



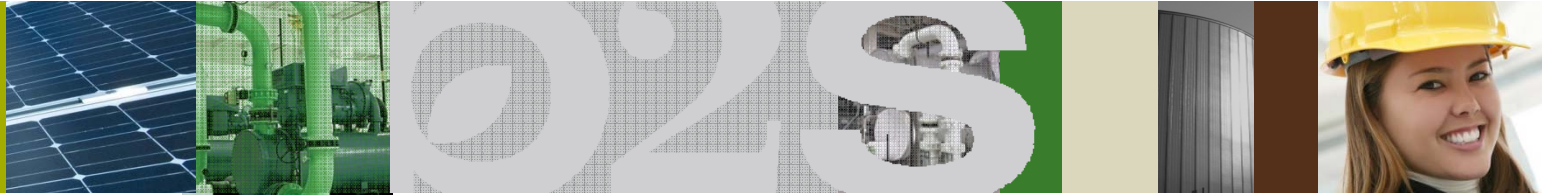
Alternative Energy Concept Plan

San Bernardino Community College District

January 13, 2011



THE VISION TO CHANGE.
THE INTEGRITY TO SUSTAIN.



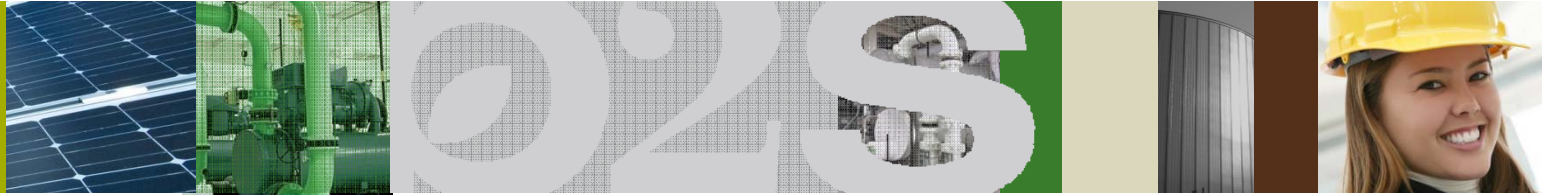
Overview

- Long Term Energy Plan
- Objective
- Methodology
- Summary of Findings
- Funding Sources
- Energy Technologies
- Energy Savings/Alternative Energy
- Overall Energy Distribution



Objective

- Reduce SBCCD reliance on the utility grid by 50% or more
 - Energy saving opportunities
 - Maximize efficiency
 - Reduce associated electrical energy costs
 - Electrical demand shifting opportunities
 - Reduce operating costs
 - Renewable energy opportunities
 - Reduce the overall dependence on the utility grid
 - Reduce carbon emissions
 - Environmental Benefits
 - Reduce greenhouse gas emissions.
 - Reduce air pollution



Methodology

- Survey of existing facilities
 - Existing systems information
 - Operational schedules
 - Campus current energy consumption
 - Rates of current utilities
- Analysis of applicable energy efficiency measures (EEM)
- Alternative energy
 - Available technologies and viability
 - Associated costs and paybacks
 - Placement locations



