



DISTRIBUTION  
SOLUTIONS  
CONFERENCE  
DSC

# Transitioning Fleets from Diesel to All electric TRU's

Gary Cullen

Robert Koelsch

Lindsay Ashmore



# Electric TRU's as easy as 1 2 3

1. we deploy cost effective infrastructure for you that is safe and user friendly
2. we help you bridge your current diesel powered systems over time
3. Our all new ZE TRU's provide Hi Performance zone temperature control

**32 HOURS  
WITHOUT  
PLUG IN!**

**even on a  
cloudy day!**



**ADVANCED ENERGY MACHINES LLC - 550,000 OPERATIONAL HOURS**

**AEM - YOUR PATHWAY TO A ZERO EMISSION FUTURE**

**SEVERAL HUNDRED CHARGE PORTS • 6-10 PLUG INS PER DAY WITH 500,000 SAFE PLUG INS**

# SOLAR TECH

ADVANCED ENERGY MACHINES

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**HARVESTING THE SUN'S ENERGY TO PROVIDE  
POLLUTION FREE TRANSPORT REFRIGERATION**



**FACILITY**

MOVE IN DATE - 2012

# MANUFACTURING EQUIP AREA

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27,000 SQ FEET



# Shareholders-Structure

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- 10 Shareholders
- 4 of them PhD's
- Combined Net Worth Exceeding \$100 Million
- **NO DEBT** - Enough Capital Reserved to Build 2,500 eTRU's
- No Investment Bankers
- No Venture Capitalists
- Committed to Customers
- Past Presidents and Vice Presidents of Sysco Corporation
- No Shareholders Earnings

# Why Electric?

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- Carbon Footprint reduction of up to 125,000 LBS. each
- Electric Saves You Money!
- Improved Cooling Of Your Products
- System is Weight Neutral With The Competition
- DC Voltage - Low Power Requirements
- Energy can be 100% **SUN**
- Quiet for Drivers and Customers
- No EPA Clean Ups Due to Accidental Diesel Spills **NO DIESEL**

# Equipment To Date

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- Total Hours on 533,200  
Total Run Hours 301,500

10 Locations

- 5 Winters

14 More Locations  
To Be Added

- Lithium Batteries Down to  
-20 Degrees for 2 Winters

- 6 Summers  
100+ Degrees



**GENERATION 1**

2008 - 2009 SOLAR PANELS



**GENERATION 2**

2009 - 2010



**GENERATION 3**

LARGER LEAD ACID BATTERY



# GENERATION 3

2010 - 2011



**GENERATION 4**

LITHIUM BATTERY PACKS

# Remote Capacity

## Alaska Constant Dark

WINTER 80 HOUR

- Added Capacity  
Added Weight 1,940 lbs

- + \$35k

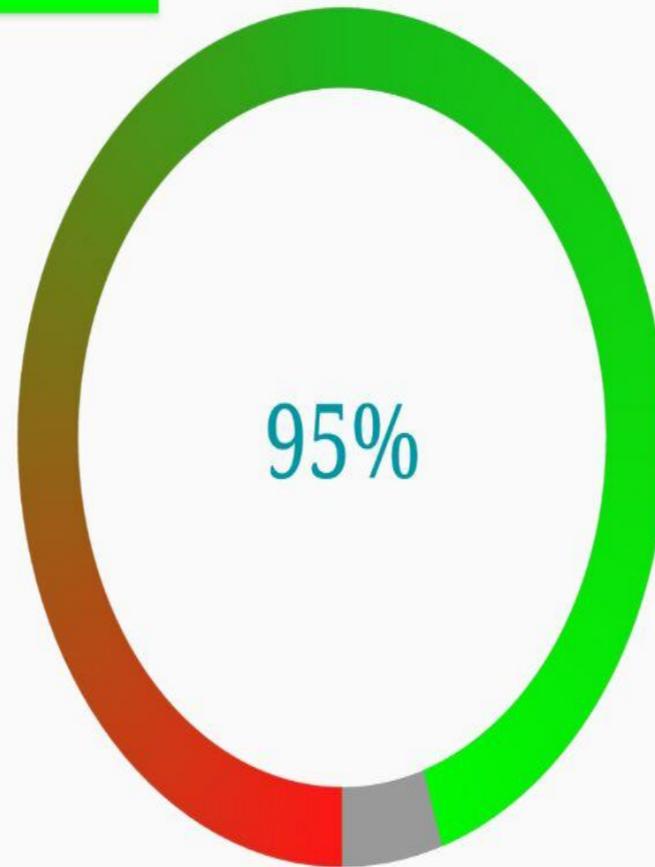




Energy Management System

NORMAL

EMS-6



Time Remaining: 21 Hrs 6 Mins

Capacity





**GENERATION 5**

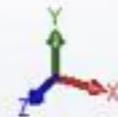
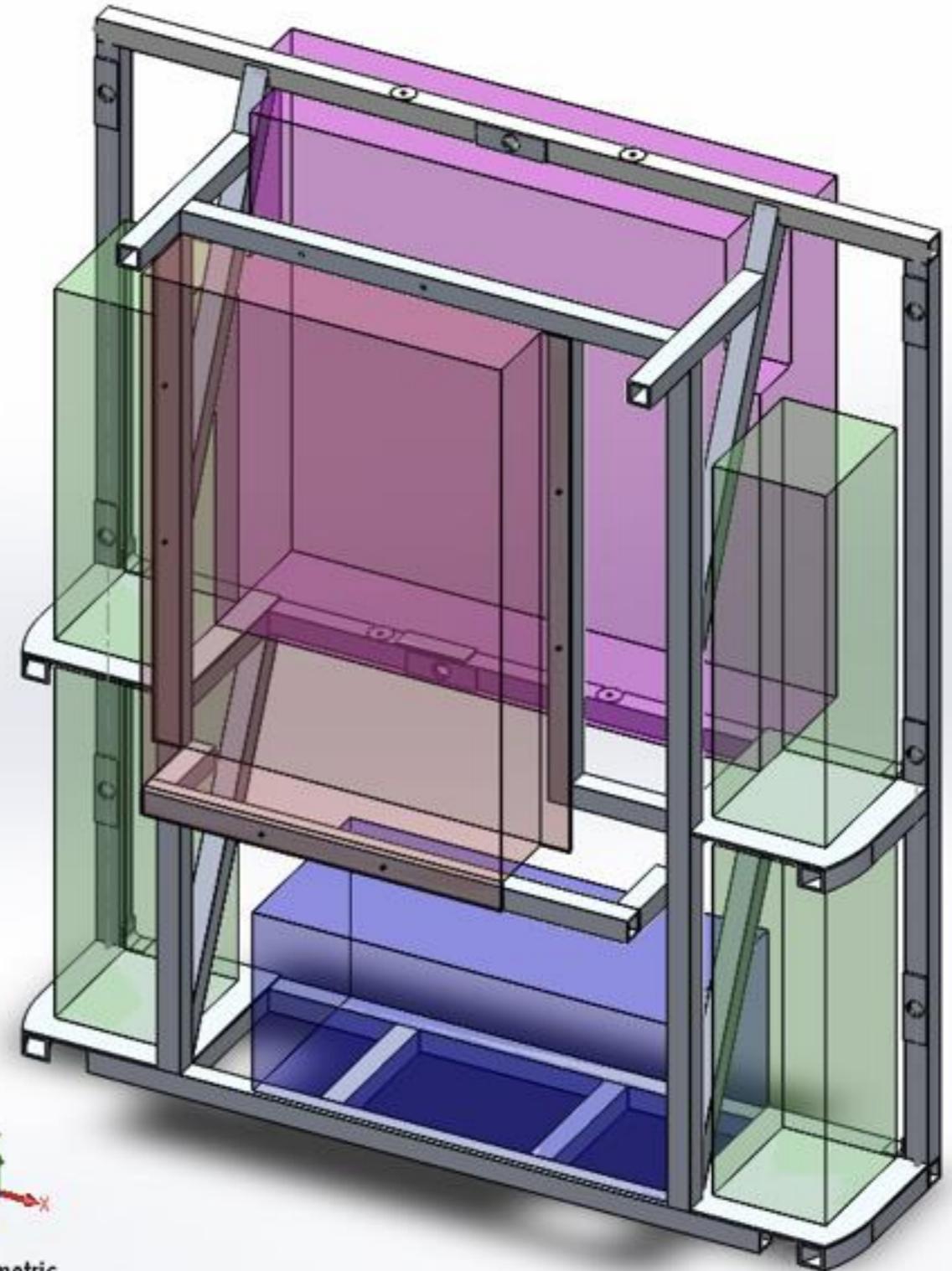
ELIMINATE DRIVESHAFT

