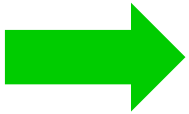
CENTER FOR TRANSPORTATION
AND THE ENVIRONMENT

Worcester Regional Transit Authority

Key Performance Indicators
Electric Bus Deployment Project

July 17, 2013

Introduction

- Project Goals
  - Achieve performance levels that meet or exceed existing fleet
  - Reduce fuel costs
  - Reduce emissions
  - Enhance transit service  Cleaner, Greener
- Purpose of KPI Reporting
  - Assess performance of electric buses as compared to existing fleet
  - Assess impact on WRTA's agency-wide fuel costs
  - Assess impact on WRTA's agency wide GHG emissions

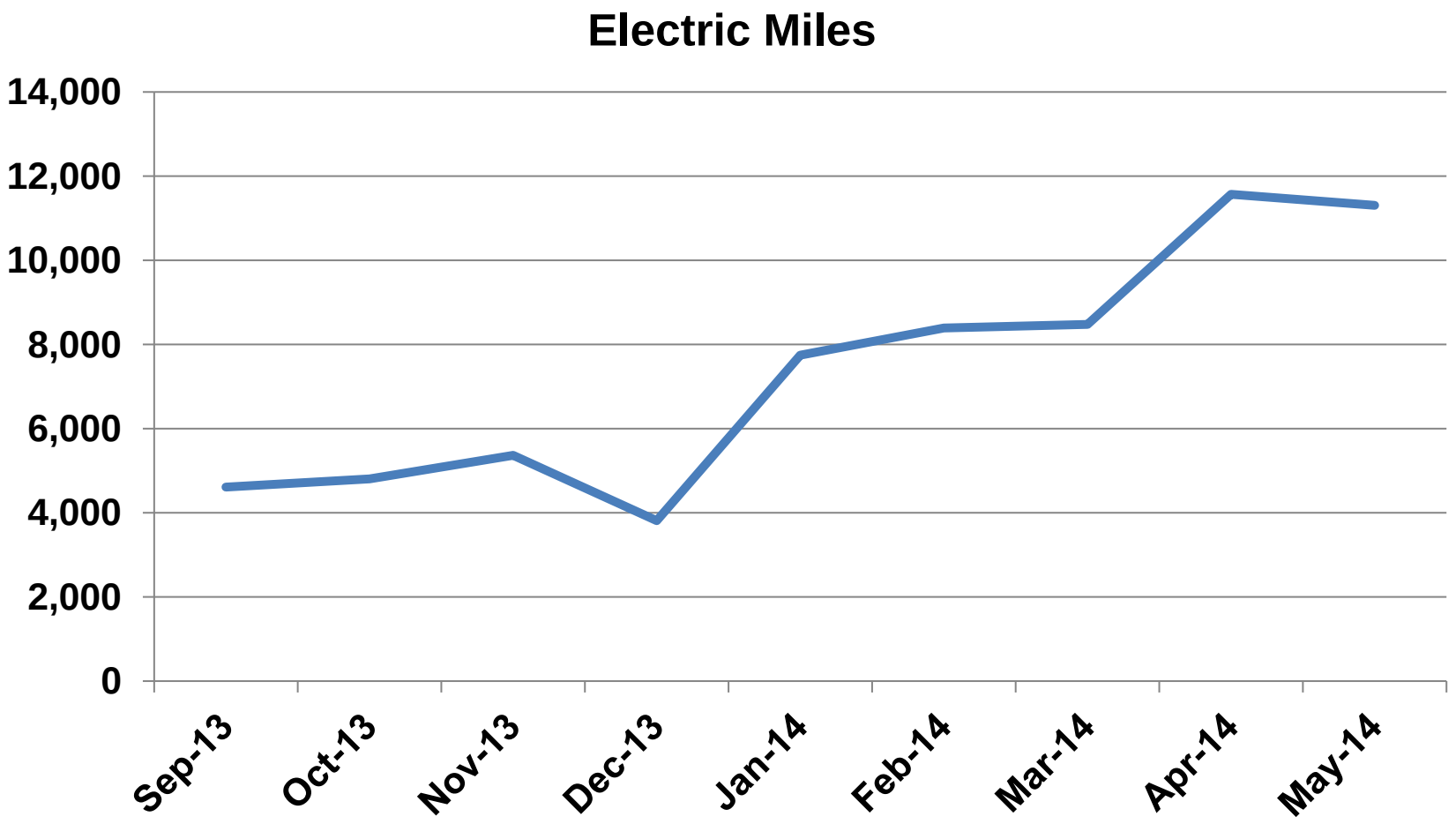
The Fleet

Bus Type	Quantity	% of Fleet
35 FOOT RTS	4	7%
29 GILLIG	5	9%
29 GILLIG HYB	2	4%
35 GILLIG	9	16%
35 GILLIG HYB	6	11%
40 GILLIG	15	27%
40 GILLIG HYB	8	15%
35' Electric	6	11%
Total Fleet	**55**	**100%**

