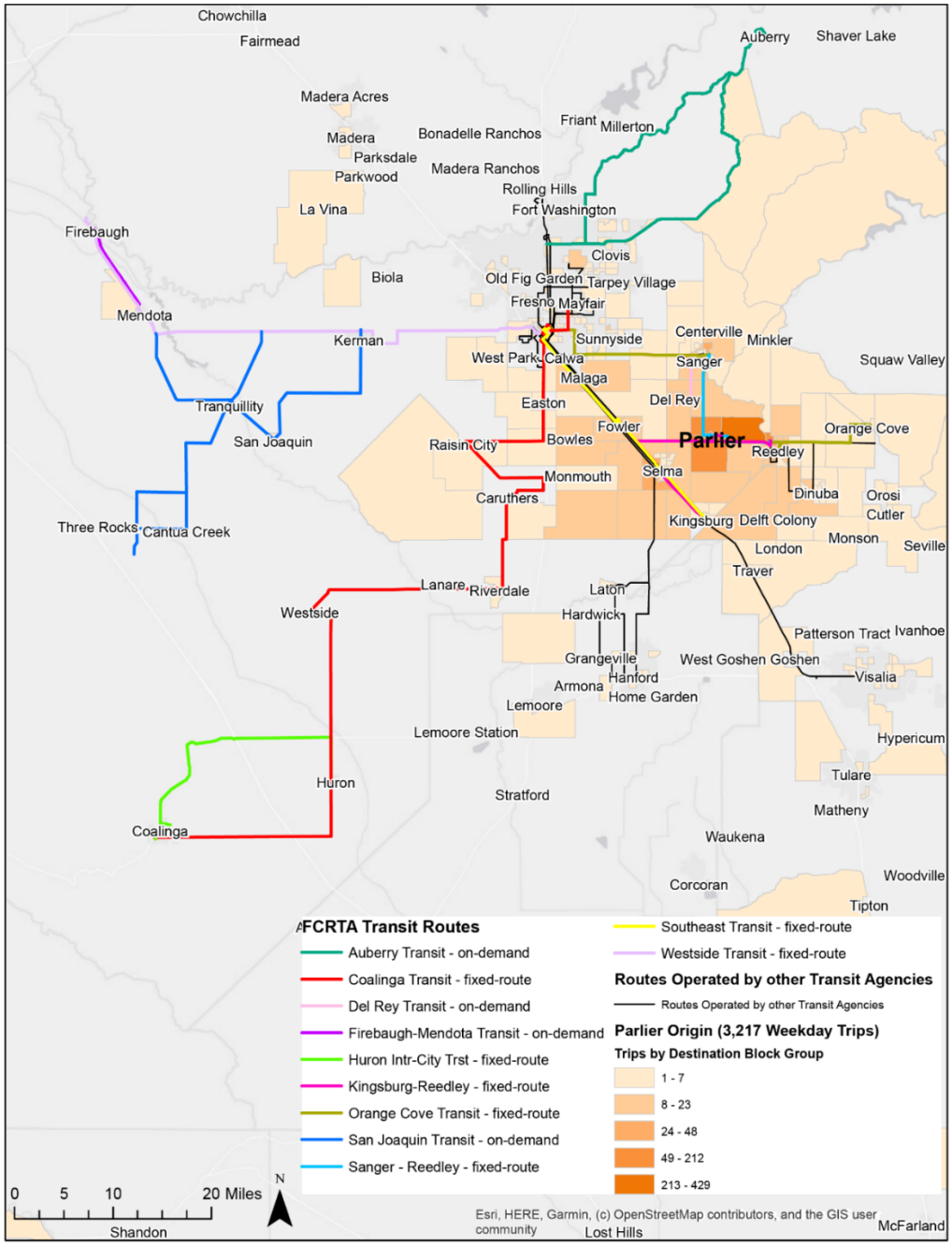


Source: Replica, Map: Walker Consultants.

Parlier

Figure 106 shows the number of trips by destination block group originating in Parlier, showing the majority of trips occur within Parlier.

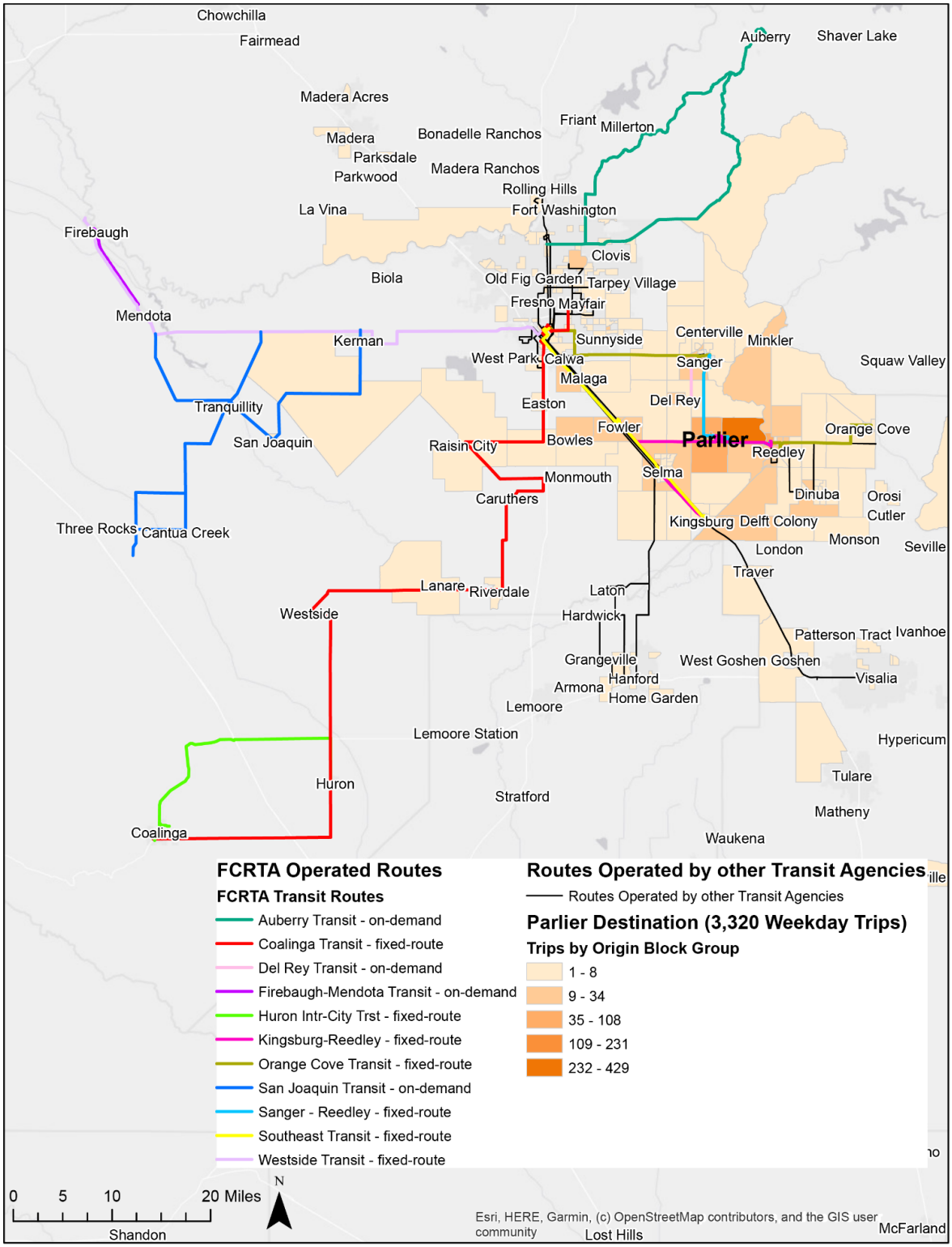
Figure 106: Destination of Trips that Originate in Parlier



Source: Replica, Map: Walker Consultants.

Figure 107 shows the origin of trips by block group that ends in Parlier, showing the majority of trip within Parlier.

Figure 107: Origin of Trips that End in Parlier

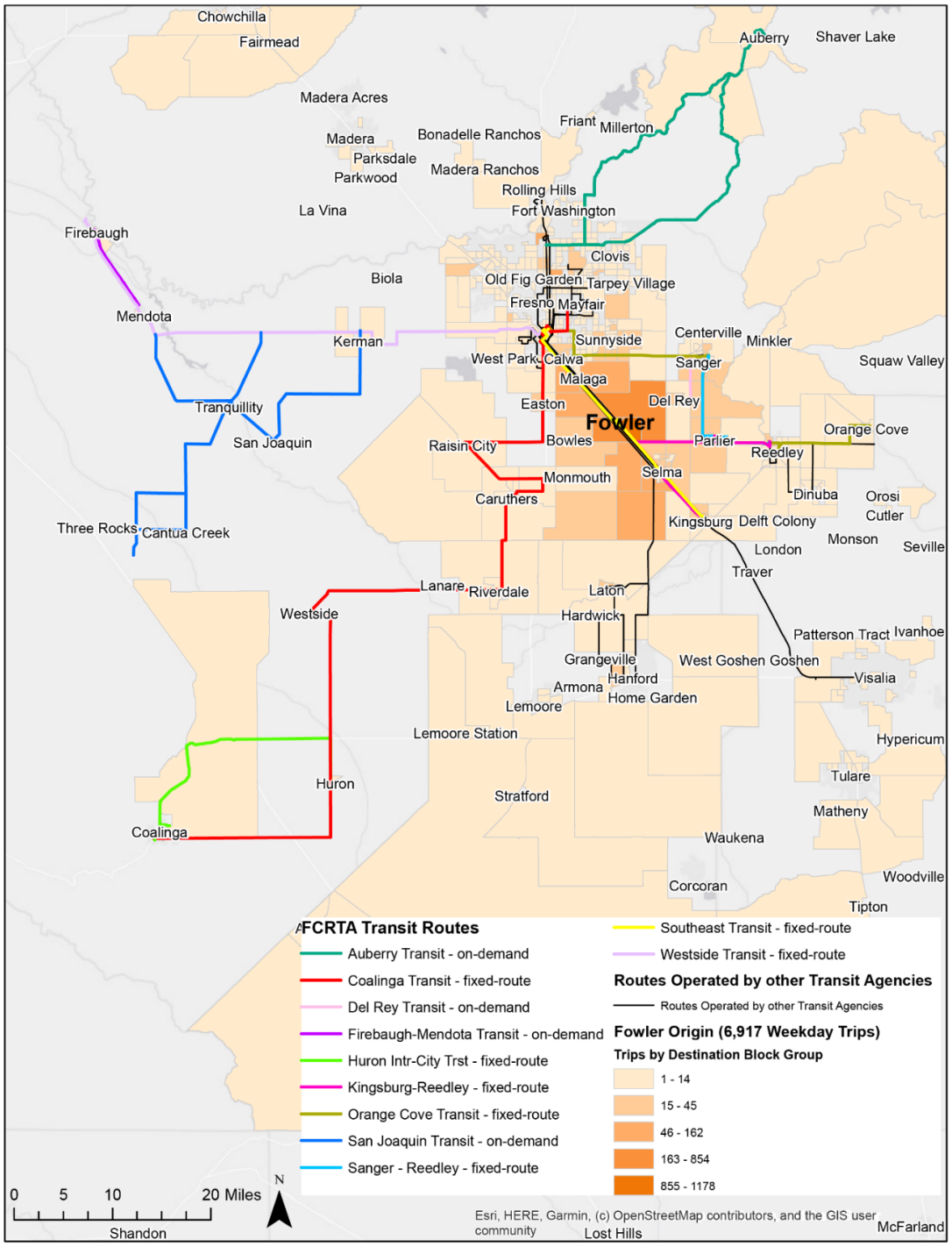


Source: Replica, Map: Walker Consultants.

Fowler

Figure 108 shows the number of trips by destination block group originating in Fowler, showing the majority of trips within Fowler.

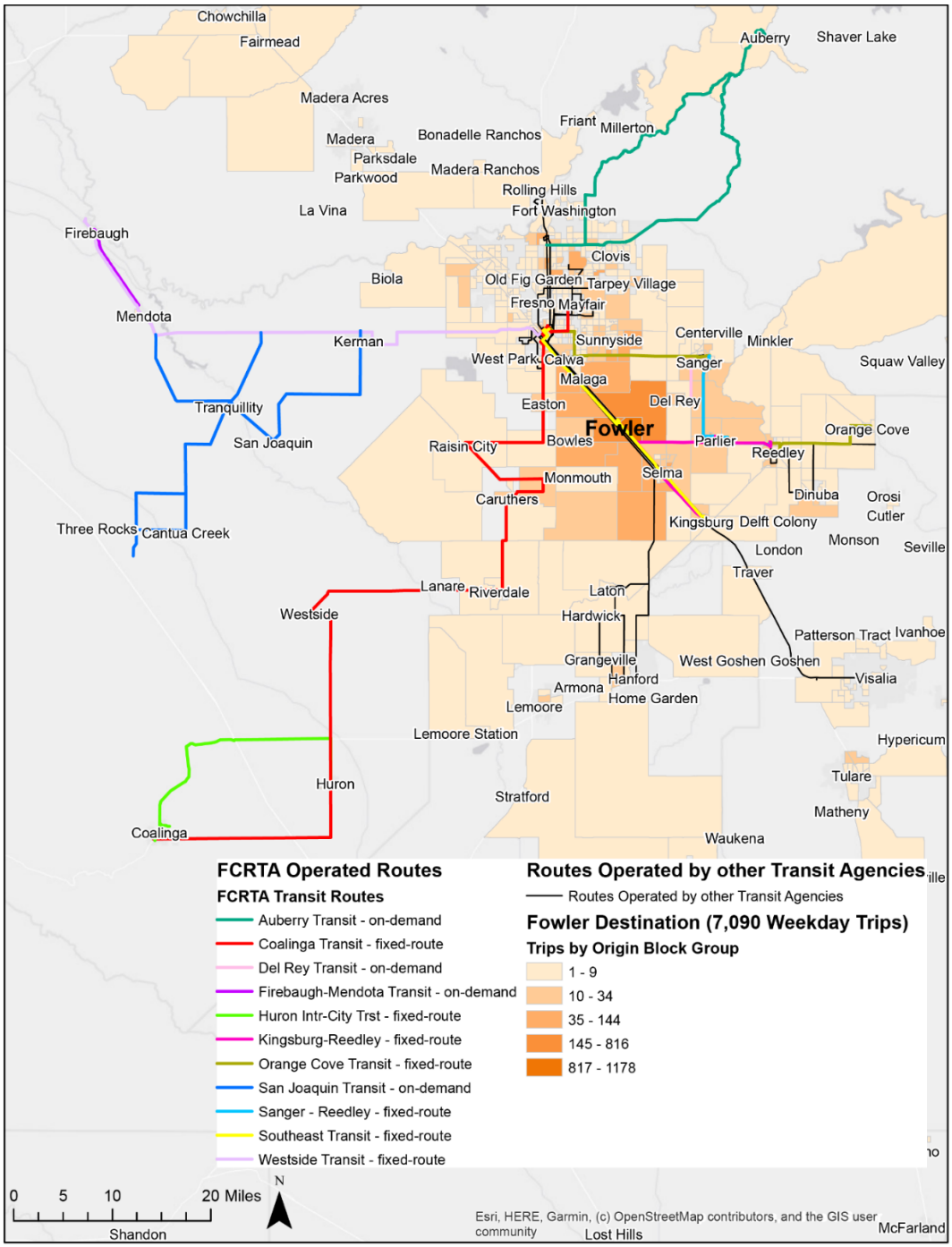
Figure 108: Destination of Trips that Originate in Fowler



Source: Replica, Map: Walker Consultants.

Figure 109 shows the number of trips by origin block group that end in Fowler, showing the majority of trips within Fowler.

Figure 109: Number of Trips by Origin that End in Fowler



Source: Replica, Map: Walker Consultants.

Existing Transit Conditions and Community Feedback

Biola

- Biola is served by rural dial-a-ride service for lifeline destinations (e.g., medical appointments). There is no fixed route service.
- Through FCRTA's Transportation Needs Assessment conducted in Biola, completed in 2021, residents identified a gap in transit service access and desired more flexible and convenient service.
- Same-day microtransit service is now provided in Biola Monday through Saturday from 7:00 a.m. to 7:00 p.m. (24-hour advanced reservation is required on Saturday), which provides rides from Biola to anywhere in Fresno County.

Lanare

- Lanare is served by the Coalinga fixed route service between Coalinga and Fresno. However, this service only has one trip to and from Fresno each day, with stops along the way. There is no evening service.
- As an unincorporated community, Lanare is served by rural dial-a-ride service for lifeline destinations (e.g., medical appointments).
- Lanare is not served by intra-city on-demand service.
- In a survey completed for FCRTA's EV Micro Transit Service Analysis in 2022 (over a third of respondents were Lanare residents):
    - 43 percent of respondents do not have access to their own vehicle at any one time.
    - 95 percent of respondents indicated they would use a service that allowed them to reserve rides to attend medical and social services appointments.

San Joaquin

- San Joaquin is served by the San Joaquin Transit inter-city on-demand service that provides service from San Joaquin and Tranquility to connections in Kerman only on Monday, Wednesday, and Friday. Service from San Joaquin to Cantua Creek, Three Rock, Halfway, Porvenir, and to connections in Kerman are offered on Tuesday and Thursday. Only one 22-passenger service vehicle is available to address service needs in this large service area. There is no evening service.
- San Joaquin has local in-city on-demand service from 6:30 a.m. to 4:00 p.m.
- Riders must make a reservation at least 24 hours in advance.

Parlier

- Parlier is served by the Sanger Express, a fixed route service that provides express service from Sanger to Reedley College and Kingsburg to Reedley Monday through Friday six times per day. Parlier is also served by Kingsburg to Reedley fixed-route that provides service between Kingsburg, Fowler, and Reedley three times per day. There is no evening service.
- Parlier has local in-city on-demand service Monday through Friday from 7:00 a.m. to 4:00 p.m.
- In the survey as part of this Microgrid Study (the vast majority of respondents live in Parlier), 27 percent indicated they do not have access to transportation on a typical day.
- At the community pop-up event that was held as part of this Microgrid Study, participants indicated that public transportation was a top five item of importance at resiliency hubs.

Fowler

- Fowler is served by two fixed routes that provide service Monday through Friday three times per day: Kingsburg to Reedley, which provides service between Kingsburg, Fowler, and Reedley, and Southeast Transit, which provides service between Kingsburg and Fresno. There is no evening service.
- Fowler has local in-city on-demand service Monday through Friday from 7:00 a.m. to 4:00 p.m.

Recommendation

Given the significant number of rural communities and the fact that they are many miles from one another, it is challenging to provide traditional fixed-route service to meet the needs of all rural residents. Many existing fixed routes are offered infrequently, with no evening or weekend service, providing limited transit options.

As the origin/destination analysis demonstrates, people are making many trips within their community and the immediate surrounding areas, and less trips further away. One of the reasons may be because there is limited transit to further away destinations for those without another transportation option. Another reason is the growth in health care facilities throughout Fresno County, may reduce the need for people to travel to the City of Fresno for medical appointments.

Through community outreach efforts conducted, residents have indicated there is a lack of convenient public transit. During the community pop-up event in Parlier, participants indicated that public transportation is one of the top five items of importance at resiliency hubs. Further, given the high poverty rates in these communities, it is difficult for residents to afford to own a vehicle. If they do, they pay a significant portion of their income in vehicle costs. Many residents share a vehicle with family members or friends, which limits access.

