



OPPORTUNITY CHARGING VS ICE FEASIBILITY ANALYSIS REPORT

Large Wharehouse

ICE TO ELECTRIC

16 Vehicles

Prepared by:
Jacob Seymore, Electrical Engineer

Report Date:
2024

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Overview

In this report the we analyze the battery/charging sizing and cost of a Opportunity Charge Single Battery Proposal vs the current ICE operation.

The Feasibility report shows the shift schedule and daily use of the site in comparison to the chosen charger and battery. Showcasing the ability to keep up with the demand of the site.

The Financial report inputs the initial equipment cost, the maintenance cost, energy cost, and any other cost associated. Breaking it down over a 60 month lease period. All custom inputs based on the product and the end users inputs.



TOYOTA 8FGCU25
5000# FORK TRUCKS

Voltage: 48V Quantity: 8
Sit-down Rider

ENERGY

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Scheduled hours	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Adjusted hours	5.59	5.59	5.59	5.59	5.59	5.59	5.59
Charging hours	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Idle hours	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scheduled Avg. Amps per running hours	74.64	74.64	74.64	74.64	74.64	74.64	74.64
Adjusted Avg. Amps per running hours	186.90	186.90	186.90	186.90	186.90	186.90	186.90

Above shows the operation time, charge time, and amp hrs per hr. This is determined for each site through data collection and input from the end users.

SCHEDULE

Mon. Tue. Wed. Thu. Fri. Sat. Sun.

SHIFT 1 (07:00 - 15:00)

Charge Time	Idle Time
09:00 - 09:15	11:15 - 11:45
13:45 - 14:00	

SHIFT 2 (15:00 - 23:00)

Charge Time	Idle Time
17:00 - 17:15	19:15 - 19:45
21:45 - 22:00	

Non-Shift Charge Time
23:00 -
07:00

Above shows the end users shift schedule and allotted charge times. Determined from input from the customer.

To the right we see the batteries selected models technology, total daily capacity, and the percentage of that daily capacity used in operation. Above 100% results in overuse and warranty will not be accepted.

We see that the 24-85F-21 battery does not have enough capacity. While the 24E1000 has the ability to perform at this level of use.

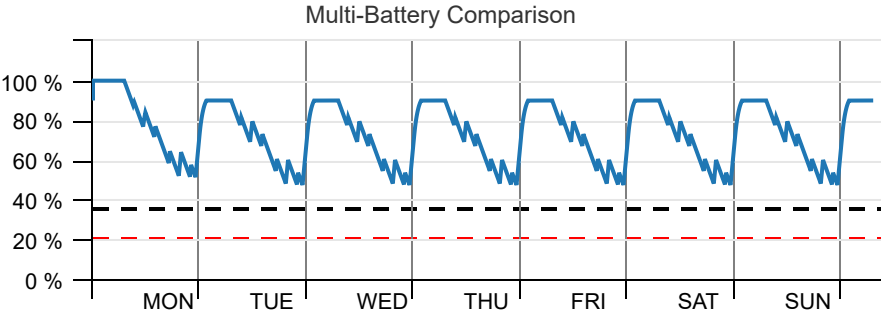
FEASIBILITY ANALYSIS REPORT

STATE OF CHARGE

Use	Charger	Max. Current at 48V	Max. battery accepts at 1000 Ah	Effective Start Rate	Min. SOC
0	LPM3-48F-320Y	320 A	250 A	25%	47%

0 Inadequate (SOC < 20%)
0 Marginal (SOC between 20-35%)
0 Optimized (SOC > 35%)

Above is the charger selected. It shows the current output of the charger and the percentage that the battery can accept.

