Solar + Storage for Community Resiliency Feasibility Study
Goals

STUDY GOALS

• Increase resiliency in SF’s emergency response plans
• Expand market for solar + storage
• Create roadmap for other cities

TODAY’S GOALS

• Inform on project status
• Set stage for future engagement
Study Overview

BUDGET
• 3 year study
• USDOE Grant: $1.3M

DELIVERABLES
• Potential Site Case Studies
• Roadmap and Best Practice Guide
• Planning tools
  • www.solarresilient.org

QUESTIONS TO ANSWER
• Are solar + storage systems technically feasibly? Yes
• Is there a commitment to site selection? No
• Is this a Capital Planning project? No
• How do we pay for the systems? Unknown
Plan: 3-7 Day Electricity Outage

Figure 1: Estimated recovery times for critical San Francisco infrastructure after an earthquake (adapted from the San Francisco Lifelines Interdependency Study).
Project Roadmap

1. Identify Stakeholders and Champions
2. Planning for Resilience: Shelters and Hazard Plans
3. Identifying the Best Sites for Resilient Shelters
4. Walking the Site and Assessing Critical Loads
5. Microgrids vs. Stand-Alone Systems
6. Sizing Solar and Storage
7. Portfolio Financing
Stakeholder Engagement

- Public Works
- Emergency Response
- Public Health
- Parks and Recreation
- Education
- Mayor’s Office
- Fire
- Police
Potential Site Selection

ARUP Solar+Energy Storage for Resiliency
spatial data viewer

Legend

Layers

- ✔ Hazus Results
- ✔ Critical Infrastructure
  - ✔ Primary NGO Kitchens - 2015
  - ✔ NERT Staging Location
- ✔ All Facilities
- ✔ Facilities with Critical Power Need
- ✔ Facilities with Generators
- ✔ Medical Assets
- ✔ Microgrids
  - ✔ Selected Sites
  - ✔ Original Sites Under Consideration
- ✔ City Data
- ✔ Hazards
  - C05 - San Andreas
  - C06 - Hayward
  - ✔ C07 - Soil Liquefaction
  - C08 - Landslide
  - ✔ C09 - Tsunami
  - C13 - Wildfire
  - C14 - Reservoir Inundation
  - C18 - Heat Vulnerability

Bookmarks

identify

Find
Microgrids → Individual Systems
Figure 5: Shelters used for load analysis for solar and storage evaluation
Site Investigation: Identify Critical Loads

- **Appliances**: How will each appliance be used after a disaster?
- **Telecom**: Are wifi, radio, servers, and cell phones required?
- **Solar PV**: Is the roof structurally sound and unshaded?
- **Existing**: Are the emergency circuits already separated?
- **HVAC**: Is heating or cooling required, and is it electric?
- **Computers**: How many are required and on what schedule?
- **Lighting**: Where is it required, and how will it be controlled?
Detailed Case Studies

Figure 17: Thurgood Marshall High School

Figure 18: Marina Microgrid

Figure 19: Hamilton Recreational Center

Figure 20: Maxine Hall Health Center
Detailed Case Study: HRC

Figure 40: Typical 24 hour electrical profile of HRC.

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<th>Existing PV (kW)</th>
<th>New PV Required (kW)</th>
<th>Roof Area for New PV (sf)</th>
<th>Parking Area for New PV (sf)</th>
<th>Battery Size (Power, kW)</th>
<th>Battery Size (Energy, kWh)</th>
<th>Inverter Size (kW)</th>
<th>Battery Space Required (cu. ft.)</th>
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Figure 41: Proposed Equipment Areas—White rectangles are identified PV areas and yellow is the storage location.
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