Rural Fresno County residents need a flexible on-demand transit service to increase access for these communities to critical healthcare, social services, education, job training, shopping, and other quality-of-life locations. FCRTA's EV Micro Transit service, which has been implemented in Biola, is a highly innovative, community supported concept. Riders can book rides on-demand by a web portal or by calling a hotline. Dispatch schedules rides, and pairs riders together who are traveling on a similar corridor to gain efficiencies. Small zero emission vehicles are parked in the community served, reducing dead head miles and improving efficiency. Many rural communities in Fresno lack access to job opportunities, given that the communities are sparsely populated and many miles away from the City of Fresno and job opportunities throughout the county. The fact that the microtransit service hires local drivers promotes job opportunities for rural residents. Hiring local drivers may also increase community trust in the service and marketing opportunities.

Microtransit service is already operated in Biola. FCRTA plans to expand the service countywide to provide access to more rural communities. Upon installation of the microgrids, microtransit service is recommended to be operated out of all five microgrid communities. Vehicles would be stored and operated out of each microgrid/multi-modal resiliency hub site. The service should allow riders to access both local destinations and destinations throughout Fresno County.

Additional Mobility Recommendations

EV Carshare

EV carshare service at each microgrid/multi-modal resiliency hub can help to fill gaps in service coverage. Through community outreach conducted as part of FCRTA's microtransit studies, many rural residents have reported not owning a vehicle. Given the high poverty rate in rural communities, vehicle ownership can comprise a significant portion of the household budget. Car share service can provide residents access to an electric vehicle without needing to own and maintain a vehicle. The carshare service would be a membership-based car reservation subscription service. People could reserve a car on-demand through a website, cell phone app, or by calling a hotline.

Electric Bike Share/Bike Library System

As discussed in the origin/destination analysis, many trips stay local within each microgrid community. For shorter trips, community electric bike share or a bike library can give people access to other places within the community. Biking provides a zero emission transportation alternative that has a relatively low cost of administration compared to microtransit or EV charshare. Bikeshare can reduce the barriers for people to ride bikes, as they don't have to purchase and maintain a bike. Approximately 50 survey respondents indicated they would be interested in bike or scooter rentals.

Bikeshare in rural communities can be operated in the form of a community library, where riders can take out a bike, just like they would a library book.

There are several options to administer the bike library. One options is a partnership with a local bike organization or bike store. Riders may not need a credit card or smartphone to check out an e-bike, they can instead check out an access fob, for a period of time (a few hours, day , or several days). The bikeshare system would likely require a public subsidy. It is a great option to increase access to local destinations, and even encourage people to purchase their own bikes when it makes economic sense.

10 | Site Framework Criteria and Ranking

10 Site Framework Criteria and Ranking

This section describes a benefit-risk ranking framework created in consultation with FCRTA stakeholders to select two sites for further analysis. Sites that scored highly were more likely to be considered for detailed cost-benefit analyses:

- Criteria Ranking Framework – Criteria development process and descriptions
- Site Ranking Results – Ranked sites based on developed criteria

Criteria Ranking Framework

Benefits included impact on community resilience, overall resilience hub project cost, investment in the community to date, and leverage from the community. Impact on community resilience considered how many critical infrastructure buildings would be supported with the project. The project cost was standardized using the cost of customer reliability, defined as the incremental cost of the microgrid project versus BaU transit operations divided by the number of kWh of reliability provided.

The investment in community to date metric aimed to ensure equitable distribution of FCRTA's support and favor communities that had not received similar assistance in the past or are unlikely to receive support through other ongoing projects. The evaluation of leverage from the community assessed the community's ability to leverage resources and support for both the implementation and ongoing operation and maintenance of the microgrid project.

Risks included stakeholder engagement complexity metrics, site development collaboration criteria, and permitting and engineering criteria. Stakeholder complexity considers the number of third parties involved with the proposed microgrid and any existing relationships with the expected third parties. Primary organization collaboration considers the involvement of primary organizations, such as local government or tribal leadership, community-based organizations, technical and engineering firms, and utilities (e.g., PG&E).

Permitting and engineering factors were evaluated based on the ease and efficiency of obtaining necessary permits and the level and cost of engineering required for the project, including grid interconnection costs and any forecasted feeder constraints.

Microgrid costs were used assuming 24 hours of reliability provided by microgrid resources to standardize costs across all sites and reduce upfront capital investment barriers while still providing significant energy backup.

A benefit and risk rating rubric was used to systematically quantify benefit-risk ratings. The rubric outlined criteria for every benefit and risk, rated on a scale of 1 to 3, where 1 indicates low benefit or risk and 3 indicates high benefit or risk. All benefits and risks were weighted equally. Table 6 shows the rubric with rating definitions for each benefit and risk.

Table 6: Benefit and Risk Rating Rubric

Criteria	Rating		
Benefit	**1 = Low Benefit**	**2 = Medium Benefit**	**3 = High Benefit**
Impact on Community Resilience	Low/No Positive Impact (0-1 Buildings Supported)	Medium Positive Impact (2-3 Buildings Supported)	High Positive Impact (3+ Buildings Supported)
Project Cost (Cost of Customer Reliability in $/kWh)	>$1000/kWh	$500-1000/kWh	<$500/kWh
Investment in Community to Date	Received a high level of FCRTA support in the past (>1 FCRTA investment)	Received moderate level of FCRTA support in the past (1 FCRTA investment)	Received little or no FCRTA support in the past (0 FCRTA investments)
Leverage from Community	Minimal expected engagement, likely challenges garnering community resources	Moderate expected engagement, likely reasonable ability to leverage community resources	High expected engagement, likely high level of ability to leverage community resources
Risk	**1 = Low Risk**	**2 = Medium Risk**	**3 = High Risk**
Stakeholder Complexity	0-1 Stakeholders Involved / Strong Relationships	2-4 Stakeholders Involved / Moderate Relationships	4+ Stakeholders Involved / No/Weak Relationships
Primary Organization Collaboration	1-2 Orgs Involved / Strong Relationships	3-5 Orgs Involved / Moderate Relationships	6+ Orgs Involved / No/Weak Relationships
Permitting and Engineering	Straightforward permits required, well-defined and manageable engineering requirements	Extensive specialized permitting required, reasonable engineering requirements	Anticipated challenges obtaining permits, extensive engineering requirements

Source: Energeia Analysis

It is important to note that this framework assumes:

- Community partners will pay energy bills and ongoing operation and maintenance costs for critical infrastructure supported by microgrid resources
- Transit impacts are equally weighted across all sites
- Resiliency hub impacts are equally weighted across all sites

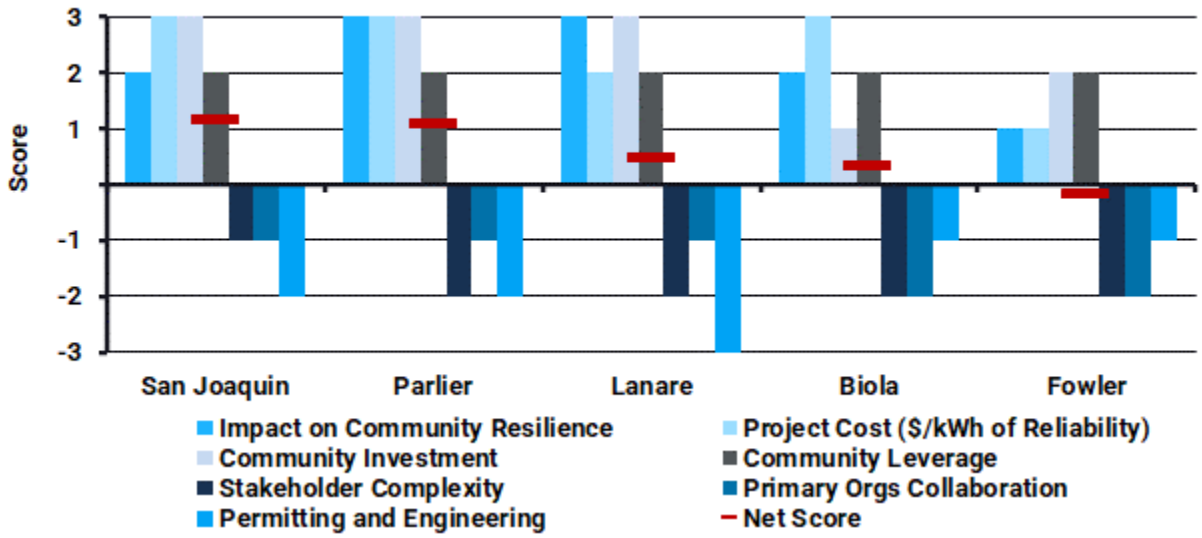
Site Ranking Results

Following the establishment of the evaluation framework, each of the five potential microgrid sites underwent a comprehensive assessment based on the identified benefits and risks.

The benefits and risks were evaluated for each site according to the above criteria in consultation with FCRTA stakeholders. Total benefit and risk scores for each site were calculated by averaging the scores for all benefit and risk criteria, respectively. A net total score was calculated by subtracting the risk score from the benefit score. Figure 110 shows a benefit and risk scoring summary by site. Figure 111 displays the total net score for each potential site.

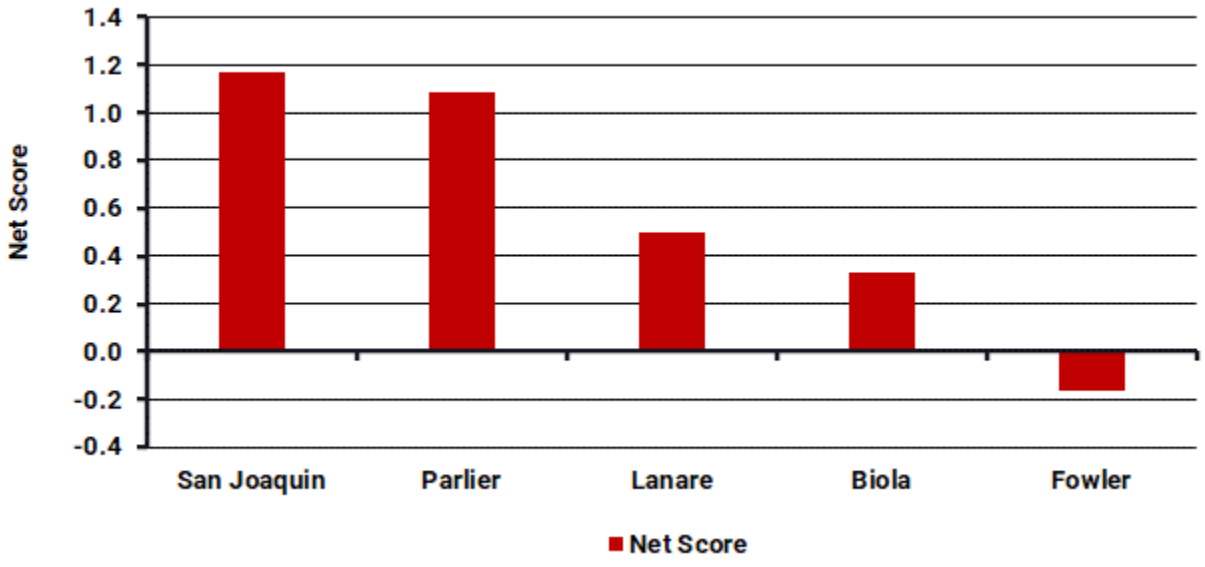
It is important to note that the purpose of this ranking framework is not to disqualify any site from future microgrid or micro transit development, but to rather identify the two most viable sites in the near term for in-depth financial analysis.

Figure 110: Scoring Summary by Site



Source: Energeia Analysis

Figure 111: Net Score by Site



Source: Energeia Analysis

Based on this site ranking methodology, San Joaquin and Parlier were selected as the top two potential microgrid sites for in-depth cost-benefit analysis. Both San Joaquin and Parlier scored comparably in terms of key benefits and risks. San Joaquin had a relatively low modeled cost of customer reliability from resource configurations at $371/kWh, and FCRTA has strong relationships with stakeholders and expected primary organizations. Similarly, Parlier had a low cost of customer reliability at $237/kWh, which would support the entirety of the Parlier Police Department's electricity load with the proposed resource configuration, and FCRTA has strong relationships with expected primary organizations.

Lanare, scoring third, had the highest scoring in the unincorporated community and scored similarly on benefits as San Joaquin and Parlier. However, a higher cost of reliability, at $667/kWh, and permitting and engineering concerns led to an overall lower score. Biola, the fourth-ranking site, has strong existing relationships with FCRTA and a low cost of customer reliability, but has previously received FCRTA investment through its micro transit service. Fowler scored the lowest of the sites due to its relatively high cost of customer reliability and the optimal resource configuration, which provides little solar PV generation to additional community infrastructure.

11 | Priority Site Assessments

11 Priority Site Assessments

Site Cost-Benefit Analysis

This section describes the detailed cost-benefit analysis conducted on the top two ranking sites, including:

- **Cost-Benefit Analysis Framework –** Costs and benefits modeled and additional key assumptions
- **Cost-Benefit Analysis Results** – Financial analysis results in net present value terms
- **Key Benefit Recommendations** – Overview of benefit value stream eligibility and recommendations

Cost-Benefit Analysis Framework

Based on the cost estimates generated from the site energy and infrastructure assessments for Parlier and San Joaquin and the reliability provided to each site in kWh terms, each of the benefit streams outlined in Section 9: Microgrid Optimization was modeled in net present value (NPV) terms.

Eligibility and revenue potential metrics were captured and forecasted over the lifetime of the microgrid resources, including a 2.5% inflation assumption and a forecasted average year-over-year increase in utility rates of 3.9%, aligning with PG&E's 2024 general rate case.

A weighted average cost of capital of 2.5% was used as a real social discount rate, as defined by the US Office of Management and Budget, to calculate NPVs of each of the cost and benefit categories, which are shown in the table below.

Table 7: Benefits and Costs Modeled in Financial Analysis by Site

Resilience Hub Benefits
Site Electricity Bill Savings
Transit Value of Reliability
Community Value of Reliability
Resource Adequacy Services
Inflation Reduction Act Tax Credits
CARB Low Carbon Fuel Standard Credits
PG&E Power Saver Rewards Program
CEC Demand-Side Grid Support Credits
Community Charging Savings
Community Health and Environmental Benefits
Resilience Hub Costs
Site Development
Capital Expenditure
Parking Lot Infrastructure
Interconnection and Panel Upgrades
Conduit and Trenching
Energy System

Capital Expenditure	
Solar PV	
Battery Storage	
Level II Chargers	
Operation and Maintenance Expenditure	
Solar PV	
Battery Storage	
Level II Charger	

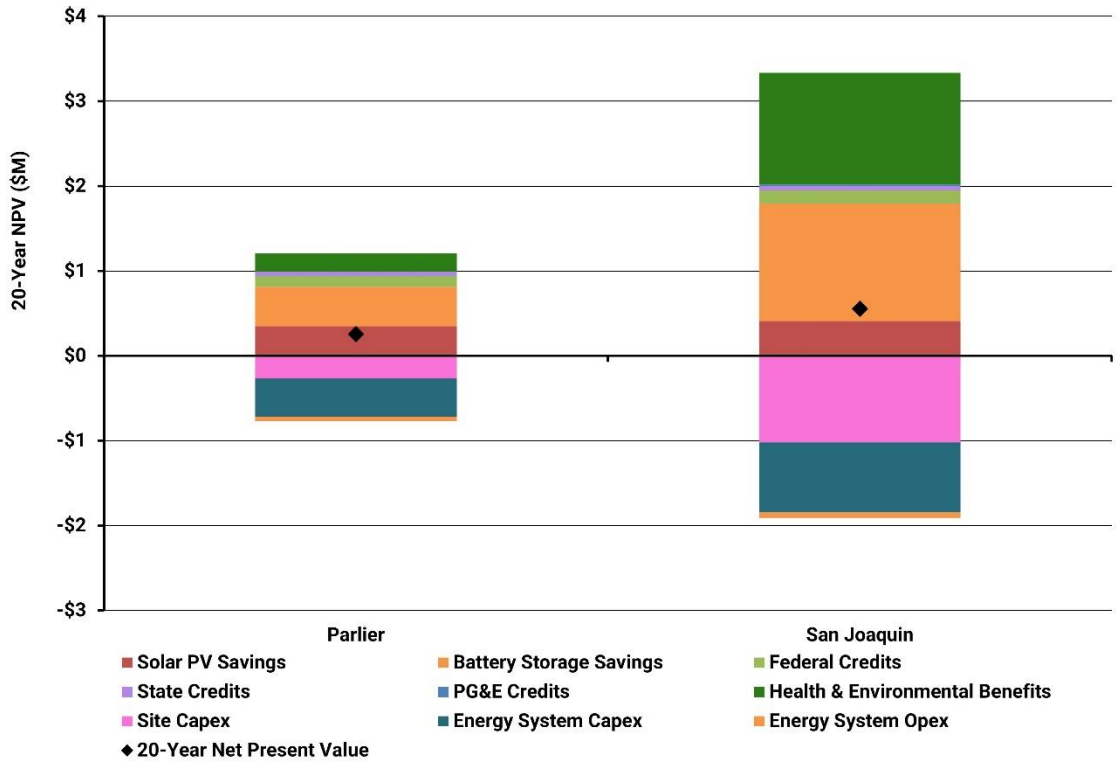
Source: Energeia Analysis

Each benefit strategy was then categorized into battery storage, solar PV, federal, state, utility, and health and environmental benefit groups. Each cost was categorized by source, such as site development or energy system, and expenditure type, being upfront capital or ongoing operation and maintenance costs.

Cost-Benefit Analysis Results

The figure below shows an estimated net benefit of over $200,000 at the modeled Parlier resilience hub and over $500,000 estimated net benefit over the 20-year in San Joaquin. While the site development costs in San Joaquin were estimated at almost $1M to develop the parking lot and grid interconnection, the abated emissions from internal combustion engines resulted in a ~$1.25M benefit to the San Joaquin community and all the surrounding unincorporated communities. These health and environmental benefits are especially crucial in Fresno County due to the air quality issues in the San Joaquin Valley.

Figure 112: 20-Year Net Present Value Cost-Benefit Analysis by Site



Source: Energeia Analysis

It is important to note that each of these microgrid value streams may benefit FCRTA directly or may benefit the community, depending on each site's specific ownership structure and metering configuration.

Key Benefit Recommendations

Based on eligibility and general requirements for each resilience hub benefit or revenue stream, all but one category were determined to be viable strategies to fully capture the benefits of each of these transit microgrid sites. CARB's LCFS crediting program was determined to require Direct Current Fast Charging (DCFC) infrastructure, also known as Level III chargers. FCRTA plans to explore future opportunities to incorporate such infrastructure in its Countywide charging infrastructure investment plans. A complete view of resilience hub benefits and recommendations is shown in Figure 113 below.

