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Sandia National Laboratories

Energy Efficiency & Renewable Energy Benefits

Indian Canyons Trading Post –
Agua Caliente Band of Cahuilla Indians

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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Overview

- Objective
- Background
- Methods
- Indian Canyons Trading Post
- History
- Renewable Energy
- Energy Efficiency
- Comparisons
- Conclusion

Objective

- Benefits of renewable energy & energy efficiency
  - Energy demand
  - Cost
  - Emissions

Background

- Global warming
- Climate change
- Non-renewable energy
- Biggest energy users: buildings
- Solutions: energy efficiency & renewable energy

Methods

- Site visit
- Approval from Agua Caliente Band Tribal Council
- Communication with tribe
- Research

Indian Canyons Trading Post

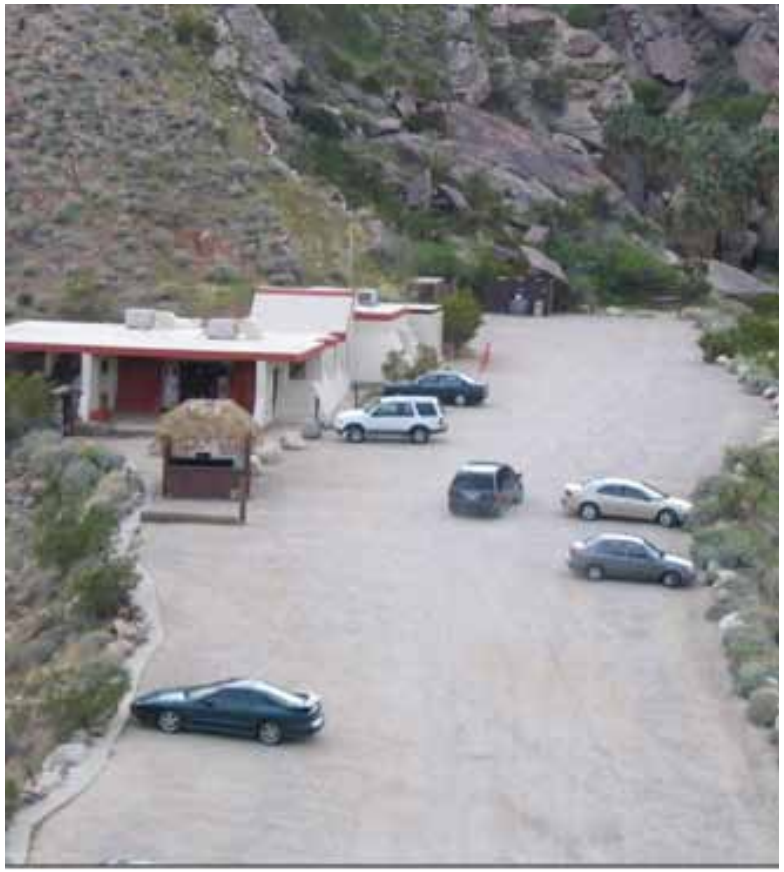


Photo showing Trading Post prior to PV installation, taken from Eastern view. Source: *Mineral Assessment Program Phase II*

- Historical site within tribal boundaries
- Off-grid ~700 square feet visitor's center & retail shop