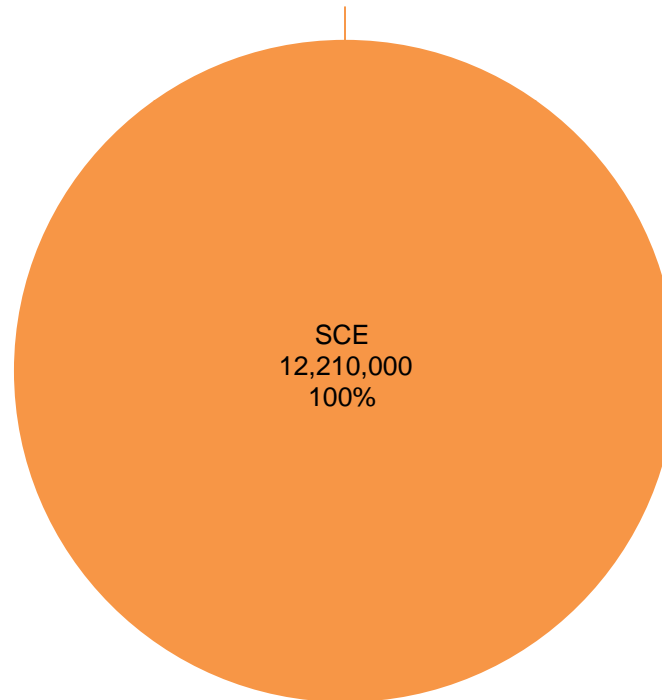
Electrical Reduction Summary

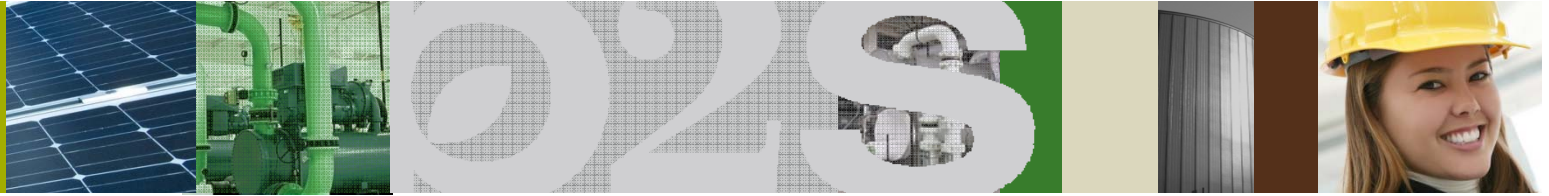
	Existing kWh/year	Projected kWh/year	% Reduction	Operating Cost Reduction
San Bernardino Valley College	8,400,000	5,378,000	36%	\$480,000
Crafton Hills College	3,300,000	-1,160,000*	135%	\$688,000
District Offices	510,000	238,000	53%	\$42,000
Total	12,210,000	4,456,000	64%	\$1,210,000

* The projected number is based on the excess kilowatt hours per year of energy generated by the PV system that could potentially be exported back to the grid pending formalization of Assembly Bills AB 2466 and AB 920 by the California Public Utilities Commission.