Figure 113: Key Detail, Eligibility, and Recommendations by Benefit Strategy

Strategy	Description	Key Risks, Issues, and Barriers	Eligibility		Recommendations
			Parlier	San Joaquin	
Site Electricity Bill Savings (Solar PV)	Electricity bill reduction from on-site solar PV generation	True solar output dependent on weather and limited to high output times, which do not necessarily overlap with peak price periods	✓	✓	Include
Transit Value of Reliability (Battery Storage)	Estimated value in $/kWh of maintaining electricity reliability for the transit sector	Transit value of reliability modeled to be relatively low, at ~$3/kWh, using a cost factor analysis, compared to other sectors. It does not reflect the value of transport services	✓	✓	Include, but note under-valuation of transport service value to riders in the documentation
Community Value of Reliability (Battery Storage)	Estimated value in $/kWh of maintaining electricity reliability for the specific sector being backed up	Only applies where the site receives backup reliability support for additional critical infrastructure (only Parlier)	✓	×	Include
Resource Adequacy Services (Battery Storage)	System-level peak demand reduction framework to ensure adequate resource across load serving entity territories	Extensive resource qualification process through CAISO and CPUC	✓	✓	Include, but note that additional work will be required to monetize the resource
IRA Tax Credits	Inflation Reduction Act microgrid resource tax credit for up to 30% of total project cost	Total IRA funding limited to ~$20M/year for CA, no guarantee of funding procurement	✓	✓	Include
LCFS Credits	CARB's Low-Carbon Fuel Supply credits ZEV infrastructure investments based on relative emissions from typical petroleum fuels	Requires EV chargers to be DCFC (Level III) for LCFS credit eligibility	×	×	Exclude
PG&E Power Saver Rewards Program	Demand Response Program focused on reducing system peak demand with voluntary demand response Up to 60 hours/year at $1/kWh payout	Revenue requires demand response event calls from peak demand events Limited to 60 hours/year Have to deal with PG&E	✓	✓	Include
CEC Demand Side Grid Support Credits	Battery Storage Incentive Program like Resource Adequacy on a smaller, behind the meter scale, with various peak period incentives based on battery sizing	Extensive resource qualification process through CEC Peak period calls happen very infrequently (CAISO wholesale price spikes >$200/MWh)	✓	✓	Include
Community Charging Savings	Cost savings to the community from charging off of excess battery/solar PV instead of DC fast chargers at 48c/kWh	Requires charging agreement with community and EMS software to ensure battery backup maintained	✓	✓	Include

Source: Energeia Analysis

12 | Microgrid Funding and Ownership Structures

12 Microgrid Funding and Ownership Structures

Microgrids are an emerging technology for FCRTA and the transit industry as a whole. Funding or financing the construction and operations of the microgrid sites requires a thoughtful approach. The complexity and uncertainty of these projects can increase risk on many levels. Given the growing demand for renewable energy, numerous opportunities exist to fund, finance, build, and operate microgrid sites. Walker conducted the following review of implementation opportunities and the potential alternatives to fund, finance, design, build, operate, and maintain the microgrid sites.

Utility Partnership

The project team first explored the potential to partner with the utility in the FCRTA's service area, Pacific Gas and Electric (PG&E), through PG&E's Microgrid Incentive Program (MIP), which funds community microgrids. As part of the evaluation to determine eligibility for PG&E MIP funding, the project team evaluated the type of microgrid energy production system that would work best for the FCRTA sites.

There are two types of microgrid energy production systems:

1. Behind the Meter: The system is located on the customer's side of the utility meter. The energy produced and stored is used on-site, reducing on-site energy needs and costs.
2. Front of the Meter: The system is located on the utility side of the meter. The energy produced, and electrical service are larger in scale. These systems supply power to the grid which is distributed to customers beyond the site.

The project team has recommended that FCRTA microgrid sites be "behind the meter," meaning the energy is produced and used only on-site. With this type of microgrid, PG&E's MIP program funding is unavailable to FCRTA, as only "front of the meter" systems are eligible for funding.

Alternatives to a Utility Partnership

Given that a partnership with PG&E to fund the microgrid construction and operations is unavailable, the project team explored three additional potential funding/financing, design, build, operation, and maintenance options, including:

1. Model 1: FCRTA/Community-owned
   A. FCRTA and its community partner design, build, own, operate, and maintain the microgrid.

2. Model 2: Design-build or Design-bid-build
   A. FCRTA funds, owns, operates, and maintains the microgrid system (with a community partner) but works with a contractor to design/bid/build or design/build the sites.

3. Model 3: Power Purchasing Agreement
   A. FCRTA enters a Power Purchasing Agreement with a private sector developer/investor who will finance, design, build, operate, and maintain the microgrid. In this model, the private partner would also own the microgrid during the contract period, with ownership reverting to FCRTA at the end of the contract.

The following sections provide an overview of the three funding/financing/ownership structures outlined above, including points to consider for each structure and case study learnings to inform FCRTA's decision making process.

Model 1: FCRTA/Community-Built and Owned Model

Public resources, such as local, state, and federal grants, loans, bonds, and other public sources, can fund/finance agency- and community-owned microgrids. In this financial/ownership model, FCRTA would work with a community partner and be responsible for funding the project. FCRTA would also oversee all aspects of the construction management process, including the design, bid, and build. It would most likely partner with a local government or community services district for site operations and maintenance. FCRTA and the community partner would jointly own the microgrid.

Factors to Consider

Advantages

Control through a wholly owned system. System ownership would grant FCRTA control over all aspects of the process, including design, construction, operations, and maintenance (FCRTA would work with its community partner, the local government, or the community services district that owns the site). FCRTA has experience in capital development from its history of leading capital projects.

FCRTA and the community partner own the system and retain control to prioritize their goals and the community's needs over private sector requirements for financial return.

Control of the construction and operations process. FCRTA would be in complete control of making all decisions (in coordination with the community partner) related to construction and operations.

Risks

Significant upfront and ongoing costs. FCRTA would be fully responsible for all upfront capital costs and would need to raise funds through additional taxes (an unlikely option) or grant awards. Even if the project is grant-funded, this funding almost always requires a local match of 20 percent or more of project costs.

Risk of future energy cost increases. While the microgrid would lower energy costs overall, at times, power would be pulled from the PG&E grid, based on the energy management system analysis. Over the past several years, FCRTA's utility operator, PG&E, has increased energy rates.[12] The California Public Utility Commission recently approved another rate increase for 2024. There may be additional rate hikes due to the need for future energy capital and maintenance projects in the PG&E service area.

[12] Pacific Gas & Electric 2023-2026 General Rate Case to the California Public Utilities Commission. Approved November 16, 2023. Available at https://www.pge.com/en/regulation/general-rate-case.html

Project and operations cost overruns. FCRTA and its community partner would be fully responsible for all construction and maintenance cost overruns. Given that FCRTA does not have architects or engineers with microgrid experience or energy experts on staff (nor do most likely community partners), this could be a significant risk.

Need for additional staff and resources. FCRTA has a small team of three staff members. While it has undertaken numerous capital projects, it remains stretched to provide adequate resources to manage current projects. Undertaking the development of a microgrid would put additional stress on staff, and FCRTA would likely need to invest resources in new team members such as architects, engineers, finance, and energy experts.

FCRTA's core mission is transit. FCRTA is responsible for providing transit service in Fresno County's rural areas. While microgrids are necessary to transition its fleet to electric vehicles, and FCRTA could leverage the investment to provide more transit and develop a community resource, energy systems are not a core area of FCRTA's mission. Further, while FCRTA has significant expertise related to energy systems, its focus is transit. As stated previously, FCRTA has no engineers, architects, or energy systems staff, making it beyond the capacity of existing staff to develop design and contracting documents or oversee construction related to the microgrid projects.

Case Study Learnings

Based on our research of transit microgrid systems, no projects were wholly built and owned by the agency, which indicates that it is unlikely to be a successful model for FCRTA. FCRTA's existing capital projects provide learnings related to this model. FCRTA typically hires a construction manager for capital projects to manage the design and construction process. Even with the benefit of a construction manager, there are significant pressures on FCRTA's staff and resources to oversee and manage capital projects.

Model 1 Conclusion

A wholly owned/community-owned model is unlikely the best alternative for FCRTA. While FCRTA and the community would retain significant control, there are considerable risks related to costs, additional staffing, and mission drift, which are especially burdensome for a small, rural transit agency. There would also be significant administration time and resources required of existing staff. A small, rural agency does not have staff solely dedicated to real estate and capital projects or architects, engineers, finance, and energy experts to develop construction documents, plans, and contracts.

Model 2: Design-Bid-Build or Design-Build

Given their similarities related to microgrid construction, the project team jointly explored a design-bid-build process and a design-build process as one model.

Design-Bid-Build

A design-bid-build is a traditional procurement process where FCRTA would hire a designer to prepare plans, drawings, and documents. FCRTA would then invite construction contractors to bid to build the microgrid project based on those designs. FCRTA would choose the construction contractor, and FCRTA also would hire a general contractor to manage the process/project on behalf of FCRTA. The general contractor would act as an intermediary between the designer and the construction contractor.

Factors to Consider

Advantages

Increased overall control. FCRTA would select both the design and the construction firm, granting the Agency more ownership and input over the design process, scope, and plans. FCRTA would also hire a general contractor to oversee the project, adding another level of control/involvement in the project.

Price control. As the designer and contractor are hired separately, FCRTA would have more control over pricing the projects.

Risks

Increased transparency as a result of the roles and responsibilities between design and construction being clearly defined.

Increased project construction and completion time because FCRTA would need to conduct three separate procurement processes to hire a designer, general contractor, and construction contractor. This can make the process more complicated and potentially delay the project because several different parties are involved in the design and construction process.

Because the designer and contractor are working separately, conflicts and issues with coordination and information may lead to change orders and increased costs or unforeseen issues during construction. Further, three separate procurement processes and contracts would lead to increased administrative and legal costs. However, if more creativity and skill are brought to the process and done well, the likelihood of conflicts and change orders may be lower.

Design-Build

In a Design-Build process, FCRTA would hire one contractor, a design-builder, to provide both design and construction for the microgrid project.

Factors to Consider

Advantages

Reduced risk as the design and construction are performed by a single team who are contractually obligated to work together to address any issues during construction. In this arrangement, construction risk for the entire project is essentially transferred to a single contractor.

A faster project delivery because it involves a single procurement process. A single contractor/team performs the design and construction, reducing the lag time between the design and procurement processes to hire a construction contractor.

Cost predictability is important because the entire design and construction process is wrapped into one procurement. Profit and project goals are aligned. The design-builder can quickly respond to any challenges.

Risks

Reduced FCRTA control with design and planning. FCRTA would rely on one single entity, the design-builder, for all aspects of the project prior to the microgrid coming online.

Lower quality design and potential for more issues because there is no upfront coordinated engineering and design process to identify conflicts. The design may be less innovative because of the increased risk to the design-builder to conduct the entire process.

Factors to Consider for Both Design-Bid-Build or Design-Build:

Advantages

FCRTA and the community partner own the system and retain control to prioritize the Agency's goals and the community's needs.

Control of the construction and operations process. FCRTA (in coordination with their community partner) would retain some control over making project decisions, which would vary depending on the DBB or DB process.

Risks

Significant upfront and ongoing costs. FCRTA would be fully responsible for all upfront design and capital costs. Even if the Agency does procure grant funding, it would typically be required to provide a local match of at least 20 percent of project costs.

Risk of future energy cost increase. In either design-bid-build or design-build, FCRTA must take on all risks related to future energy cost increases when it pulls power from the PG&E grid.

Need for additional staff and resources. While a DBB or DB process would provide design, construction, and general oversight resources, there would still be significant pressure on FCRTA's small staff and resources to oversee and manage the projects and provide oversight.

FCRTA's core mission is transit. FCRTA is the entity responsible for providing transit service in Fresno County's rural areas. Given the many projects FCRTA currently has underway, it does not have the staff capacity to conduct design, engineering, architectural, and energy projects at this scale without hiring additional staff or straying from its core transit mission.

Case Study Learnings

FCRTA is constructing a new maintenance facility known as the Selma Maintenance Facility Project, which consists of developing a 7.5-acre vacant in Selma, California, for dispatch and vehicle maintenance operations that will serve rural Fresno County and accommodate future transit needs. The facility will include a maintenance shop equipped to service natural gas and battery electric buses, light-duty electric vehicles, and vans. The project is like a microgrid project in that it has significant energy-related components.

FCRTA is funding this project through a federal United States Department of Transportation Bus and Bus Facilities grant and its own resources. It is using the Design-Bid-Build process to construct the project. FCRTA hired a general contractor to manage the construction process. Even with the benefit of a general contractor, there are significant pressures on FCRTA's staff and resources to oversee the ongoing construction. There have been significant cost overruns and challenges with supply chain issues specifically related to procuring energy equipment, such as switch gears, that have led to delays. FCRTA is responsible for these overruns, as well as future operations and energy costs, and the associated risks. This strains FCRTA's staff and resources.

Model 2 Conclusion

A Design-Bid-Build or Design-Build procurement may be realistic if grant funding is available. However, FCRTA would need to hire a capital project manager or facilities manager to oversee contractors and day-to-day activities. FCRTA would also likely need additional staff to manage day-to-day site operations. The project would also be unique in that FCRTA would fund and oversee design and construction in coordination with a community partner, but the local partner, not FCRTA, would own the land.

Model 3: Power Purchase Agreement

A Power Purchase Agreement (PAA) is an arrangement where a third-party, private sector developer (and its inventors) designs, constructs, owns, operates, and maintains the microgrid and all equipment (vehicle chargers, solar panels, battery) on behalf of FCRTA and the community partner. In return, FCRTA and the community partner purchase power generated at the site for an agreed period and cost.

The private owner/developer/investor creates a special purpose entity that acts as the owner of the microgrid and the energy system, which they own (including all equipment) for the duration of the contract. This entity also typically funds all or most upfront and ongoing costs. To bring in additional revenue to make the financing viable, when the system produces excess power, the private owner can sell the excess power back to the local utility. It can also leverage state and federal tax credits, which are returned to FCRTA and the community partner through reduced energy costs, and charge a fee for public electric vehicle charging. PPAs are usually long-term agreements between 10 and 25 years or longer.

Factors to Consider

Advantages

Enables the microgrid to be developed. Because FCRTA does not have to fund the upfront and ongoing costs fully, it may make a microgrid project more viable.

Reduced energy cost risk and long-term stability. In a PPA, energy costs escalate based on a fixed, predictable increase over the duration of the contract term (typically between 2% and 5%). The cost increase is to account for increased microgrid maintenance and energy costs over time. This adds predictability to FCRTA and the community partner's energy costs. Over the term of the contract, energy costs may be lower than PG&E rates.

Energy cost savings. Typically, the energy rates paid through a PPA are lower than PG&E rates.

No/low upfront and/or operations/maintenance costs. FCRTA would typically incur no upfront/ongoing costs or only minimal costs related to operations and maintenance of the solar panels, charging infrastructure, or battery with this type of model. The community partner would only incur any costs related to the multi-modal resiliency hub and FCRTA costs related to the microtransit service. A microgrid project developed using this model would likely still be eligible for state and federal grant funding.

Ability to leverage tax credits and rebates. As a private sector partner, the developer/investors can take advantage of and benefit from state and federal tax credits for renewable energy projects. This reduces project and energy costs, which in turn benefits FCRTA through lower energy costs. FCRTA cannot take advantage of these tax benefits as a public agency.

Limited design and construction risk. The developer/investor is responsible for the system's design, construction, operations, maintenance, and performance. FCRTA can negotiate terms with the developer/investor in its own best interests and the best interests of the public.

Efficient use of FCRTA staff and resources related to its mission. Because FCRTA would not take on the design, construction, ownership, operations, or maintenance of the microgrid under this model, use of staff time and other resources would be minimized. FCRTA's staff time could then be spent on activities related to its core transit mission while still permitting it to transition its fleet to electric, as required by the State.

Risks

Uncertainty of PPAs in a rural market. Most PPAs have occurred in larger urban and suburban markets. FCRTA's microgrid projects are potentially too small to generate interest from the private market.

Limited control over the design and construction process, as well as operations. Through a PPA process, FCRTA would retain limited control over design and construction of the microgrid. However, it would not own the land or equipment and would have only a limited say in operations.

The contract and system are complex to navigate and explain to the community and stakeholders. PPAs are complex agreements, and developers/investors focus solely on these structures. While FCRTA has significant experience in energy systems, its mission and focus is transit, and it would likely need to bring in outside advisors for contracting. FCRTA would also need to develop educational materials to explain the process and agreement to the community and stakeholders.

Case Study Learnings

Through a competitive bidding process, Montgomery County entered into a public-private partnership agreement with AlphaStruxture to design, build, finance, own, and operate the microgrid. AlphaStruxture owns, operates, and maintains the equipment throughout the lifecycle.

In exchange for constructing and owning the equipment, Montgomery County pays AlphaSruxture through a 25-year Energy as a Service agreement (EaaS), which helps to ensure predictable operating expenses (energy costs) for the County. A set price is agreed upon with annual escalation over 25 years, regardless of fluctuations in energy prices by factors such as geopolitics. There are no upfront costs to the County, and the agreement is structured to take advantage of environmental credits, tax credits, and other incentives to mitigate these upfront costs. The County pays for energy through a commodity charge per kilowatt hour, regardless of what type of energy is being used.

Model 3 Conclusion

A Power Purchase Agreement may make sense for developing both the top-ranking microgrid projects, while also making the remaining three sites viable. This development model would bring the benefits of project viability with low or no FCRTA upfront capital costs or operations costs, as well as energy cost predictability, and energy cost savings. A PPA would also allow FCRTA to focus on its core transit mission while still supporting the conversion of its fleet to electric. Notably, a PPA would permit the private sector to benefit from state and local tax credits and allow FCRTA to leverage those benefits in the form of lower energy rates, which it cannot currently do as a public agency.

For the most part, FCRTA would not be responsible for design, construction, or operations, which would limit its control. Due to the complex nature of these agreements, outside advice would likely be needed to navigate the contracting process.

One question that has not been tested or answered is whether a PPA is viable in a small, rural market. FCRTA's microgrid projects are generally smaller than the PPA projects that have been built, so interest from the private market may not materialize.

13 | Next Steps

13 Next Steps

Based on the site selection criteria and priority site assessment, the project team recommends that FCRTA pursue Phase I microgrid and community multi-modal resiliency hubs in San Joaquin and Parlier. This chapter discusses the next steps for implementing Phase I site recommendations and provides supportive information as FCRTA considers pursuing Phase II sites.

In the immediate term, next steps for implementation include:

- **Partnerships.** Expand partnerships with the cities of Parlier and San Joaquin to create a task force to pursue project development and funding:
    - FCRTA already enjoys a strong partnership with both the cities of Parler and San Joaquin. Both cities are active members of FCRTA's Board, and staff collaborate on transit planning and operations. FCRTA and each city should enter into a memorandum of understanding with each city to begin a formal implementation process.
- **Ownership and funding model.** Determine the appropriate model for funding and ownership structure.
    a. FCRTA/Community-owned
    b. Design-build or Design-bid-build
    c. Power Purchasing Agreement
- **Identify a funding pathway.** Regardless of the funding structure, there will likely be necessary public or grant funding to support implementation. Table 8 evaluates potential funding opportunities and their applicability score to fund implementation.
- **Due diligence.** If pursuing a Power Purchasing Agreement, retain appropriate advisors to perform due diligence on developers and investors, as well as opportunities for small, rural microgrids.
- **Coordination with the Electric Vehicle Charging Master Plan and Energy Management System Plan.** FCRTA is set to embark on an electric vehicle charging master plan and energy management system plan. Coordinate microgrid activities with each of these efforts.
- **Phase II.** The Phase III sites may have funding and implementation opportunities (Lanare, Biola, and Fowler). FCRTA is active in all three locations, and can leverage these partnerships as funding opportunities arise. In Biola, FCRTA is partnering with the Biola Community Services District to provide microtransit service to the community. In Fowler, FCRTA is working with the City on a transit feasibility study exploring bus rapid transit on State Route 99 as well as developing transportation connections at new affordable housing sites. The three remaining microgrid sites are potential. FCRTA provides limited transit service to the community of Lanare and connects with the community through local non-profits.