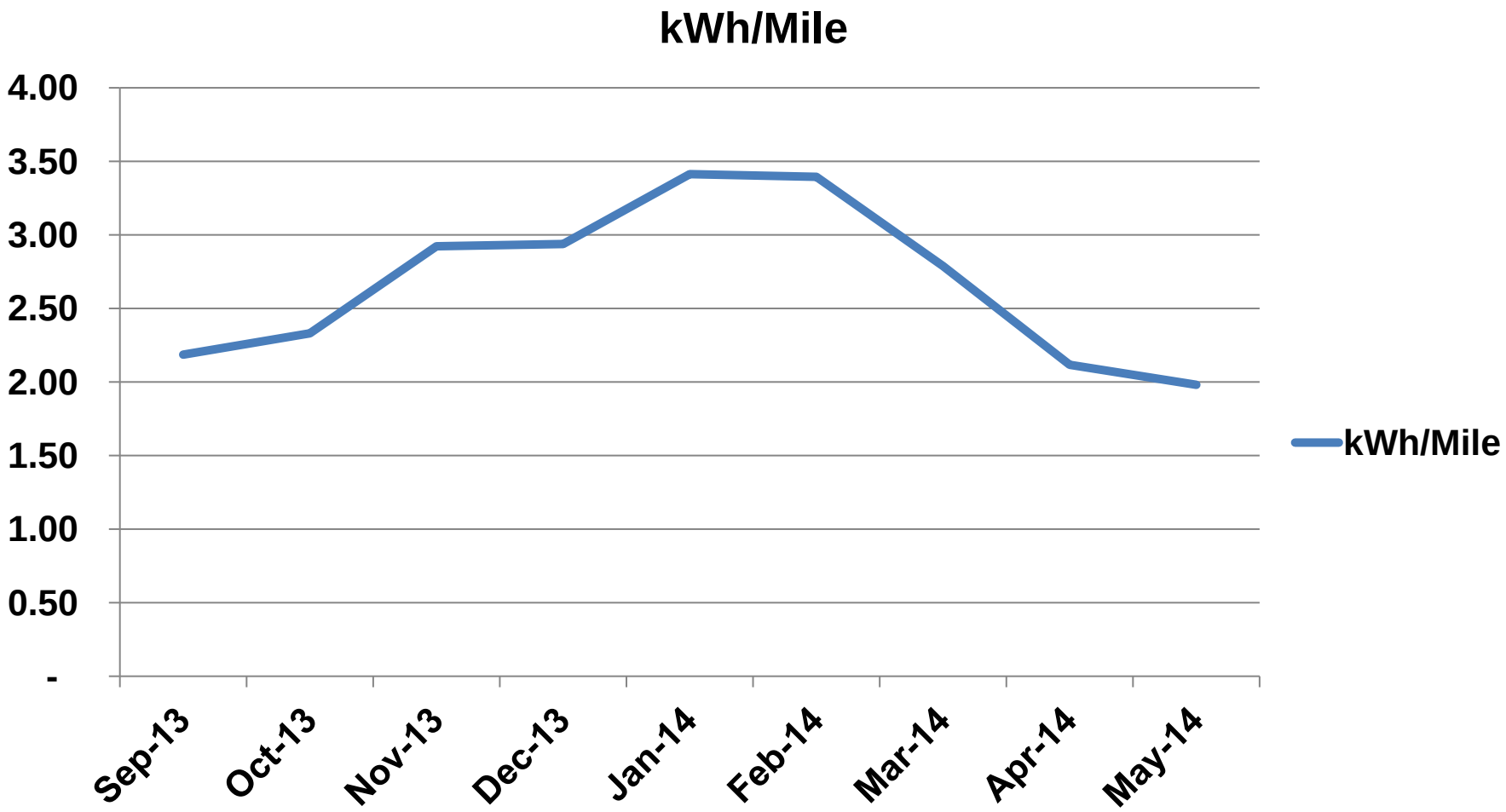
The Routes

- Route 4
- Route 18
- Downtown “Green” Circulator
- Alternate: Route 8

KPI: Mileage


Electric Miles
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14

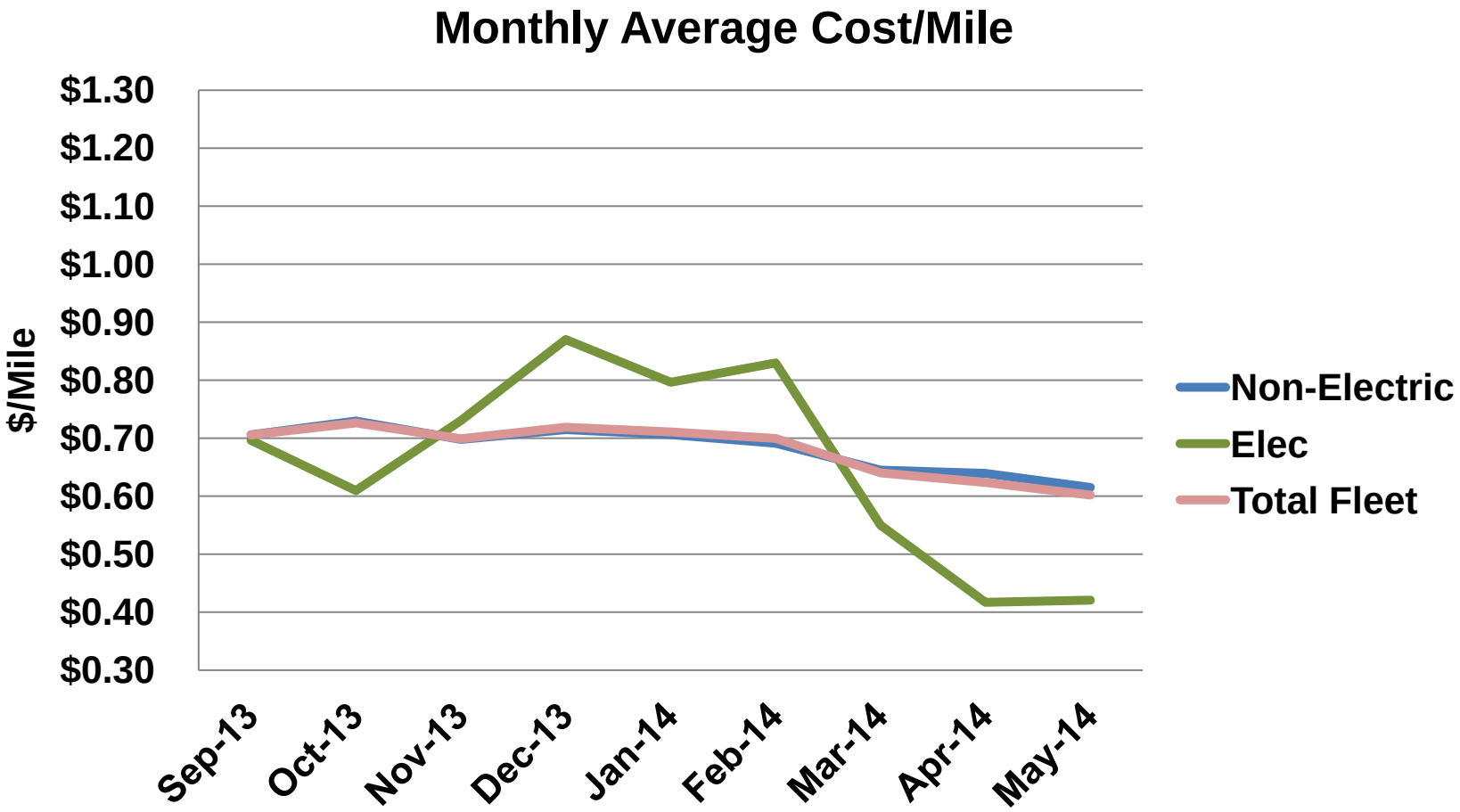
KPI: Average Fuel Efficiency



KPI: Average Fuel Efficiency

Monthly kWh/Mile					
Month	**Miles**	**kWh**	**kWh/mile**	**Total Cost**	**Cost/mile**
Sep-13	4,611	10,080	2.19	$ 3,210.37	$ 0.70
Oct-13	4,805	11,200	2.33	$ 2,929.60	$ 0.61
Nov-13	5,365	15,680	2.92	$ 3,918.13	$ 0.73
Dec-13	3,812	11,200	2.94	$ 3,316.43	$ 0.87
Jan-14	7,746	26,435	3.41	$ 6,168.71	$ 0.80
Feb-14	8,391	28,484	3.39	$ 6,962.07	$ 0.83
Mar-14	8,477	23,635	2.79	$ 4,661.50	$ 0.55
Apr-14	11,568	24,487	2.12	$ 4,823.42	$ 0.42
May-14	11,306	22,400	1.98	$ 4,756.91	$ 0.42
Average	5,788	17,180	2.97	$ 4,417.55	$ 0.76