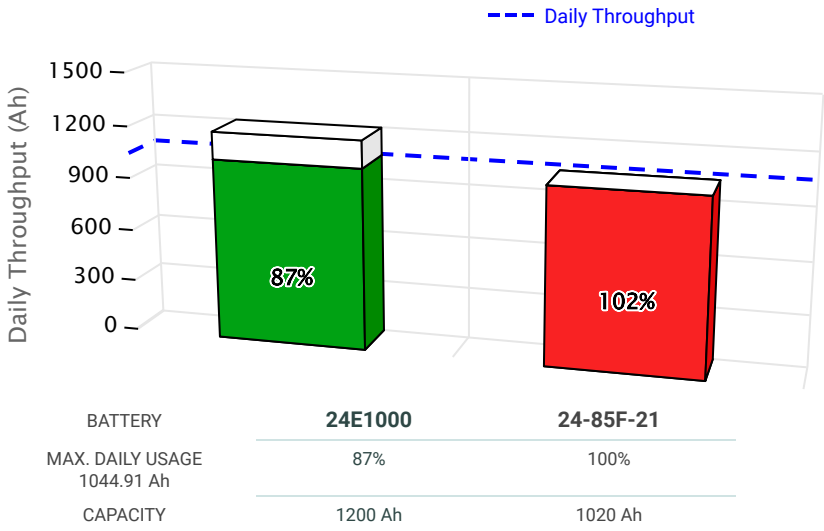


— 24E1000 + LPM3-48F-320Y

State of charge throughout a high use work week. showing if the battery and charger can keep up with the work load at this site. We want to see it maintain above 40% below 20% is over discharging.

BATTERY ANALYSIS

Make	Series	Model	Ah	kWh	Warranty Daily Limit (%)
HAWKER	ENERGYPLUS	48V 24E1000	1000	48.0	120
HAWKER	POWERLINE	48V 24-85F-21	850	40.8	120





TOYOTA 8FGCU25
5000# FORK TRUCKS

FINANCIAL REPORT

Proposed Opportunity Charge Solution vs ICE operation. Broken down into equipment cost, energy cost, maintenance cost, and additional cost related to safety.

APPLICATION ANALYSIS

Vehicle Load Capacity: 4500-6499 Lbs.
Days of operation: 364
Weekly energy required: 338.8 Battery kWh
Battery model: 24E1000
Batteries per vehicle: 1
Charging methodology: OPPORTUNITY CHARGE
of Vehicles: 8

FINANCIAL METHOD

OPERATING COST SUMMARY

Proposed Hawker Solution

LPG

INITIAL INVESTMENT SUMMARY PROJECT

\$ 0.00

\$ 0.00

EQUIPMENT INVESTMENT SUMMARY ANNUAL / PROJECT

\$ 70,460.16

\$ 43,519.68

FUEL / ENERGY EXPENSE ANNUAL / PROJECT

\$ 14,678.83

\$ 115,213.32

MAINTENANCE EXPENSE ANNUAL / PROJECT

\$ 39,270.00

\$ 37,430.00

ADDITIONAL EXPENSES ANNUAL / PROJECT

\$ 14,400.00

\$ 0.00

TOTAL:

\$ 138,808.99

\$ 196,163.00

VEHICLE	PROPOSED HAWKER SOLUTION LEASE 60 Months 0%	LPG LEASE 60 Months 0%
BATTERY	LEASE 60 Months 0%	LEASE 60 Months 0%
CHARGER	LEASE 120 Months 0%	

Lease period and rate.

DETAILS | Annual / Project

Proposed Hawker Solution

LPG

INITIAL INVESTMENT SUMMARY

No Upfront Costs Available

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TOTAL:

\$ 0.00

\$ 0.00

LEASE/FINANCE SUMMARY

\$ 70,460.16

\$ 43,519.68

Vehicle Model #: 8FGCU25

Default

Vehicle Price: \$ 272,000.00

\$ 256,000.00

Vehicle Annual Payment: \$ 46,240.32

\$ 43,519.68

Battery Price: \$ 96,240.00

\$ 0.00

Battery Annual Payment: \$ 17,901.12

\$ 0.00

Charger Price: \$ 64,480.00

\$ 0.00

Charger Annual Payment: \$ 6,318.72

\$ 0.00

FUEL / ENERGY EXPENSE

\$ 14,678.83

\$ 115,213.32

Fuel Cost: \$ 0.09 per Battery kWh

\$ 2.65 per Gallons

Battery Change vs Tank Refill: 0 min.

