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Energy and Grid Resilience: Mitigating Risk through Climate Adaptation

Santa Barbara Unified
Every child, every chance, every day.

Modesto City Schools

Yolo County Office of Education

May 22, 2024

Ten Strands
Connecting Education, Environment, and Community

UNDAUNTED K12

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Welcome

Ingrid Roberson

Assistant Director,
CCEE

- Recording & slides will be posted on CCEE's website
- Slides will be linked in the chat
- **Questions/Comments**: Please use the Q&A feature on the toolbar to elevate your questions and comments

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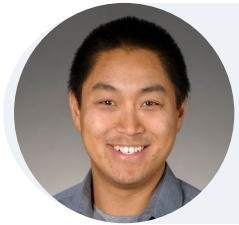
Meet the Presenters

Matthew Juchniewicz

Director, Operations Services
Yolo County Office of Education



Desmond Ho

Operations and Sustainability Coordinator
Santa Barbara Unified School District

Veronica Coronado

Associate Superintendent
Yolo County Office of Education

Gilbert Blue Feather Rosas

Director of Sustainability and Adaptation
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Series Overview and Energy Resilience

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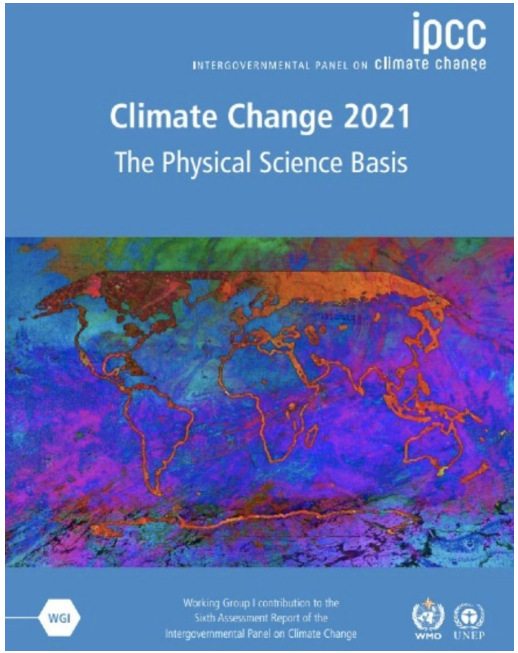
Series Focus: Climate Impacts and Schools



Report Released
August 2021

Three Key Findings:

- **Global warming is unequivocally caused by humans**
- **The impacts of the Climate Crisis are already here,** and are disproportionately impacting low-income, Black, indigenous, and communities of color
- **Temperatures have already increased by 1.09°C since 1880, and will continue** to the 1.5°C mark in the next twenty years due to emissions from past decades.

Two Clear Calls to Action:

- If humans **act urgently to mitigate climate change**, temperatures could peak at that 1.5°C and then decline - stabilizing the planet.
- Communities must begin to **adapt to climate impacts**

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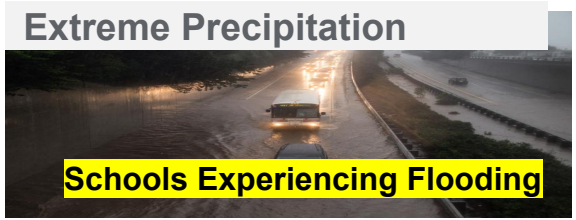
Series Focus: Climate Impacts and Schools

High Heat

Heat impacts the ability to learn and stay focused

Extreme Precipitation



Schools Experiencing Flooding

Air Quality

Canceled Activities and Adjustments to Routines

Drought

Folsom Lake - January 16, 2014

Sea level rise

Coastal Communities are most vulnerable

Wildfires

Fires Contribute to the Most School Closure Days in CA

A CALL TO ACTION
Climate Resilient California Schools
Safeguarding Children's Health and Opportunity to Learn in TK-12

CAL MATTERS

Climate Impacts:

- Threaten the Physical and Mental Health of Students and Staff
- Contribute to Lost Learning Time
- Are projected to increase in frequency and intensity throughout this decade and beyond

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Series Features: Climate Impacts and Schools

1) Open Doors

- April: Prepare for a New Normal: Climate Emergencies and Their Impact on Schools
- May: Energy and Grid Resilience Adaptations
- Summer: High Heat and Schoolyard Adaptations

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Connecting Education, Environment, and Community

2) Spotlights

- April: Climate Change and Emergency Management in San Mateo County
- May: Energy and Grid Resilience
- Summer: Stormwater Management