KPI: Fleet Average Fuel Cost per Mile



Contracted Diesel Fuel Cost: $3.14/gal
Average Electricity Costs: $0.23/kWh

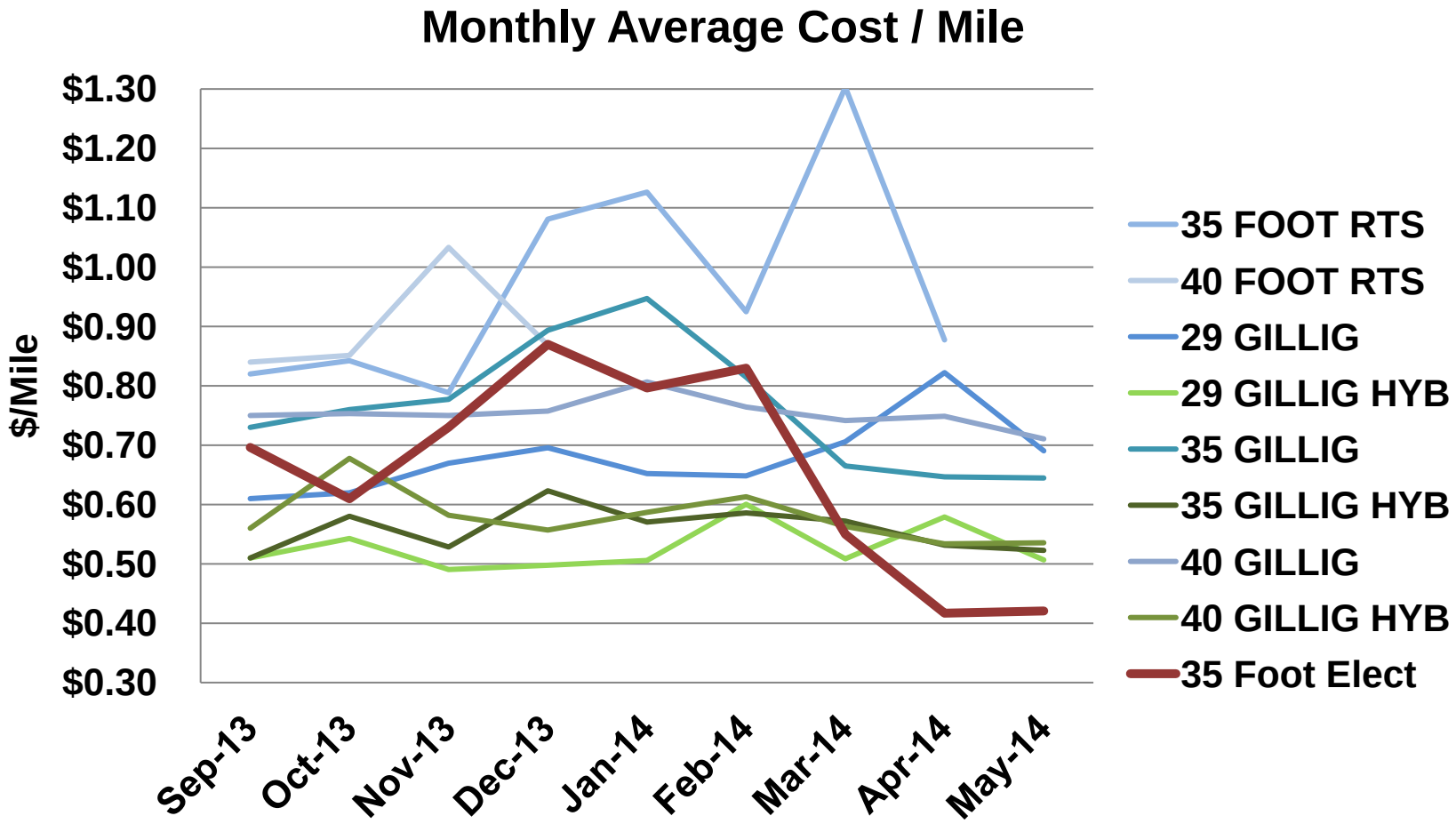
KPI: Fleet Average Fuel Cost Per Mile

AGENCY TOTAL									
Month	Non-Elec. Mileage	Non-Electric Fuel Cost	Non-Electric $/mile	Elec. Mileage	Electric Fuel Cost	Electric $/mile	Total Mileage	Total Fuel Cost	Total $/mile
Sep-13	148,303	$ 104,667	$ 0.71	4,611	$ 3,210	$ 0.70	152,914	$ 107,877	$ 0.71
Oct-13	165,372	$ 120,646	$ 0.73	4,805	$ 2,930	$ 0.61	170,177	$ 123,576	$ 0.73
Nov-13	148,597	$ 103,713	$ 0.70	5,365	$ 3,918	$ 0.73	153,962	$ 107,631	$ 0.70
Dec-13	144,719	$ 103,445	$ 0.71	3,812	$ 3,316	$ 0.87	148,531	$ 106,761	$ 0.72
Jan-14	145,741	$ 102,909	$ 0.71	7,746	$ 6,169	$ 0.80	153,487	$ 109,078	$ 0.71
Feb-14	134,347	$ 92,877	$ 0.69	8,391	$ 6,962	$ 0.83	142,738	$ 99,839	$ 0.70