Funding Sources and Applicability Score

The following are potential microgrid and multimodal community resiliency hub funding sources. The applicability score is a measure of the likelihood of FCRTA receiving funding. The score is based on the grant source and professional judgement of the project team, who has experience successfully leading over $12 million in grant funding for electrification projects.

Table 8: Potential Funding Sources

Funding Source	Type of Funding	Funding Entity	Applicability to Microgrid	Applicability Score
Grants for Bus and Bus Facilities (5339(b))	Competitive Grant	Federal Transit Administration (FTA)	-funds infrastructure, including technological changes or innovations -microgrid consistent with FTA goal of supporting zero-emissions vehicles	High
Transit and Intercity Rail Capital Program (TIRCP)	Competitive Grant	California State Transportation Agency (CalSTA)	-funds capital improvements that decrease greenhouse gas emissions, vehicle miles traveled, and congestion	High
Measure C	Fresno County Sales Tax	Fresno County Transportation Authority (FCTA)	-can help FCRTA meet the local match requirement for competitive grants	High
Measure C New Technology	Competitive Grant	Fresno Council of Governments (FCOG)	-funds new transit technologies	High
Clean Vehicle Fueling Infrastructure Program	Incentive Program	San Joaquin Valley Air Pollution Control District	-funds EV charging stations and solar infrastructure	High
Clean Mobility Options (CMO) Mobility Project Vouchers	Voucher Program	Calstart	-funds innovative transit service, bikeshare, scooter share, EV carshare	High
Innovative Charging Solutions for Medium- and Heavy-Duty Electric Vehicles	Competitive Grant	California Energy Commission (CEC)	-funds innovative EV charging technologies	High
Energy Improvement in Rural or Remote Areas	Competitive Grant	Department of Energy (DOE)	-funds clean energy demonstration projects -focuses on providing measurable	Medium

			benefits directly to energy customers	
Strengthening Mobility and Revolutionizing Transportation (SMART)	Competitive Grant	United States Department of Transportation (USDOT)	-funds projects that reduce greenhouse gas emissions in the transportation sector -focuses on data collection and data sharing best practices	Medium

Source: Walker Consultants

Energy Management System

Critical to the microgrids is an energy management system. FCRTA must monitor its energy needs, consumption, solar generation, and storage. Energy management systems can optimize charging schedules based on variables, including bus routes and the price of electricity. Energy management systems can ensure charging occurs during off-peak times, reducing costs and giving greater control and flexibility for fleet operations and dispatch because the agency can avoid charging during peak times.

FCRTA received funding from the Caltrans Sustainable Communities grant program to conduct a County-Wide Energy Management System Plan. The Plan will identify an energy management system solution that would improve the reliability and enhance the resiliency of FCRTA's transit system. FCRTA's goal is to have one energy management system to avoid the need to coordinate among multiple systems and vendors. The energy management system will be tied into all of FCRTA's microgrids.

EV Charging Master Plan

In addition to the Energy Management System Plan, the Caltrans Sustainable Communities grant will fund an EV Charging Master Plan. The primary objective of the EV Charging Master Plan is to facilitate FCRTA's transition to an all-EV fleet, reducing GHG emissions. Given the size of its service area, FCRTA operates out of 13 bus yards across the County and is partnering with communities to implement EV microtransit service. Range limitation has been one of the critical barriers to FCRTA's fleet transition efforts. Having the correct EV charging types and locations and understanding each site's capacity and necessary upgrades/appropriate charging infrastructure will allow FCRTA to optimize efficiency, cost-effectiveness, and transit service reliability. The EV Charging Master Plan will help inform the microgrid's final design and phasing.

14 | Appendices

Zero-Emissions Bus Rollout Plan

Fresno County Rural Transit Agency (FCRTA)

FCRTA
Fresno County
Rural Transit Agency

*Accessible EV **Mobility** & **Infrastructure** For All*

Table of Contents

Developed by Walker Consultants on behalf of the Fresno County Rural Transit Agency

Executive Summary

The Fresno County Rural Transit Agency (FCRTA) is on the leading edge of deploying new technology to provide high-quality, sustainable transportation service and infrastructure in rural, disadvantaged areas. In doing so, FCRTA will support State and local goals to reduce vehicle miles traveled (VMT) and Greenhouse Gas Emissions (GHGs) and increase transportation equity and resiliency. FCRTA has been a leader in advancing energy-efficient transportation and the transition to zero-emission vehicles (ZEVs). FCRTA has transitioned some of its fleet to electric vehicles (EV), installed public EV charging infrastructure throughout the County, implemented EV micro-transit service, and will provide transportation and EV charging infrastructure at affordable housing sites. To prepare the electric grid for the transition to EVs and ZEVs, FCRTA conducted an electrical grid analysis study and an EV charging infrastructure network and readiness plan. FCRTA is also conducting a microgrid feasibility study to plan a rural transit solar-powered microgrid network on vacant land that would power its ZEV fleet and support community mobility and resiliency.

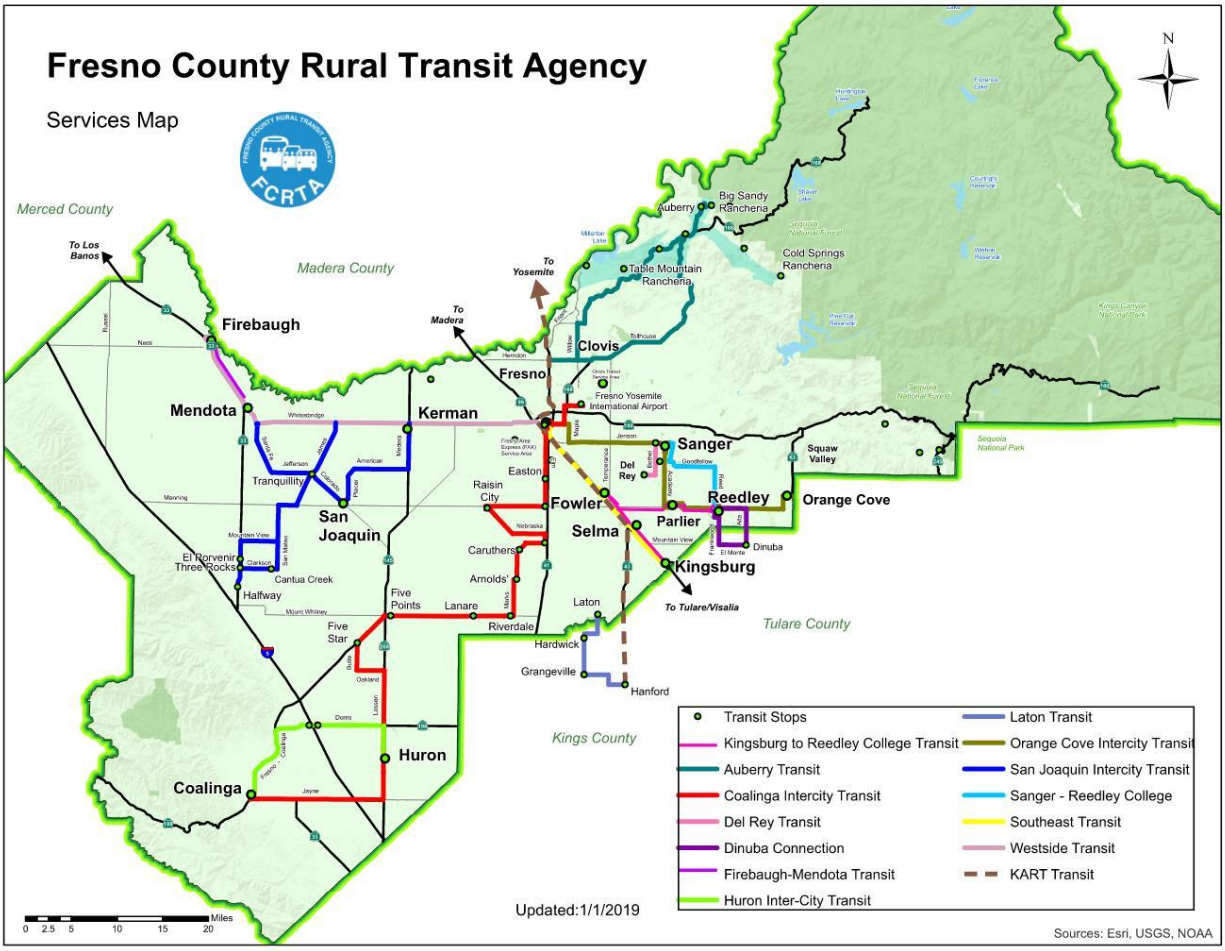
FCRTA's goal is 100 percent electrification by 2030, well ahead of a 2040 horizon requirement from the State of California. To do so, FCRTA would need to make an estimated investment of $21.3 million.[1]

[1]All cost estimates are at a rough order-of-magnitude (ROM) and intended to be for planning purposes only.

Section A: Overview

The Fresno County Rural Transit Agency (FCRTA) provides public transit service to rural communities throughout Fresno County, keeping the Central Valley connected and allowing passengers to conveniently travel within their community and throughout the Central Valley. FCRTA provides both scheduled, fixed route services with designated bus stops along specific routes, as well as reservation-based, demand-response service that offers curb-to-curb transportation. Figure 1 shows the FCRTA transit service area.

FIGURE 1: FCRTA SERVICE AREA



Source: Fresno County Rural Transit Agency

FCRTA operates 26 transit subsystems with 127 vehicles that operate in 13 rural incorporated cities throughout the County. FCRTA's transit services are available to the elderly (60+), disabled, low-income, and general public patrons within each of the 13 rural incorporated cities of Fresno County. In addition, FCRTA serves 39 unincorporated rural communities within Fresno County.

FCRTA has relationships with several local, regional, and statewide transit providers, including:

- Fresno Area Express
- Clovis Transit
- Kings Area Rural Transit
- Dinuba Connections
- Sequoia Shuttle
- Yosemite Area Regional Transportation System (YARTS)

Amtrak, with support from the California Department of Transportation (Caltrans), operates daily intercity San Joaquin trains linking Fresno with locations throughout California. Amtrak augments San Joaquin trains with an extensive system of buses that have guaranteed train-side connections. The Fresno Amtrak Station is located at 2650 Tulare Street, Building B on the corner of Tulare Street and Santa Fe Avenue.

Greyhound provides frequent daily service from Fresno to a variety of points within California. Destinations served north of Fresno County include Sacramento, Oakland, San Francisco, San Jose, and Stockton. Destinations served south of Fresno County include Visalia, Bakersfield, and Los Angeles. Connecting service is available to San Diego (via Los Angeles) and Yosemite National Park (via Merced).

Orange Belt Stages does not service Fresno or Selma but serves Hanford, Lemoore, Kettleman City, and Paso Robles, as well as continued service to Atascadero, San Luis Obispo, Grover Beach, and Santa Maria.

Transportes Intercalifornias provides daily round-trip service from Fresno to Los Angeles, with connecting services onward to Santa Ana, San Ysidro, Tijuana, and other cities.

Central Valley Ridesharing (CRV) provides riders with a match list of compatible commuters that have expressed an interest in ridesharing. CVR's ride-matching database currently covers Fresno, Kings, Madera, and Tulare Counties. All of the services and information are provided free of charge to commuters, employers, and other organizations.

Figure 2 provides more information on FCRTA.

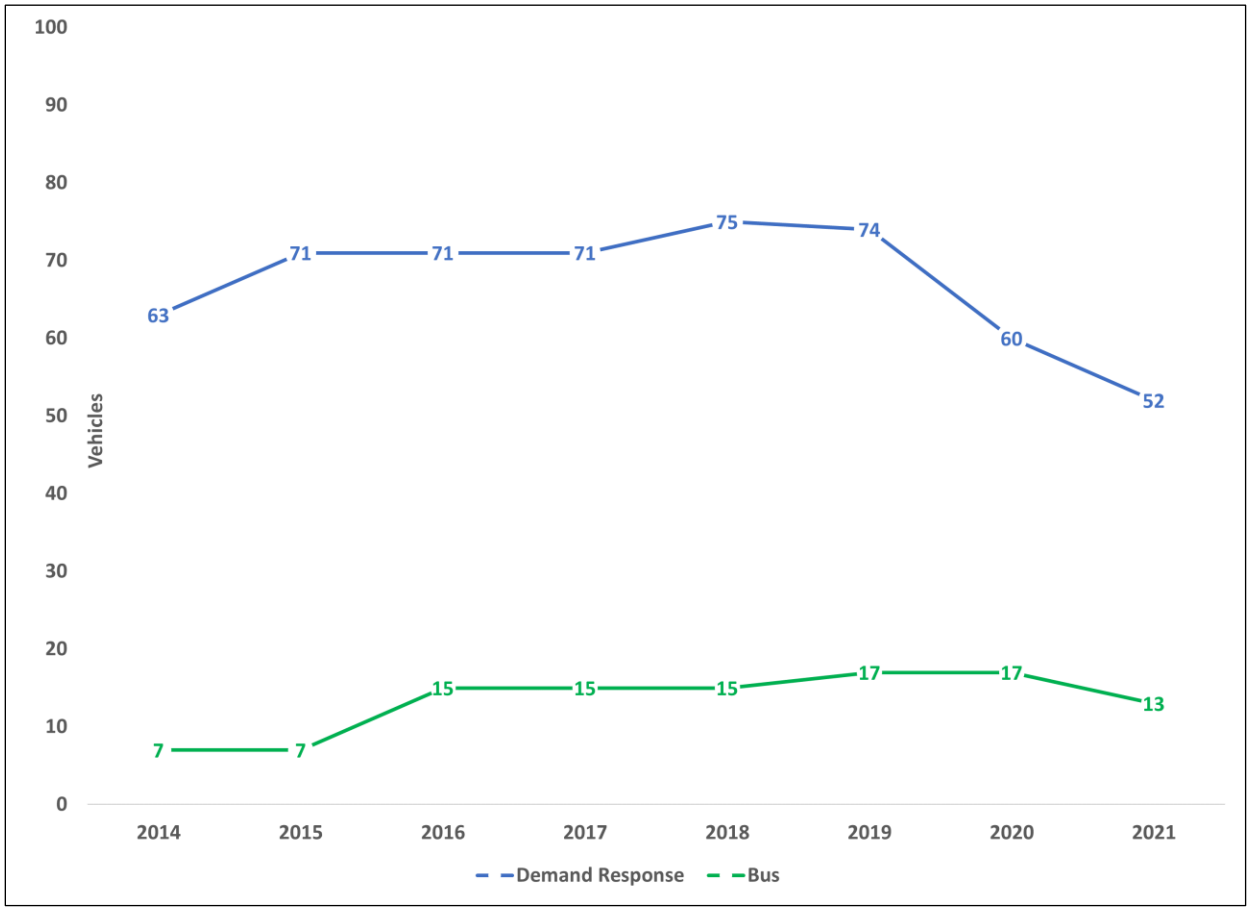
FIGURE 2: FCRTA AGENCY INFORMATION

Transit Agency Information	
Transit Agency's	Fresno County Rural Transit Agency (FCRTA)
Mailing Address	2035 Tulare Street, Suite 201 Fresno, CA 93721
Transit Agency's Air District	San Joaquin Valley Pollution Control District
Transit Agency's Air Basin	San Joaquin Valley
Number of Buses in Annual Maximum Service	65
Fresno Urbanized Area Population (2017)	701,045
Contact Information	Moses Stites General Manager 559.233.6789 mstites@fresnocog.org
Joint Group Member	N/A

During the Covid-19 pandemic, FCRTA has continued to operate regular service, with the only service changes were to temporarily shut down for college routes because there were no in-person classes. FCRTA also stepped in to support its member cities to perform their meal delivery service and offered free rides for passengers to get vaccinated. As shown in Figure 3, in 2019 FCRTA deployed its largest number of vehicles at maximum capacity (91) before reducing to the current 65 vehicles.

FCRTA delivered meals to support residents during the pandemic

FIGURE 3: FCRTA VEHICLES OPERATED AT MAX CAPACITY



Source: Fresno County Rural Transit Agency

There are two (2) utility companies within the FCRTA service boundary (Fresno County), Pacific Gas & Electric Company (PG&E) and Southern California Edison (SCE). PG&E covers 8,079 square miles (86%) of Fresno County, while SCE covers the remaining 1,300 square miles of the County (14%).

Section B
Rollout Plan General Information

To improve air quality and mitigate climate change, the State of California and Fresno County have aggressive GHG emission reduction goals. The State has a GHG reduction target of 40 percent and 80 percent below 1990 levels by 2030 and 2050, respectively. The per capita GHG reduction target for the Fresno region in the 2022 Sustainable Communities Strategy is 14% and 21% below 2005 levels by 2035 and 2046, respectively. To support these goals, transit agencies are electrifying their fleets and converting them to zero-emissions.

FCRTA's goal is to convert to a 100 percent electric vehicle (EV) fleet by 2030. FCRTA has already made significant strides toward this goal by deploying 33 EVs to date and will ensure all future bus/vehicle purchases comply with Innovative Clean Transit regulation requiring 100 percent ZEB by 2029.

ICT Zero-Emission Bus Purchase Requirements for Small Agencies:

- January 1, 2026 - 25% of all new bus purchases must be zero-emission
- January 1, 2027 - 25% of all new bus purchases must be zero-emission
- January 1, 2028 - 25% of all new bus purchases must be zero-emission
- January 1, 2029+ - 100% of all new bus purchases must be zero-emission
- March 2021-March 2050 – Annual compliance report due to CARB

FCRTA will avoid retiring its fleet of conventional buses before they meet their useful life benchmarks (ULBs). Currently, 34 of 89 (38%) of FCRTA's current buses (with GVWR over 14,000 pounds) meet or exceed their useful life benchmarks (older than 10 years and/or mileage beyond 150,000). FCRTA also recognizes that 87 of 89 (98%) of its conventional bus fleet will have met their ULBs by 2030 including five Proterra BEBs and two BYD BEBs. With wise planning and the aggressive pursuit of grant opportunities, FCRTA will replace its aging fleet with appropriately sized buses capable of carrying its patrons across its fixed-route network. Figure 4 shows FCRTA's current bus fleet.

FIGURE 4: FCRTA EXISTING BUS FLEET WITH GVWR GREATER THAN 14,000 POUNDS (89 BUSES)

Number of Buses	Engine Model Year	Bus Model Year	Fuel Type	Bus Type
4	2007	Bluebird	CNG	Bus
12	2008	GMC Glaval Titan	CNG	Cutaway
15	2009	GMC Glaval Titan	CNG	Cutaway
38	2013[1]	Chevy Arboc	Gasoline	Cutaway
8	2016[2]	El Dorado	CNG	Bus
2	2016	Ford E350 Champion	CNG	Cutaway
1	2017	Ford Villager	Gasoline	Bus
5	2018	Proterra	Electric	Bus
2	2019	BYD K95 35-Ft	Electric	Bus
2	2021	BYD K7M-ER 30-Ft	Electric	Bus

1 Two Chevy Arbocs exceed their useful life based on mileage.
2 One El Dorado exceeds its useful life based on mileage.
Source: Fresno County Rural Transit Agency

Section C
Technology Portfolio

Given the rural nature of FCRTA's services, the long distances FCRTA must travel to serve the rural communities of Fresno County, high operations and maintenance costs, and manueverability challenges with large buses on rural roads, FCRTA is planning to decrease the size of vehicles used for service.