History

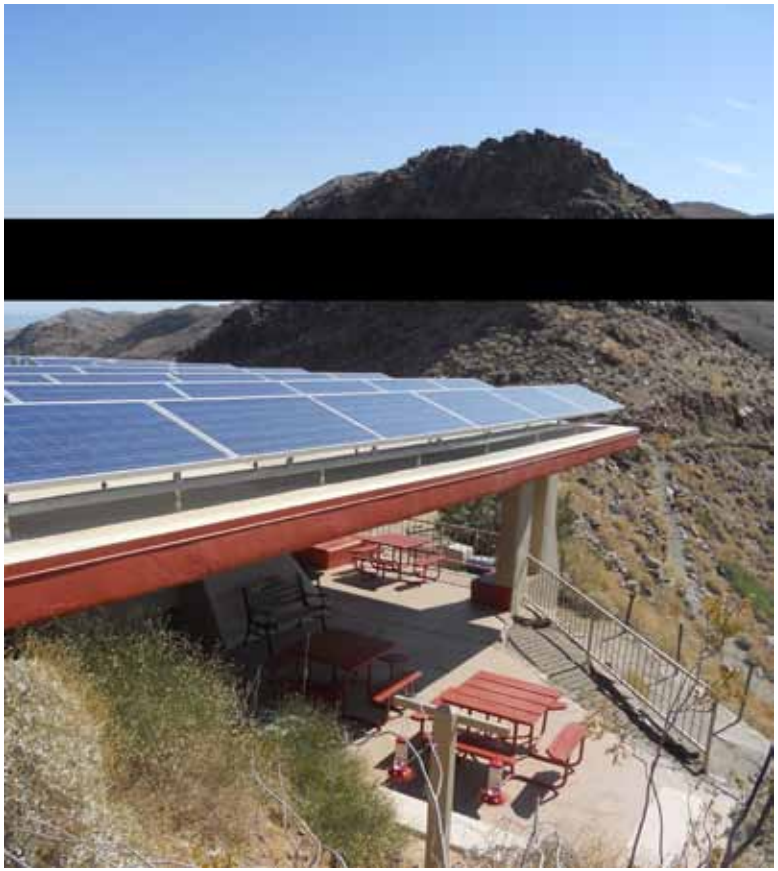
- Propane: generator, refrigerator, & freezer
  - High costs
  - Noise pollution

- 2005: DOE Tribal Energy Program Grant
  - Strategic Energy Plan

- 2009: DOI Bureau of Indian Affairs 638 Mineral Assessment Program Grant
  - Implementation

Renewable Energy

- 8.25 kW photovoltaic array
- Diesel generator back-up
- Propane designed equipment removal
- Roof repair



Picture showing Trading Post after PV installation, taken from Southwestern view. Source: Sandra Begay-Campbell