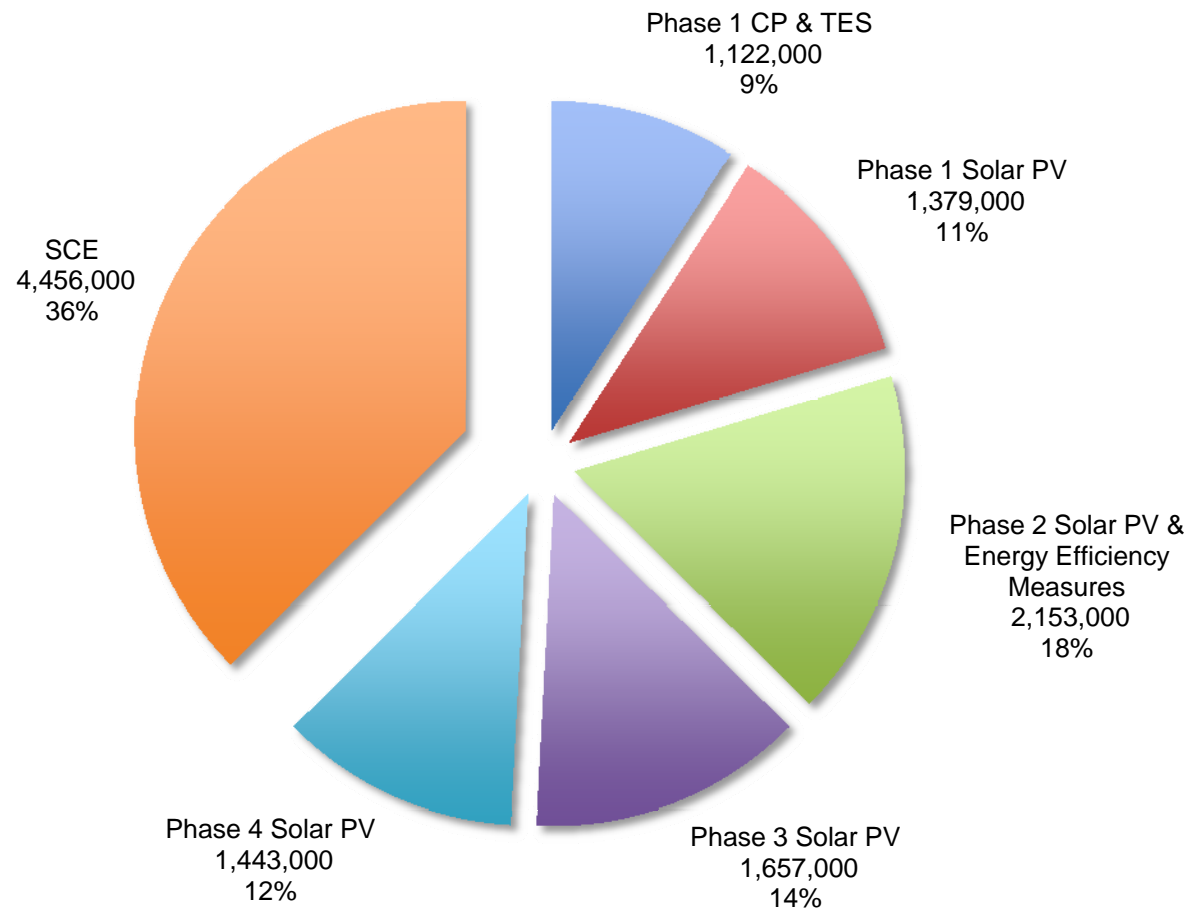


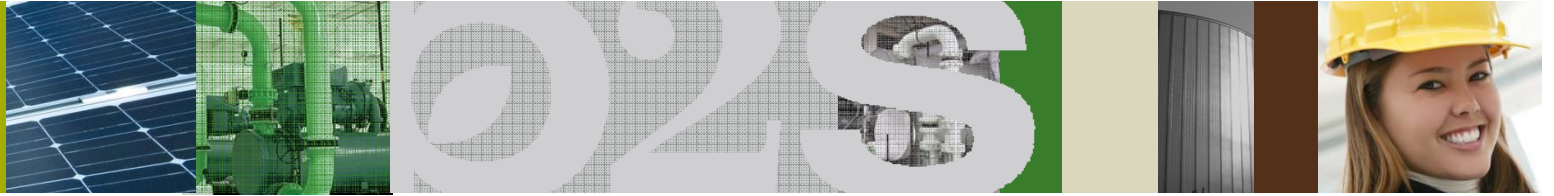
SBCCD Existing Electrical Energy Consumption in kWh/yr





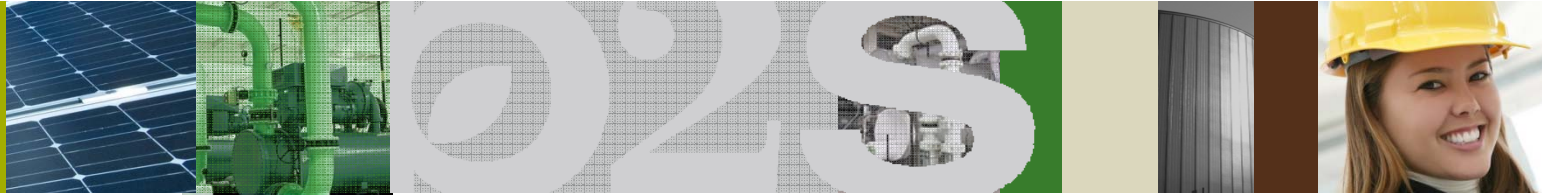
SBCCD Annual Electrical Energy Reduction in kWh/yr





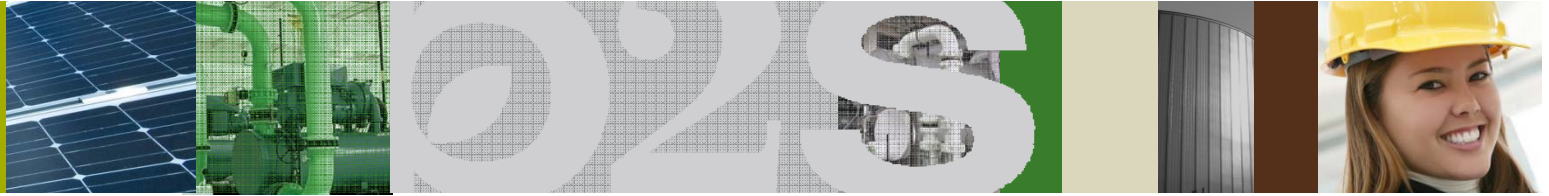
Funding Sources

- CCC/IOU Partnership Program
- California Solar Initiative
- Future California Energy Commission Loan Grants
- Utility Financing Options
- Measure M Bond Program



Technologies Explored and Analyzed

- Fuel Cells
- Microturbines
- Wind Power
- Photovoltaic
- Solar Thermal
- Central Plant
- Thermal Energy Storage
- Lighting Retrofits