FCRTA plans to operate the majority of its intra-city on demand services with electric passenger vans, with wheelchair accessibility (4 passenger, 2 wheelchair). In looking at route ridership, FCRTA believes these vehicles would have sufficient capacity to accommodate FCRTA's needs while providing significant savings on purchase, operations, and maintenance costs.

FCRTA also intends on investing in 30-foot or smaller zero-emission buses (23-foot, if possible, based on manufacturing availability) that provide low-level-boarding accommodating designs to serve disabled patrons. Fleet conversion goals can range depending on the type of services such as micro transit, fixed route, or paratransit operations.

FCRTA will purchase buses with conventional technologies if the battery or fuel cell bus technologies are not available to meet the FCRTA's needs at the time of purchase.

Section D
Current Bus Fleet Composition and Future Bus Purchases

FCRTA operates 26 transit subsystems with 127 vehicles that operate in 13 rural incorporated cities throughout Fresno County. To date, FCRTA has deployed 9 battery electric buses (BEBs), 18 Chevy Bolts, and six (6) Electric Zenith Ram 3500s for its electric vehicle micro-transit and on-demand service, installed public electric vehicle (EV) charging infrastructure throughout Fresno County and will provide transportation and EV charging infrastructure at new affordable housing sites. Figure 5 outlines the existing fleet composition.

FIGURE 5: FCRTA CURRENT VEHICLE FLEET COMPOSITION

Number of Vehicles	Engine Model Year	Vehicle Model	Fuel Type	VehicleType
4	2007	Bluebird	CNG	Bus
12	2008	GMC Glaval Titan	CNG	Cutaway
15	2009	GMC Glaval Titan	CNG	Cutaway
4	2009	Chevrolet Uplander	Gasoline	Cargo Van
38	2013	Chevrolet Arboc	Flexible Fuel	Cutaway
2	2014	Ford 4 Wheel Van	Gasoline	Passenger Van
2	2014	Ford F-450	Gasoline	Serv. Truck
6	2016	Zenith Ram 3500	Electric	Passenger Van
8	2016	El Dorado	CNG	Bus
2	2016	Ford E-350	CNG	Cutaway
1	2017	Ford Villager	Gasoline	Bus
5	2018	Proterra	Electric	Bus
1	2018	Big Rex Trailer	N/A	Trailer
14	2019	Chevrolet Bolt	Electric	Car
2	2019	BYD K95 35-Ft	Electric	Bus
4	2020	Chevrolet Bolt	Electric	Car
2	2021	BYD K7M-ER 30-Ft	Electric	Bus
5	2022	Chrysler Voyager	Gasoline	Passenger Van
127	Total Vehicle Fleet			

Source: Fresno County Rural Transit Agency

In order to meet the goal of a full transition to zero-emission buses by 2030, FCRTA will need to replace 87 buses in their existing fleet (with GVWR greater than 14,000 pounds in weight), by 2030. Buses phase out of their ULB after 10 years or 150k miles (whichever comes first). Based on a review of FCRTA's operations, FCRTA has determined that only 78 vehicles need to be replaced to accommodate its transit service needs. Figure 6 on page 10 illustrates a schedule of new vehicle purchases that if followed will enable a full conversion of battery electric buses by 2030. It should be noted that seven (7) of FCRTA's existing battery electric buses will meet their ULB before 2030, and those too will need to be replaced by 2030.

FIGURE 6: REPLACEMENT VEHICLES FOR BUSES OVER 14,000 POUNDS THAT WILL EXCEED USEFUL LIFE BY 2030

Year Bus Exceeds Useful Life	Bus Model	Fuel Type	Vehicle Type	# of Vehicles	Replacement Vehicle	# of Replacement Vehicles	Replacement Year
Exceeded	Bluebird	CNG	Bus	4	Not Replaced	0	N/A
Exceeded	GMC Glaval Titan	CNG	Cutaway	27	Electric Passenger Van	30	2023
Exceeded							
Exceeded	Chevy Arboc	Gasoline	Cutaway	2	Electric Passenger Van	2	2023
Exceeded	El Dorado	CNG	Bus	1	30-foot BEB	1	2023
2023	Chevy Arboc	Gasoline	Cutaway	36	Electric Passenger Van	28	2024
2026	El Dorado	CNG	Bus	7	30-foot BEB	7	2027
2026	Ford E350 Champ	CNG	Cutaway	2	Electric Passenger Van	2	2027
2027	Ford Villager	Gasoline	Bus	1	30-foot BEB	1	2028
2028	Proterra 40-foot	Electric	Bus	5	30-foot BEB	5	2029
2029	BYD K95 35-foot	Electric	Bus	2	30-foot BEB	2	2030

Source: Fresno County Rural Transit Agency

Figure 7 shows the estimated cost of future electric bus purchases to convert FCRTA's fleet. The estimated costs are based on quotes received by FCRTA, applying a 3 percent annual price increase for both vehicle types.

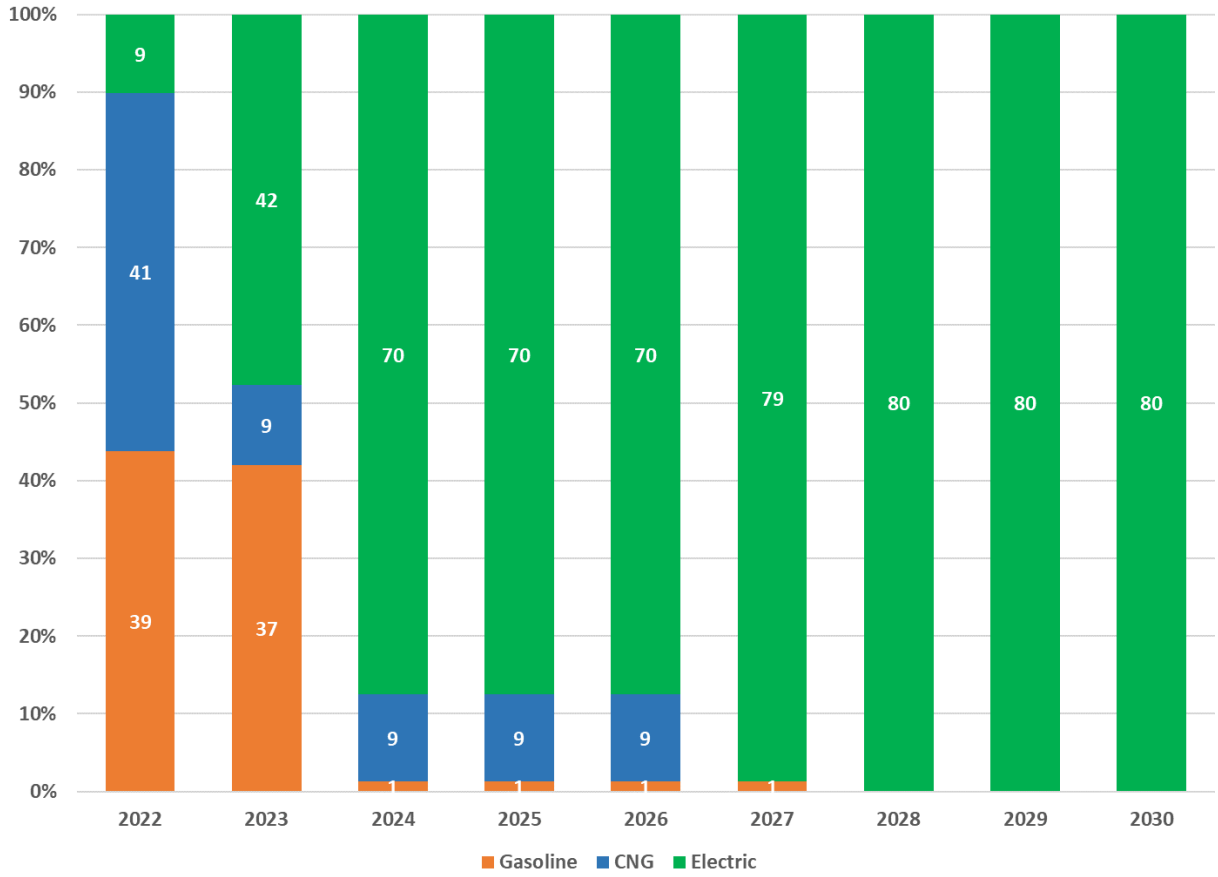
FIGURE 7: RANGE AND ESTIMATED COSTS OF FUTURE ZERO EMISSION VEHICLE PURCHASES

Timeline (Year)	Number of ZEBs	Bus Type(s)	Estimated Cost Per Vehicle	Total Estimated Cost
2023	32	Electric Passenger Van	$125,053	$4,001,681
2023	1	30-foot BEB	$727,920	$727,910
2024	28	Electric Passenger Van	$128,804	$3,606,515
2027	7	30-foot BEB	$819,280	$5,734,963
2027	2	Electric Passenger Van	$140,748	$281,495
2028	1	30-foot BEB	$843,859	$843,859
2029	5	30-foot BEB	$869,175	$4,345,873
2030	2	30-foot BEB	$895,250	$1,790,500
Total Estimated Cost				$21,332,806

Source: Fresno County Rural Transit Agency

FCRTA intends to procure new battery electric vehicles as an alternative to converting aging buses to electric propulsion systems. This allows FCRTA to better calculate maintenance needs, and charging times/utility rates, as well as have a predictable understanding of bus ranges between each charging period. Figure 8 shows a fleet conversion schedule from 2022 to 2030. The schedule accounts for the replacement of CNG, diesel, and battery electric buses that will meet or exceed their ULBs by 2030. This conversion schedule allows FCRTA the flexibility to allocate aging CNG and Gasoline buses to spare or training functions while deploying a larger BEB fleet for regular operational uses.

FIGURE 8: FCRTA 2030 FLEET CONVERSION SCHEDULE (END OF YEAR)



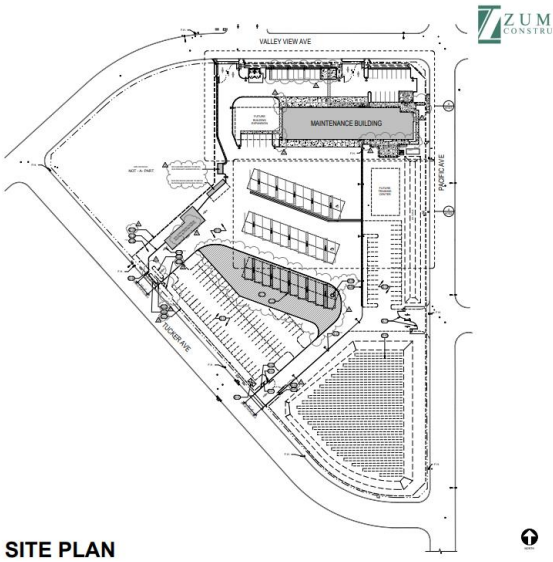
Source: Walker Consultants analysis of Fresno County Rural Transit Agency data.

Section E
Facilities and Infrastructure Modifications

Fresno Area Express (FAX), Clovis Transit, and Fresno County Rural Transit Agency (FCRTA) are the three transit agencies that serve Fresno County. Both FAX and Clovis Transit utilize one bus depot for the entirety of their fleets, while FCRTA is currently spread among 13 bus depots, due to the need to provide service coverage over long distances and having vehicles near route start and end locations.

FCRTA is constructing a new maintenance facility known as the Selma Maintenance Facility Project which consists of developing a 7.5-acre vacant in Selma California for dispatch and vehicle maintenance operations that serve rural Fresno County and accommodate future transit needs. The project is going through a design-build process with plans to finalize construction in 2023. Figure 9 shows the Selma Maintenance Facility design. The facility will include a maintenance shop equipped to service both natural gas and 40-foot battery electric buses, light-duty electric vehicles and vans.

FIGURE 9: PLANNED SELMA MAINTENANCE FACILITY



OVERALL SITE PLAN

The project will include office building split evenly between a centralized dispatching and supervisor's offices and a training facility for technician training in advanced transit vehicle technology (electric and solar). Also included is a bus wash capable of washing up to 40-foot transit buses that would apply conservation and operations best practices such as on-site recycled water, a reverse osmosis final rinse water system, and bus air dryers. A much-needed wash pad with a canopy for handwashing cars and vans will also be installed along with a tire storage and canopy, and a new covered hazardous material storage with concrete curb containment.

The project will require the installation of three (3) Level 2 Chargepoint chargers, 27 WitriCity Level 2 Halo EV chargers, one (1) WAVE inductive charger, two (2) BYD depot chargers, three (3) solar bus ports, solar field, battery storage, and an energy management system.

FCRTA intends for the on-site solar, battery storage, and electric vehicle chargers to be connected into a single integrated system comprehensively managed by an onsite energy management control system and/or microgrid system to minimize impact to the electric utility grid for bus charging and reduce electric utility demand charge costs for FCRTA. The chargers, solar, and battery storage will be separate from the building power supplies.

As mentioned earlier, FCRTA deploys its bus fleet from 13 different bus depots. Figure 10 displays 16 bus yards spread across 13 cities and notes additional FCRTA charging infrastructure in these cities. FCRTA will determine which sites are best suited for charging infrastructure and the pertinent upgrades.

FIGURE 10: FACILITIES INFORMATION AND CONSTRUCTION TIMELINE

Division/Facility Name	Address	Main Function	Type(s) of Infrastructure	Needs Upgrade? (Yes/No)	Estimated Construction Timeline	Additional Charging Infrastructure Locations (outside of bus yard)
Coalinga	27500 Phelps Ave Coalinga, CA 93210	Bus Yard	2 Plug-in Chargers	Yes	Long-term plans to work with the City and PG&E on upgrades	1 Envision Arc Solar Charger located at the Downtown Parking Lot, 245 North 6th Street, Coalinga, CA 93210 1 BYD Charger and 1 Solar Tree at 779 East Polk Street, Coalinga, CA
Firebaugh 1	1890 7th St Firebaugh, CA 93662	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	1 Envision Arc Solar Charger located at Firebaugh City Hall, 1133 P Street, Firebaugh, CA 93622
Firebaugh 2	1734 Saipan Ave Firebaugh, CA 93622	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	
Fowler	231 S. 5th St Fowler, CA 93625	Bus Yard	1 JuiceBox 40 Level III Charger	Yes	Long-term plans to work with the City and PG&E on upgrades	1 Envision Arc Solar Charger located at Fowler Branch Library, 306 South 7th Street, Fowler, CA 93625
Huron	36311 Lassen Ave Huron, CA 93234	Bus Yard	Envision Arc Solar Charger	Yes	Long-term plans to work with the City and PG&E on upgrades	
Kerman	15201 W California Kerman, CA 93630	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	2 Envision Arc Solar Chargers located at Kerman Community Center, 15100 West Kearney Blvd., Kerman, CA 93630 and 850 S. Madera, Kerman, CA 93630
Kingsburg	1200 Kern St Kingsburg, CA 93631	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	1 Envision Arc Solar Charger located at Kingsburg Branch Library, 1399 Draper Street, Kingsburg, CA 93631

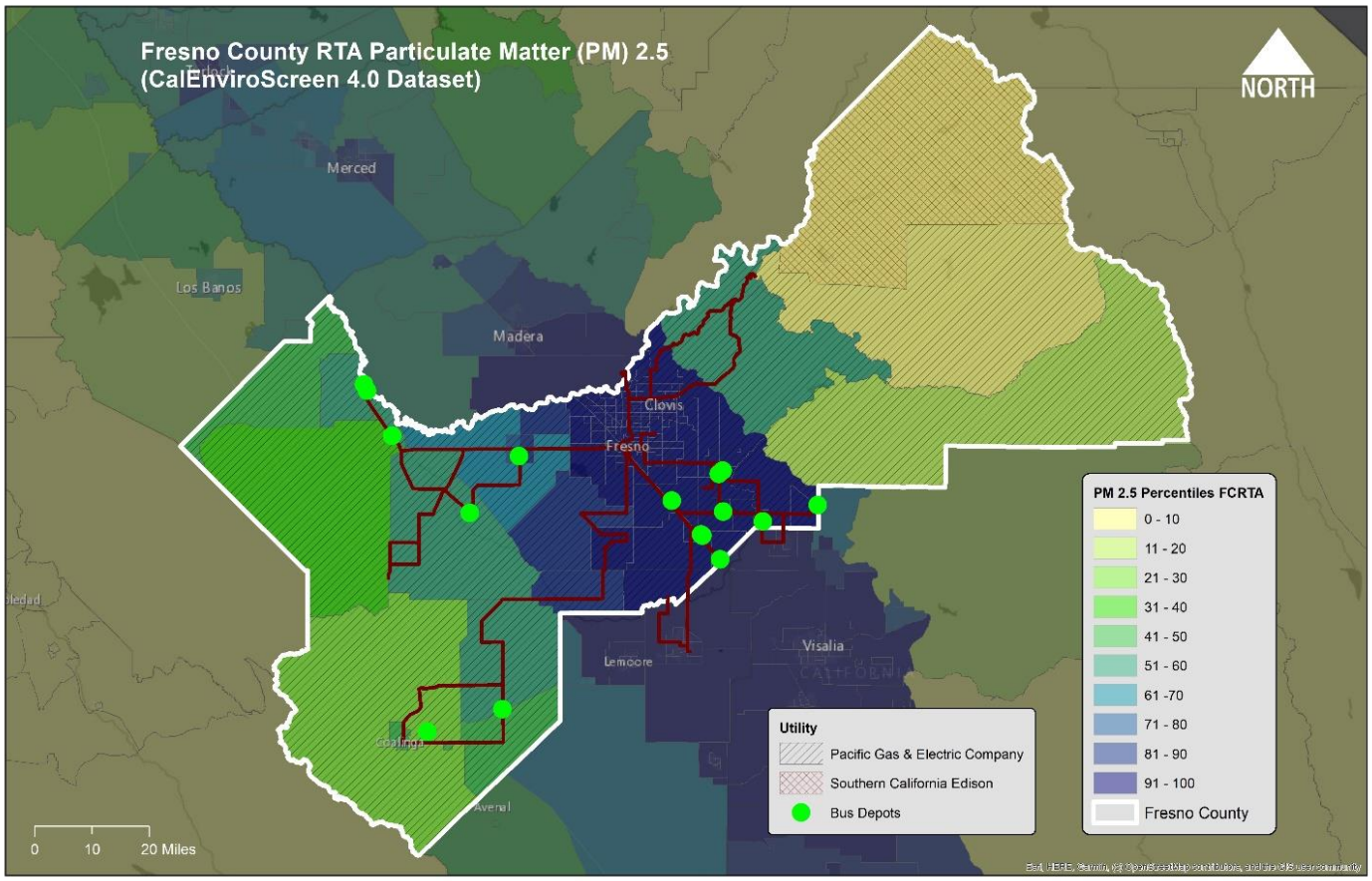
Mendota	1300 2nd St. Mendota, CA 93640	Bus Yard	2 Juicebox 75 Level II Chargers located	Yes	Long-term plans to work with the City and PG&E on upgrades	1 Envision Arc Solar Charger located at Mendota City Hall, 643 Quince Street, Mendota, CA 93640
Orange Cove	802 2nd St Orange Cove, CA 9.646 Bus Yard	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	2 Envision Arc Solar Charges located at Orange Cove City Hall, 633 6th Street, Orange Cove, CA 93646 1 BYD Charger and 1 Solar Tree located at 1705 Anchor Avenue, Orange Cove, CA 93646
Parlier	8770 Mendocino Parlier, CA 93648	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	2 Envision Arc Solar Chargers located at Parlier City Hall, 1100 East Parlier Avenue, Parlier, CA 93648 and Police Department, 8770 S. Mendocino Ave. Ste A, Parlier, CA 93648 3 JuiceBox 40 Level III Chargers at an unknown address
Reedley	1108 S I Street, Reedley, CA 93654	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	2 Envision Arc Solar Chargers located at Reedley Public Works, 845 G Street, Reedley, CA 93654 and Reedley Airport, 4557 Frankwood Ave., Reedley, CA 93654 10 JuiceBox Level II Chargers located in the parking lot behind Reedley City Hall
San Joaquin	21956 W Railroad Ave San Joaquin, CA 93660	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	1 Envision Arc Solar Charger located at San Joaquin City Hall, 21900 West Colorado Avenue, San Joaquin, CA 93660
Sanger	1864 Industrial Way Sanger, CA 93657	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	1 Envision Arc Solar Charger located at Sanger Civic Center, 1700 7th Street, Sanger, CA 93657
Sanger	3537 S Academy Sanger, CA 93657	Bus Yard		Yes	Long-term plans to work with the City and PG&E on upgrades	1 JuiceBox Level II Charger at an unknown address
Selma 1	1325 Nebraska Ave, Selma, CA 93662	Bus Yard	1 Juicebox 75 Level II Chargers located (not yet installed) 2 Proterra Chargers	Yes		1 BYD Bus Charger, 1 Proterra Charger, 2 JuiceBox 40 Level III Chargers, 1 JuiceBox 40 Level II Charger at 1870 Dockery Avenue, Selma, CA 93662 4 Proterra Chargers at Glacier Lot, Selma, CA
Selma 2	1100 Valley View Ave,	Bus Yard		Yes	Upgrades planned as part of new	

	Selma, CA 93622				Selma Maintenance Facility project (2024)	

Source: Fresno County Rural Transit Agency and Walker Consultants.

