



Hawaii Prince Golf Course Solar Golf Cart Top Pay Back Analysis

Prepared by GreenCarts, LLC

- Charging Costs when using Wall Charger
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 - EarthCare Solar- Peel N Stick

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This cost analysis was prepared using data collected during the two-week trial test at Hawaii Prince Golf Course. This pay back analysis is an estimate based on environmental conditions, use of golf cart, and current utility costs. Actual savings and pay back time may be different from estimates.

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Charging Costs when using Wall Charger

A 120-volt battery charger is rated to draw 10 amps of power. The power you use in charging the batteries is measured in kilowatt-hours. The formula is volts times amps equal watts:

	Energy rating	Multiplying Factor	Rates
<u>Charger</u>	120 volts x	10amps =	1.2 Kilowatts (1,200 watts)
<u>Hourly Energy Consumption (KWH)</u>	1.2 Kilowatts x	1 hour =	1.2 Kilo-watt Hour
<u>HI Utility Rate (\$0.20)</u>	1.2 Kilowatts x	\$0.20 =	\$0.24 per hour of charging

***It costs \$0.24 per hour to charge the cart

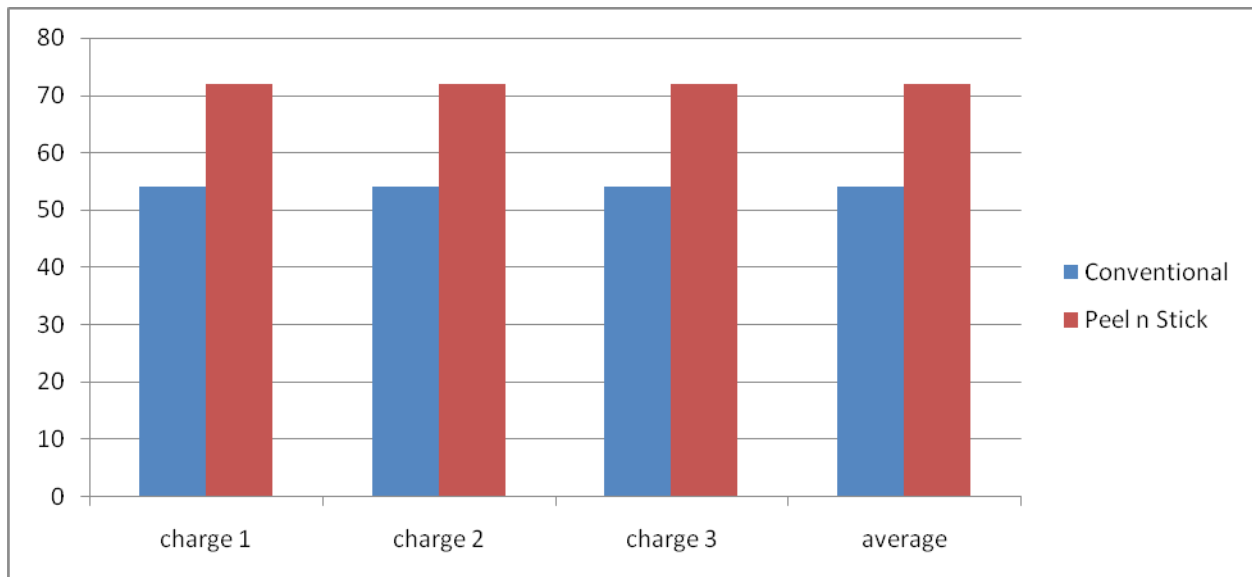


Test Results

1. Conventional golf cart – No solar roof: [54 holes](#)

2. Peel and Stick: [72 holes](#)

Test Trial at Hawaii Prince Golf Course



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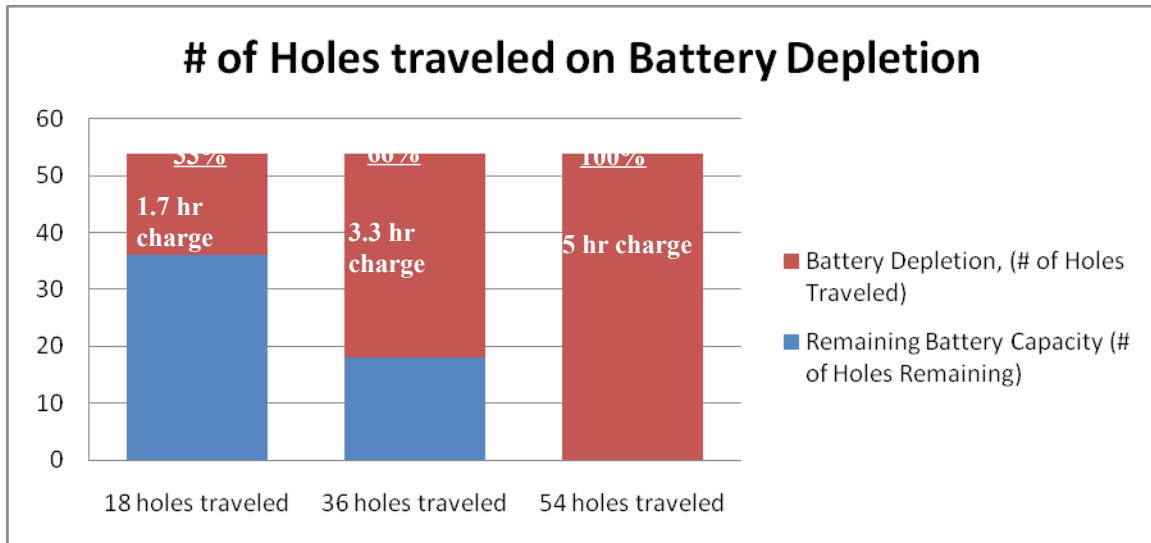
The trial test was conducted under Hawaii Prince Golf Course's normal business operations, using golf course's cart, employees, and guests. The test was not modified to produce favorable results.