- Building Controls
- Monitoring-Based Commissioning
- Plug Load Control
- Premium Efficiency Motors
- Tankless DHW Heaters



Alternative Energy Concept Plan Summary

Location	Construction Cost	Rebates	Annual Energy Cost Reduction
San Bernardino Valley College	\$3,002,000*	\$1,705,000	\$480,000
Crafton Hills College	\$12,594,000	\$3,665,000	\$688,000
District Offices	\$650,000	\$214,000	\$42,000
Grand Total	\$16,246,000	\$5,584,000	\$1,210,000

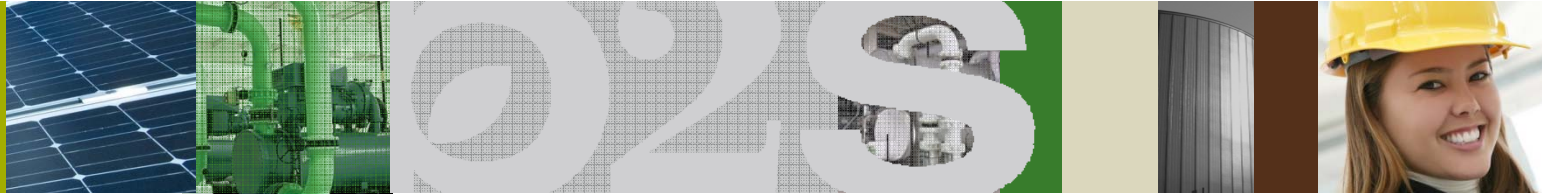
* Construction cost of CP/TES and Phase 1 PV is included in Utility Infrastructure and Parking Structure projects respectively.