# GENERATION 6 2016 SOLUTION

REFRIGERATION UPGRADE

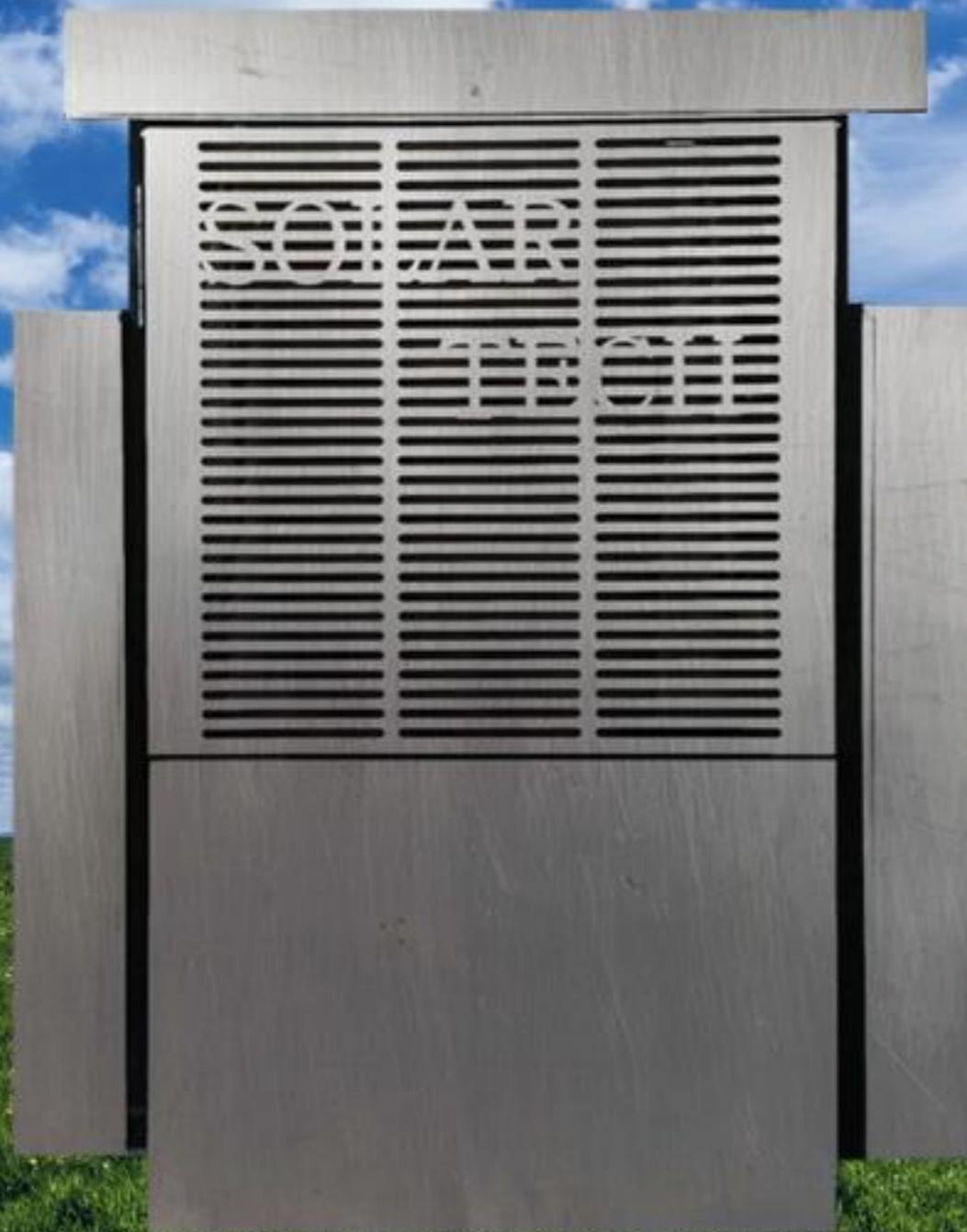
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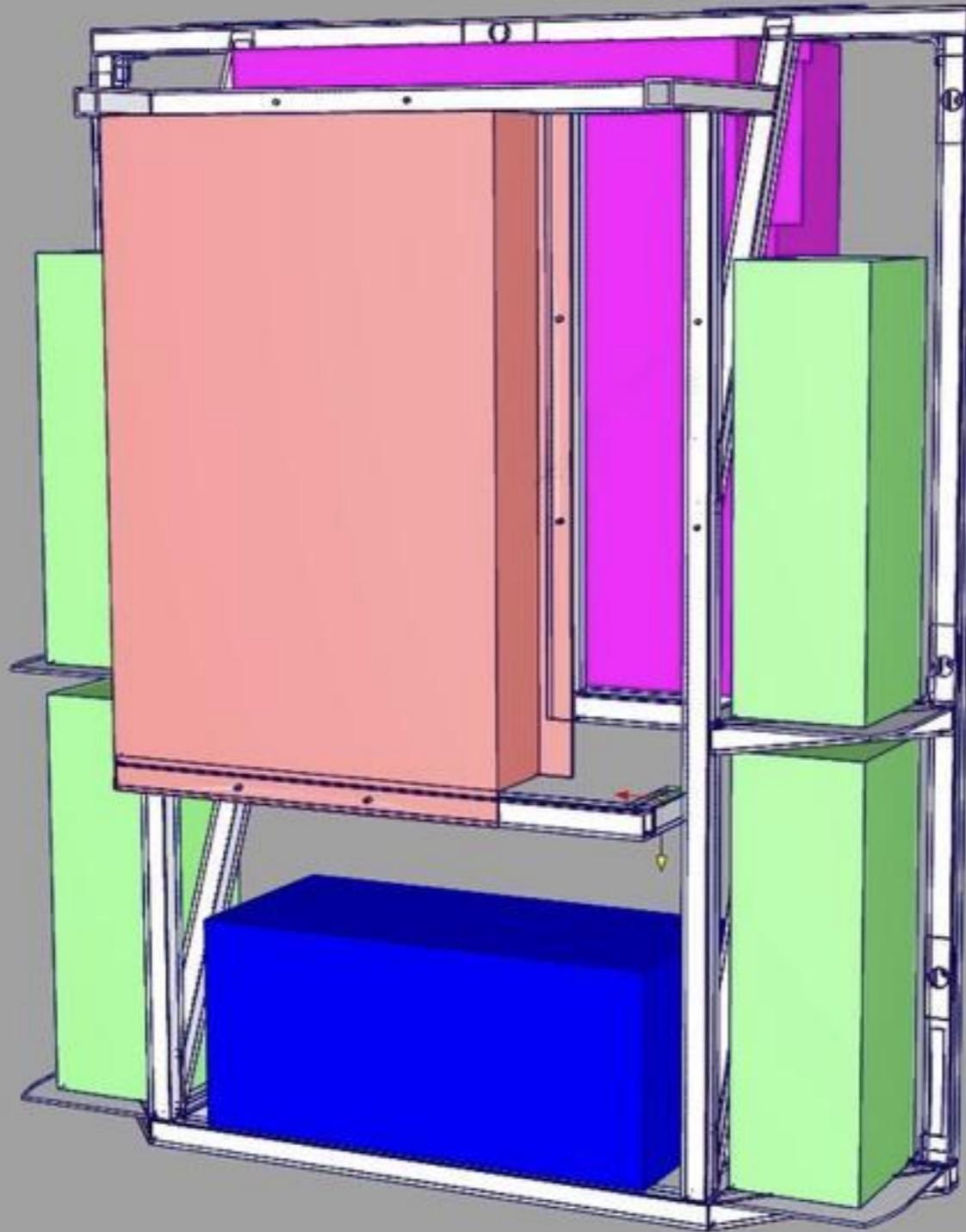
IMPROVED EFFICIENCY AND COOLING RATES