15 min

Changes vs Refill Per Day: 0

1

Labor Rate (Cost per hour): \$ 30.00 per hrs

\$ 30.00 per hrs

MAINTENANCE EXPENSE

\$ 39,270.00

\$ 37,430.00

Annual hours of usage: 2035 hrs.

2035 hrs.

Vehicle Maintenance (Per Hour): \$ 1.65

\$ 2.25

Vehicle cost for PM: \$ 100.00

\$ 100.00

Batteries per vehicle: 1 Batteries

Battery Maintenance (Per Battery): \$ 125.00

Watering program (Per Battery): \$ 1,200.00

Charger Maintenance: \$ 126.00

ADDITIONAL EXPENSES

\$ 14,400.00

\$ 0.00

Electric and Eyewash: \$ 14,400.00

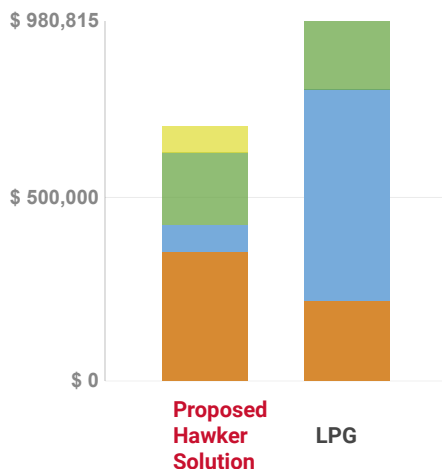
\$ 0.00

TOTAL:

\$ 138,808.99

\$ 196,163.00

FIVE YEAR COST COMPARISON



Initial cost is the cost of the trucks, batteries, and chargers. The proposed solution has a higher initial cost due to the additional batteries and chargers needed. Energy cost is the end users electric rate vs the cost of lpg including labor for changing propane. Maintenance costs consist of pms, repairs, and watering. Additional expenses for electrical and eywash install. Resulting in an annual 29% savings or 58K difference.



TOYOTA 8FGCU25 5000# Single Double

Voltage: 48V Quantity: 8
Sit-down Rider

ENERGY

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Scheduled hours	14.00	14.00	14.00	14.00	14.00	14.00	14.00
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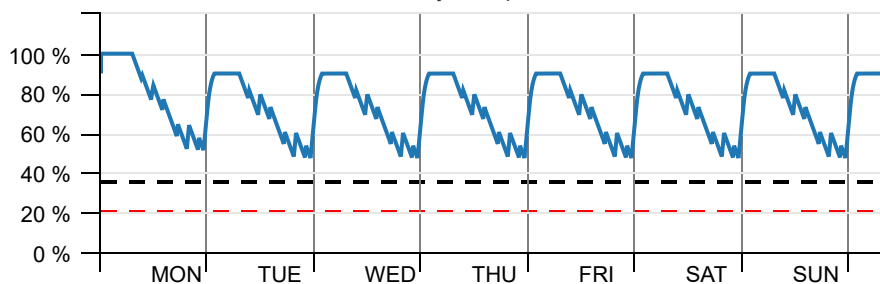
Same batteries and chargers as the Feasibility report on page 3. Second set of trucks analyzed. Data remains the same.

FEASIBILITY ANALYSIS REPORT

STATE OF CHARGE

Use	Charger	Max. Current at 48V	Max. battery accepts at 1000 Ah	Effective Start Rate	Min. SOC
<input type="radio"/>	LPM3-48F-320Y	320 A	250 A	25%	47%
<input type="radio"/>	Inadequate (SOC < 20%)	<input type="radio"/>	Marginal (SOC between 20-35%)	<input type="radio"/>	Optimized (SOC > 35%)