Mar-14	157,019	$ 101,270	$ 0.64	8,477	$ 4,661	$ 0.55	165,496	$ 105,932	$ 0.64
Apr-14	153,318	$ 98,015	$ 0.64	11,568	$ 4,823	$ 0.42	164,886	$ 102,838	$ 0.62
May-14	155,554	$ 95,669	$ 0.62	11,306	$ 4,757	$ 0.42	166,860	$ 100,426	$ 0.60
Average	150,330	102,579	$ 0.68	7,342	$ 4,527	$ 0.66	157,672	$ 107,106	$ 0.68

Electricity Costs

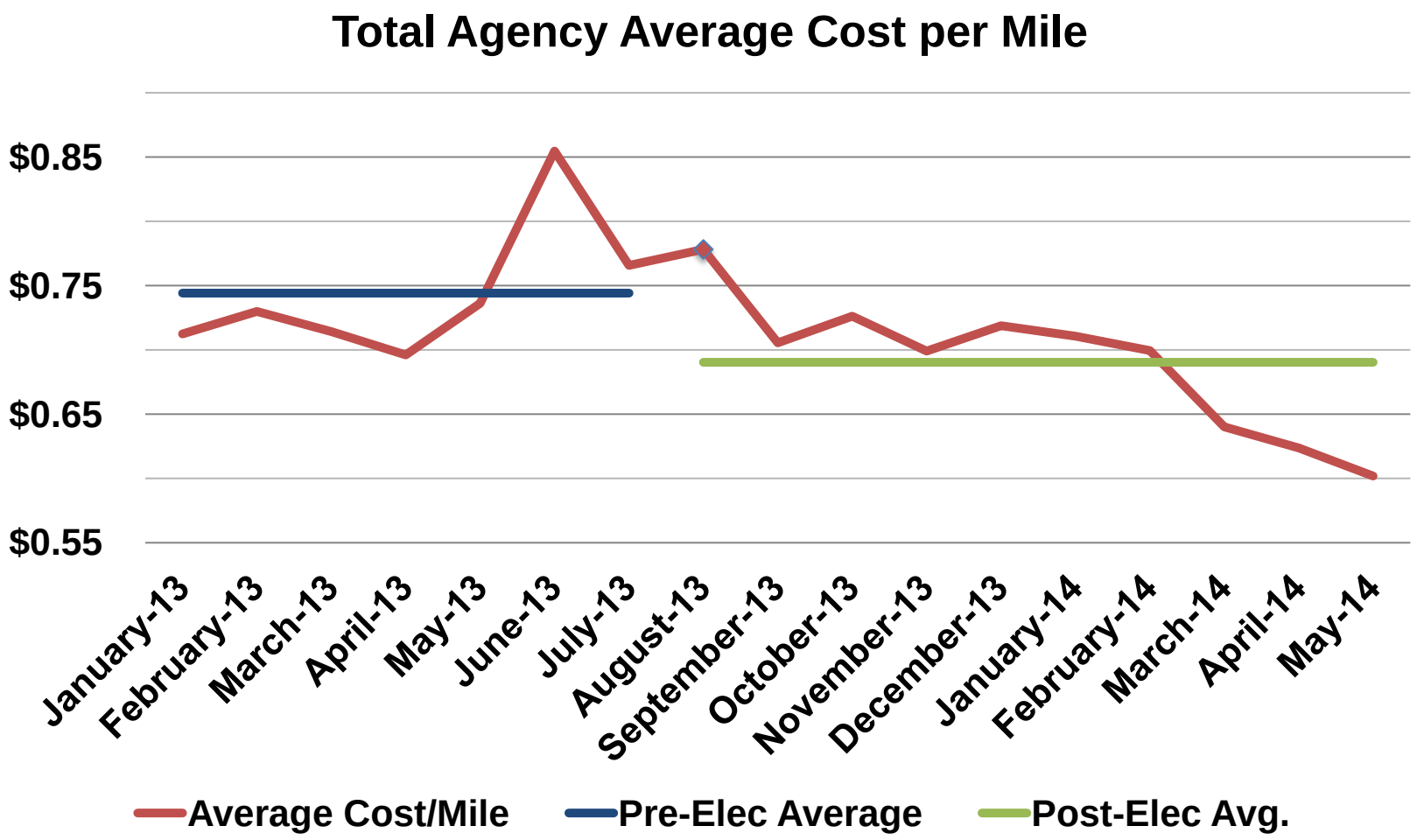
National Grid Charges						
Month	kW Demand	kW Demand Charge	kWh Consumed	kWh Dist/Trans Charges	Total Cost/kWh	
Sep-13	371	$ 2,227	10,080	$ 983	$	0.32
Oct-13	306	$ 1,834	11,200	$ 1,096	$	0.26
Nov-13	370	$ 2,218	15,680	$ 1,701	$	0.25
Dec-13	293	$ 1,757	11,200	$ 1,560	$	0.30
Jan-14	298	$ 1,786	26,435	$ 4,383	$	0.23
Feb-14	288	$ 1,728	28,484	$ 5,234	$	0.24
Mar-14	288	$ 1,728	23,635	$ 2,933	$	0.20
Apr-14	349	$ 2,093	24,487	$ 2,731	$	0.20
May-14	338	$ 2,026	22,400	$ 2,731	$	0.21