Alternative Energy Concept Plan Summary

Location	Project Description/Phase	Payback (Years)	Preliminary Schedule
San Bernardino Valley College	<u>Phase 1</u>		2011-2015
	Thermal Energy Storage*	17	
	Solar PV on Parking Structure – 400kW	25	
	<u>Phase 2</u>		2011-2015
	Energy Efficiency Measures	7	
	<u>Phase 3</u>		2015-2020
Solar PV on Building Rooftops – 450kW	17		

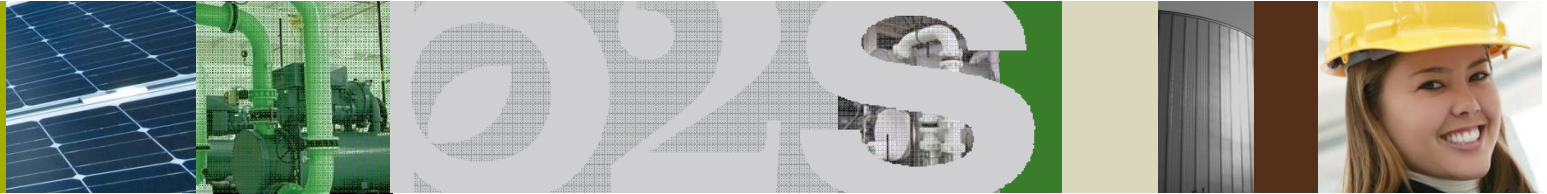
* Central Plant is included in Utility Infrastructure project.



Alternative Energy Concept Plan

Summary

Location	Project Description/Phase	Payback (Years)	Preliminary Schedule	
Crafton Hills College	<u>Phase 1</u>		2011-2015	
	Thermal Energy Storage	15		
	Solar PV on Parking Structure – 400kW	22		
	<u>Phase 2</u>		2011-2015	
	Solar PV in Parking Lot – 400kW	22		
	Energy Efficiency Measures	6		
	Solar Collectors - Pool	11		
	<u>Phase 3</u>			2015-2020
	Solar PV on Building Rooftops – 400kW	13		
	<u>Phase 4</u>			2020-2025
Solar PV on Campus Available Land – 800kW	22			

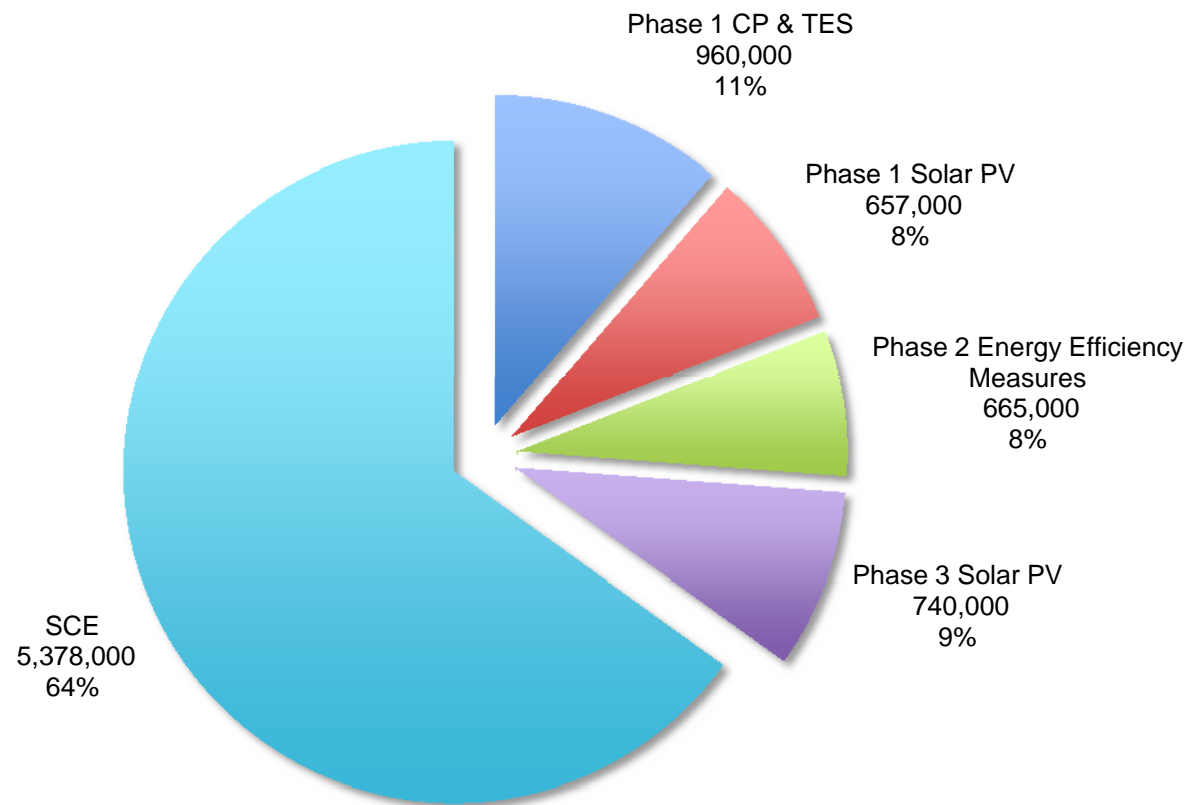


Alternative Energy Concept Plan Summary

Location	Project Description/Phase	Payback (Years)	Preliminary Schedule
District Offices	<u>Phase 2</u>		2011-2015
	Energy Efficiency Measures	2	
	<u>Phase 3</u>		2015-2020
	Solar PV on Building Rooftop – 100kW	14	