Environmental justice should play a role in the location of ZE infrastructure and their resulting benefits to disadvantaged communities. Figure 11 and Figure 12 on page 16 show the distribution of bus yards in particulate matter (PM) 2.5 concentrated areas as well as across disadvantaged communities. PM 2.5 has been shown to cause respiratory illness in children, seniors, and at-risk residents. All existing and future buses will be dispatched from PM 2.5 areas as defined by California Ambient Air Quality Standards (CAAQS). Environmental justice mapping as seen in Figure 12 revealed that 9 of 16 bus yards are in locations with high percentile concentrations of PM 2.5 (90% and above). Figure 11 indicates the particulate matter percent concentrations as defined by the CalEnviroScreen.

FIGURE 11: FCRTA PARTICULATE MATTER 2.5 DISTRIBUTION



Source: CalEnviroScreen

FIGURE 12: PARTICULATE MATTER 2.5 PERCENTILE RANGE BY BUS DEPOT SITES

Division's Name	PM 2.5 Percentile
Coalinga	24.4

Firebaugh 1	50.8
Firebaugh 2	50.8
Fowler	95.7
Huron	50.7
Kerman	76.2
Kingsburg	97.5
Mendota	50.5
Orange Cove	90.3
Parlier	95.4
Reedley	95.6
San Joaquin	50.2
Sanger 1	95.9
Sanger 2	94.9
Selma 1	98.1
Selma 2	96.5

Source: CalEnviroScreen

Section F

Providing Service in Disadvantaged Communities

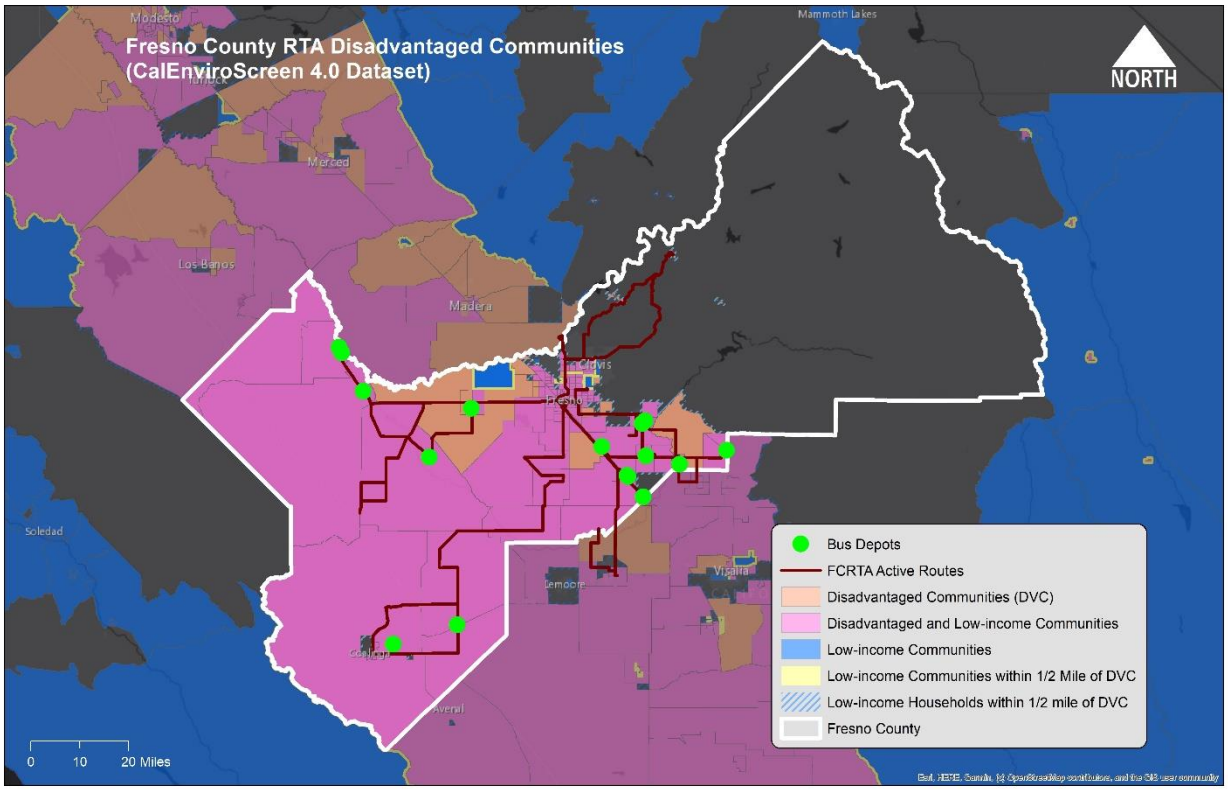
The majority of the Fresno County Regional Transit Agency service area operates in disadvantaged communities as defined in the latest version of CalEnviroScreen 4.0. Social service organizations and non-governmental organizations across Fresno County have expressed the need for transportation services for their residents/clients to travel to jobs, healthcare appointments, training, and other quality-of-life locations. While some organizations provide limited transportation services, most lack the resources necessary to provide transportation or lack the funding to reach their full client base. The lack of transportation results in a high number of missed appointments, a lack of access to essential needs, and a lack of access to education and employment opportunities, which perpetuates the poverty cycle in many of these rural, disadvantaged communities. FCRTA is stretched to provide regular, fixed-route services to all areas of need throughout Fresno County. Operations are expensive because FCRTA must cover a 6,000 square mile area that consists of sparsely populated, low-density communities that are many miles away from one another and from services located in the City of Fresno. As a result, communities are left with gaps in access. FCRTA is working to apply innovative concepts to fill these gaps, including expanding EV micro-transit service, a system of solar microgrid mobility/resiliency hubs, and partnerships with affordable housing developers.

Most of the communities in the FCRTA service area are designated as disadvantaged, as shown in the California Climate Investments Priority Populations 4.0 by Census Tract:

- Sixty-four percent (62%) of all census tracts within Fresno County are considered disadvantaged communities according to the CalEnviroScreen 4.0 Dataset.
- 62 of 67 bus stops are located in disadvantaged communities (93 percent).
- All of FCRTA's routes serve disadvantaged communities.
- FCRTA provides service to 69 disadvantaged communities in Fresno County.

Figure 13 on page 18 displays the distribution of disadvantaged communities in relation to existing bus yards and future electric vehicle infrastructure.

FIGURE 13: FCRTA DISADVANTAGED COMMUNITY AREAS



Source: CalEnviroScreen

FCRTA's electric vehicles will be deployed on all of FCRTA's service routes (both fixed route and demand response); therefore, all of the vehicles will serve disadvantaged communities.

Section G
Workforce Training

New technologies such as ZEVs and their associated charging infrastructure require a responsive network of trained and skilled professionals who ensure a safe and reliable fleet of buses. Workforce development planning prevents job displacement, while also providing standardized education, training, certifications, apprenticeships, while supporting new jobs across multiple sectors. Workforce development is a critical but often overlooked building block of EV market development.

FCRTA's transit operator is MV Transportation. MV Transportation employees 30 drivers to operate FCRTA's transit services. All 30 drivers belong to a labor union (Amalgamated Transit Union Local 1027). There is a collective bargaining unit in place for the drivers.

In 1989, SB 1586, a State of California law, created the General Public Transit Vehicle driver training, licensing, and background checks requirements. In response, FCRTA developed and implemented a forty (40) hour training program that included classroom and behind-the-wheel training for all drivers assigned to operate buses.

These training programs are now administered by MV Transportation, FCRTA's contract operator. All new MV operators receive 110 hours of defensive driver training courses. In addition, MV operators meet monthly during two (2) hour sessions to gain training/insight from disability advocates, insurance representatives, the California Highway Patrol Offices, Drug and Alcohol Consortium representatives, and others to improve the interaction of operators with FCRTA patrons.

MV Transportation provides 16-20 hours of formal training specifically designed to teach drivers how to operate electric vehicles and buses. MV Transportation is Transportation Safety Institute (TSI) certified and is therefore able to administer all required training in-house. In addition, the MV Transportation supervisors that administer the trainings have all received "train the trainer" training from electric vehicle vendors Build Your Dreams and Proterra, so they have the expertise needed to ensure drivers are properly trained. All of 30 of the drivers that operate FCRTA's services have received the 16-20 hours of training and are equipped to operate electric buses, and all new drivers have and will continue to have the opportunity to receive the same training. MV Transportation's training program is designed to provide training to all drivers to operate the electric vehicles, avoiding displacing the existing workforce or excluding the new drivers from being recruited. All required training is paid for through FCRTA's existing contract with MV Transportation.

To operate Air Break buses (electric buses that exceed 35 feet in length), drivers must receive a separate certification from the California Department of Motor Vehicles. MV Transportation works with drivers to identify the required certification program and provides training to drivers once they receive the certification. Due to the rural nature of FCRTA's service and the fact that transit ridership has declined as a result of the COVID-19 pandemic, FCRTA is transitioning to smaller electric vehicles, reducing the number of drivers who will need the Air Break certification.

Ongoing maintenance and repair work on fleet vehicles is contracted with the City of Selma through a maintenance manager, who also coordinates maintenance vendor training. There are a total of eight employees who maintain the vehicle fleet: two detailers, two shuttle drivers, two mechanics, one fleet

services manager, and one service coordinator. Currently, only six of these positions are filled, two of the positions are posted and vacant. All employees are City of Selma employees and are represented within the City's collective bargaining units. All employees are trained to maintain the electric vehicles by the OEM bus vendors.

Further, bus manufacturers Proterra and BYD coordinate with the City of Selma and MV staff to provide operator and maintenance training to staff as new buses are purchased. FCRTA Maintenance staff and MV trains staff, charge buses, troubleshoot, operations, and maintenance, and daily pre-trip daily inspections. The following is a list of regular education and instructional courses provided by municipal and operator managers.

- Defensive driver training
- Operational guidelines for safety
- Motor vehicle code regulations
- Patron assistance techniques
- Daily vehicle inspection
- Maintenance
- Record keeping and reporting procedures
- Fire extinguisher usage
- Wheelchair securement recertification
- Emergency incident procedures
- Sexual harassment training

Section H:
Potential Funding Sources

The following funding sources are potential opportunities to fund FCRTA's fleet transition costs.

1. Low or No Emissions Vehicle Program 5339 (c)
    a. **Rationale:** Provides funding to state and local governments for the purchase or lease of zero-emission and low-emission transit buses.
2. Low Carbon Transit Operations Program (LCTOP)
    a. **Rationale:** Provides operating and capital assistance for transit agencies to reduce greenhouse gas emissions with a priority on serving disadvantaged communities.
3. Local Measure C
    a. **Rationale:** This local half-cent sales tax supports transit in Fresno County and could serve as a local match for larger grants.
4. Affordable Housing and Sustainable Communities Program (AHSC)
    a. **Rationale:** State funding from cap and trade dollars and funds transportation projects to support infill and compact development that reduce greenhouse gas emissions, priority is for disadvantaged areas.
5. Transit and Intercity Rail Capital Program (TIRCP)
    a. **Rationale:** Provides grants for transformative transportation projects that reduce greenhouse gas emissions.
6. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)
    a. **Rationale:** The vehicle is an eligible vehicle type as listed on the HVIP website
7. VW Mitigation Trust - Zero-Emission Transit, School, and Shuttle Buses
    a. **Rationale:** All 49 vehicle(s) qualify for the tax credit. Specifically, the BYD K7Ms 30' are eligible. To qualify, a vehicle must be a class 4 - 8 zero-emission shuttle bus or transit bus meant to replace an older, high-polluting equivalent vehicle.
8. EV Fleet Program
    a. **Rationale:** PG&E EV Fleet Program offers competitive incentives to facilitate the installation of EVSE for medium- and heavy-duty vehicle fleets. PG&E offers dedicated electrical infrastructure design and construction services and reduced costs for electrical infrastructure work.
9. Compressed Natural Gas (CNG) and Electricity Tax Exemption for Transit Use
    a. **Rationale:** CNG and electricity that local agencies or public transit operators use as a motor vehicle fuel to operate public transit services are exempt from applicable user taxes a county imposes. Typical Amount Description Tax exemption.
10. Zero-Emission Transit Bus Tax Exemption
    a. **Rationale:** Zero-emission transit buses sold to public agencies eligible for HVIP are exempt from sales and use tax in California.
11. PG&E EV Charge Network Program
    a. **Rationale:** PG&E will install ten (10) 7,500 Level 2 electric vehicle (EV) chargers at multi-unit dwellings and workplaces. If you have at least ten parking spots that can be used, this

program provides an opportunity to contribute to California's energy goals, while also improving your property.

12. San Joaquin Valley Incentive Project
    a. **Rationale:** The District is currently accepting applications to replace on-road diesel trucks and yard trucks with cleaner technology units or to expand fleets with the cleanest technology available.
13. Drive Clean in the San Joaquin
    a. **Rationale:** The District is currently accepting applications for its Drive Clean Rebate Program which provides rebates to Valley residents and businesses for the purchase or lease of new, clean-air vehicles.
14. Qualified PEV Tax Credit
    a. **Rationale:** The tax credit is only available for qualifying electric vehicles for which final assembly occurred in North America. Further changes to the eligibility rules will begin in 2023. Overall, the reforms in the Inflation Reduction Act mean that the tax credit for electric vehicles will evolve considerably over the coming months and years.
15. The California Energy Commission (CEC)
    a. **Rationale:** $2.9 billion investment plan that accelerates California's 2025 electric vehicle (EV) charging and hydrogen refueling goals.

Section I: Start-up and Scale-up Challenges

1. Costs and Funding

   Deployment of zero emissions vehicles have significant capital cost and unknown operating and maintenance costs. The cost of ZEVs is greater than gasoline powered buses, in addition to the charging infrastructure and ongoing energy and maintenance costs, ranging from monthly electricity bills to cleaning solar panels. Further, upgrading the grid capacity at FCRTA's maintenance yards will likely be necessary to support charging infrastructure. Support from the federal and state government will be necessary to meet the ICT regulation requirements. Most funding is only granted on a competitive basis, which is a resource intensive effort for small rural agencies. CARB could support by leading a statewide capital procurement. FCRTA will rely on CARB and other sources to provide funding opportunities that allow rural transit agencies to compete with larger agencies for a full conversion of electrified buses by 2030.

2. Energy Management System

   FCRTA will need to develop an electric vehicle energy management system, which will collect data to maximize the efficiency of the existing electrical infrastructure and avoid any costs with capacity upgrades. The system would provide tools to manage, reduce, and conserve and optimize electricity consumption. It would allow FCRTA to understand energy compaction, detect leaks and other failures, set conservation targets, and measure and plan for energy performance to minimize risk and price fluctuations. This would save create cost savings overtime.

3. Trade in Battery Replacement Program

   The most critical and expensive part of an electric vehicle is the battery. Batteries degrade over time based on use and exposure. EV battery replacement can be expensive and not always possible. CARB could develop a program or standards for bus manufacturers to offer battery replacement.

4. Technology Advancement and Range Limitations

   BEBs are new to the market and their performance is unproven, especially in rural areas. These vehicles have not been in operation long enough to comprehend their performance and reliability. FCRTA has mitigated this issue in the short-term by having spares available to account for any range issues. However, this increases FCRTA's spare ratio, which can then be a challenge when apply for grant funding. The technology is constantly improving and access to data on their performance in areas similar to rural Fresno County will be helpful to guide future purchases.

5. Grid Resiliency:

   Grid resiliency is critical for FCRTA's successful transition to a fully electrified fleet as well as ensuring timely compliance with local agency zoning laws and policies. FCRTA has prepared an Electrical Grid Analysis Study to identify the impacts of the anticipated increased electrification on the electric grid system and the unique challenges faced by rural communities serviced by FCRTA. To develop this Study, existing conditions within Fresno County were assessed to identify existing grid-related issues. This included reviewing data from sources that provided information about

socioeconomic conditions, energy sources, electrification efforts, and an assessment of the electric grid system.

A major concern is resiliency for lifeline and emergency response in case of emergency and power outage. FCRTA is currently conducting a microgrid feasibility study to assess how to leverage existing and develop additional solar facilities, electricity storage facilities, and charging infrastructure to support electric buses through partnerships with municipalities and potential bus manufacturers. The study would determine the demand for electric buses during normal operations as well as during critical events and emergencies. The study would also determine the optimal solar and storage power and assess their potential to support the power distribution system by addressing capacity concerns, providing energy capacity if the rest local grid is out of service, put power back in the grid, and/or provide other services that are meaningful to the local communities such as backup power for lifeline responses during an emergency. The study would identify five (5) potential sites in rural Fresno County for placement of a distributed energy resource technology/microgrid or another affordable electric vehicle charging model that is zero emissions based, as well as opportunities for future expansion.

FCRTA will need to address charging infrastructure opportunities, technologies, and cost profiles in the future that are not necessarily addressed in this plan. CARB can help FCRTA with funding streams as they become available as planning work reveals the ideal locations for the five sites mentioned previously.

