

ORIGINAL

OPEN MEETING



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MEMORANDUM

Arizona Corporation Commission

DOCKETED

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AZ CORP COMMISSION
DOCKET CONTROL

TO: THE COMMISSION

FROM: Utilities Division

DATE: August 24, 2011

DOCKETED BY

RE: ARIZONA PUBLIC SERVICE COMPANY - APPLICATION FOR APPROVAL OF PROPOSED ELECTRIC VEHICLE READINESS DEMONSTRATION PROJECT (DOCKET NO. E-01345A-10-0123)

Background

Pursuant to Arizona Corporation Commission (“Commission”) Decision No. 71104, dated June 5, 2009, Arizona Public Service Company (“APS” or “Company”) was required to conduct a Vehicle to Grid (“V2G”) feasibility and cost benefit study (“V2G Study”). Subsequent to completion of the V2G Study, APS was required to propose a V2G program for Commission consideration, no later than April 2, 2010. The V2G Study was docketed on April 1, 2010, along with an overview of the proposed Electric Vehicle (“EV”) Readiness Demonstration Program. On October 1, 2010, APS filed its application for the proposed Electric Vehicle Readiness Demonstration Project.

Staff believes that APS is in compliance with Decision No. 71104 in regards to the V2G issue. However, the proposed Project is not a V2G program. According to the V2G Study, none of the V2G concepts reviewed by the study are presently commercially viable. The results of the V2G Study are discussed later in this document. Staff agrees that the EV battery and infrastructure technologies are too immature for a meaningful V2G program to be designed and implemented at this time. Therefore, Staff believes that APS has complied with Decision No. 71104.

On June 29, 2011, Staff filed a Staff Report and Proposed Order in response to the Company’s proposal, and on July 7, 2011, Staff filed a revised Proposed Order in this matter. The Residential Utility Consumer Office (“RUCO”) filed comments in response to Staff’s recommendations on July 8, 2011. On July 19, 2011, the Company filed a Request for Extension of Time because Staff, RUCO and the Company had differing views on the role the Company should have regarding electric vehicle (“EV”) recharging, and monitoring the potential impact of EVs on the utility distribution system. The Request for Extension of Time allowed the Company time to develop an alternative proposal, entitled “*Revised EV-Ready Study*” (“Study”), which was filed on August 8, 2011. This revised application is the subject of this Memorandum.

Revised EV-Ready Study

Program Overview

APS proposes the Study as a three-year study project. At the end of the three-year period (i.e. December 31, 2014), APS would assess the effectiveness and success of the Study and would recommend available options to the Commission, which may include continuation or modification of the Study.

The Study would consist of two main components: (1) a residential time-of-use ("TOU") rate that incents customer charging of EVs during off-peak hours; and (2) a public TOU electric vehicle charging offering where any EV owner may charge their EV on a point-of-sale basis. APS has designed the Study so that customers who enjoy the benefits of the Study will largely support its costs. Those electric vehicle drivers who choose to participate in the public point-of-sale rate schedule would pay a substantial percentage of the costs associated with the Study.

Residential TOU Rate

APS proposes that Experimental Rate Schedule ET-EV (Electric TOU – Electric Vehicles) ("Rate ET-EV") would be available to residential customers with a qualifying electric vehicle¹. These customers would be required to verify continuing ownership of an EV on an annual basis throughout the three-year Study period through an APS-managed certification process.

Rate ET-EV is a time-of-use rate schedule that provides residential customers with a "Super Off-Peak" time period designed to encourage off-peak EV charging. However, this rate schedule is a "whole house" rate schedule, meaning that all of the customer's electricity usage would be served under this rate schedule, not just the electricity used to charge the EV. The "Super Off-Peak" pricing period would be from 11 p.m. to 5 a.m. Monday through Friday (excluding qualifying holidays). The Off-Peak period would be from 5 a.m. to 12 noon and 7 p.m. to 11 p.m., Monday through Friday and all day weekends and holidays; and the On-Peak period would be from 12 noon to 7 p.m., Monday through Friday. These time periods would be the same year round. Separate summer and winter rates are included in the rate schedule. The charges on the rate schedule consist of a Basic Service Charge of \$0.556 per day and energy charges as shown in Table 1.

The energy charges of the proposed Rate ET-EV are as follows:²

¹ Neighborhood Electric Vehicles as defined by A.R.S. §28-101(36) do not qualify for this rate schedule.

² These rates would also be subject to all applicable Adjustment Schedules, taxes and service fees.

Table I
Experimental Rate Schedule ET-EV (Electric TOU - Electric Vehicle)

May - October Billing Cycles (Summer)	November - April Billing Cycles (Winter)
\$0.20963 per kWh during On-Peak hours, plus \$0.02644 per kWh during Off-Peak hours, plus \$0.02264 per kWh during Super Off-Peak hours	\$0.16345 per kWh during On-Peak hours, plus \$0.02644 per kWh during Off-Peak hours, plus \$0.02264 per kWh during Super Off-Peak hours

APS-Owned Public EV Charging Stations

APS proposes a public charging program that would provide EV drivers the ability to charge EVs in convenient and accessible locations outside the home, and to enable longer-distance travel throughout the state.