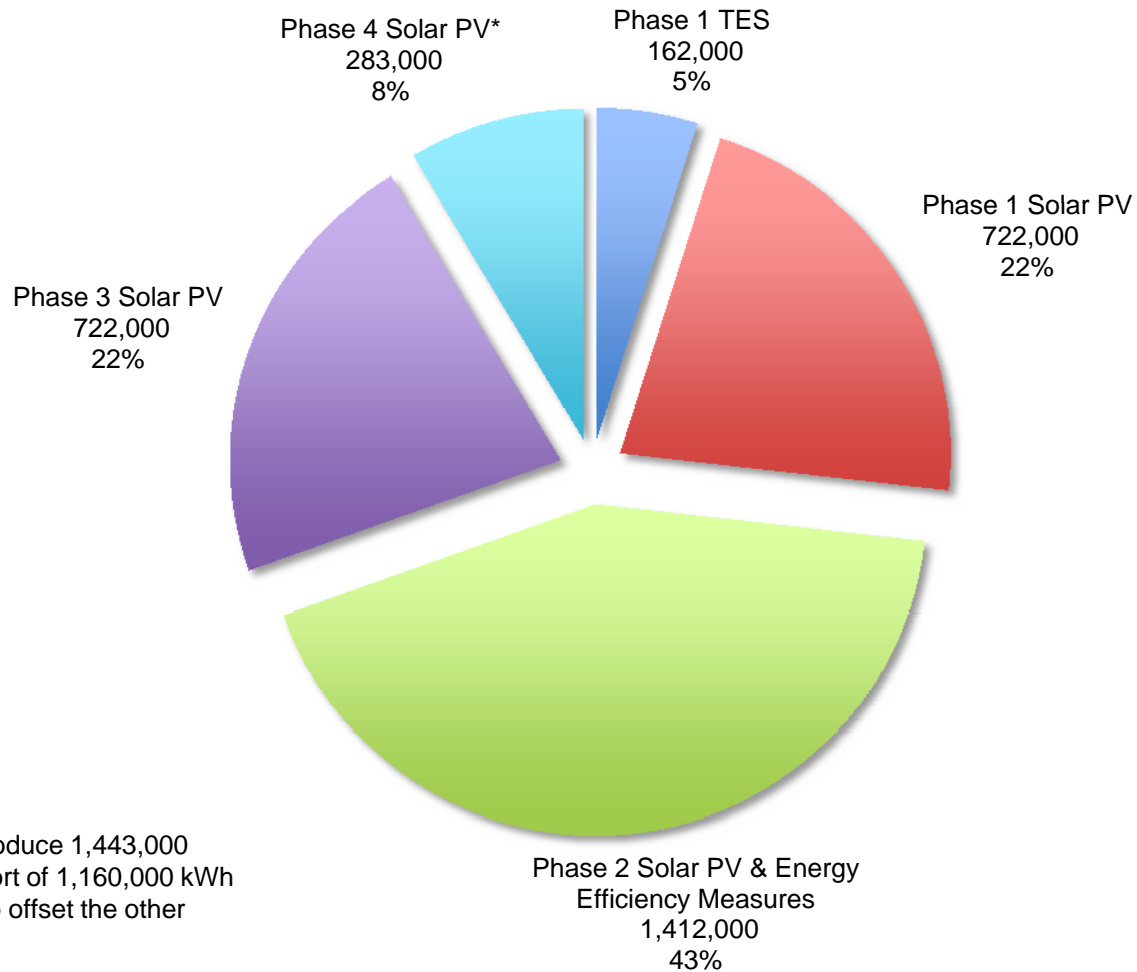


SBVC Annual Electrical Energy Reduction in kWh/yr





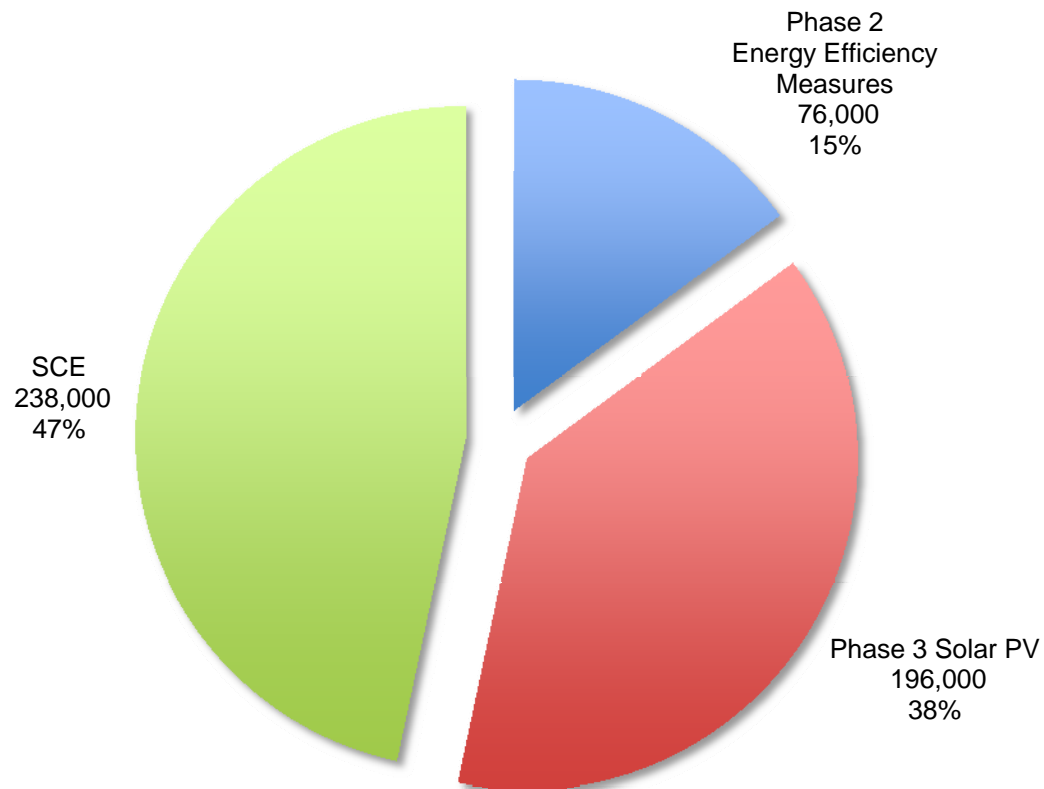
CHC Annual Electrical Energy Reduction in kWh/yr



* Phase 4 Solar would produce 1,443,000 kWh/yr including the export of 1,160,000 kWh back to the electric grid to offset the other District electric meters

