



KEEP IT GREEN
TRANSIT
green energy alternative fuels™

The City of West Covina
EV Experience Pilot

Four Departments Participated

- Code Enforcement
- Building Inspections
- Police Traffic Divisions
- Community Services

WEST COVINA EV EXPERIENCE GASOLINE VS EV COST COMPARISON									
DAY	TOTAL MILES	% CHARGED	TIME CHARGED	KWH HRS USED	EV COST PER MILE	EV COST OF CHARGE	GAS GALLONS USED	GAS COST PER MILE	GAS COST OF TRIP
1	47	20%	1.2	8.4	\$ 0.02	\$ 1.01	2.6	\$ 0.20	\$ 9.56
2	43	30%	1.5	15.75	\$ 0.04	\$ 1.89	2.4	\$ 0.20	\$ 8.74
3	51	72%	3.5	88.2	\$ 0.21	\$ 10.58	2.8	\$ 0.20	\$ 10.37
4	49	50%	2.0	35	\$ 0.09	\$ 4.20	2.7	\$ 0.20	\$ 9.96
5	31	20%	1.3	9.1	\$ 0.04	\$ 1.09	1.7	\$ 0.20	\$ 6.30
6	30	15%	1.0	5.25	\$ 0.02	\$ 0.63	1.7	\$ 0.20	\$ 6.10
7	29	0%	0.0	0	\$ -	\$ -	1.6	\$ 0.20	\$ 5.90
8	20	0%	0.0	0	\$ -	\$ -	1.1	\$ 0.20	\$ 4.07
9	24	0%	0.0	0	\$ -	\$ -	1.3	\$ 0.20	\$ 4.88
10	27	35%	1.7	20.825	\$ 0.09	\$ 2.50	1.5	\$ 0.20	\$ 5.49
11	12.7	0%	0.0	0	\$ -	\$ -	0.7	\$ 0.20	\$ 2.58
12	12	0%	0.0	0	\$ -	\$ -	0.7	\$ 0.20	\$ 2.44
13	33	41%	1.7	24.395	\$ 0.09	\$ 2.93	1.8	\$ 0.20	\$ 6.71
14	15	26%	1.5	13.65	\$ 0.11	\$ 1.64	0.8	\$ 0.20	\$ 3.05
15	52	22%	3.0	23.1	\$ 0.05	\$ 2.77	2.9	\$ 0.20	\$ 10.57
16	82	79%	3.7	102.305	\$ 0.15	\$ 12.28	4.6	\$ 0.20	\$ 16.67
17	46	88%	4.0	123.2	\$ 0.32	\$ 14.78	2.6	\$ 0.20	\$ 9.35
TOTALS				469.175		\$ 56.30	33.5		\$ 122.75

Public Works: Code Enforcement

- **Total Miles:** 190.3 miles
- **Average Daily Miles:** 47.5 miles
- **Average Charge Time:** 2 Hours
- **Green Fuel/Electricity/Energy Cost:** \$17.68
- **Projected Gasoline Cost:** \$38.63
- **Fuel Savings:** 54%
- **Most EV Miles Driven in one day:** 51 miles

Public Works: Building Inspector

- **Total Miles:** 161
- **Average Daily Miles:** 26.83
- **Average Charge Time:** 1.15 hour
- **Green Fuel/Electricity/Energy Cost:** \$4.22
- **Projected Gasoline Cost:** \$32.74
- **Fuel Savings:** 87%
- **Most EV Miles Driven in one day:** 30 miles

KIGT EV Plugged-In to a Level 2 (220V) Charge Station



How did the battery react when the air condition and heat were on?

Dan Nowotney (Building Inspector) - "The battery went down very little, it was still fine for me."

City of West Covina
City Hall
Level 2 (220V) Charge Station



Police Department: Traffic Division

- **Total Miles:** 72.7 miles
- **Average Daily Miles:** 18.17 miles
- **Average Charge Time:** 1.6 hours
- **Green Fuel/Electricity/Energy Cost:** \$4.57
- **Projected Gasoline Cost:** \$14.78
- **Fuel Savings:** 70%
- **Most EV Miles Driven in one day:** 33

* **Idle Test:** For two (2) hours we left the EV in 'On' and 'Accessory' modes with the heat and radio on full blast. The EV Battery was only reduced by 5-7%.