\*Trimetric

# REFRIGERATION FROM SUNLIGHT





## Generation 7

Proprietary  
Refrigeration Design

IMPROVED EFFICIENCY  
IMPROVED PERFORMANCE



**GENERATION 8**

AERODYNAMIC  
ENCLOSURE

# Customer's Three Key Questions

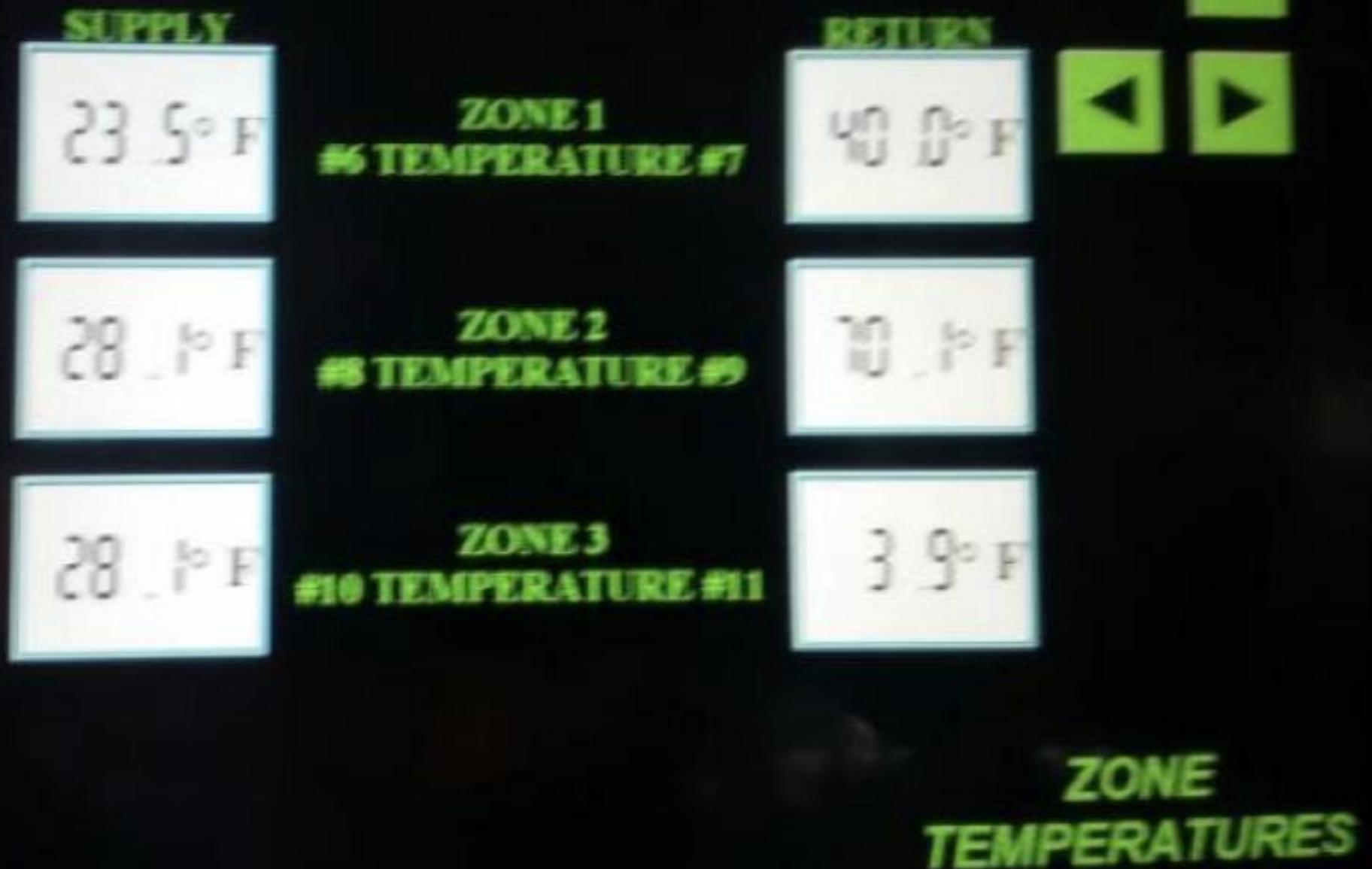
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Does it cool well enough for ice cream ?

Can I seamlessly integrate it into operations ?

How much money will it save me ?