KPI: Average Fuel Cost per Mile by Type

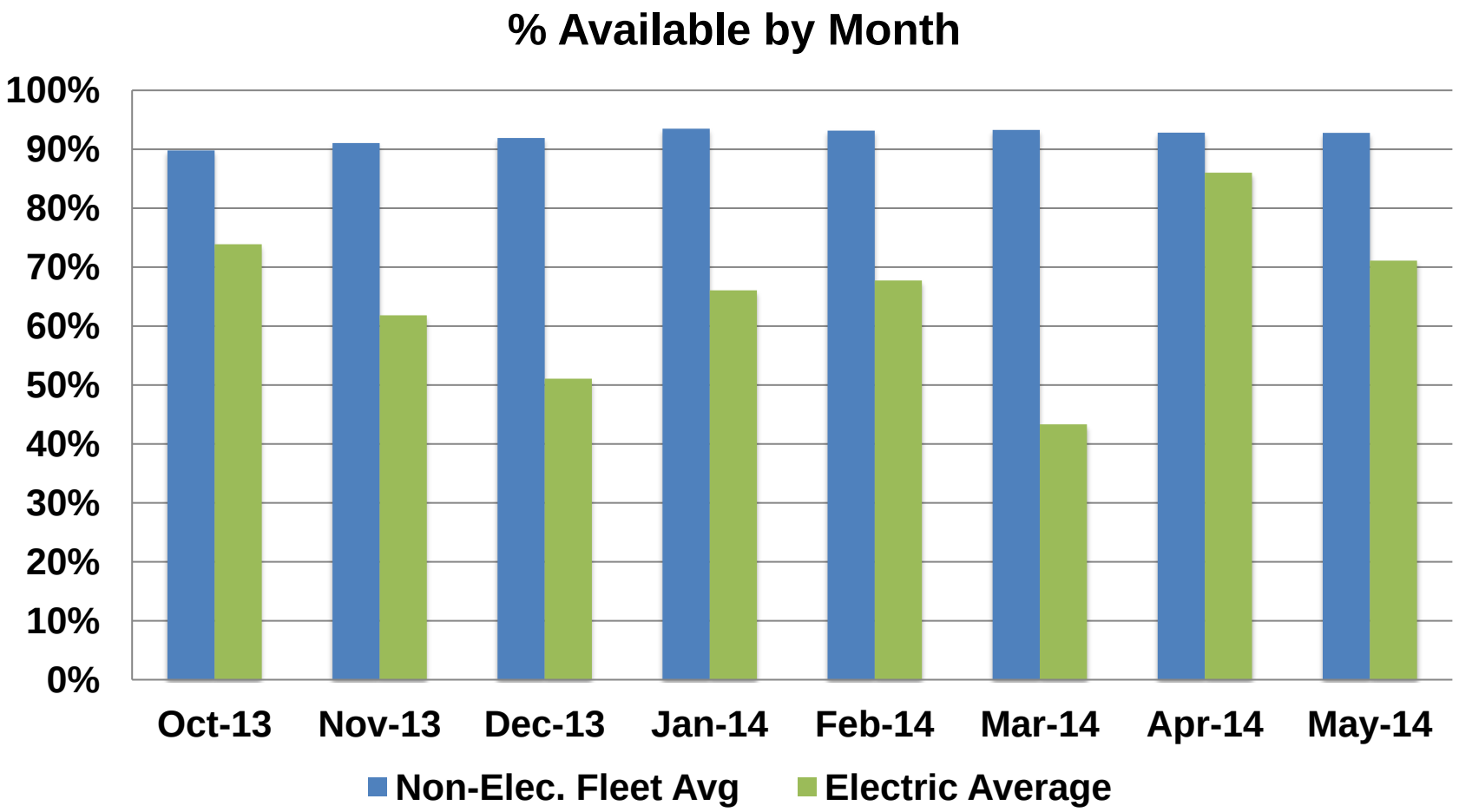


Contracted Diesel Fuel Cost: $3.14/gal
Average Electricity Costs: $0.23/kWh

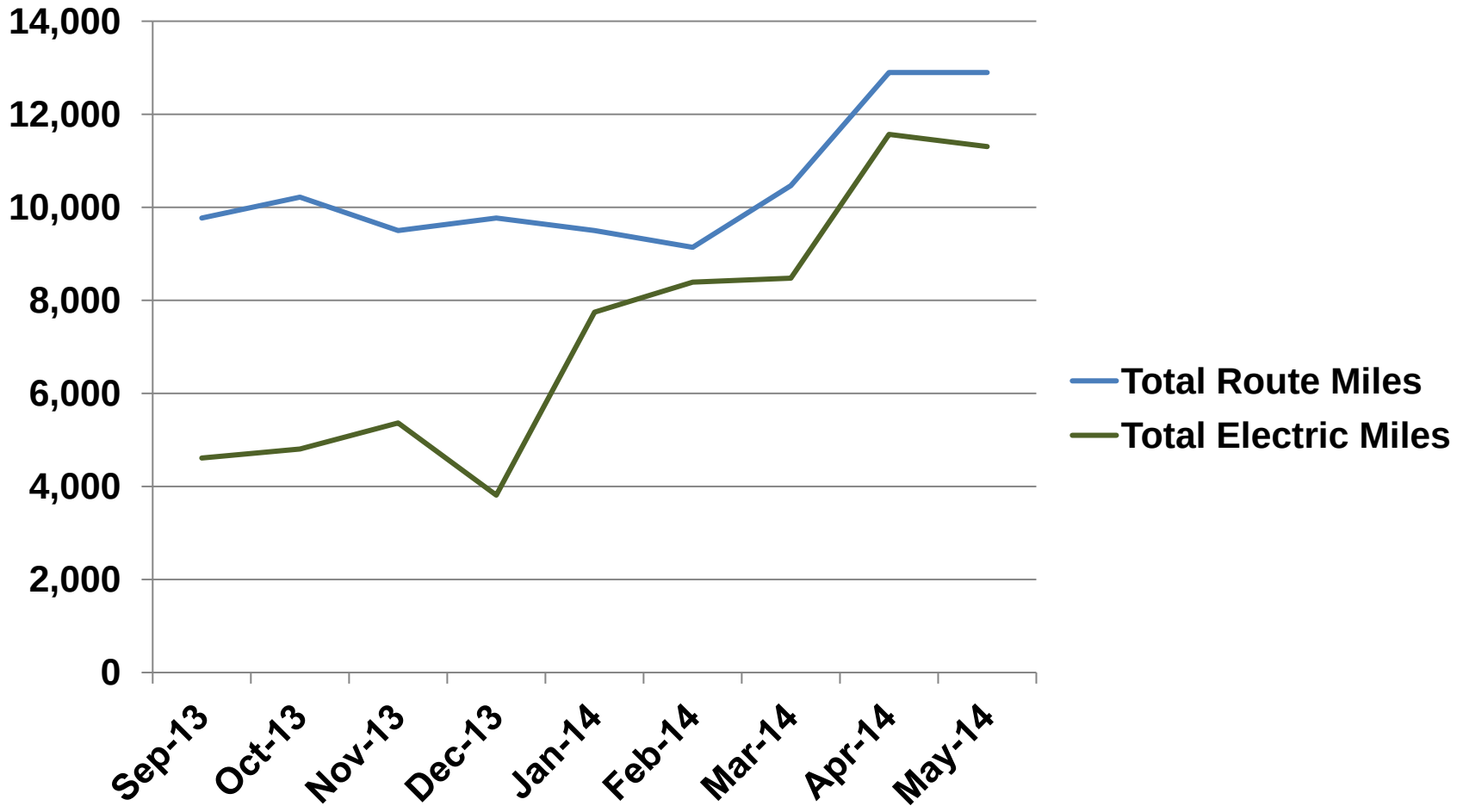
KPI: Change in Fleet Average Cost/Mile