Community Services Department:

- **Total Miles:** 180 miles
- **Average Daily Miles:** 60 miles
- **Average Charge Time:** 3.5 hours
- **Green Fuel/Electricity/Energy Cost:** \$29.83
- **Projected Gasoline Cost:** \$36.60
- **Fuel Savings:** 19%
- **Most EV Miles Driven in one day:** 82 miles

* **EV Charging:** community service department charged using both Level 1 and Level 2 chargers. Level 1 takes longer to charge thus costing more money, compared to the other departments.

The EV Experience™ | Level vs. Level 2 Case Study | KIGT Solutions

Average EV Charge Time

- Level 1 (110 volts) : 8 hours
- Level 2 (220 volts): 2 Hours

Highway Driving

- Reached highway speeds of 80 mph
- EV Drivers can drive the carpool lane alone due to the fact the vehicle is a certified ZEV
- The driver felt the vehicle only allowed him “80-90 or so miles range.” This may or not be true; pending on driving habits and speed. Keep in mind that the EV is very similar to a gasoline vehicle in the way, that when you drive your vehicle at higher speeds you will also lose miles per gallon (MPG)

An Estimated 287-479 CO2 Emissions reduced during the West Covina EV Experience Pilot

Estimated Carbon Footprint (CO2 Emissions Output)

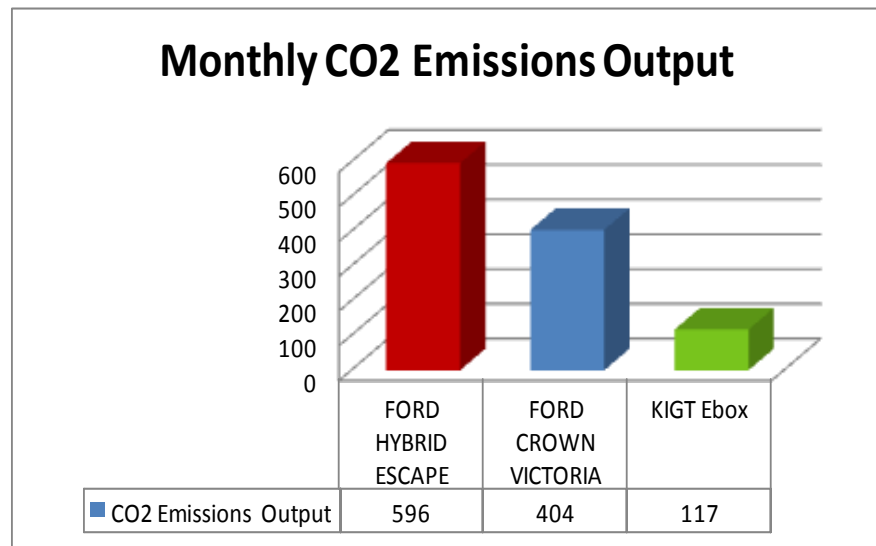
Gasoline Vehicle Lbs of CO2

- 2005 Ford Hybrid Escape: 596 lbs CO2
- 2000 Ford Crown Victoria: 404 lbs CO2

Electric Vehicle Lbs of CO2

- KIGT eBox: 117 lbs CO2

The EV Emits 71-80% less CO2Emissions



The EV Experience™ | Total Month Pilot Results

*Total Month Pilot Results

- Total EV Driving Miles: 604 miles
- Average Highway Driving: 31 miles
- Average Street Driving Miles: 24 miles
- Most Miles Driven in a Day: 82 Miles
- Average Charge Time: 1.4 (1 hr. 24 Min)
- Average Charge Rate Increase: 38%
- Depleted Batteries Enroot: Zero (0)

Gasoline vs. EV Travel Cost

- Total Kwh Used: 469.17
- Total Electricity Cost to Charge: \$56.30
- Projected Gasoline Gas: \$102.89
- Estimated Fuel Savings: 45%

** (City Employees are off on Fridays)

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The EV Experience™ | Charging Case Study

Test Driver | Community Services Department

Proposition

KIGT Electric Vehicles battery range suits and supersedes the parameters of department driving needs. When Level 2 (220V) charge stations are available the battery range was a non-issue every errands and work routes with battery life to spare. When older technology like Level 1 (110V) was used to charge the vehicle the car charged dramatically slow and did not reach 100% after 8 hours of charge.

Day 1: The driver used a Level 2 (220V) charge station at West Covina City Hall and the battery Range was a non-issue.

Day 2: The driver used a Level 2(220V) charge station for two hours at West Covina City Hall and battery increased in a timely manor. When charged using the Level 1 charger (110V) at Cameron Park for 8 hours, battery only increased by 44%.