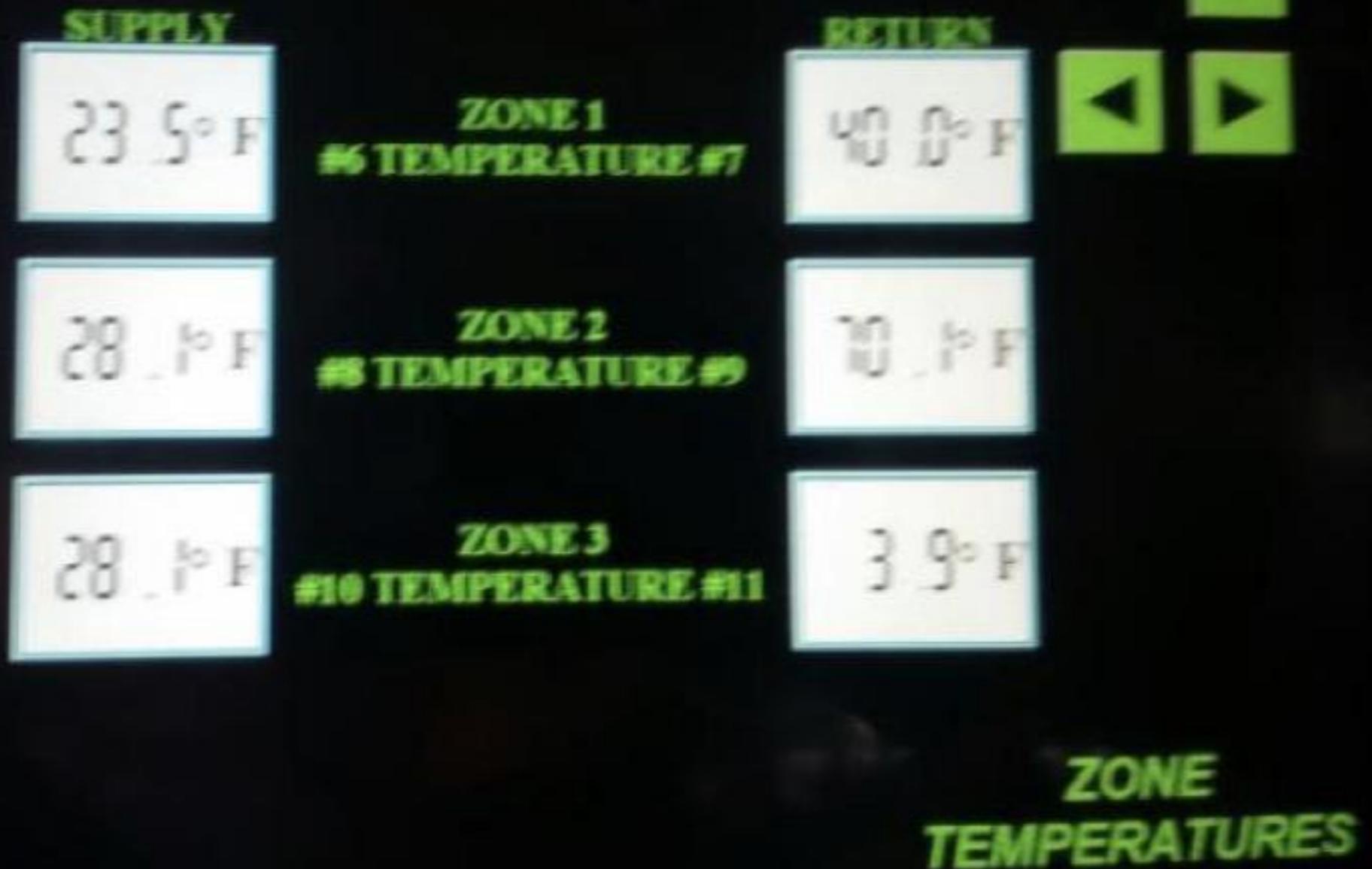
**SYSTEM MONITOR**  
**PAGE 6 OF 6**



**Powerful New  
Solar System**

COOLS FREEZER WITH  
17 DEGREES COLDER AIR

**SYSTEM MONITOR**  
**PAGE 6 OF 6**



**Powerful New  
Solar System**

WHILE PROVIDING  
COLDER AIR BY 42 DEGREES  
in Zone 2 Refrigerator

ZONE 1  
SET TEMP

0.0° F 14.1° F

ZONE 2  
SET TEMP

39.0° F 38.2° F

ZONE 3  
SET TEMP

0.0° F -1.8° F

STANDBY

▶

■

PRECOOL

ACTIVE ALARMS

TEMPERATURE TREND

PRE COOL ON

SYSTEM MONITOR

CONFIGURATION

## New Display Detail

# Robust Plugging

4,000 Cycle Rating



# Warning LED Strobe

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When Door is Open





**40 Volt DC Power**  
Safe And Secure  
Dock Connections

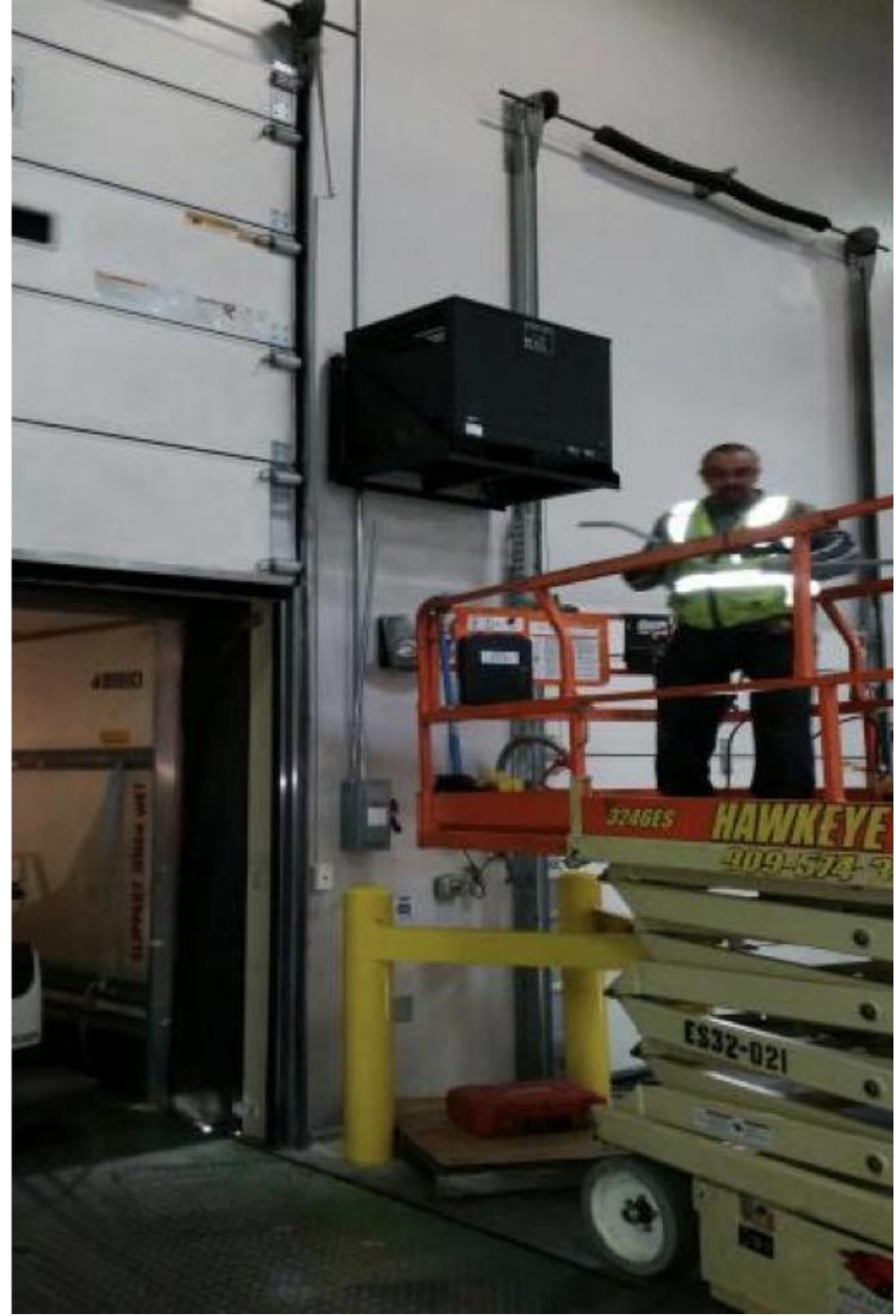
SIMILAR TO GOLF CART VOLTAGE



## Non Intrusive Dock Installation

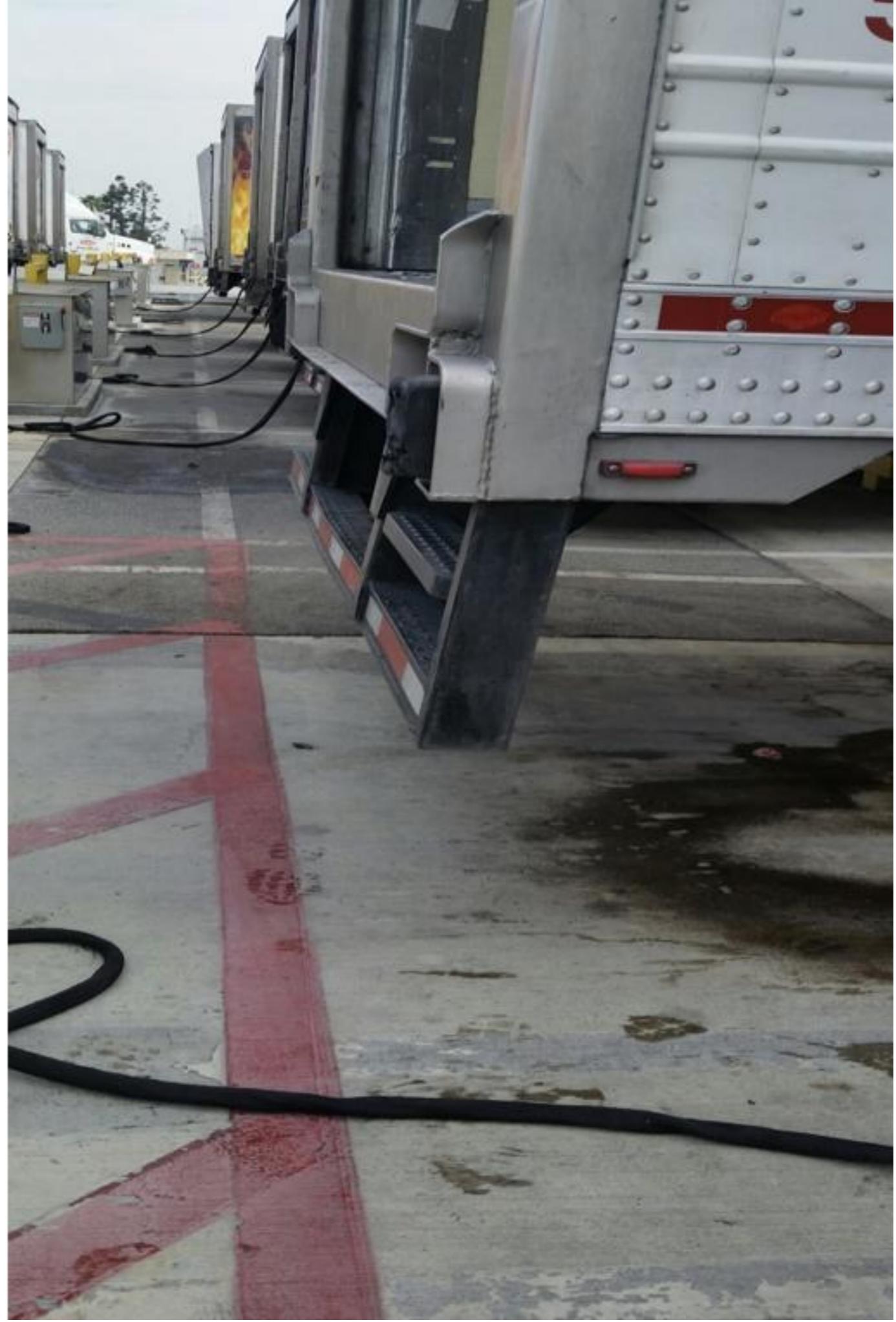
# Facilities Remote Charger Install

DC Power Generation



# Parking Lot Install

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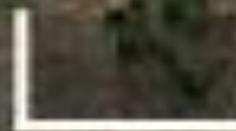