6. Future High-Capacity Transit Plans:
   FCRTA has plans for potential high frequency transit service on the Highway 99, Golden State Highway corridor, using either monorail, light rail, or bus rapid transit (BRT). FCRTA is studying the service mode. FCRTA will need to identify the needed charging infrastructure, propulsion systems, and a corridor alignment that meets community expectations. If bus rapid transit is the preferred service mode, CARB can help advocate for BRT systems that address transit efficiencies and zero-emission designs.

7. Lack of Vehicle Types:
   There is a lack of vehicle types (smaller battery electric buses and cutaways) that meet FCRTA's needs. CARB should conduct surveys and interviews on future needs and the lack of available vehicles to meet these from manufacturers.

8. VMT Analysis
   FCRTA requests that CARB help analyze a new LOS to VMT metric – with applied credits for electric vehicle charging stations to developers who provide needed infrastructure. The newly passed VMT legislation does not provide a subcategory for a level of service. Can CARB help with legislation amendments that offer VMT/LOS credits if developers partner with transit agencies to offer service with ZEVs, with new calculations for the riders, and the vehicle type? In rural areas the issue is even greater, rural areas will have greater VMT, how can the legislation be amended to incentivize development + VMT mitigation if a developer partners with a transit agency to purchase buses and have credit for using EVs – economic development plus more transit capacity?

Appendix I: Board Resolution

FCRTA Microgrid Study
Lanare Community Center
SITE ASSESSEMENT

Address:
20620 S Grantland Avenue
Riverdale, CA 93656

APN
053-041-40ST

Major Street Intersections
South Grantland Avenue and West Mt. Whitney Avenue.

Site Description
The existing site is the location for the Lanare Community Center on a 4.66-acre parcel owned by the Lanare Community Services District (Lanare CSD). The site contains an approximately 2,850 square foot (sf) building which acts as their community center, an approximate 300 sf office district office building, and 11,520 sf of paved parking lot which includes 30 parking spaces (28 standard, 2 accessible). The site also contains water tanks and treatment facilities, a well site, a soccer field on the northern half, a basketball court in the northeast corner, a baseball backstop, a playground, and a 375 sf restroom building in the center of the site, and a drainage basin in the southeast corner. Presently there is a temporary storage container on the north end of the parking lot. Approximately half of the site area is undeveloped. There is an unpaved, unnamed alley/road along the southern side of the site.

Adjacent development is single family residential/agricultural to the south and agricultural to the east. The land to the north is also owned by Lanare CSD and is generally undeveloped except for an antennae in the southeast corner.

Existing General Plan Land Use Designation:
The site land use is designated as Public Facilities with uses for a community center according to the Lanare Community Plan.

Existing Zoning Designation:
AL20 – Limited Agricultural

Flood Zone:
Flood Zone X: Area of minimal flood hazard per FEMA Community Map 06019C2875J effective 1/20/2016

Soil Conditions
The general area is known to have subsurface soils with layers of sand underlain with thicker layers of clayey soils which may require special design considerations for structural foundations.

Site Access:
The site is approximately seven miles west of State Route 41 at the intersection of Mt. Whitney Avenue. The site is easily accessible from either of the two drive approaches from S. Grantland Ave. The site is currently fenced with manual rolling gates at each drive approach.
Grantland Avenue is a two lane county road and the shoulder is often used for parking during community events at the site.

There is also gated access off the unpaved road near the southeast corner of the site.

Site Utilities:
The site has electrical service, water service, and telephone/cable service to the existing buildings, groundwater well, water treatment facilities, and parking lot lighting. The electrical service meter, transformer and other equipment is located in the northwest corner of the parcel.

Site Drainage:
The site appears to be relatively flat, but the improved areas drain by surface flow towards Grantland Avenue. There appears to be a grated storm drain inlet off the southwest corner of the site, but it is unclear what this inlet connects to or where it drains.

Space Available/Proposed Layout Considerations
The site is only partially developed so it is likely that proposed batteries and other equipment could be located in the northern, middle or eastern parts of the site.


S Grantland Ave
Lanare
Community Center
S Grantland Ave
W Mt Whitney Ave
W Mt Whitney Ave
W Mt Whitney Ave

FCRTA Microgrid Study
Biola Community Services District
SITE ASSESSEMENT

Address:
4925 N. 7th Avenue
Biola, CA 93606

APN
016-470-08T, 09T

Major Street Intersections
West Shaw Avenue and North 7th Avenue.

Site Description
The existing site is the location for the Biola Community Services District (Biola CSD). The site contains an approximately 5,000 square foot building which acts as their office and event center and 29,000 sf of paved parking lot which includes 62 parking spaces (58 standard, 4 accessible). The site also contains a trash enclosure in the northwest corner of the parking lot and a storm drain retention pond in the northwest corner of the property. The remainder of the property is greenspace containing grass, trees and various sitting areas with hardscape.

Adjacent development is residential to the south and west, multi-family residential to the north, and agricultural to the east.

Existing General Plan Land Use Designation:
The site is planned for Public Facilities: Recreational Center per the adopted Biola Community Land Use map for the County of Fresno General Plan.

Existing Zoning Designation:
R1 – Single Family Residential

Flood Zone:
Flood Zone X: Area of minimal flood hazard per FEMA Community Map 06019C1525H effective 2/18/2009

Soil Conditions
The existing site is mostly developed with pavement and planter areas, but the general area is known to have clayey soils which may require special design considerations for structural foundations.

Site Access:
The site is easily accessible from either of the two drive approaches from N. 7th Ave and C Street. The site is currently fenced with automatic gates at each drive approach.
There is currently no acceleration lane or two-way left turn lane on W Shaw Avenue (speed limit 55 mph) which is a consideration for bus safety when turning from N. Biola Ave or N. 7th Ave onto W. Shaw Avenue.

Site Utilities:
The site has electrical service with roof-top solar facilities, water service, and gas services to the existing building and parking lot lighting.

The PG&E meter and connection is located on the south side of the building adjacent to 'C' Street.

Site Drainage:

The site appears to drain well. There is a curb and gutter on the east side of the southern section of the parking lot and a concrete swale in the center of the northern portion of the parking lot. This swale in the center of the northern parking lot does pose a potential conflict with footings of a proposed solar array/shade structure at this location.

Space Available/Proposed Layout Considerations

The site is fully developed so it is likely that proposed batteries and other equipment will be located in areas currently designated for parking.


haw Ave
W Shaw Ave
Shaw Ave
W Shaw Ave
N Biola Ave
N 7th Ave
TNT Fireworks
Temporarily closed
Shaw Market
N Biola Ave
N 7th Ave
N 7th Ave
Biola Community
Services District (Biola...
N Biola Ave
C St
C St
C St
N 7th Ave
Google

FCRTA Microgrid Study
City of Fowler
SITE ASSESSEMENT

Address:
No formal address; between 116 7th Street (Dataworks) and 312 7th Street (Library)

APN
343-31-003ST (Parking Lot/Storage Yard) & 343-31-004ST (Stormwater Basin)

Major Street Intersections
E. Fresno St. & S. 7th St. & E. Main St & S. 7th St

Site Description
The proposed project location consists of an existing parking lot, a City storage yard, and a stormwater basin. The parking lot serves the adjacent Fresno County Library - Fowler Branch and consists of approximately 10,000 square feet of concrete pavement with striping for 36 standard parking stalls and two (2) solar powered electric vehicle charging stations (EVCS). The perimeter of the parking lot is green space consisting of trees and ground cover. Chain-linked and barbed wire fencing separates the parking lot from the basin and a block wall separates the library parcel from the basin. The City storage yard site is located just northwest of the library parking lot. It has perimeter chain-linked and barbed wire fencing around the entire site, and the only permanent on-site improvement is a single site light on a wooden pole which if fed from overhead electrical wiring from a site light on the parking lot. The stormwater basin is located to the southwest of the existing parking lot and storage yard and receives stormwater from the municipal storm drain system in 7th Street.

Adjacent development is the Union Pacific Railroad to the southwest, commercial to the northwest, residential across 7th Street to the northeast, and vacant commercial land to the southeast.

Existing General Plan Land Use Designation:
The site is planned for Light Industrial use by the City of Fowler General Plan

Existing Zoning Designation:
M1 – Light Industrial

Flood Zone:
Flood Zone X: Area of minimal flood hazard per FEMA Community Map 06019C2143H effective 2/18/2009

Soil Conditions
The existing site is partially developed with concrete pavement and planter areas, but the general area is known to have sandy soils which typically don't require special design considerations for structural foundations.

Site Access:
The parking lot site is accessible from a single drive approach off S. 7th St and is not fenced. The storage yard is accessible from a single drive approach off S. 7th St. and the yard is currently fenced with a manual gate at the drive approach. The City has preliminary designs for a secondary driveway extending from the northwest end of the parking lot through a portion of the yard and connecting to a new drive approach off 7th Street.

Golden State Boulevard, a major regional arterial, is parallel to and on the opposite side of the railroad tracks to the southwest of the site, accessible from both Merced Street and Vine Street. The nearest on-/off-ramp to State Route 99 is approximately ½-mile away from the site at Merced Street.

Site Utilities:

The parking lot site has electrical service for site lighting and the building, communication lines, and water service for irrigation. Water supply for the library parcel is near the southeast corner of the building. All utilities stub off underground main lines in 7th Street. The storage yard site does not appear to have any site utilities of its own; electrical power for the one site light is fed from the parking lot.

Site Drainage:

The improved site appears to have adequate surface drainage out to 7th Street. The storage yard has no formal drainage improvements, but can be graded to drain to 7th Street. There are curb inlets to the municipal storm drain system off the northeast corner of the storage yard and at the intersection of 7th Street and Vine Street. It doesn't appear that any of the site drains directly to the adjacent stormwater basin.

Space Available/Proposed Layout Considerations

The site is partially developed with the undeveloped areas being used for storage. It is likely that the proposed batteries and other equipment will be located in the existing storage yard to the northwest. Should the City of Fowler decide to redirect storm water to other facilities in their future master plan, the basin parcel may also be considered for development.

electrical service meter, transformer and other equipment is located on the northeast corner of the building.

Site Drainage:

The site appears to be relatively flat, but the improved areas drain by surface flow from east to west towards S. Mendocino Avenue. There is an existing storm drain inlet on the northwest corner of Mendocino Avenue and Tuolumne Street which appears to connect to a public storm drain system located in Tuolumne Street.

Space Available/Proposed Layout Considerations

The site is almost fully developed, though it is unknown the planned use of the existing parking lot once the new parking lot is usable. It is likely that the proposed batteries and other equipment could be located on the western part of the site where there is existing open green space.

FCRTA Microgrid Study
Parlier Community Center
SITE ASSESSEMENT

Address:
8770 S. Mendocino Avenue
Parlier, CA 93648

APN
355-510-21T

Major Street Intersections
South Mendocino Avenue and Tuolumne Street.

Site Description
The existing site is the location of the Parlier Police department on a 2.34-acre parcel owned by the City of Parlier. The site contains an approximately 10,500 square foot (sf) building that acts as their community police department, a 22,500 sf paved parking lot to the west which includes approximately 42 parking spaces (40 standard, 2 accessible) and an approximately 8,000 sf newly constructed paved parking lot to the east which includes about 32 parking stalls (30 standard, 2 accessible). The site also contains an approximately 8,500 sf green space area on the west part of the property. Presently, there is a temporary storage container (seatrain) on the south side of the building adjacent to Tuolumne St.

Adjacent development is single family and multifamily residential to the north and undeveloped vacant land to the east.

Existing General Plan Land Use Designation:
The site land use is Public Facilities according to the Parlier Community plan.

Existing Zoning Designation:
PF – Public Facilities

Flood Zone:
Flood Zone X: Area of minimal flood hazard per FEMA Community Map 06019C2660H effective 2/18/2009

Soil Conditions
The general area is known to have good soil conditions that don't typically require special design considerations.

Site Access:
The site is approximately six miles east of State Rout 99 at the intersection of Manning Avenue. The site is easily accessible from either of the two drive approaches along S. Mendocino Ave. The eastern part of the site is fenced while the western part of the property is open. Mendocino Avenue is a two-lane divided road that appears to be fully developed.

There is also a drive approach off of Tuolumne Street that provided access to the adjacent outlot to the south of the subject property which is currently owned by a separate entity.

Site Utilities:
The site has electrical service, water service, and telephone/cable service to the existing buildings, temporary EV charging, photovoltaic shade structures and parking lot lighting. The

FCRTA Microgrid Study
City of San Joaquin
SITE ASSESSEMENT

Address:
No formal address; on South Main Street between Nevada Avenue and West Colorado Avenue.

APN
033-093-15t

Major Street Intersections
W. Colorado Ave. & Manning Ave.

Site Description
The proposed project location is a vacant lot. The lot is bound by an existing strip mall to the northeast a restaurant to the southwest and an alley way to the northwest and fronts S. Main St.

Existing General Plan Land Use Designation:
The site is planned for Central Business District use by the City of San Joaquin's General Plan

Existing Zoning Designation:
C-MS – Main Street Commercial

Flood Zone:
Flood Zone X: Area of minimal flood hazard per FEMA Community Map 06019C2550H effective 2/18/2009

Soil Conditions
The general area is known to have clayey soils which may require special design considerations for structural foundations.

Site Access:
The site is accessible from the existing alley that runs along the northwest boundary of the site. There is no other vehicular access to the proposed project site and is unsecure and with no perimeter fencing. Manning Avenue, a major arterial, runs just south and intersects W. Colorado Ave. at a four-way stop sign. This is anticipated to be the main route to the project site.

Site Utilities:
There appears to be water and sewer services available and located in the alley. There are also aerial electrical lines running down the alley that is currently serving the adjacent properties. We can assume distribution is available for this site. There are no signs of the property currently having existing utility services.

An electrical meter or existing point of connection was not able to be identified. However, the existing power pole in the west corner of the property appears to be the most likely location for an electrical point of connection.

Site Drainage:
The undeveloped property appears to slope from northwest to southeast and does not have any storm water drainage facilities onsite.

Space Available/Proposed Layout Considerations
The site is fully undeveloped and various layouts should be considered.

Fresno County Rural Transit Agency Microgrid Feasibility Study

Advisory Committee Meeting #1

July 26, 2022

3:15 – 3:25 – Welcome and introductions
FCRTA and Walker provided an overview of the study and kicked off introductions

In person attendees:
Daniel Garcia – Walker
Christian Turner – Walker
Greg Strangeways – Walker
Chrissy Mancini Nichols – Walker
Tania Schleck – Walker
Janelle Del Campo – FCRTA
Moses Stites – FCRTA
Ezra Beeman – Energeia
Maggie Riley – Energeia
Kay Bertken – League of Women Voters
Terri Figgs – League of Women Voters
Simran Jhutti – Fresno Council of Governments
Christopher Xiong - Caltrans

Virtual attendees
Gabe Tabarez – MV Transportation
Amy Hance – City of Clovis
Francine Farber – League of Women Votes
Marianna Alvarenga – Leadership Counsel
Teresa Johnson – City of Kerman
Thomas Gaffery - City of Fowler
Dario Dominguez – City of Fowler
Sonia Hall – City of Parlier
Armanda Ortez – Self Help Enterprise
Marilu Morales – City of Reedley
Erin Hagenson – Fresno County Public Works and Planning
Jing Guo - California Air Resources Board
Yachun Chow – California Air Resources Board
Julie Cooper – California Air Resources Board
Ben Gallegos – City of Firebaugh
Daniel Galvez – City of Kingsburg Public Works

3:25 – 3:45 – Background information

League of Women Voters asked the following questions

- Asked about the interaction between the consultants on the team?
    - Walker responded that Energeia worked on the electrical grid study, Walker worked on the transit study, now coming together for this project. The team also includes Provost & Pritchard – local civil engineer and ScholarDev Apps the website developer.
- Asked where microgrids/resiliency hubs come from?
    - FCRTA responded that the microgrids arose from challenges that FCRTA has come across, The methodology and analysis depend on the context, and cities range in population
    - FCRTA mentioned initiatives including solar bus stops and conversion to electric buses, and hiring resident drivers from rural communities, providing employment for people in rural areas
- What agencies would fund implementation?
    - FCRTA responded that potential funding could come from Caltrans, CEC, CARB

3:45 – 4:10 – Resiliency hub site identification brainstorming

City of Kingsburg asked how big of a site do you need?

- FCRTA and Walker responded a minimum of ½ acre or more and depends on what resiliency hub amenities will be on site
    - Land can be used on weekend and evenings for community gardens, food trucks
- The sites will also serve unincorporated communities
- Use existing resources to minimize capital

League of Women's Voters asked if FCRTA will need to own the land outright or does it need to be leased for a private owner?

- FCRTA indicated preference is to own site, but as a JPA FCRTA can develop and make improvements on public property municipalities own

Site criteria discussed

- Available land
- High frequency of transit service
- Site should be replicable
- Grid capacity
- Community support/partnership

Leadership Counsel asked about communities that will be considered?

- Walker responded the RTAP study covered Cantua Creek, Laton, Lanare
- FCRTA responded the study will be looking at the County as a whole, where could microgrids be located, and FCRTA is looking at equity in regards to including unincorporated communities
- As a result of the study, the Cities should be able to apply for funding as well

City of Kingsburg stated that Kingsburg could be potential location because it is an entrance into Fresno County

4:10 – 4:25 - Public outreach plan

- League of Women Voters suggested the Fresno County Fair and suggested using students as volunteers, and suggested providing transportation
- League of Women's Votes asked if there is a timeline involved?
    - Walker responded right now the project is in the initial analysis phase, and will hold events in the fall and winter

4:25 – Next steps

- Walker will be sending out materials on next steps and informational materials

4:30 - Adjourn

Fresno County Rural Transit Agency Microgrid Feasibility Study

Advisory Committee Meeting

March 15, 2023

Meeting Minutes

1:00: Welcome
FCRTA welcomed members of the Advisory Committee

1:05: Project updates
Walker provided an update on the Zero Emissions Bus Rollout Plan to submit to CARB

- 100% of all new bus purchases must be zero emissions by 2029
- FCRTA's goal is 100 percent electrification by 2030
- Quantifying cost for vehicle and charging infrastructure
    - All bus depots need infrastructure and/or grid upgrade
    - Will not retire fleet before the end of useful life
- Challenges include:
    - Costs and funding
    - Energy management system
    - Battery replacement
    - Technology advancement
    - Range limitations
    - Grid resiliency
    - Lack of vehicle types

1:20: Community Popup Events

- Walker will conduct six community popup events to educate the community about FCRTA's transit services, microgrid energy and multi-modal community resiliency hub amenities. We will hold a series of interactive activities to gain input to shape the study.
- The community survey is live and available on paper and online. Please distribute this in newsletters and social media.

1:30: Site Selection Factors

- The project team discussed factors that are important to site selection. This includes:
    - Provides electrical grid capacity and community resiliency
    - Support from PG&E (If applicable)
    - Return on investment to FCRTA and community
    - Regional and local economic development opportunity
    - Shared partnership:

- In-kind (public land, staffing, and maintenance resources)
- Financial (shared cost of land purchase, electricity)
- Agree to load shedding: Load shedding is the controlled disruption of power when a microgrid (MG) begins to run through its energy reserves while in island mode, and must isolate its highest load-serving priorities from the rest of the MG

- Shared Resources: Costs and maintenance needs for infrastructure and hub amenities; the goal is a community benefit, not a fiscal burden:
  - Electricity
  - Cleaning
  - Security
  - Energy management
  - Site management
  - Coordination of amenities
  - During emergencies
  - Non-emergencies
  - Vendor management (i.e., food trucks, community gardens)
  - Marketing/community outreach/awareness
  - Ongoing funding

- **Proximity to Critical Infrastructure as** defined by the California Public Utilities Commission
  - Medical centers/health clinics
  - Schools
  - Community centers
  - Senior centers
  - Churches
  - Law enforcement/fire stations
  - Water/waste treatment facilities
  - Communications infrastructure
  - Cooling and warming centers

2:00: Site Selection Examples

- Energeia reviewed the grid capacity and key sites to consider at each community popup location.