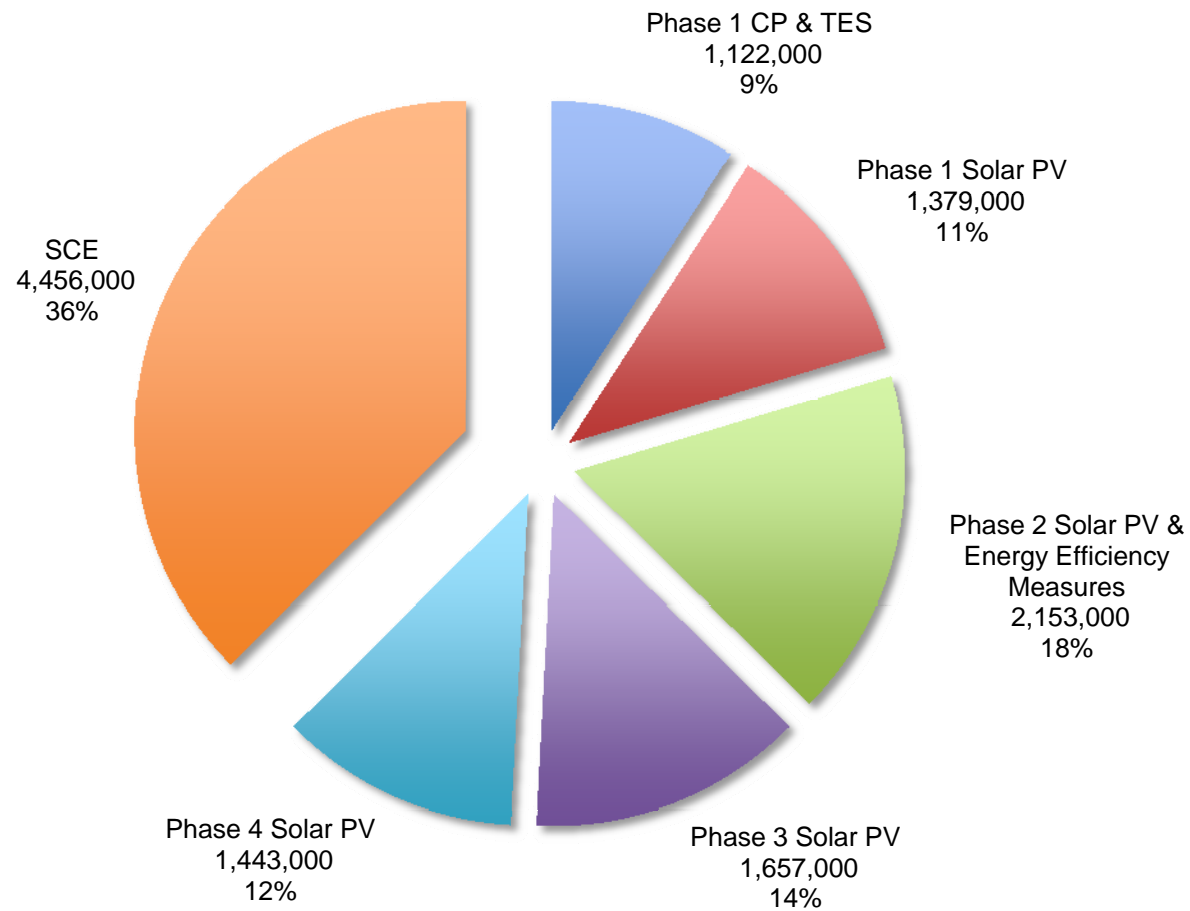


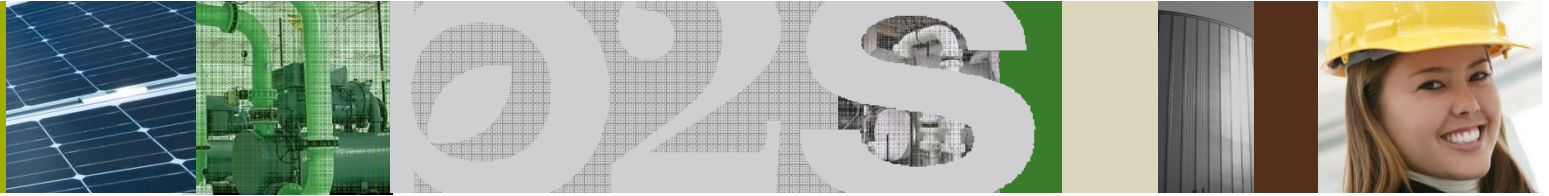
District Offices Annual Electrical Energy Reduction in kWh/yr



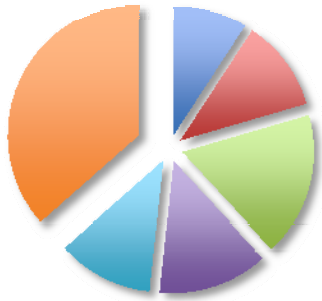


SBCCD Annual Electrical Energy Reduction in kWh/yr





Energy Savings Equivalents



7,755,000kwh of Energy Savings



**Equivalent to reducing
7.2 million miles driven by automobiles each
year**



2552 tons less of carbon emissions



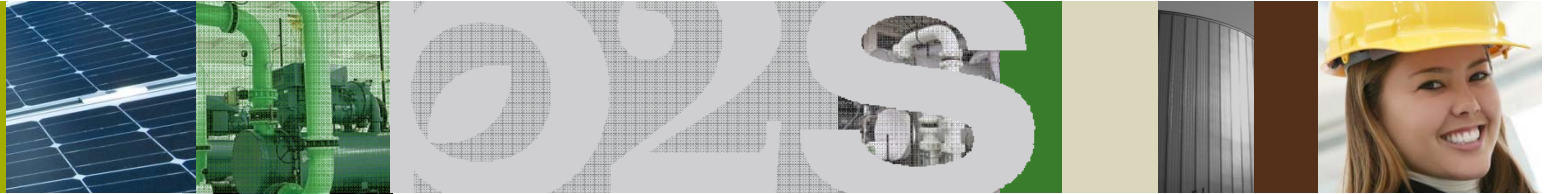


Alternative Energy Concept Plan

Additional Information



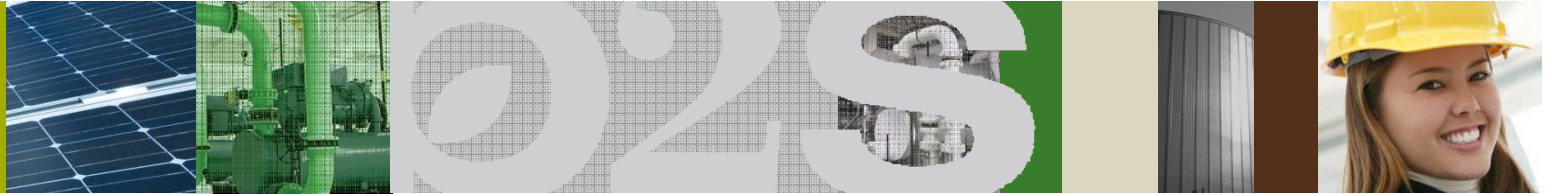
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Current Conditions

