Energy Efficiency & Renewable Energy Benefits

Indian Canyons Trading Post – Agua Caliente Band of Cahuilla Indians
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

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

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

<table>
<thead>
<tr>
<th></th>
<th>Before EE</th>
<th>After EE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Demand</td>
<td>34 kWh/day</td>
<td>25 kWh/day</td>
</tr>
</tbody>
</table>
Comparison of Energy Demand: Before & After Energy Efficiency Measures

Before: 34 kWh/day

After: 25 kWh/day

Savings: 9 kWh/day

Overall Savings: 26%
## Cost Comparison

### Table 2: Comparison of Off-Grid Costs Before and After Energy Efficiency & Renewable Energy Implementation

<table>
<thead>
<tr>
<th></th>
<th>BEFORE Propane</th>
<th>AFTER PV</th>
<th>AFTER Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>$1,194.27</td>
<td>$160.00</td>
<td>$4.00</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$153.85</td>
<td>$100.00</td>
<td>$5.83</td>
</tr>
<tr>
<td>Total Costs Per Month</td>
<td>$1,348.12</td>
<td></td>
<td>$269.83</td>
</tr>
</tbody>
</table>
Before: Propane

$1,194.27

After: Solar & Diesel

$1,078.29

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

Savings

Maintenance

Operations

80.0%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
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

<table>
<thead>
<tr>
<th></th>
<th>BEFORE Propane</th>
<th>AFTER PV</th>
<th>AFTER Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fuel Amount (per month)</strong></td>
<td>329.39 gal</td>
<td>-</td>
<td>0.83 gal</td>
</tr>
<tr>
<td><strong>CO₂ Emissions (per month)</strong></td>
<td>4,280.8 lbs</td>
<td>-</td>
<td>18 lbs</td>
</tr>
</tbody>
</table>
Comparison of CO2 Emission: Before & After
Energy Efficiency & Renewable Energy Measures

Before: 4,280.8 lbs/month
After: 4,262.8 lbs/month

Savings: 18 lbs/month

99.6%
Emission Savings

- 4,262.8 pounds = 1.9336 metric tons per month

- 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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