The APS public EV charging program would be available to all EV drivers (not just APS customers) on a point-of-sale basis under proposed Experimental Rate Schedule EV-PS (Electric Vehicle – Point of Sale) (“Rate EV-PS”). Under this rate schedule, the EV driver would render payment for the transaction amount at the point and time of purchase via a credit card, a pre-paid card, or other method acceptable to APS.

The proposed EV-PS rate schedule includes an “Infrastructure Charge” in addition to a time-of-use energy rate. The Infrastructure Charge has been designed to recover the fixed and variable costs associated with the purchase, installation, and on-going operations and maintenance of charging stations in a variable manner, based on a 10-year book life of the charging stations. The Infrastructure Charge is proposed at \$0.18249 per kWh. This rate schedule is designed to be “self-funding”, meaning that the revenue generated from the Infrastructure Charge will be utilized to fund the installation of the public charging infrastructure. In the event the Study is not continued beyond the initial three years, the remaining cost of the charging stations would be recovered through the normal ratemaking process.

The energy charges on the proposed Rate EV-PS rate are as follows:³

Table II
Experimental Rate Schedule EV-PS (Electric Vehicle – Point of Sale)

May - October Billing Cycles (Summer)	November - April Billing Cycles (Winter)
\$0.14133 per kWh during On-Peak hours, plus \$0.05413 per kWh during Off-Peak hours	\$0.12190 per kWh during On-Peak hours, plus \$0.05413 per kWh during Off-Peak hours

³ These rates will also be subject to all applicable Adjustment Schedules, taxes and service fees.

The number and location of public charging stations to be deployed by APS is based on estimates of EV sales within APS' service territory and would be adjusted based on actual EV purchases during the Study period. APS' proposed public EV charging program would complement the Department of Energy's *EV Project*,⁴ which is focused solely on roll-out and testing of charging stations within the Phoenix and Tucson metropolitan areas and along the I-10 corridor between those cities, but not in the balance of APS' service territory.

Public Education and Outreach

APS is in the process of developing several communication tools in order to reach and inform customers regarding the benefits of electric vehicles and the availability of Company programs to support the adoption of EVs. First, APS has launched a website (aps.com/cars) that is intended to be a "one-stop shop" for customers to learn the basics of EV ownership.

APS has also partnered with leading automobile manufacturers, other utilities, and battery and charging station manufacturers to establish a website to educate consumers, policymakers, and key industry sectors on the benefits of EVs. This collaborative site, GoElectricDrive.com, contains comprehensive information about owning and operating an EV, including available federal and state incentives and other EV benefits.

The Company is also investigating additional consumer outreach channels to broaden the awareness of the proposed Rate ET-EV and the availability of public charging stations within APS' service territory. In addition, detailed information will be made available to EV dealerships to educate the sales force regarding the availability of the proposed EV rates.

Reporting

At the end of each Study year, APS proposes to provide a detailed report to Commission Staff which would include a Study status report, a current analysis of the EV market, an analysis of data gathered, and the Company's recommendations for moving forward with the Study. Staff has recommended that these reports be filed with the Commission in this docket.

Study Expenses

APS anticipates the cost of the three-year Study to be approximately \$1.5 million⁵. Of this amount, approximately \$1 million is related to the capital expenditures for procuring and deploying vehicle chargers. These expenses would begin at the time the Commission approves

⁴ The DOE's *EV Project* is a federal project to deploy EVs and EV charging infrastructure in 18 major cities and metropolitan areas across the United States. By 2012, the EV Project will deploy approximately 14,000 Level 2 charging stations and 300-400 Level 3, DC Fast Charging Stations. The ultimate goal of the EV Project is to take the lessons learned from the deployment of the first 8,300 EVs, and the charging infrastructure supporting them, to enable the streamlined deployment of the next 5,000,000 EVs.

⁵ APS may spend more or less than the forecasted \$1.5 million based upon EV market indicators.

the Study and would be staggered over the initial Study period based on the level of market activity.