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3) Summary Report and Toolkit

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Focus for Today's Open Door

- **Energy Use in Schools during the Climate Era**

- **Stories from the Field:**
  - Energy Conservation
  - Microgrids
  - Energy Education

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Introduction to Energy Resilience

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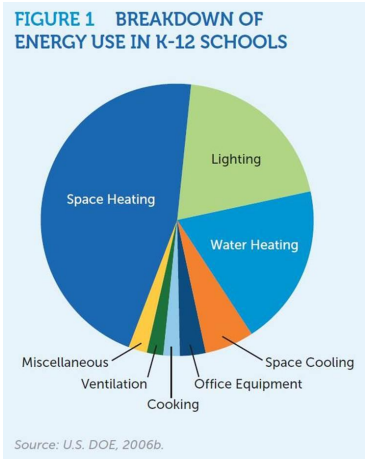
Energy Use in Schools During the Climate Era

- **Schools Need Energy:** Access to reliable energy is critical for schools to function!
- **Two Energy Challenges:**
  - Energy demand is a large portion of a school's ecological footprint, and has an environmental, social, and economic impact.
  - The impacts of climate change threaten school's ability to maintain safe and consistent access to energy.



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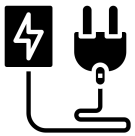
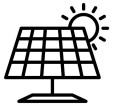
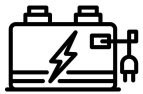
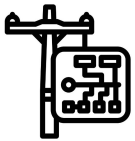
Energy Use in Schools During the Climate Era

Energy Resilience: maintaining the ability to withstand and rapidly recover from power outages and continue operating with electricity, heating, cooling, ventilation, and other energy-dependent services.

	**Electrification** - The process of powering by electricity, and in many cases the process of transitioning away from natural gas power sources.
	**Solar** - Reduces demand on the grid and enables off-grid power when controlled locally.
	**Storage** - Utilize batteries that store electricity to allow for off-grid power for facilities and equipment.
	**Microgrids** - Local grids that disconnect from the main grid to operate autonomously. This can be done with solar to battery or generators.

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Energy Resilience in Education

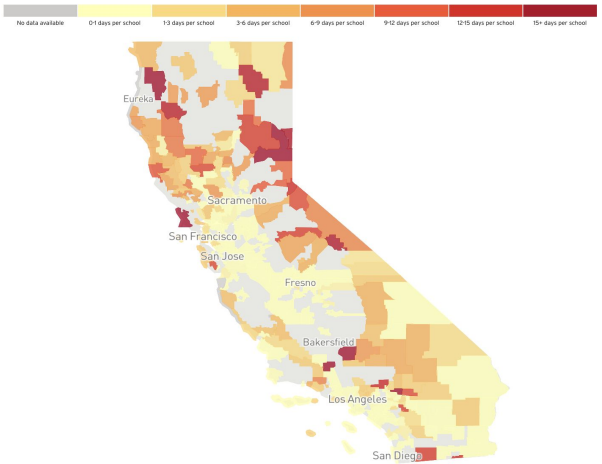
CAL MATTERS

School closures from have kept more than a million kids home

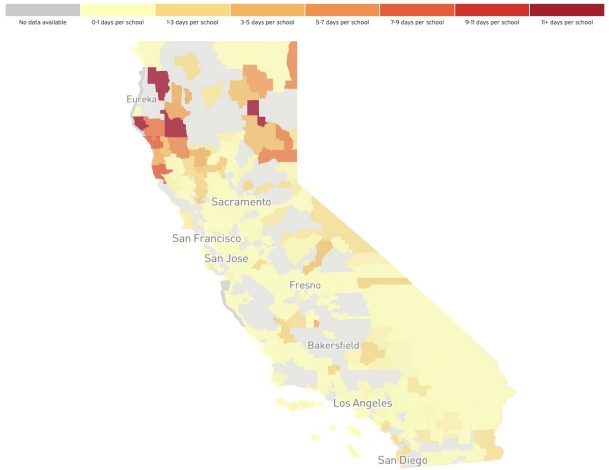
BY RICARDO CANO

NOVEMBER 15, 2018 UPDATED JUNE 23, 2020

School closure days due to natural disasters and weather per school in each district.



School closure days due to a failure in required infrastructure per school in each district.