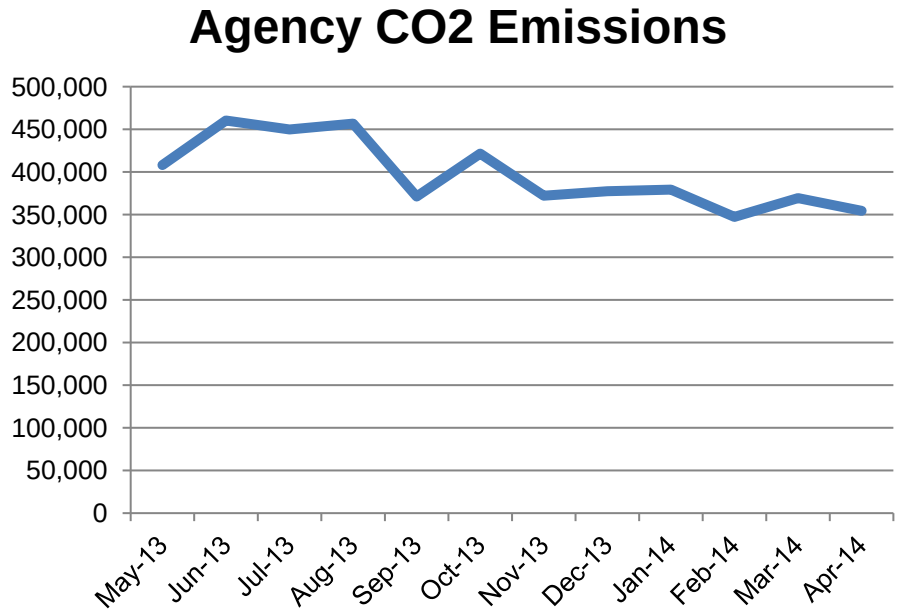
KPI: Availability



KPI: Utilization (DRAFT)

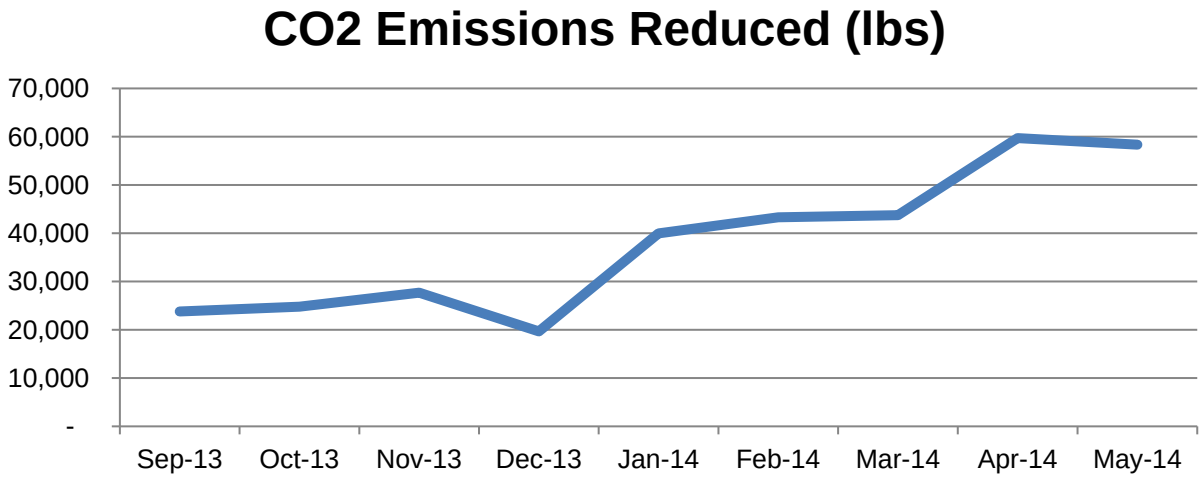


KPI: Emission Reduction



Total CO_2 Reduction to Date:

171 Tons!



Conclusions

- Resolution of early deployment issues are leading to higher availability and utilization
- Higher utilization will lower cost per mile
  - High utility demand charges are spread across more miles
- Cost per mile is seasonal
  - Expect higher cost/mile in winter