San Bernardino Valley College

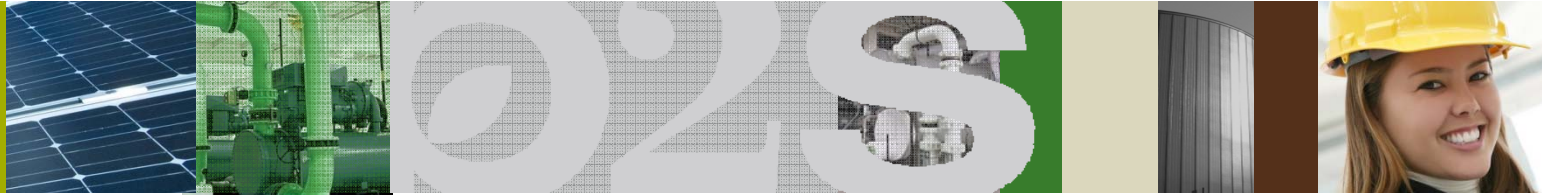
- Current Utility Data
 - Electrical consumption 8.4 million kWh/ year
 - Peak electrical demand 2.3 MW
 - Average electricity cost \$0.13/kWh
 - Average gas cost \$0.81/therm
- Distributed Cooling and Heating System
 - Chillers, package DX units, split systems
 - High operating and maintenance costs
- Electric resistance water heaters for domestic hot water needs
- Older buildings lack demand and occupancy controls
- Lighting systems equipped with 1st generation T8 lamps and lack effective occupancy and daylight controls



Current Conditions

Crafton Hills College

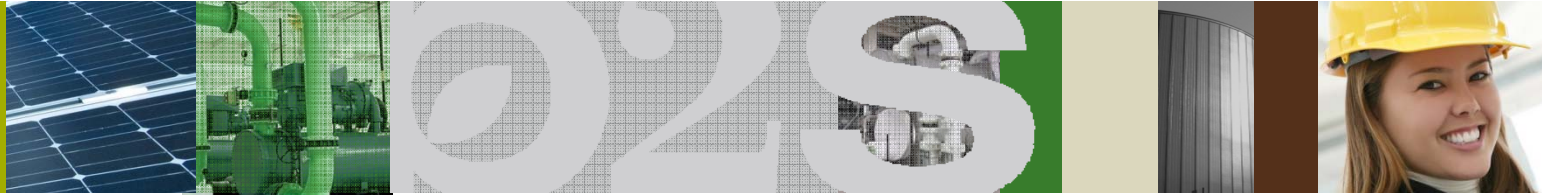
- Current Utility Data
 - Electrical consumption 3.3 million kWh/year
 - Peak electrical demand 1.13 MW
 - Average electricity cost \$0.14/kWh
 - Average gas cost \$0.72/therm
- Existing Central Plant
 - Chiller capacity 750 tons
 - Boiler capacity 13,080 MBH
- Electric resistance water heaters for domestic hot water needs
- Air handling systems have exceeded their useful life and lack demand control
- Lighting systems were found to be 1st generation T8 lamps and lack effective occupancy and daylight controls



Current Conditions

District Offices

- Current Utility Data
 - Electrical consumption 510,000 kWh/year
 - Peak electrical demand 158 kW
 - Average electricity cost \$0.15/kWh
 - Average gas cost \$1.17/therm
- Lower efficiency rooftop package cooling units
- Electric resistance water heaters for domestic hot water needs
- Lighting systems were found to be 1st generation T8 lamps and lack effective occupancy and daylight controls



Overall Energy Savings/Alternative Energy Production

San Bernardino Valley College

Phase	Description	Annual Energy Savings (kWh)	Cost	Rebates	Annual Energy Cost Reduction	Payback (Years)
1	Thermal Energy Storage	960,000	*	\$243,000	\$207,000	17
	Proposed PV Production 400 kW Parking Structure	657,000	**	\$621,000	\$85,000	25
2	Energy Efficiency Measures	665,000	\$752,000	\$138,000	\$93,000	7
3	Proposed PV Production 450 kW Building Rooftop	740,000	\$2,250,000	\$703,000	\$95,000	17

* Included in Central Plant Budget

** Included in Parking Structure Budget



Overall Energy Savings/Alternative Energy Production

Crafton Hills College

Phase	Description	Annual Energy Savings	Cost	Rebates	Annual Energy Cost Reduction	Payback (Years)
1	Thermal Energy Storage (TES)	162,000 kWh	*	\$39,000	\$94,000	15
	Proposed PV Production 400kW Parking Structure	722,000 kWh	**	\$685,000	\$101,000	22
2	Proposed PV Production 400kW Parking Lot	722,000 kWh	\$3,200,000	\$685,000	\$101,000	22
	Energy Efficiency Measures	690,000 kWh	\$731,000	\$169,000	\$100,000	6
	Solar Collectors, Pool	30,000 therms	\$263,000	\$30,000	\$21,000	11
3	Proposed PV Production 400kW Building Rooftop	722,000 kWh	\$2,000,000	\$686,000	\$101,000	13
4	Proposed PV Production 800kW Campus Available Land	1,443,000 kWh	\$6,400,000	\$1,371,000	\$170,000	22

* Included in Thermal Energy Storage Budget

** Included in Parking Structure Budget



Overall Energy Savings/Alternative Energy Production

District Offices

Phase	Description	Annual Energy Savings (kWh)	Cost	Rebates	Annual Energy Cost Reduction	Payback (Years)
2	Energy Efficiency Measures	76,000	\$50,000	\$18,000	\$13,000	2
3	Proposed PV Production 100kW	196,000	\$600,000	\$196,000	\$29,000	14