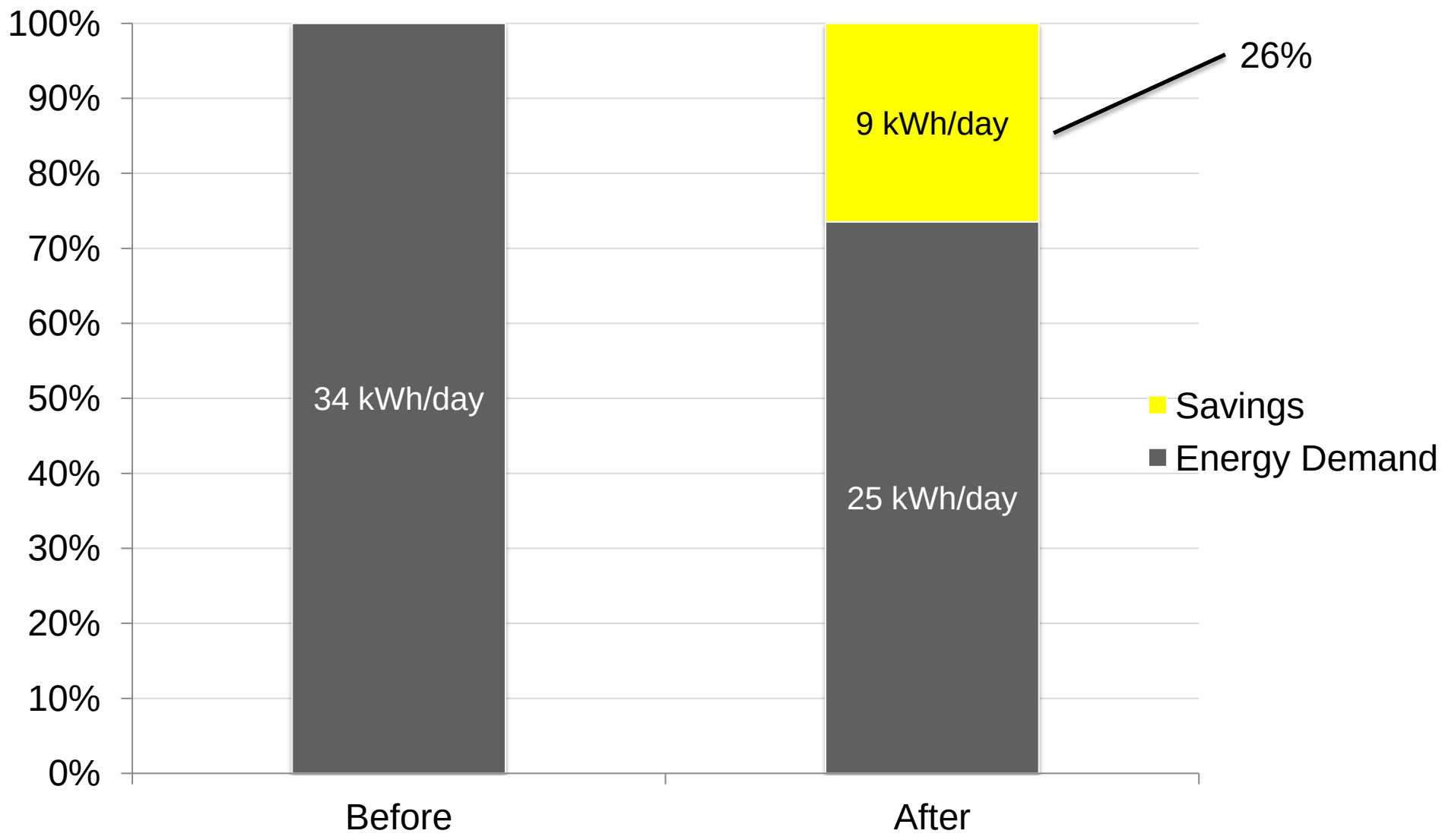
Energy Efficiency

- Electric Frigidaire Refrigerator/Freezer
- Electric Arctic Air Commercial Freezer Model
- Lights: 160w to 475w
- Toaster: 1000w to 1500w
- Two ceiling fans
- Unnecessary extra electric freezer