## Parking Lot Install



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In ground example installed for 4 years

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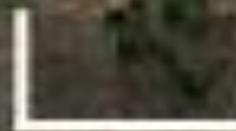
# Ground dual space nonintrusive Low Voltage DC

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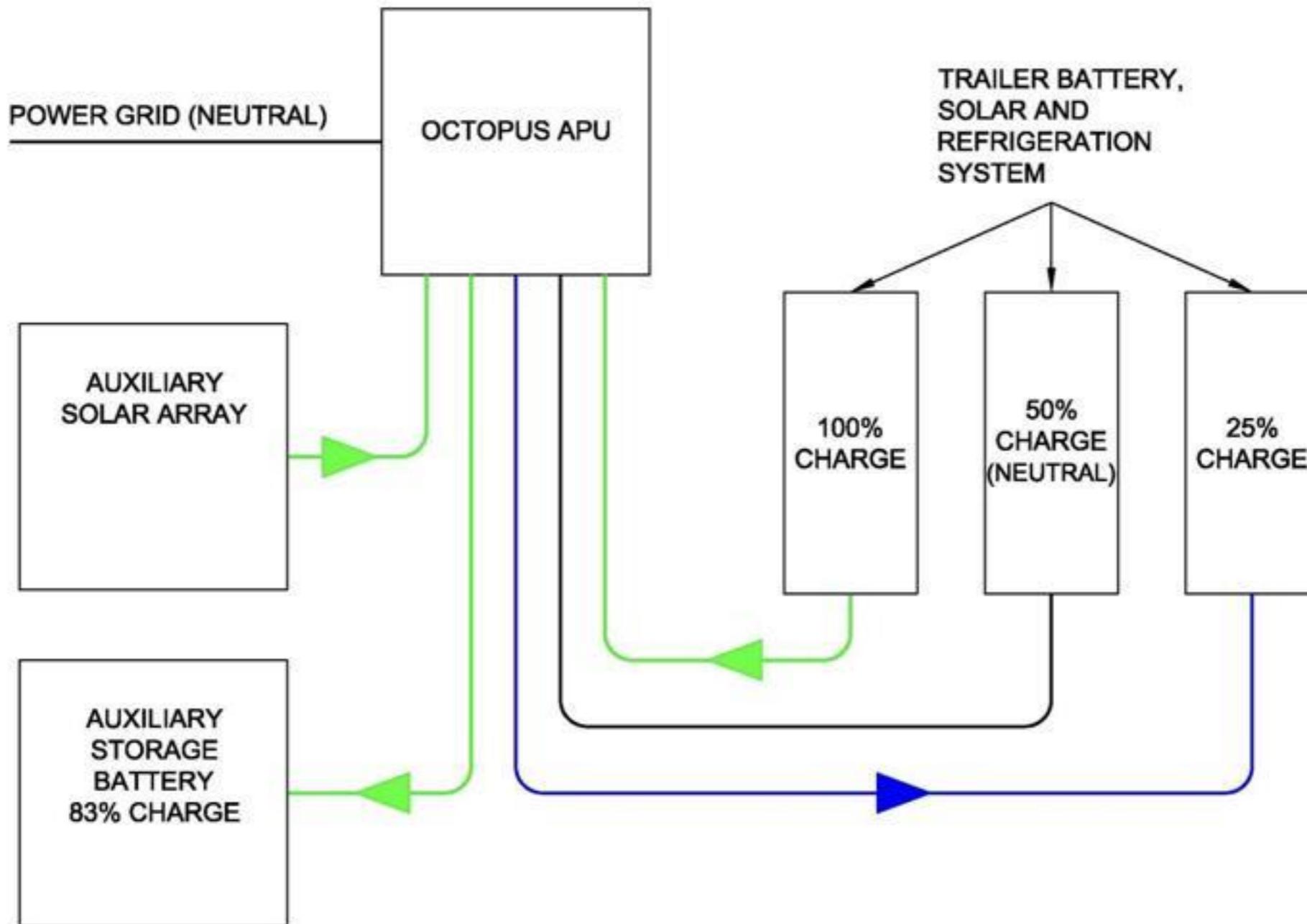
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**Trailer Network**  
Can Create Solar Farm