Attendees

Janelle Del Campo – FCRTA
Moses Stites – FCRTA
Christopher Xiong – Caltrans
Yachun Chow, CARB
Jin Guo – CARB
Julie Cooper – CARB
Armando Ortiz – Self Help Enterprises
Mariana Alvarenga - Leadership Counsel for Justice and Accountability
Thomas Gaffery – City of Fowler
Wilma Tucker – City of Fowler
Dario Dominguez – City of Fowler
Stan Bulla – City of San Joaquin
John Kunkel – City of Huron

Ben Gallegos – City of Firebaugh
Cruz Ramos – Biola Community Services District
Kristine Cai – Fresno Council of Governments
Simran Jhutti – Fresno Council of Governments
Gabriel Tabarez – MV Transportation
Chrissy Mancini Nichols – Walker
Tania Schleck – Walker
Ben Weber – Walker
Nick Auerbach – Energeia
Chloe Rush - Energeia
Ben Weber – Walker

Fresno County Rural Transit Agency Microgrid Feasibility Study

Advisory Committee Meeting

February 27, 2024

Meeting Minutes

1:00: Welcome
FCRTA welcomed members of the Advisory Committee

1:05: Project updates
Walker provided a general overview of the microgrid/multi-modal resiliency hub feasibility study, including defining resiliency hubs, the purpose of the study, and project updates since the last meeting, including:

- Conducted community outreach
- Successfully submitted FCRTA EV Fleet Transition Plan to CARB and Federal Transit Administration.
- Conducted energy assessments for FCRTA's service area, including 13 cities and 39 unincorporated areas.
- Conducted financial and ownership structure evaluation.
- Determined five sites for future evaluation (Biola, Lanare, Fowler, San Joaquin, Parlier).
- Conducted energy, civil, cost, and feasibility assessments at five sites.
- Developed criteria methodology and ranking.
- Determined top 2 sites for further study for Phase I.

1:15: Community engagement findings
Walker conducted a community survey to gain input on microgrid/multi-modal resiliency hub locations and amenities (the survey was conducted online and on paper) and held pop-up events in Parlier, Fowler, Reedley, Kerman, Firebaugh, and Huron with over 1,000 people attending events.

When asked what amenities should be at a multi-modal resiliency hub, the most frequent responses were:

- Wi-Fi
- Public transportation
- Phone charging
- Heating and cooling centers
- Community gardens
- Childcare
- Medical
- Alerts

When asked about the destination they most frequently visit to gain input on locations for a multi-modal resiliency hubs, the most frequent responses were:

- Parks
- Shopping centers
- Health care centers
- Post Offices
- Library
- School
- Downtown core areas

Other significant findings include:

- **Many do not feel prepared for disasters,** least prepared for wildfires
- **Many community members need additional assistance in the event of a disaster**
    - 43% indicated they or their neighbors need additional assistance (e.g., they are elderly, dependent on medical equipment, etc.)
- **During disasters**, the top five items respondents indicated should be included at Resilience Hubs:
    - **Emergency food/clean water/pet food**
    - **Shelter**
    - **Medical supplies**
    - **Heating/cooling**
    - **Information**
- On a **day-to-day basis**, the top five items respondents indicated should be included at Resilience Hubs:
    - **Food vendors or food trucks**
    - **Wi-Fi/internet**
    - **Heating/cooling**
    - **Childcare**
    - **Retail stores**
- **78 respondents indicated they would be interested in taking a leadership role** at resiliency hubs, and 18 provided their contact information

Electric Vehicle-Related Responses:

- **91% do not own an electric vehicle**
- **81%** are not considering purchasing an electric vehicle
- **80%** lack access to electric vehicle (EV) charging
- 26% said EV charging would incentivize them to purchase a vehicle
    - 15% said EV charging would incentivize them to purchase, but only if it were free to charge my vehicle
- 33% would be willing to pay for electric vehicle charging.

1:30: Site Energy Assessments and Analysis

- Energeia reviewed the site energy assessments and analysis, including microgrid load analysis and resource optimization, as well as economic and operating costs based on reliability needs for the five sites.
    - FCRTA commented that the site selection process was also based on equity and the need for partners to support site operations.
- Walker reviewed the site assessment conducted for each site, including the following:
    - Civil review (by Provost & Pritchard)
    - Transit: All sites will be microtransit locations, with two vehicles
    - Charging infrastructure
    - Power supply to critical infrastructure
    - Power Reliability
    - Site infrastructure improvements, including paving, lighting, fencing, security, electrical connection, conduit, and trenching
    - Microgrid
- FCRTA explained that one of the reasons the team chose San Joaquin is given the proximity to other unincorporated communities, including Cantua Creek, El Porvenir, and Three Rocks, and the ability to provide a central multi-modal resiliency hub and micro transit service.
- Leadership Counsel is actively pursuing funding for the Lanare Community Center.

1:50: Microgrid Site Ranking Framework

- Energeia reviewed the site ranking criteria used to narrow the list of five sites down to two.
- Criteria include a range from impact on community resilience, investment in the community to date, project cost, stakeholder complexity, collaboration, permitting and engineering, and leverage from the community.
- The top two ranking sites include Parlier and San Joaquin.
- FCRTA mentioned that for sites not selected, local communities can explore funding for implementation or be part of a Phase II process.

2:05: Wrap up and next steps

- Walker reviewed the next steps for the project, including conducting a cost/benefit analysis of San Joaquin and Parlier and also evaluating funding sources available to fund construction and ownership structure.
- FCRTA mentioned that funding is available for EV vehicle purchases through the Air District.
- FCRTA mentioned how the project will help FCRTA be partially or wholly independent of the grid.
- FCRTA mentioned the Selma Maintenance Facility and how it will be a test of the technology, including solar infrastructure and inverters.
- FCRTA is looking to pursue a study to look at repurposing batteries.
- Dr. Chow (CARB) commented that the study will help other entities to think about the next steps for their electrification efforts.
- Draft report in March, which will be reviewed at the April Advisory Committee meeting.

Attendees

Janelle Del Campo – FCRTA
Moses Stites – FCRTA
Christopher Xiong – Caltrans
Nicholas Isla - Caltrans
Lorena Mendibles - Caltrans
Yachun Chow, CARB
Jing Gao - CARB
Kay Bertken – League of Women Voters
Simran Jhutti – Fresno Council of Governments
Jennifer Rodriquez - Fresno Council of Governments
Lupe Macias - City of Selma
Matt Flood – City of San Joaquin
Stan Bulla – City of San Joaquin
Kamara Biawoga, City of Selma
Thomas Gaffery – City of Fowler
Mariana Alvarenga - Leadership Counsel for Justice and Accountability
Thomas Dunlin – Fresno EOC
Gabe Tabarez – MV Transportation
Jerry Buckley - Reedley College
Thomas Dulin, Fresno EOC
Zander Mrlik, Intertie
Chrissy Mancini Nichols – Walker
Tania Schleck – Walker
Ben Weber – Walker
Bernard Lee – Walker
Eric Haggett - Walker
Ezra Beeman – Energeia
Nick Auerbach – Energeia
Aubree Nygaard – Energeia
Paul Hubbs - Energeia
Brayden Lovik - Provost & Pritchard
Michael Osborn – Provost & Pritchard

Estudio de viabilidad de microrredes de tránsito

FCRTA
Fresno County Rural Transit Agency

*Accessible EV **Mobility** & **Infrastructure** For All*

Fresno County Rural Transit Agency (FCRTA) provee servicio de tránsito público en áreas rurales dentro del Condado de Fresno. FCRTA se está embarcando en un proyecto innovador para crear microrredes de tránsito y centros de resiliencia comunitaria para expandir el acceso al transporte, mejorar la calidad del aire y apoyar a las comunidades locales.

¿Cuál es el propósito de este proyecto?

- Aumentar el servicio de transporte y el acceso
- Transformar los terrenos baldíos o subutilizados en las áreas rurales
- Hacer la transición a una flota 100% cero emisiones
- Mejorar la calidad del aire
- Construir estaciones de carga para vehículos eléctricos para la población local
- Crear centros de resiliencia comunitaria con comodidades y servicios
- Suministrar energía de reserva en casos de emergencia (los apagones, los incendios forestales)
- ¡Crear un condado de Fresno más resiliente!

¿Qué es una microrred?

Las microrredes son sistemas de energía pequeños e independientes que utilizan energía sostenible (como la solar o la eólica) para alimentar todo, desde autobuses eléctricos hasta celulares.

¡Involúcrese!

Los resultados de este proyecto impactarán a toda la comunidad. Por eso, cada residente del Condado de Fresno es un socio clave. Comparta sus comentarios, influya en nuestro trabajo, y realice un seguimiento al progreso del proyecto al visitar la página del Estudio de viabilidad de microrredes para tránsito.

Llame al (559) 233-6789 o haga clic en el enlace a continuación:

>>Estudio de microrredes<<

Vamos a convocar talleres comunitarios y realizar encuestas a lo largo de 2022. Se pueden encontrar los detalles en www.ruraltransit.org y se publicarán localmente.

¿Cuál es el calendario del proyecto?

La participación publica

BASE CONTINUA
Colaborar con la comunidad del Condado de Fresno para desarrollar estrategias efectivas y tomar decisiones que funcionen

LA PRIMAVERA DE 2022
Analizar y definir las condiciones existentes de la red de energía del Condado de Fresno y las oportunidades para mejorar el servicio de tránsito rural

Condiciones existentes

EL VERANO DE 2022
Generar estrategias para que FCRTA desarrolle microrredes en el Condado de Fresno

Desarrollo de estrategias

EL OTOÑO DE 2022
Evaluar y clasificar las estrategias

Análisis

LA PRIMAVERA DE 2023
Crear plan de acción para implementar microrredes en centros de resiliencia comunitaria

Plan de acción

Transit Microgrids Feasibility Study

FCRTA
Fresno County Rural Transit Agency

*Accessible EV **Mobility** & **Infrastructure** For All*

The Fresno County Rural Transit Agency (FCRTA) provides public transit service in rural areas within Fresno County. FCRTA is embarking on an innovative project to create transit microgrids and community resiliency hubs to expand transportation access, improve air quality, and support local communities.

WHAT IS THE PURPOSE OF THIS PROJECT?

- Increase transportation service and access
- Redevelop vacant and underutilized land in rural areas
- Transition to a 100% zero emissions fleet
- Improve air quality
- Build electric vehicle charging stations for local residents
- Create community resiliency hubs with amenities and services
- Provide backup power during emergencies (blackouts, wildfires)
- Create a more resilient Fresno County!

WHAT IS A MICRO GRID?

Microgrids are small, independent power systems that use sustainable energy (like solar or wind) to power everything from electric buses to cell phones.

GET INVOLVED!

The outcomes of this project will impact our entire community. Because of that, every resident of Fresno County is a key partner! Share your feedback, influence our work, and stay up-to-date on project progress by visiting the Transit and Microgrid Study page.

Call (559) 233-6789 or Click/tap the link below:

>>Microgrid Study<<

We will be holding community workshops and conducting surveys throughout 2022. Details are available at www.ruraltransit.org and will be publicized locally.

WHAT IS THE PROJECT SCHEDULE?

Public Engagement

ONGOING
Collaborate with the Fresno County community to develop effective strategies and make decisions that work

SPRING 2022
Analyze and define existing conditions of Fresno's energy grid and opportunities for improving rural transit service

Existing Conditions

SUMMER 2022
Generate strategies for FCRTA to develop migrogrids in Fresno County

Strategy Development

FALL 2022
Evaluate and rank strategy options

Analysis

SPRING 2023
Create action plan to implement microgrids at community resiliency hubs

Implementation and Action Plan

Join Us For Resilient Fresno County

Dinner's On Us!

Tuesday, March 14th
4:00PM-6:00PM

Fowler City Council Chambers
128 S. 5th Street

Food and Beverages will be served

The Fresno County Rural Transit Agency is working to create community resiliency hubs to expand transportation and provide services during emergencies. The hubs will also have year-round programming and amenities like electric vehicle charging, Wi-Fi, and community gardens.

Tell us what services you want at the hubs by joining us for dinner and fun!

Take the Short Survey!

Link Here:
https://www.surveymonkey.com/r/microgrid

For more information please visit
www.ruraltransit.org

FCRTA
Fresno County Rural Transit Agency
Accessible EV Mobility & Infrastructure For All

Caltrans

Únase a nosotros para el Condado de Fresno Resiliente

¡La cena va por nosotros!

El martes, el 14 de marzo
4:00PM-6:00PM

Fowler Cámaras del Concejo Municipal
128 S. 5th Street

Se servirán alimentos y bebidas

La Agencia de Tránsito Rural del Condado de Fresno (FCRTA) está trabajando para crear centros de resiliencia comunitaria para expandir el transporte y proveer servicios durante emergencias. Los centros también tendrán programación durante todo el año y servicios como carga de vehículos eléctricos, Wi-Fi, y jardines comunitarios.

¡Cuéntanos qué servicios le gustaría ver en los centros uniéndose a nosotros en la cena y diversión!

¡Realice la breve encuesta!

Enlace aqui:
https://www.surveymonkey.com/r/microrred

Para obtener más información, visite www.ruraltransit.org

FCRTA Fresno County Rural Transit Agency

Caltrans

Accessible EV **Mobility** & **Infrastructure** For All

Join Us For Resilient Fresno County

Dinner and Fun On Us!

Tuesday, March 14th
3:30PM-6:30PM

City of Parlier Heritage Park
Corner of Newmark and Fresno Street

Food and Beverages will be served

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¡La cena va por nosotros!

El martes, el 14 de marzo
3:30PM-6:30PM

Ciudad de Parlier Heritage Park
A la esquina de Newmark y Fresno Street

Se servirán alimentos y bebidas

La Agencia de Tránsito Rural del Condado de Fresno (FCRTA) está trabajando para crear centros de resiliencia comunitaria para expandir el transporte y proveer servicios durante emergencias. Los centros también tendrán programación durante todo el año y servicios como carga de vehículos eléctricos, Wi-Fi, y jardines comunitarios.

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Join Us For Resilient Fresno County

Dinner's On Us!

Thursday, March 16th
3:00PM-6:00PM

City of Huron Council Chambers
17051 12th Street

Food and Beverages will be served

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For more information please visit
www.ruraltransit.org

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Caltrans

Accessible EV Mobility & Infrastructure For All

Únase a nosotros para el Condado de Fresno Resiliente

¡La cena va por nosotros!

El jueves, el 16 de marzo
3:00PM-6:00PM

Cámaras del Consejo de la Ciudad de Huron
17051 12th Street

Se servirán alimentos y bebidas

La Agencia de Tránsito Rural del Condado de Fresno (FCRTA) está trabajando para crear centros de resiliencia comunitaria para expandir el transporte y proveer servicios durante emergencias. Los centros también tendrán programación durante todo el año y servicios como carga de vehículos eléctricos, Wi-Fi, y jardines comunitarios.

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FCRTA Fresno County Rural Transit Agency

Caltrans

Accessible EV **Mobility** & **Infrastructure** For All

Join Us For Resilient Fresno County

Dinner's On Us!

Wednesday, March 15th
4:30PM-7:00PM

Reedley Community Center Senior Room
100 N. East Avenue

Food and Beverages will be served

The Fresno County Rural Transit Agency is working to create community resiliency hubs to expand transportation and provide services during emergencies. The hubs will also have year-round programming and amenities like electric vehicle charging, Wi-Fi, and community gardens.

Tell us what services you want at the hubs by joining us for dinner and fun!

Take the Short Survey!

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Únase a nosotros para el Condado de Fresno Resiliente

¡La cena va por nosotros!

El miércoles, el 15 de marzo
4:30PM-7:00PM

Reedley Community Center Senior Room
100 N. East Avenue

Se servirán alimentos y bebidas

La Agencia de Tránsito Rural del Condado de Fresno (FCRTA) está trabajando para crear centros de resiliencia comunitaria para expandir el transporte y proveer servicios durante emergencias. Los centros también tendrán programación durante todo el año y servicios como carga de vehículos eléctricos, Wi-Fi, y jardines comunitarios.

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Join Us For Resilient Fresno County

Games and Prizes!

Wednesday, March 15th
5:00PM-8:00PM

Kerman Farmers Market
15101 W. Kearney Blvd.

The Fresno County Rural Transit Agency is working to create community resiliency hubs to expand transportation and provide services during emergencies. The hubs will also have year-round programming and amenities like electric vehicle charging, Wi-Fi, and community gardens.

Tell us what services you want at the hubs by visiting us at the Kerman Farmers Market for games and prizes!

Take the Short Survey!

Link Here:
https://www.surveymonkey.com/r/microgrid

For more information please visit
www.ruraltransit.org

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Caltrans

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Únase a nosotros para el Condado de Fresno Resiliente

¡Juegos y premios!

El miércoles, el 15 de marzo
5:00PM-8:00PM

Kerman Farmers Market (mercado agrícola)
15101 W. Kearney Blvd.

La Agencia de Tránsito Rural del Condado de Fresno (FCRTA) está trabajando para crear centros de resiliencia comunitaria para expandir el transporte y proveer servicios durante emergencias. Los centros también tendrán programación durante todo el año y servicios como carga de vehículos eléctricos, Wi-Fi, y jardines comunitarios.

¡Cuéntanos qué servicios le gustaría ver en los centros visitándonos en el mercado agrícola en los juegos y premios!

¡Realice la breve encuesta!

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https://www.surveymonkey.com/r/microrred

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Join Us For Resilient Fresno County

DONUTS and COFFEE On Us!

Thursday, March 16th
9:00AM-Noon

Firebaugh Central California Food Bank Distribution
1655 13th Street

Snacks and Beverages will be served

The Fresno County Rural Transit Agency is working to create community resiliency hubs to expand transportation and provide services during emergencies. The hubs will also have year-round programming and amenities like electric vehicle charging, Wi-Fi, and community gardens.

Tell us what services you want at the hubs by joining us for donuts and fun!

Take the Short Survey!

Link Here:
https://www.surveymonkey.com/r/microgrid

For more information please visit
www.ruraltransit.org

FCRTA Fresno County Rural Transit Agency

Caltrans

Accessible EV Mobility & Infrastructure For All

Únase a nosotros para el Condado de Fresno Resiliente

¡Donas y café van por nosotros!

El jueves, el 16 de marzo
9:00AM-12:00PM

Firebaugh Community Center (Centro Comunitario)
Distribución del Banco de Alimentos de California Central
1655 13th Street

Se servirán aperitivos y bebidas

La Agencia de Tránsito Rural del Condado de Fresno (FCRTA) está trabajando para crear centros de resiliencia comunitaria para expandir el transporte y proveer servicios durante emergencias. Los centros también tendrán programación durante todo el año y servicios como carga de vehículos eléctricos, Wi-Fi, y jardines comunitarios.

¡Cuéntanos qué servicios le gustaría ver en los centros uniéndose a nosotros en los aperitivos y diversión!

¡Realice la breve encuesta!

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