Golf Cart Use

At the Hawaii Prince Golf Course, Golf Carts are used for one round, 18 holes of golf; then plugged in to charge. Golf Carts may be used again if needed for play.

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of Hours to Recharge Batteries

The golf carts' battery is depleted approximately 30% after 18 holes of golf.

Golf cart battery takes approximately 5 hours to fully charge a completely depleted battery. Based on cart use, Hawaii Prince Golf Course charges the golf carts for 2 hours to charge a battery that is depleted by 30%:

$$5 \text{ hour-full charge} \times 33\% = 1.65 \text{ or } \underline{\text{approximately 2 hours}}$$



Energy Consumption \$\$

Using the equation and information provided above, Hawaii Prince Golf Course spends approximately \$24,192 a year to charge 140 golf carts for two hours every day:

Energy Consumption	Utility Rate	# of Hours Recharging	# of Golf Carts	Days / Year	Total Recharging Costs / Year
1.2 KW	\$0.20/KWH	2	140	360	\$24,192

1.2 KW x \$0.20 x 2 hours of charging x 140 carts x 360 days in a year = \$24,192



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Prolong Battery Life

Sulfation is the primary reason that batteries need to be replaced. Solar panels provide a constant charge to the battery bank preventing the crystallization of lead sulfate and can double battery life.

- Batteries cost \$600 per golf cart.
- \$600 x 140 golf carts= \$84,000
- **Batteries at the Hawaii Prince Golf Course are regularly replaced every three years.**
 - Over a period of three years, the golf course spends \$28,000 a year:
 - $\$84,000 \div 3 \text{ years} = \$28,000$
- **A solar golf cart roof will extend the battery life by two years.**
 - By installing a solar top, battery life is extended to five years.
 - Over a period of five years, the golf course spends \$16,800 a year:
 - $\$84,000 \div 5 \text{ years} = \$16,800$
- **Hawaii Prince Golf Course will save \$11,200 a year on battery costs.**
 - **$\$28,000 - \$16,800 = \underline{\$11,200 \text{ yearly savings}}$**

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- If the batteries are purchased with the solar panels they also qualify for a 30% Federal Tax Credit. This also significantly reduces battery costs.
 - \$84,000 x 30% Federal Tax Credit= \$25,200

Hawaii Prince Golf Course: Peel N Stick Solar Roof Kit Payback Analysis

This payback analysis shows the total cost of 140 solar tops. The tops are priced at \$1,600

Pay Back Analysis

	$(\$1,600 \times 140) =$
Total Cost of Solar tops	\$224,000
	$\$224,000 \times 30\% =$



30% Federal Tax Credit	\$67,200
Cost after Tax Credit	\$156,800
	\$10,887 + \$11,200 =
Yearly Energy and Battery Savings	\$22,087
	\$156,800 ÷ \$22,087 =
Cost ÷ Yearly Savings	7 years

After the seventh year, the system has paid itself off!

Hawaii Prince Golf Course will continue to

Save a total of \$22,087 every year!

Payback without Tax Credit

$$\$1,600 \times 140 = \$224,000$$

$$\$224,000 \div \$22,087 = 10 \text{ years}$$

Yearly Savings Sheet

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<u># of Holes Golf Cart can Travel</u>	<u>Day1: # of Holes Traveled</u>	<u># of Holes Remaining</u>	<u>Battery Depletion/ Hours to Recharge</u> (% are based on 5 hours to reach full charge)	<u>Cost per Recharge</u> (one cart)	<u>Cost</u> (140 Carts)	<u>Yearly Cost</u> (360 days)	<u>Yearly Savings</u>
Battery							
54 Holes	18	36	33% depleted 18 holes used ÷ 54 holes total = .33 33% Battery Depletion	\$0.24/hr x 2 hrs = \$0.48/day to recharge one cart	\$67.20 / day to charge 140 carts for 2 hours	\$24,192 / year to charge 140 carts for 2 hours	N/A
Battery + Peel N Stick							
72 Holes	18	54	22% depleted 12 holes used ÷ 54 holes total = .22 22% Battery Depletion Solar panel puts backs 6 holes per round	\$0.24/ hr x 1.1 hr = \$0.26/day to recharge one cart	\$36.96 / day to charge 140 carts for 1.1 hours	\$13,305 / year to charge 140 carts for 2 hours.	\$24,192 - \$13,305 = \$10,887

- Yearly Savings of \$10,887 with Peel N Stick Solar Roof Kit**