# MICROGRID SCHEMATIC



**Trailer Network**  
Can Create Solar Farm



**GENERATION 7**

DURABLE



**GENERATION 7**

SLIM 1/4 INCH THICK

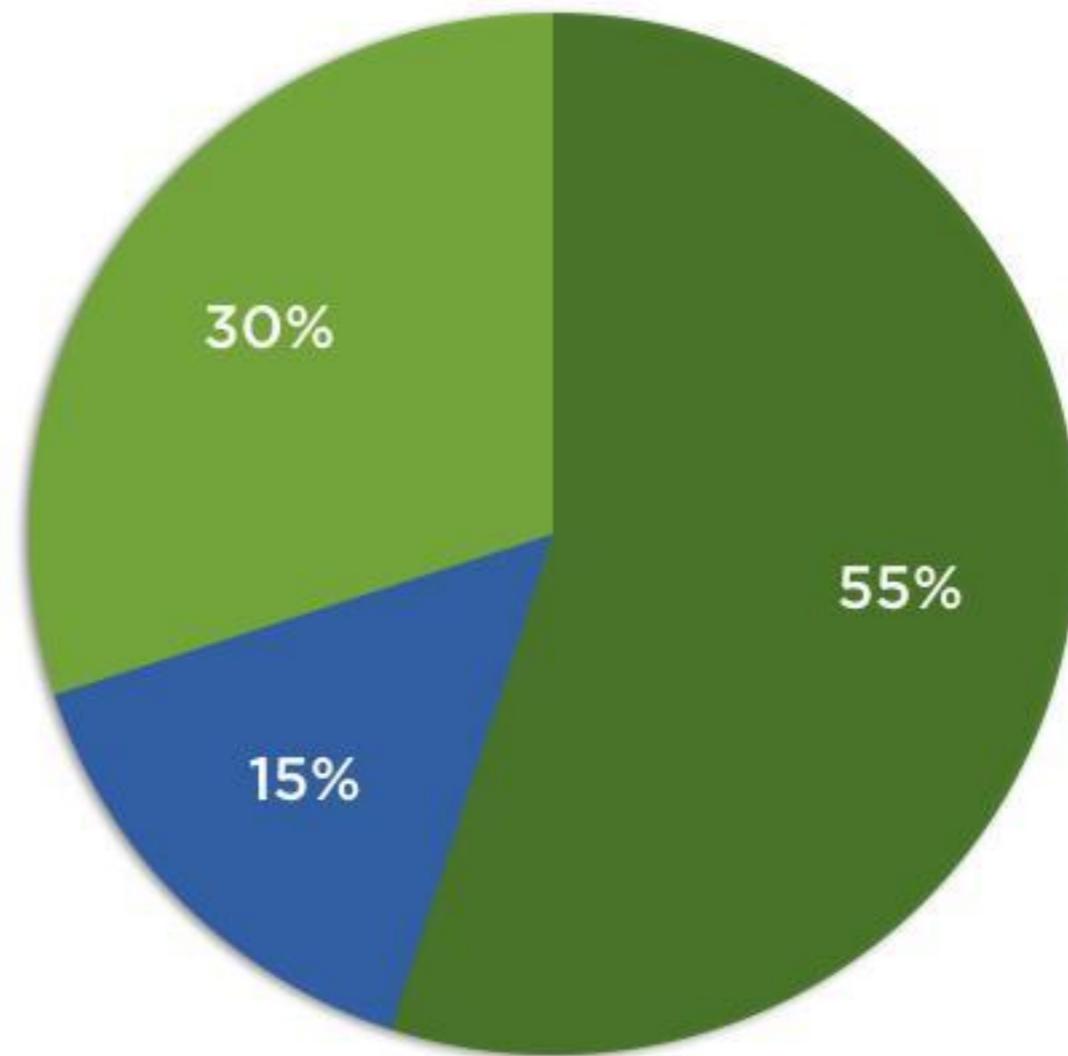
# 10 Year Operational Cost Breakdown

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● Diesel Fuel

● Diesel Maintenance

● Diesel Machine Cost



# Food Service

Cost of Ownership

Traditional Diesel Powered TRU

VS

ZE Electric TRU w/Solar

# Cost of Ownership

## PURCHASE COST TRU DIESEL

\$33,000

Capital Investment

Annual Depreciation

\$5499

## LEASE COST ZE ELECTRIC

\$25,800 First & Last  
month of lease

Annual lease after  
first year \$12,900



# Cost of Operational Maintenance

## DIESEL TRU

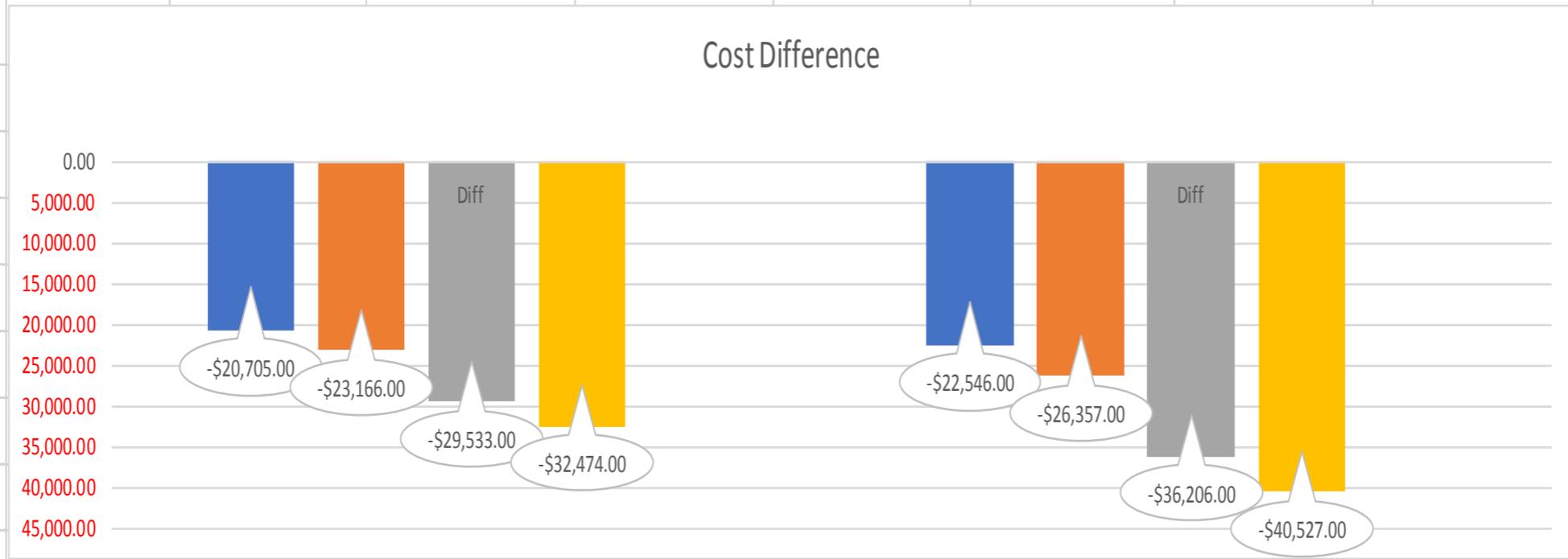
Cost per hour \$1.60  
Annual hours 2950  
Annual cost \$4720.00

## ZE ELECTRIC TRU

Maintenance Cost  
included in annual lease  
payment \$12,900

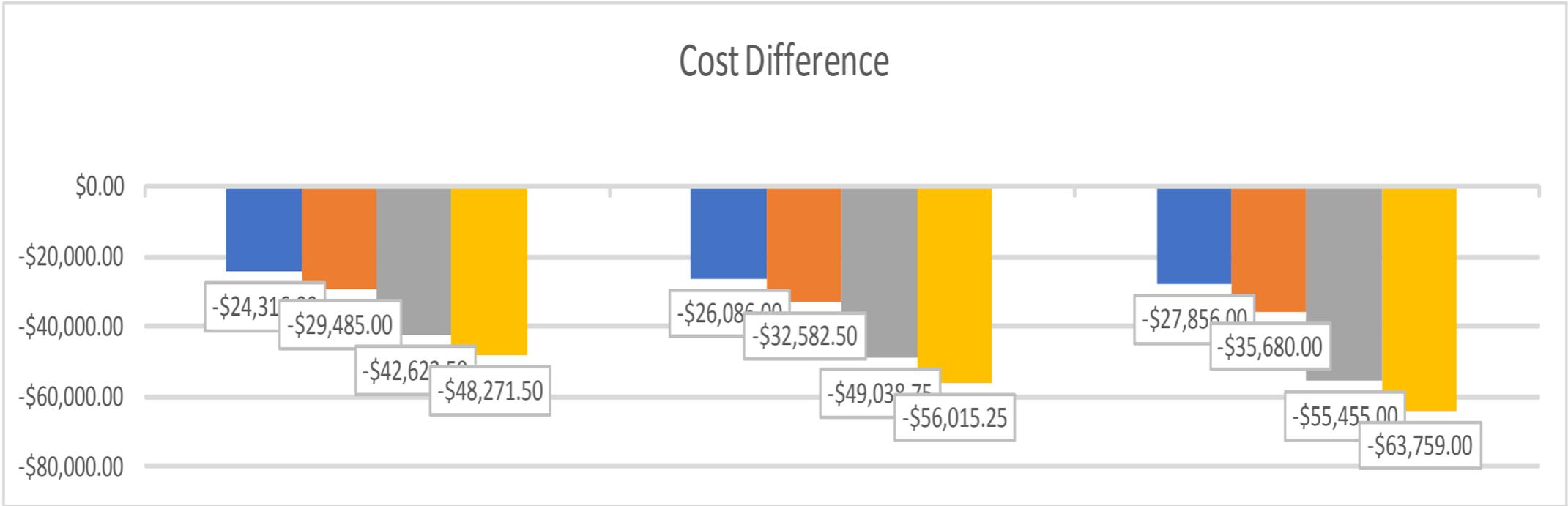
# Total Cost Comparison

Cost P/Gal		\$2.99			\$3.25		
	Diesel	ZE Elect	Diff	Diesel	ZE Elect	Diff	
3 years	73,319.00	52,614.00	<b>-\$20,705.00</b>	75,160.00	52,614.00	<b>-\$22,546.00</b>	
5 years	102,256.00	79,090.00	<b>-\$23,166.00</b>	105,447.00	79,090.00	<b>-\$26,357.00</b>	
10 years	175,138.00	145,605.00	<b>-\$29,533.00</b>	181,811.00	145,605.00	<b>-\$36,206.00</b>	
12 years	204,815.00	172,341.00	<b>-\$32,474.00</b>	212,868.00	172,341.00	<b>-\$40,527.00</b>	



