MEMORANDUM

February 9, 2017

TO: MEMBERS, PORT COMMISSION
Hon. Willie Adams, President
Hon. Kimberly Brandon, Vice President
Hon. Leslie Katz
Hon. Eleni Kounalakis
Hon. Doreen Woo Ho

FROM: Elaine Forbes
Executive Director

SUBJECT: Update on the EV ARC™ 3 Charging Station

DIRECTOR'S RECOMMENDATION: Informational Only – No Action Required

Executive Summary

At its meeting on March 8, 2016, the Port Commission heard about a program called *Driving on Sunshine*, to promote the adoption of zero emission vehicles. The program featured three portable solar-powered electric vehicle charging stations, the EV ARC™3 (EV ARC), manufactured by Envision Solar. At that time, the Port Commission authorized staff to accept the donation of up to two EV ARCs for its support of the program. Subsequently, Envision Solar donated one unit each to the Port of San Francisco, the San Francisco Public Works Department, and the San Francisco Recreation and Park Department. The Port's EV ARC unit has been available at Seawall Lot 330 for public use, free of charge since April 2016. The EV ARC has been used regularly and has provided enough energy to drive more than 4,000 zero-emission miles.

Strategic Objective and Climate Action

The EV ARC is symbolic of the movement to achieve zero-emission transportation and the development of charging stations for electric vehicles. The Port of San Francisco's 2016-2021 Strategic Plan (Strategic Plan) includes ***Sustainability*** as one of seven strategies to realize the Port's mission.

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The sustainability strategy is, “to limit climate change and secure a broad environmental stewardship, implement sound sustainability practices for all aspects of the Port and San Francisco Bay.” Efforts to achieve zero-emission transportation are consistent with this strategy and the supporting objective to minimize carbon emissions.

LBE Role/Opportunities:

The EV ARC is maintained by Port staff and offers no opportunity for contract assistance or LBE employment.

Funding:

At the time of the donation the EV ARC was valued at $46,550 and the annual cost of maintenance was estimated at $940. Funding for maintenance is available in the Port’s Operating Budget.

In late December 2016, someone who had used the EV ARC drove off without removing the charger from their vehicle and this damaged the cord. The cost of the replacement part is about $265 and the repair will be made by Port electricians.

Use and Analysis

The system is equipped with monitoring sensors that make data available remotely. These data indicate that, until the damage occurred in late December 2016, the EV ARC had been in operation without incident and was used close to its practical capacity.

From April to December 2016 the public used the EV ARC 741 times to charge an electric vehicle. The unit was used an average of 2.7 times per day, with a maximum count of 11 per day. During this time the EV ARC delivered 1,385 kWh of energy. The Nissan Leaf, which the Port owns, can travel 100 miles on 34kWh of energy. Based on this, the EV ARC delivered enough energy for a Nissan Leaf to travel more than 4,000 miles (see Table 1).

TABLE 1: Summary Use Data: April 2016-December 2016

Number Of Uses	Average Uses Per Day	Maximum Use per Day	Energy Delivered (kWh)	Miles Powered (at 34 kWh / 100 Miles)
741	2.7	11	1,385	4,070

The EV ARC symbolizes the Port’s commitment to clean transportation, especially because it is independent of the electric grid and infrastructure. The unit is expensive to purchase and is not likely an optimal solution for the Port to expand most of its electric vehicle infrastructure. However, the EV ARC does support the growing popularity of electric vehicles. It will continue to provide free electricity to owners of electric vehicles and it has helped staff understand some of the issues that are related to electric vehicle infrastructure. The useful life of this particular charging station is estimated to be 20 years.

Based solely on the cost of energy, i.e., fuel, electric vehicles can be highly competitive. It is potentially less expensive to operate a Nissan Leaf with electricity from the grid than conventional automobiles, including hybrids. As the price of electricity approaches $0.25/kWh, the Leaf becomes less competitive with the Prius, but remains less expensive than conventional gasoline vehicles (See Table 2).

TABLE 2: Cost To Drive 100 Miles

	Electric Vehicles		Gasoline Vehicles		
	kWh / 100 Miles	**Cost / kWh ($)**	**Cost / Gallon ($)**	**Miles / Gallon**	**Cost / 100 Miles ($)**
	Electric Vehicles				
Nissan Leaf (electric)	34	0.10	---	---	3.40
	34	0.15	---	---	5.10
	34	0.25	---	---	8.50
Toyota Prius (hybrid)	---	---	3.25	55	5.91
	---	---	3.50	55	6.36
	---	---	3.75	55	6.82
Honda Civic (gasoline)	---	---	3.25	37	8.78
	---	---	3.50	37	9.46
	---	---	3.75	37	10.14
Truck or Large SUV			3.25	20	16.25
			3.50	20	17.50
			3.75	20	18.75

The damage that occurred in December is similar to incidents at gas stations when a person drives away with the dispenser still in the vehicle tank. It is a predictable risk and occurrence. As the infrastructure is expanded, staff can try to minimize this through design considerations.

Most importantly, electric vehicles result in zero-emissions when driven. They are ultimately as clean as the electricity that powers them. When an electric vehicle is charged with power from SF PUC, it is virtually a zero-emission vehicle.

Summary

Since the Port Commission authorized staff to accept the donation of the EV ARC, the unit has been utilized at close to practical capacity. It has provided enough free energy to drive more than 4,000 zero-emission miles in and around San Francisco. The experience has helped staff develop its understanding of issues that will be pertinent as the Port seeks to expand its electric vehicle infrastructure. Finally, the project is fully aligned with the Port's Strategic Plan and can inform future decisions without the initial capital outlay.

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