Day 2: After charging at a 110V outlet for eight (8) hours at Cameron Park, in West Covina, Ca, the EV reached 88%. After charging the driver still drove 30+ miles at highway speeds reaching 80mph, arriving home with 48% battery life left. When arriving at home, the driver plugged the EV into his (110V) garage outlet. Unfortunately his 110V outlet did not charge the EV fully overnight.

Day 3: Before work the next morning the Community Service Supervisor made a stop at a Level 2 (220V) charge station near his home for 20 minutes; before charging the EV was at 12%, after charging the vehicle was at 23%. When arriving at work the battery was at 9; total morning driving 32 highway and street miles.

Conclusion: Reaching 9% is similar to the Gas Light coming on in current fleet vehicles; however, if the driver had access to a Level 2 charger at Cameron Park and at his home there would have been no need to stop and charge the EV before work. The battery would have had more than 55% capacity left when arriving at work.

Level 1 vs. Level 2 Case Study | KIGT Solutions

- In this case a Level 2 (220V) was at the Cameron Park location the last day experience would have been entirely different. If their were a Level 2 Charge Station like at City Hall at the end of every charge the battery would have always been at 100%. A 100% battery at the beginning of every trip is like always having a full tank of gas before leaving
- According to our research, in order to achieve a real EV experience with the City of West Covina, the current technology must be used to charge the vehicles. This means that a Level 2 (220V) should be used to charge the EVs at all times.
- The Pilot showed when a Level 2 Charge Station (220V) was used; the driving range was a non issue for all departments.
- When Level 1 (110V) was used, the EV experience skewed and some "range anxiety" issues occurred, however, the EV always performed by getting the driver where he needed to go. Not once during the 604 miles was a driver stranded, and only once did the EV get below 10%
- KIGT will donate a Level 2 (220V) charge station to the Cameron Park
- Our team of electricians will install a small 220V power box costing less than \$350 at the house of the Community Supervisor. This will allow Mike to get full charge within a couple hours at home. Both tasks together will only take 3 hours to spec and install

Commercial Charge Station

Level 2 (220V) Charge Station



Residential Charging: In this case the Community Service Supervisor was able to charge his car at home the city would eliminate gasoline cost, and now add the new fuel cost to the energy cost.

Based on Edison's Kwh rate around \$0.12 it would only cost Mike \$42 a month in the case he charges the car every day from 0-100%, but based on the Pilot charging from 0-100% is an improbability seeing we only got below 9% once.

See the images below that illustrate the Small Power Box we at an employees home instead of a Charge Station. This would only add \$14 a month to Mike's home energy bill. The community Service Supervisor can inform the city car he drives during at work and to home in the evening uses at least \$300 a month on fuel.

Residential Charge Stations

- **Estimated Monthly Fuel Cost Savings:** \$300
- **Estimated Annual Fuel Cost Savings:** \$3,600



Small 220V Power Box –Price: \$200 - \$300



Residential
Wall Mount Charging
Level 2 (220V) Charge Station

The EV Experience™ | Participant Interviews

Mike Cresap (MC) Interview | Community Services Supervisor

Were there any Challenges?

- MC - "For my application I may need more range, needs 180-200 miles."

Did the Vehicle ever go dead?

- MC - "It got me every where I needed to go when driving in the City around town."

At your work site you had to use a 110V power outlet to charge; would've a Level 2 (220V) Charge Station made a difference?

- MC - "Yes, if you always have Level 2 access. If you have Level 2 you can always get a full battery, charge it for a three hours and get back to a full battery, 100%."
- MC - "A Level 2 Charge station would have made it more convenient."

If you always had 100% before driving the vehicle would you have more confidence in the battery life?

- MC - "Yes."

What surprised you about the car?

- MC - "I like the power of the vehicle; it had plenty of Power. You always here they are not that fast, it drives like a regular car. The EV operated very well."

Dan Nowotney (DN) | Building Inspector

Were you concerned about the EV Battery dying at anytime?

- DN - "No."

What did you dislike about the EV, how did the EV treat you during the day, was it good for work purposes?

- DN - "I didn't have any issue, it was fine."

Did you face any challenges, especially in regards to the charging the battery?

- DN - "No. I didn't need to charge throughout the day, more than enough charging overnight is fine."

What did you like about the EV?

- DN - "Not going to the gas station; saving gas, pollution, and all that other good."

Did the vehicle meet expectations?

- DN - "Absolutely."



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