Total Cost Comparison

Cost P/gal	<b>\$3.50</b>		<b>\$3.75</b>		<b>\$4.00</b>				
	Diesel	ZE Elect	Diesel	ZE Elect	Diesel	ZE Elect			
3 years	\$76,930.00	\$52,614.00	<b>-\$24,316.00</b>	\$78,700.00	\$52,614.00	<b>-\$26,086.00</b>	\$80,470.00	\$52,614.00	<b>-\$27,856.00</b>
5 years	108,575.00	\$79,090.00	<b>-\$29,485.00</b>	\$111,672.50	\$79,090.00	<b>-\$32,582.50</b>	\$114,770.00	\$79,090.00	<b>-\$35,680.00</b>
10 years	188,227.50	\$145,605.00	<b>-\$42,622.50</b>	\$194,643.75	\$145,605.00	<b>-\$49,038.75</b>	\$201,060.00	\$145,605.00	<b>-\$55,455.00</b>
12 years	220,612.50	\$172,341.00	<b>-\$48,271.50</b>	\$228,356.25	\$172,341.00	<b>-\$56,015.25</b>	\$236,100.00	\$172,341.00	<b>-\$63,759.00</b>



# US Diesel Prices (On-Highway, All Types)



Min=0.953 (22 Feb 1999); Max=4.764 (14 Jul 2008)

# FOOD SERVICE ZERO EMISSION TRU LEASE 24% SAVINGS

The Diesel Power plant consumes .8 GPH 1st 5k hours, then .9 thereafter  
 Total Diesel Maintenance costs are calculated @ \$1.60 per hour  
 Driver/hustler saves .8 hours per week refueling time/loaded \$38 per hour plus fuel spill reserve  
 Units run 180 days per year 12 hr routes plus backhauls 65% duty cycle

## Fuel Cost Calculation Diesel Motor

Hours Of Operation	Fuel Usage GPH	Year	Fuel Cost Per Gallon	Total Fuel Cost Yearly	Cost of PM's And Repairs	Driver refuel Time Savings EPA spill reserve	Annual Costs Per Unit	Multi year Operating Costs	
							<b>Diesel TRU Cost</b>	<b>\$33,000.00</b>	
2,950	0.8	1	\$2.99	\$7,056.40	\$37,720.00	\$1,620.00	\$46,396.40		
2,950	0.8	2	\$2.99	\$7,056.40	\$4,720.00	\$1,620.00	\$13,396.40		
2,950	0.9	3	\$2.99	\$7,938.45	\$4,720.00	\$1,750.00	\$14,408.45	<b>\$74,201.25</b>	3 years
2,950	0.9	4	\$2.99	\$7,938.45	\$4,720.00	\$1,750.00	\$14,408.45		
2,950	0.9	5	\$2.99	\$7,938.45	\$4,720.00	\$1,870.00	\$14,528.45	<b>\$103,138.15</b>	5 years
2,950	0.9	6	\$2.99	\$7,938.45	\$4,720.00	\$1,870.00	\$14,528.45		
2,950	0.9	7	\$2.99	\$7,938.45	\$4,720.00	\$1,870.00	\$14,528.45		
2,950	0.9	8	\$2.99	\$7,938.45	\$4,720.00	\$1,870.00	\$14,528.45		
2,950	0.9	9	\$2.99	\$7,938.45	\$4,720.00	\$1,990.00	\$14,648.45		
2,950	0.9	10	\$2.99	\$7,938.45	\$4,720.00	\$1,990.00	\$14,648.45	<b>\$176,020.40</b>	10 years
2,950	0.9	11	\$2.99	\$7,938.45	\$4,720.00	\$2,180.00	\$14,838.45		
2,950	0.9	12	\$2.99	\$7,938.45	\$4,720.00	\$2,180.00	\$14,838.45	<b>\$205,697.30</b>	12 years

## All Electric Solar Unit

Charging Hours	Year	Electric Cost per Hour	Total Electric Cost	Extended Warranty W/On site support Lease	Multi year Operating Costs	
3.6 Hours/Day						
650	1	\$0.520	\$338.00	\$25,800.00	\$26,138.00	
650	2	\$0.520	\$338.00	\$12,900.00	\$39,376.00	
650	3	\$0.520	\$338.00	\$12,900.00	<b>\$52,614.00</b>	3 years
650	4	\$0.520	\$338.00	\$12,900.00	\$65,852.00	
650	5	\$0.520	\$338.00	\$12,900.00	<b>\$79,090.00</b>	5 years
650	6	\$0.620	\$403.00	\$12,900.00	\$92,393.00	
650	7	\$0.620	\$403.00	\$12,900.00	\$105,696.00	
650	8	\$0.620	\$403.00	\$12,900.00	\$118,999.00	
650	9	\$0.620	\$403.00	\$12,900.00	\$132,302.00	
650	10	\$0.620	\$403.00	\$12,900.00	<b>\$145,605.00</b>	10 years
650	11	\$0.720	\$468.00	\$12,900.00	\$158,973.00	
650	12	\$0.720	\$468.00	\$12,900.00	<b>\$172,341.00</b>	12 years

# Food Service Cost of Ownership CASH 47% to 60% savings

The Diesel Power plant consumes .8 GPH first 5,000 hours then .9 thereafter  
 Total Diesel Maintenance costs are calculated @ \$1.60 per hour .  
 Driver/hustler will save .8 hours per week refueling time at a loaded rate of \$38 per hour plus fuel spill reserve  
 Units run 180 days per year 12 hr routes plus backhauls 65% duty cycle

## Fuel Cost Calculation Diesel Motor

Hours Of Operation	Fuel Usage GPH	Year	Fuel Cost Per Gallon	Total Fuel Cost Yearly	Cost of Pm's And Repairs	Driver refuel Time EPA spill reserve	Annual Costs Per Unit	Multi year Operating Costs	
							Diesel TRU Cost	\$33,000.00	
2,950	0.8	1	\$2.99	\$7,056.40	\$37,720.00	\$1,620.00	\$46,396.40	\$46,396.40	
2,950	0.8	2	\$2.99	\$7,056.40	\$4,720.00	\$1,620.00	\$13,396.40		
2,950	0.9	3	\$2.99	\$7,938.45	\$4,720.00	\$1,750.00	\$14,408.45	\$74,201.25	3 years
2,950	0.9	4	\$2.99	\$7,938.45	\$4,720.00	\$1,750.00	\$14,408.45		
2,950	0.9	5	\$2.99	\$7,938.45	\$4,720.00	\$1,870.00	\$14,528.45	\$103,138.15	5 years
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2,950	0.9	10	\$2.99	\$7,938.45	\$4,720.00	\$1,990.00	\$14,648.45	\$176,020.40	10 years
2,950	0.9	11	\$2.99	\$7,938.45	\$4,720.00	\$2,180.00	\$14,838.45		
2,950	0.9	12	\$2.99	\$7,938.45	\$4,720.00	\$2,180.00	\$14,838.45	\$205,697.30	12 years