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Yolo County
OFFICE OF
EDUCATION

Yolo County Office of Education

Veronica Coronado
Associate Superintendent
Administrative Services

Matthew Juchniewicz
Director
Support Operations Services

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Integrating Environmental Sustainability and Climate Resilience at Yolo County Office of Education

- Powering Future Generations: The Yolo County Schools Resiliency and Sustainability Project
- Brief overview of Yolo COE's vision and mission: Leadership in action
- Importance of sustainability and resilience in our operations

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The Journey to Energy Resilience

- Initial focus on environmental sustainability and energy conservation.
- Role of Prop 39 in advancing these efforts.
- Factors that expanded our focus to include climate resilience:
  - Cost avoidance
  - Public power shut-offs
  - Sustainable operations
  - 2022 Sustainability Resolution

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Catalysts for Expanding Focus

- Energy Audits - you can't change what you don't measure
- Cost savings opportunities identified
- Strategic support to enhance climate resilience and sustainability

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Tailoring Energy Solutions: Our Project

- Solar and battery storage
- Heating, ventilation, and cooling efficiency and controls
- Plug load management
- Window film
- Building envelope
- Healthy buildings

Building	CalSHAPE (AB841)	BAS/ Controls	CO2 Sensors	PM 2.5 (Suite 190)	HVAC Rejuvenation	HVAC Replacement	Plug Load	Window Film	Building Envelope	Solar	Battery Storage	EV Chargers
Santa Anita		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Greengate	✓	✓	✓		✓	✓	✓	✓	✓	✓		
Chavez	✓	✓	✓		✓		✓	✓	✓	✓		
Plainfield		✓	✓						✓			
Esparto		✓	✓									
Lemen		✓	✓									

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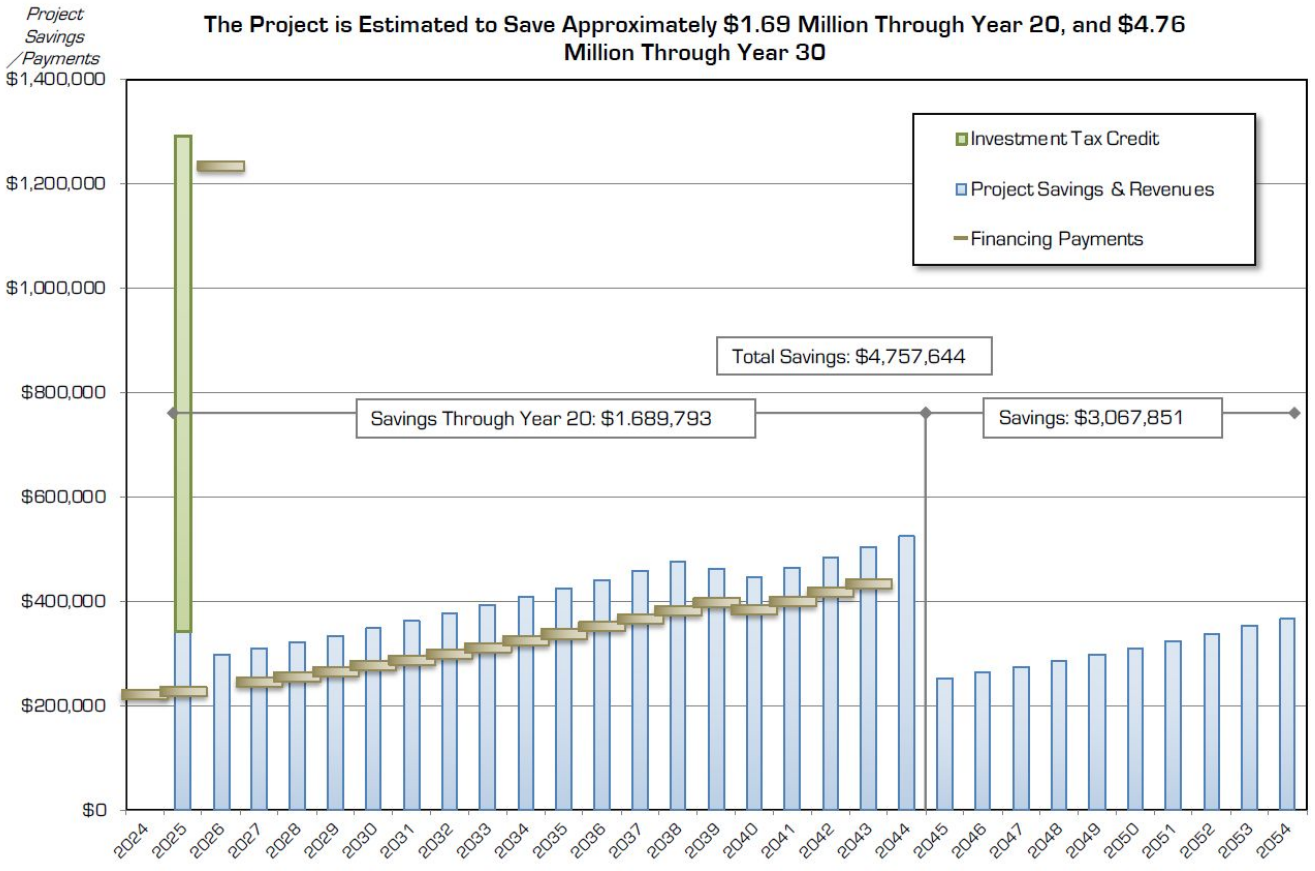
Sustainable Operations and Energy Resiliency: Project Focus