Multi-Battery Comparison

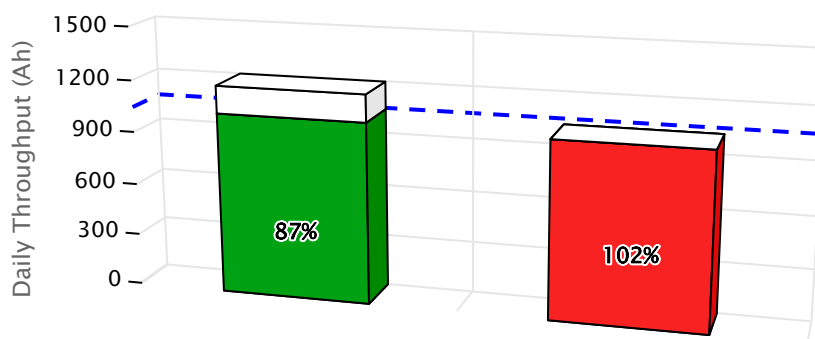


— 24E1000 + LPM3-48F-320Y

BATTERY ANALYSIS

Make	Series	Model	Ah	kWh	Warranty Daily Limit (%)
HAWKER	ENERGYPLUS	48V 24E1000	1000	48.0	120
HAWKER	POWERLINE	48V 24-85F-21	850	40.8	120

--- Daily Throughput



BATTERY	24E1000	24-85F-21
MAX. DAILY USAGE 1044.91 Ah	87%	100%
CAPACITY	1200 Ah	1020 Ah



TOYOTA 8FGCU25
5000# Single Double

FINANCIAL REPORT

Same Financial report data as page 4. Second set of trucks analyzed. Data remains the same.

APPLICATION ANALYSIS

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PROPOSED HAWKER SOLUTION

LPG

VEHICLE	LEASE 60 Months 0%	LEASE 60 Months 0%
BATTERY	LEASE 60 Months 0%	
CHARGER	LEASE 120 Months 0%	

OPERATING COST

SUMMARY

Proposed Hawker Solution

LPG

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MAINTENANCE EXPENSE ANNUAL / PROJECT

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\$ 37,430.00

ADDITIONAL EXPENSES ANNUAL / PROJECT

\$ 14,400.00

\$ 0.00

TOTAL:

\$ 138,808.99

\$ 196,163.00

DETAILS | Annual / Project

Proposed Hawker Solution

LPG

INITIAL INVESTMENT SUMMARY

No Upfront Costs Available

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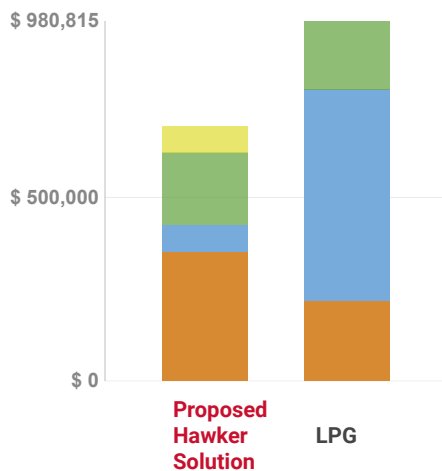
\$ 0.00

TOTAL:

\$ 138,808.99

\$ 196,163.00

FIVE YEAR COST COMPARISON



PROJECT FINANCIAL REPORT

PROJECT RETURN ON INVESTMENT

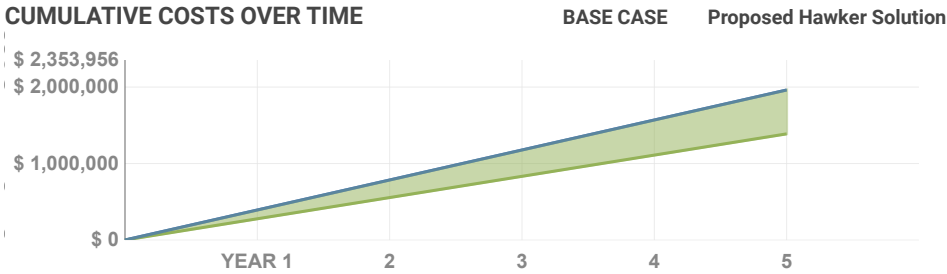
SUMMARY

	Proposed Hawker Solution	Base Case	
INITIAL INVESTMENT SUMMARY PROJECT	\$ 0.00	\$ 0.00	\$ 0.00
EQUIPMENT INVESTMENT SUMMARY ANNUAL / PROJECT	\$ 140,920.32	\$ 87,039.36	\$ 53,880.96
FUEL / ENERGY EXPENSE ANNUAL / PROJECT	\$ 29,357.66	\$ 230,426.64	\$ 201,068.96
MAINTENANCE EXPENSE ANNUAL / PROJECT	\$ 78,540.00	\$ 74,860.00	\$ 3,680.00
ADDITIONAL EXPENSES ANNUAL / PROJECT	\$ 28,800.00	\$ 0.00	\$ 28,800.00
PROJECT ADDITIONAL EXPENSES ANNUAL / PROJECT	--	--	--
TOTAL ANNUAL BENEFIT			\$ 114,708.02

Total project cost of the 16 total trucks. Annual benefit of swapping ICE to Batteries is \$114,708.02

Cost over time shown below. As equipment age the gap grows in cost. Resulting in \$573,540.10 of savings over 5 years.

CUMULATIVE COSTS OVER TIME



PROJECT SAVINGS OVER 5 YEARS

\$ 573,540.10



TIME LINE FOR RETURN ON INVESTMENT

IMMEDIATE

PROJECT COSTS

PROJECT ADDITIONAL EXPENSES	Proposed Hawker Solution	Base Case
Battery Handling Equipment Annual Cost	--	--
Infrastructure Annual Cost	--	--
iBOS Annual Cost	--	--
HawkerNet Annual Cost	--	--
No	--	--
TOTAL UPFRONT ADDITIONAL CHARGES		

\$ 0.00

\$ 0.00

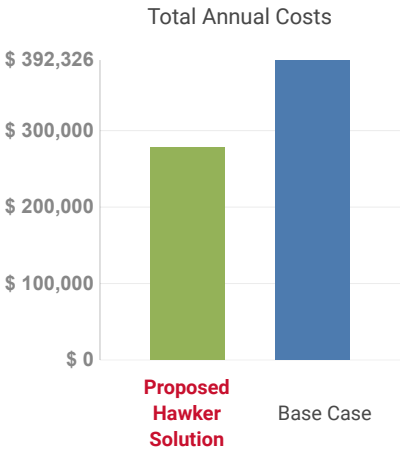
\$ 0.00

PROJECT TOTAL COST OF OWNERSHIP

PROJECT ANNUAL TOTAL COST OF OWNERSHIP



Fleet Size: 16 vehicles

Type	Qty	Vehicle	Solution	Proposed Hawker Solution	BASE CASE
	8	Toyota 8FGCU25 5000# FORK TRUCKS	C2E	\$ 138,808.99	\$ 196,163.00
	8	Toyota 8FGCU25 5000# Single Double	C2E	\$ 138,808.99	\$ 196,163.00
PROJECT ADDITIONAL EXPENSES				--	--
				\$ 277,617.99	\$ 392,326.01



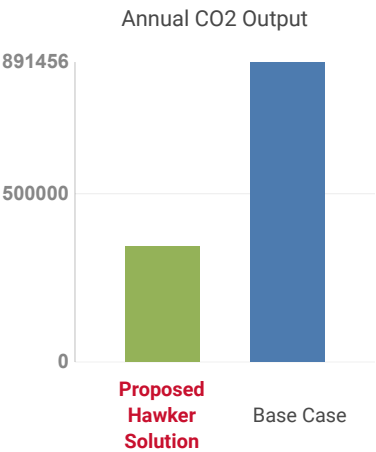
CO2 PROJECT FOOTPRINT

ANNUAL CO2 EMISSIONS

Type	Qty	Vehicle	Solution	Proposed Hawker Solution	BASE CASE
	8	Toyota 8FGCU25 5000# FORK TRUCKS	C2E	171,944 Lbs.	445,728 Lbs.
	8	Toyota 8FGCU25 5000# Single Double	C2E	171,944 Lbs.	445,728 Lbs.
				343,888 Lbs.	891,456 Lbs.

Electric batteries vs propane trucks results in significant reductions in pollutants and CO2.

Fleet Size: 16 vehicles



CARBON EMISSIONS ELIMINATED PER YEAR 547,568 Lbs. 