Energy Comparison

Table 1: Comparison of Energy Demand Before and After Energy Efficiency Measures		
	Before EE	After EE
Energy Demand	34 kWh/day	25 kWh/day

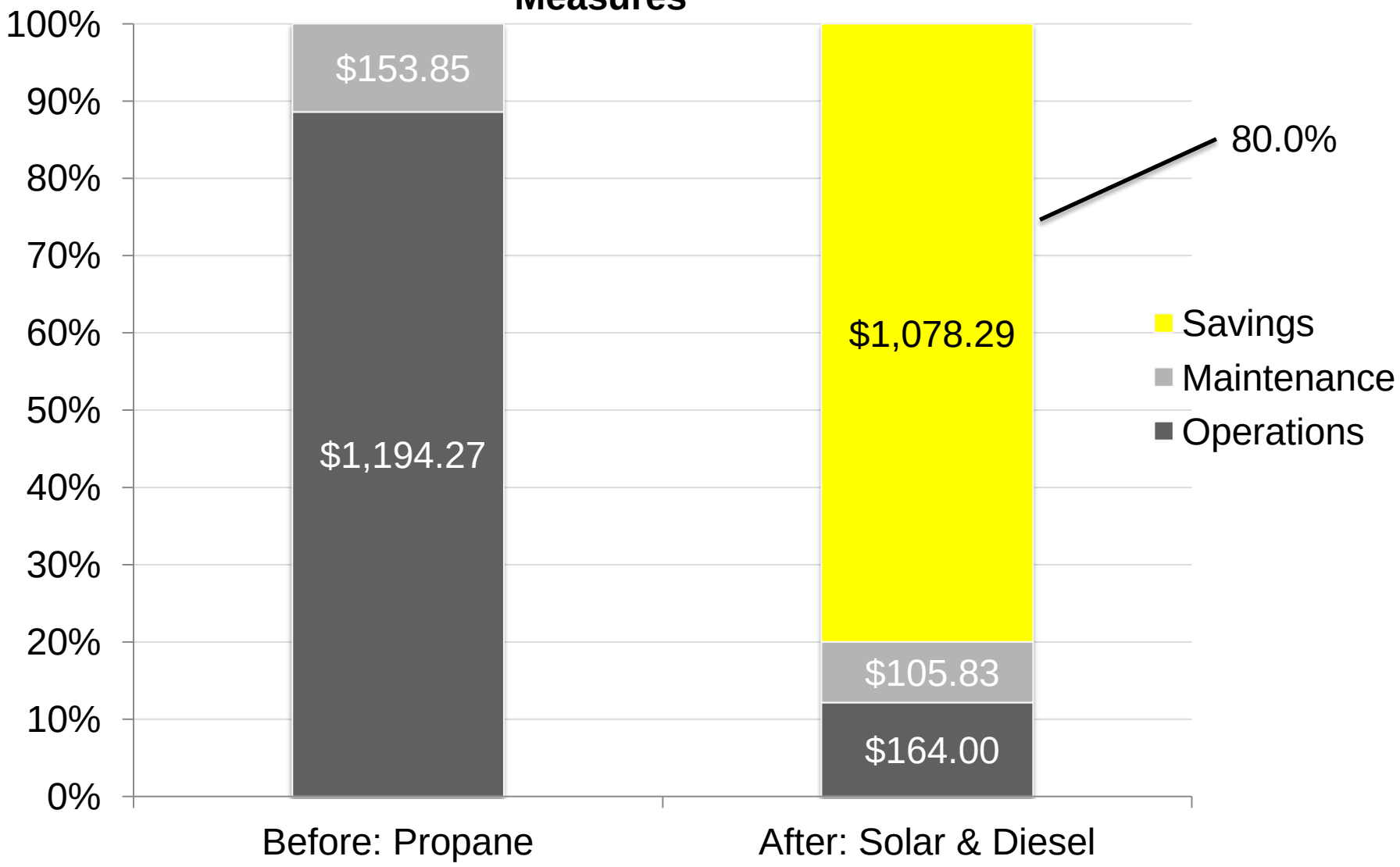
Comparison of Energy Demand: Before & After Energy Efficiency Measures