- Achieving energy resilience
  - Protecting our school's network
- Reducing our energy consumption
- Producing our own energy

Financing our project

Federal Inflation Reduction Act

- Investment Tax Credits
  - Solar
  - Battery Storage
  - Electric Vehicle Chargers



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Partnership

- Collaborating with partners and stakeholders
- Communicating with the board and gaining support
- Bring in the right expertise
    - You can't do it alone!

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Lessons Learned:

- Bring in the right players early on
- Think outside of what is currently conventional thinking
- Don't take no as an answer, keep focused on the goal
- Know that with the right grit and determination, an idea can become a reality

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Santa Barbara Unified School District

Desmond Ho
Operations and
Sustainability Coordinator

Overview

- Grid vulnerability
- Community resiliency
- Solar and microgrid project
- Financing - power purchase agreement
- Lessons learned

School District

Santa Barbara Unified School District

- 12 Elementary
- 4 Junior High
- 5 High Schools
- Services 13,000 students
- 57.7% of students on free or reduced price meals
- 1700 staff

Grid Vulnerability

- Location and nature of Santa Barbara County
- No power generation within County
- County split - mountain range splits power service

Grid Vulnerability

Community

- SBUnified school sites serve as emergency shelters during natural disasters
  - Microgrids power largest kitchens
  - Gyms/MPRs shelter
- Thomas Fire 2017, mudslides 2018, flooding 2023, etc. initiated the project

Buy In

- Bonds issued in 2016 - limited appetite for another bond measure
- Necessitated use of consultants
  - Clean Coalition
  - Sage Energy Consultant
  - Feasibility Study
- Meetings with principals, PE teachers, and community members

Clean Coalition

SAGE ENERGY CONSULTING an NV5 company

Solar

- 14 solar arrays & 6 microgrids
  - Parking lots where feasible
  - Play fields for shading
- Provides 70% of SBUnified's overall electricity use
- Offsets 93% of GHG emissions from utility electricity use
- Microgrids for the largest facilities

Microgrid

Tier 1 loads:

- Freezers, refrigerators, emergency shelter facilities,comms equipment (internet, radio etc)
- 100% resilience expected

Tier 2 loads:

- Multi-purpose rooms/gyms, site comms equipment
- 80% resilience expected

Tier 3 loads:

- Remainder of the school < 25% resilience expected

Normal usage to Emergency use continuum

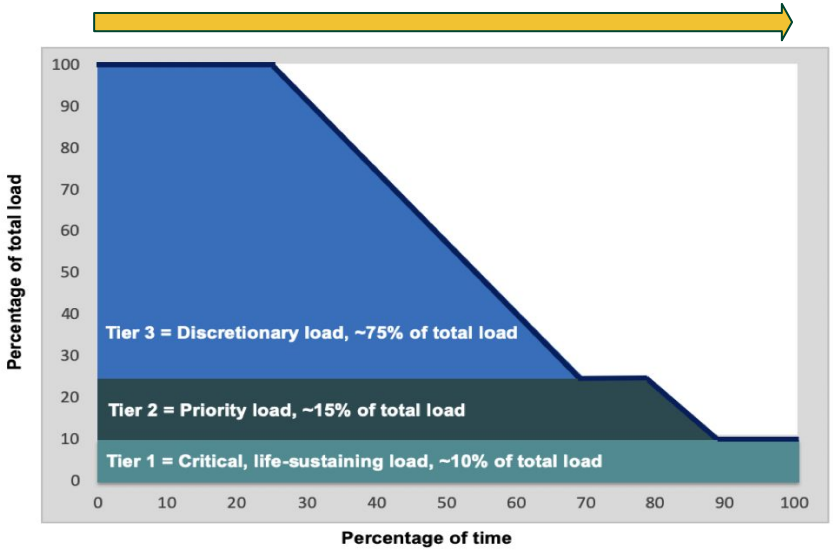
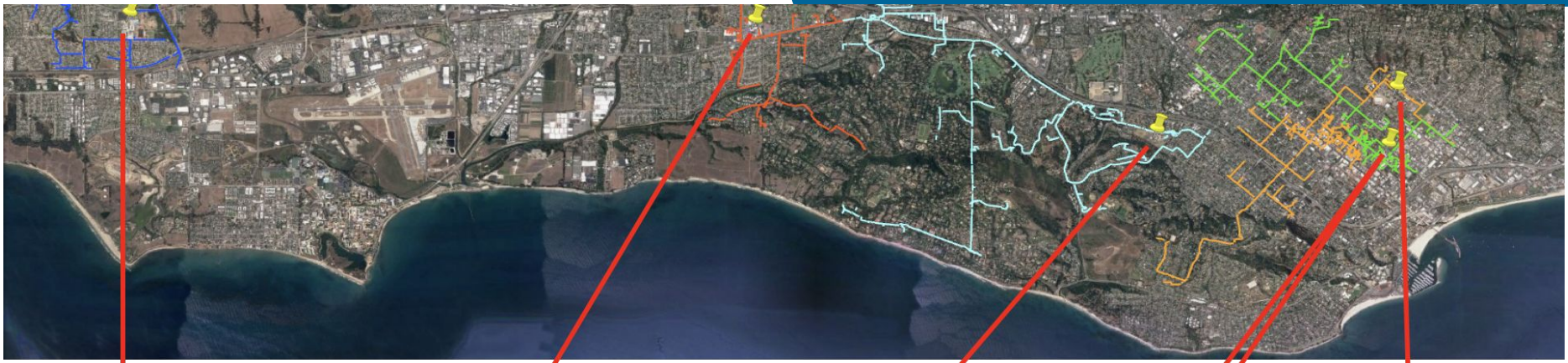


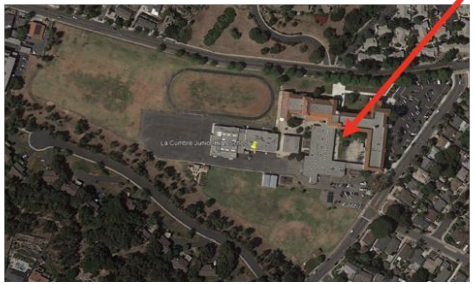
Illustration of resilience levels and loads for Tiers 1-2-3 load where (a) solar is sufficient to attain zero net energy (ZNE) and (b) storage capacity equals 2 hours of solar.
Source: Clean Coalition, analysis completed for UCSB