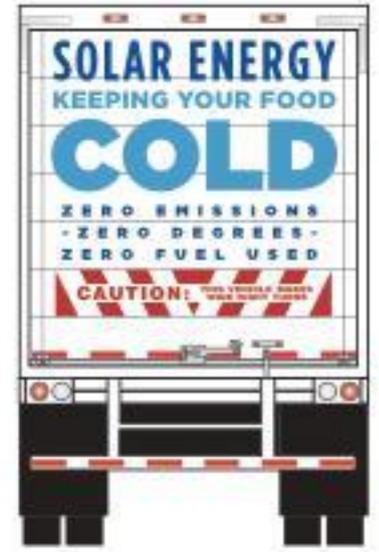
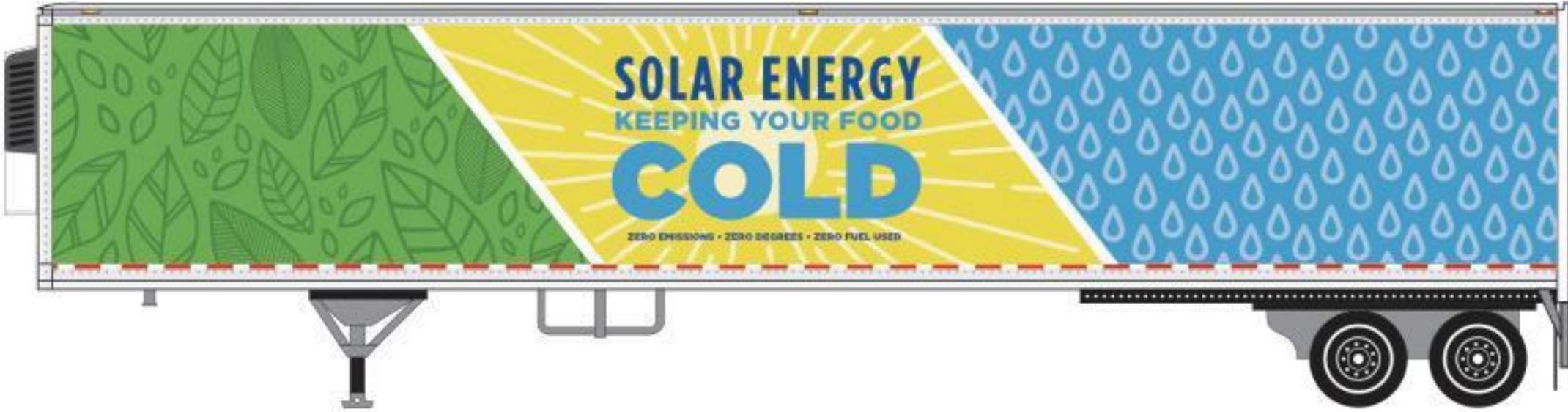
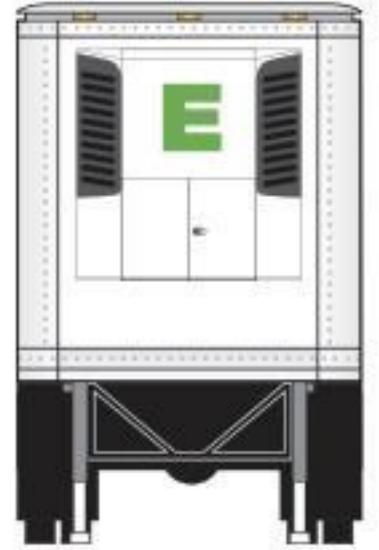
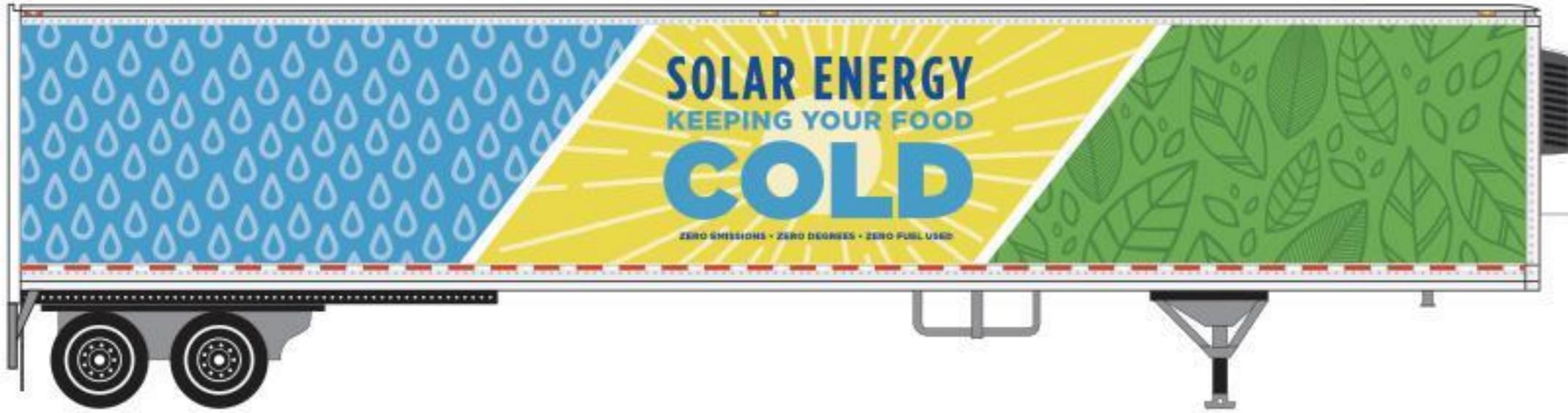
## All Electric Solar Unit

Charging Hours Loading	Year	Electric Cost per Hour	Total Electric Cost	Support Cost Included	Reefer System Purchase	Extended Warranty On site support	Annual Energy Contract cost Per Unit	Multi year Operating Costs	
Lithium Ion battery solution									
650	1	\$0.520	\$338.00		\$87,000.00	\$2,400.00		\$89,738.00	
650	2	\$0.520	\$338.00			Tax Credit	-\$26,000.00		
650	3	\$0.520	\$338.00					\$90,076.00	3 years
650	4	\$0.520	\$338.00			\$9,000.00			
650	5	\$0.520	\$338.00					\$99,076.00	5 years
650	6	\$0.620	\$403.00						
650	7	\$0.620	\$403.00			\$9,000.00			
650	8	\$0.620	\$403.00						
650	9	\$0.620	\$403.00						
650	10	\$0.620	\$403.00			\$9,000.00		\$108,479.00	10 years
650	11	\$0.720	\$468.00					\$108,947.00	
650	12	\$0.720	\$468.00					\$109,415.00	12 years

Food Service COO with Grants 71% savings									
The Diesel Power plant consumes .8 GPH first 5,000 hours then ,9 thereafter									
Total Diesel Maintenance costs are calculated @ \$1.60 per hour over 12 years.									
Driver/hustler will save .8 hours per week refueling time at a loaded rate of \$38 per hour ( 52 x .8 x \$38 ) 4% annual increase									
Units run 180 days per year 12 hr routes plus backhauls 65% duty cycle									
<b>Fuel Cost Calculation Diesel Motor</b>									
Hours Of Operation	Fuel Usage GPH	Year	Fuel Cost Per Gallon	Total Fuel Cost Yearly	Cost of Pm's And Repairs	Driver refuel Time EPA spill reserve	Annual Costs Per Unit	Diesel TRU Cost	Multi year Operating Costs
								\$33,000.00	
2,950	0.8	1	\$2.99	\$7,056.40	\$37,720.00	\$1,620.00	\$46,396.40	\$46,396.40	
2,950	0.8	2	\$2.99	\$7,056.40	\$4,720.00	\$1,620.00	\$13,396.40		
2,950	0.9	3	\$2.99	\$7,938.45	\$4,720.00	\$1,750.00	\$14,408.45	\$74,201.25	3 years
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2,950	0.9	10	\$2.99	\$7,938.45	\$4,720.00	\$1,990.00	\$14,648.45	\$176,020.40	10 years
2,950	0.9	11	\$2.99	\$7,938.45	\$4,720.00	\$2,180.00	\$14,838.45		
2,950	0.9	12	\$2.99	\$7,938.45	\$4,720.00	\$2,180.00	\$14,838.45	\$205,697.30	12 years
<b>All Electric Solar Unit</b>									
Charging Hours Loading	Year	Electric Cost per Hour	Total Electric Cost	Support Cost Included	Reefer System Purchase	Extended Warranty On site support	Annual Energy Contract cost Per Unit	Multi year Operating Costs	
<b>Lithium Ion battery solution</b>									
650	1	\$0.520	\$338.00		\$27,000.00	\$2,400.00		\$29,738.00	
650	2	\$0.520	\$338.00						
650	3	\$0.520	\$338.00					\$30,076.00	3 years
650	4	\$0.520	\$338.00			\$9,000.00			
650	5	\$0.520	\$338.00					\$39,076.00	5 years
650	6	\$0.620	\$403.00						
650	7	\$0.620	\$403.00			\$9,000.00			
650	8	\$0.620	\$403.00						
650	9	\$0.620	\$403.00						
650	10	\$0.620	\$403.00			\$9,000.00		\$57,479.00	10 years
650	11	\$0.720	\$468.00						
650	12	\$0.720	\$468.00					\$57,947.00	12 years



**GENERATION 8**



# TRAILER WRAP ARTWORK

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1. we deploy cost effective infrastructure for you that is safe and user friendly
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