Cost Comparison

Table 2: Comparison of Off-Grid Costs Before and After Energy Efficiency & Renewable Energy Implementation			
	BEFORE	AFTER	
	Propane	PV	Diesel
Operations	$1,194.27	$160.00	$4.00
Maintenance	$153.85	$100.00	$5.83
Total Costs Per Month	$1,348.12	$269.83	

Comparison of Total Costs Per Month: Before & After Energy Efficiency & Renewable Energy Measures



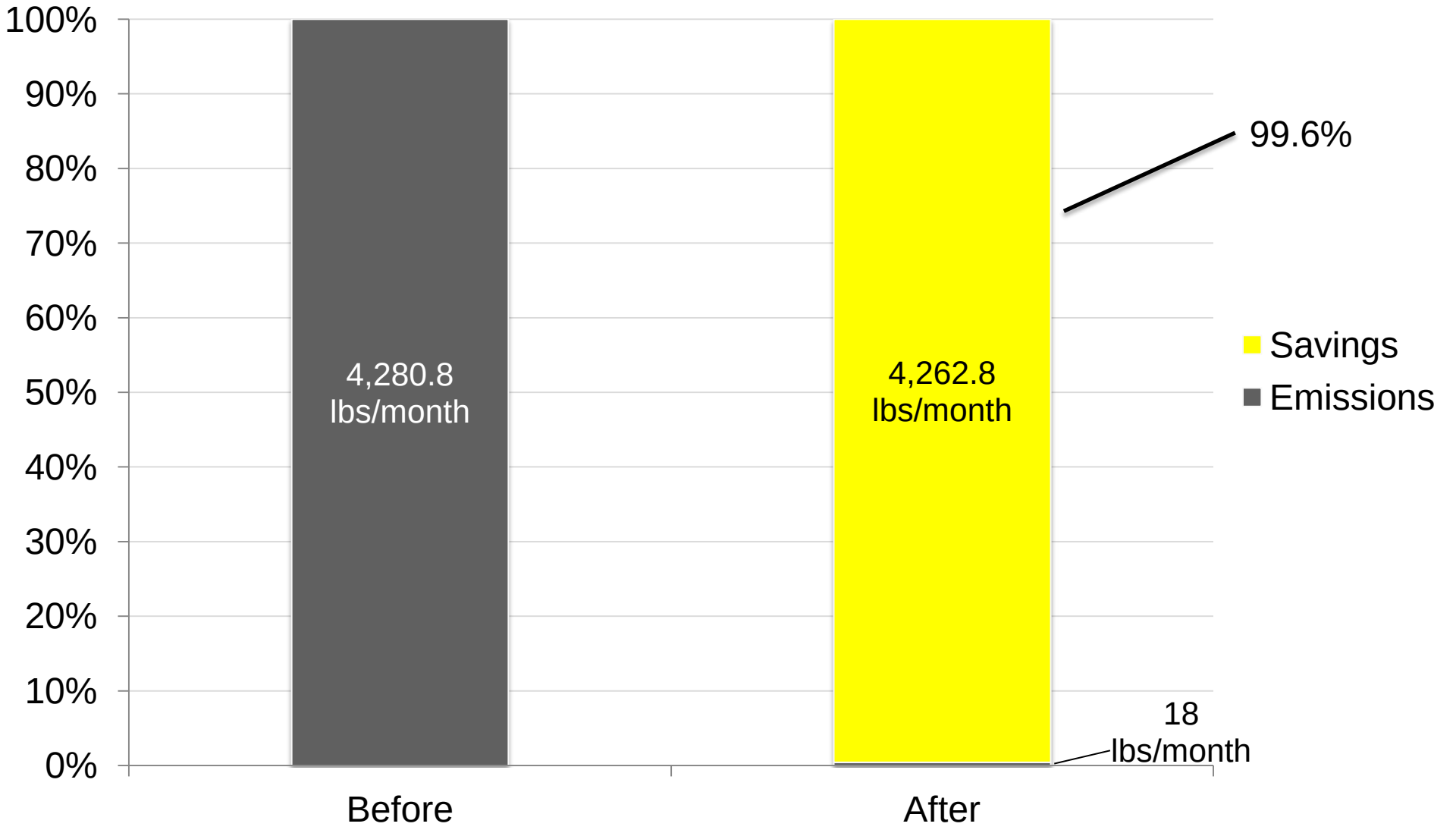
Cost Savings

- $12,939.48 per year
- $129,394.80 per decade
- Initial cost of system = $117,000
- Return on investment = ~9.5 years
- At 10 years: $12,394.80 after investment
  - O&M costs for 3 years & 10 months

Emissions Comparison

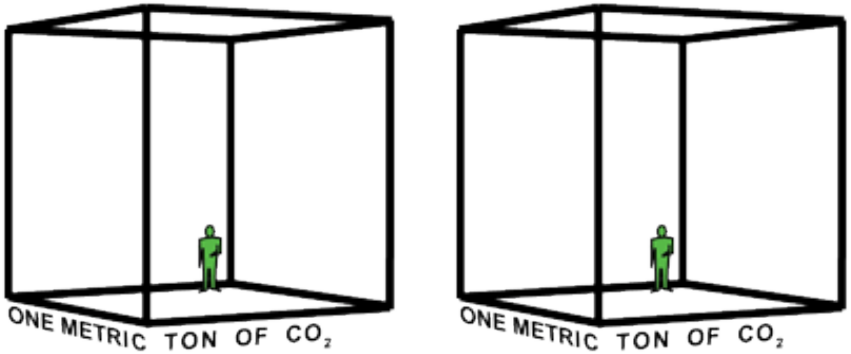
Table 3: Comparison of Off-Grid Carbon Emissions Before and After Energy Efficiency & Renewable Energy Implementation			
	BEFORE	AFTER	
	Propane	PV	Diesel
Fuel Amount (per month)	329.39 gal	-	0.83 gal
CO_2 Emissions (per month)	4,280.8 lbs	-	18 lbs

Comparison of CO2 Emission: Before & After Energy Efficiency & Renewable Energy Measures



Emission Savings

- 4,262.8 pounds = 1.9336 metric tons per month



Versus Carbon Neutral. (March 2011). *What Does a Metric Ton of CO2 Look Like?* Retrieved from http://www.verus-co2.com/blog/?p=1964

- 23.203 metric tons per year

Conclusion

- Cost effective than running business as usual
- Uniquely designed systems
- Energy efficiency & conservation as 1st step
- Sustainable marketing
- Future implementation = future benefits
- Reducing effects of climate change

Before & After

Photo showing Trading Post prior to PV installation, taken from Eastern view. Source: *Mineral Assessment Program Phase II*

Picture showing Trading Post after PV installation, taken from Southwestern view. Source: Sandra Begay-Campbell

Thank You

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