Microgrid

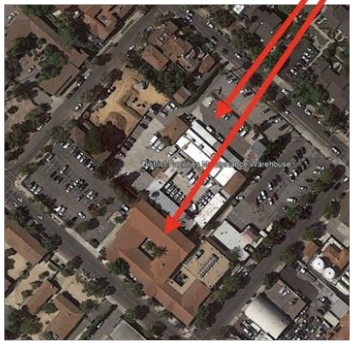


Dos Pueblos High School

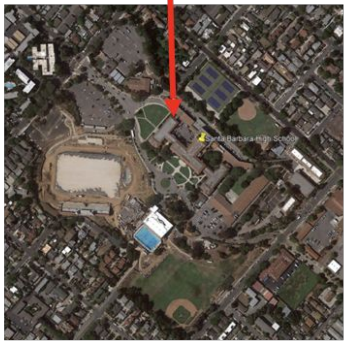
San Marcos High School



La Cumbre Junior High School

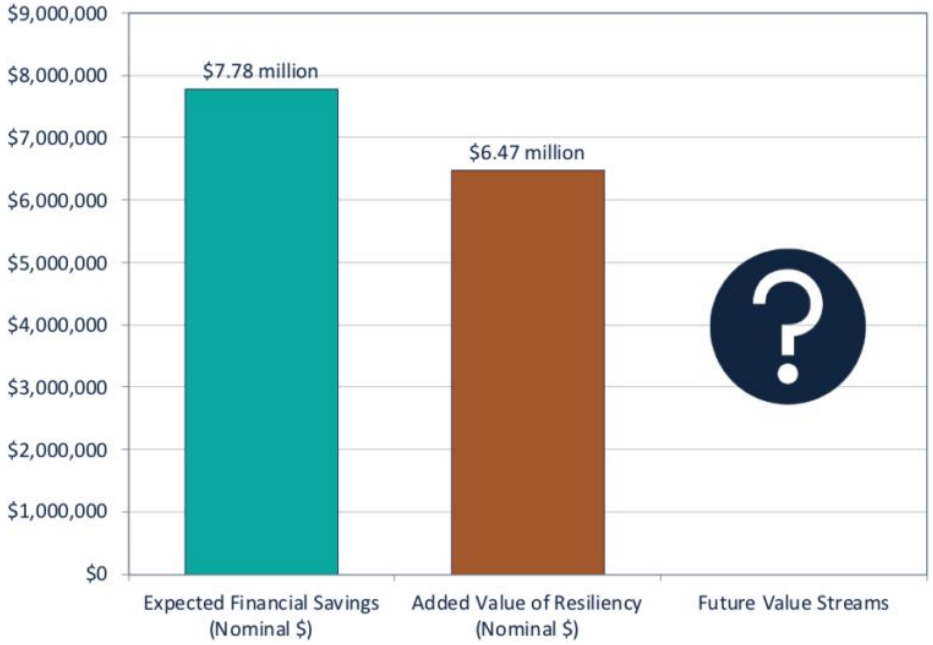


District Office & Facilities
Maintenance Warehouse



Santa Barbara HS

Finance



Power Purchase Agreement (PPA)

- Flat rate for 28-year term
- Traded slightly higher rates for $1.2 million contingency fund
- No upfront capital costs
- Original savings: $7.7M
- Updated savings: $14.0M

Lessons Learned

- Expect the unexpected
- Contingency depleted rapidly due to construction change orders
- How to deal with neighbor complaints
- Coordinating with facilities
- Construction fatigue at schools

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Modesto City Schools (District)

Gilbert Blue Feather Rosas
Director of Sustainability
and Adaptation

MODESTO CITY SCHOOLS

EVERY STUDENT MATTERS, EVERY MOMENT COUNTS

Our 2 Year Report Card

- Received $17.6M million from San Joaquin Valley Air Pollution Control District, HVIP, CARB, & EPA Clean School Bus Program-for electric buses, solar, & charging stations

- 3 Phases of Green Infrastructure: Cost $50.6M Savings $64.3M

  - Solar Carports at 6 high school
  - 6 Sustainable Outdoor Learning Environments (SOLEs)
  - Transportation Yard-Electric School Bus Solar Carports & Charging Stations

- We are estimating ~$12 million in ITC Direct Pay Incentive for Phases 1-3

Teacher Coordinators

In March 2023, the Board approved funding for "Sustainability Teacher Champions" at all school sites to establish and lead environmental initiatives.

34

Electric School Buses

MCS converted half of its bus fleet to Blue Bird electric school buses and received the final bus of the purchase order in October 2023.

30

Onsite Air Monitors

MCS received 35 Purple Air Monitors in partnership with UC Merced for all campuses and the Transportation Yard. Student engagement projects are underway.

35

Solar Structures

MCS built a solar carport at the Transportation Yard and is constructing solar carports at all 7 high schools. MCS also built 6 Solar Outdoor Learning Classrooms (SOLEs) at 2 elementary, 1 junior high, and 2 high schools.

14


This project sponsored in part by
WATER & POWER

Our collective Why

Electric School Bus vs. Diesel Bus Analysis

10-Yr Lifetime Operational Cost per Mile			
O&M Cost Comparison	**ESB**	**Diesel**	**Savings**
Electricity/Fuel Cost, $/mi	$0.03	$0.44	**$0.41**
Maintenance Cost, $/mi	$0.56	$1.54	**$0.97**
Total Operation Cost, $/mi	*$0.60*	*$1.98*	***$1.38***

MODESTO CITY SCHOOLS

MCS- Our Collective Why

- Every student graduates with the **SUSTAINABILTY** skills, knowledge, and character traits essential to thrive and contribute to society.

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Discussion: Question and Answer

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Question and Answer

- **Questions/Comments**: Please use the Q&A feature on the Zoom toolbar
- **Questions:** Specify if your question is for one of the guest speaker or all of the guest speakers

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Closing and Follow-Up

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3) Summary Report and Toolkit

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Thank You

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Feedback Survey