The following table provides a summary of the Study's overall estimated expenses:

Table III
Estimated EV-Ready Study Expenses by Year⁶

	2012	2013	2014
Infrastructure	\$ 670,000	\$ 130,000	\$ 180,000
Administration	\$ 120,000	\$ 120,000	\$ 120,000
Public Education and Outreach	\$ 55,000	\$ 55,000	\$ 55,000
Total Forecast Annual Expense	\$ 845,000	\$ 305,000	\$ 355,000
Estimated Cumulative EV Population in APS Territory	538	694	957
APS Level 2 Public Chargers	27	8	13
APS Level 3 Public DC Fast Chargers	<u>3</u>	<u>1</u>	<u>1</u>
Annual Number of Public APS Chargers	30	9	14

Analysis

V2G Study Findings

Under terms of Decision No. 71104, APS was required to prepare a report on the feasibility and cost benefits of V2G program. Accordingly, APS contracted with Navigant Consulting, Inc. ("Navigant") to prepare a study. APS asked Navigant to assess the potential for the emergence of a plug-in hybrid electric vehicle ("PHEV")/EV fleet and how it might affect utilities in general and APS in particular. Navigant also examined the potential for using PHEV/EV as energy storage devices to redeliver energy in V2G or Vehicle-to-Building ("V2B") applications. APS filed the "*PHEV/EV⁷ and V2G Impacts and Valuation Study*", dated March 10, 2010 ("V2G Study") in this docket on April 1, 2010.

The V2G Study concludes that the market penetration of PHEV/EVs is likely to be gradual, especially within the next 15 years. PHEV/EVs are likely to comprise about 2 percent of motor vehicle sales in the APS service territory by 2018. After 2025, however, sales are expected to increase substantially, and by 2035, PHEV/EV could account for about 17 percent of

⁶ Infrastructure expense during the first year includes software and system upgrades for the remainder of the Study. Infrastructure equipment costs are preliminary and are subject to formal quotes from vendors.

⁷ "PHEV/EV" is an acronym that stands for Plug-in Hybrid Electric Vehicle / Electric Vehicle. The V2G Study makes a distinction between PHEVs that contain an internal combustion engine in addition to a battery driven electric motor, and EVs which contain only a battery and electric motor. Both PHEVs and EVs have the capability to recharge their batteries from the grid. Unless otherwise noted, the term "EV" as used in this document refers collectively to both PHEVs and EVs

sales. This equates to sales of about 29,000 EVs and 12,000 PHEVs in 2035 for a total PHEV/EV population of about 174,000.

The V2G Study states that the case for V2G services, defined as utility customers selling energy stored in vehicle batteries back to the grid, is less optimistic than for PHEV/EV market penetration. V2G is currently at the research and pilot stage, and none of the V2G concepts reviewed by the study are presently commercially viable. V2G services are not forecast to be economic for the utility until vehicle batteries achieve a much higher level of battery cycle life and affordability.

The V2G Study concludes: "Overall, PHEV/EV will have relatively minor impacts on the APS system in the next 10 years with the exception of the local distribution system. Impacts in the next 20 to 30 years, although growing, will also be relatively minor. V2G/V2B services will play only a minor role within the next 20 to 30 years in providing energy services within the APS service territory."

EV Market Development

Several programs at the national level are working in concert to stimulate the rapid adoption of EVs and their attendant infrastructure. The Department of Energy's *EV Project*, in partnership with General Motors and Nissan, and through their implementation contractor, ECotality, will deploy approximately 14,000 chargers in 18 major cities and metropolitan areas located in six states and the District of Columbia. Both Chevrolet Volt and Nissan LEAF drivers who qualify to participate in the *EV Project* will receive a residential charger at no cost. In addition, most, if not all, of the installation cost will be paid for by the *EV Project*. The Phoenix and Tucson metropolitan areas are designated deployment communities in the *EV Project*. The ultimate goal of the *EV Project* is to take the lessons learned from the deployment of the first 8,300 EVs, and the charging infrastructure supporting them, to enable the streamlined deployment of the next 5,000,000 EVs.

ChargePoint America is another national program designed to quickly roll out EV charging infrastructure. The program is sponsored by Coulomb Technologies to provide electric vehicle charging infrastructure to nine selected regions in the United States. The program is made possible by the American Recovery and Reinvestment Act through the Transportation Electrification Initiative administered by the Department of Energy. The objective is to accelerate the development and production of electric vehicles to substantially reduce petroleum consumption, reduce greenhouse gas production, and create jobs. To build the electric vehicle-charging infrastructure, Coulomb Technologies will provide a total of nearly 5,000 fully networked Level II charging stations at no cost in the participating regions. There are two types of networked charging stations being offered through the program: home and public/commercial. Installation of these charging stations in most cases will be paid by the station owner (host) or the individual.

Also working at the national level, *The Electrification Coalition* is a nonpartisan, not-for-profit group of business leaders committed to promoting policies and actions that facilitate the deployment of electric vehicles on a mass scale. The Coalition seeks to achieve its goals through a combination of public policy research and the education of policymakers, opinion leaders, and the public. The Coalition has published several comprehensive “roadmap” guides to electrification of company fleets and private passenger fleets. The Coalition’s most recent publication is an analysis of the economic impact of implementing their “*Electrification Roadmap*”. The Coalition’s analysis predicts numerous societal benefits including job creation, increased federal revenues, increased household income, and decreased oil imports.

The primary driver of the expected near term adoption of EVs are federal tax credits and other tax credits and incentives that help offset the price differential between an EV and a comparable conventional vehicle. Presently, the minimum federal credit amount for typical passenger vehicles is \$2,500, and the credit may be up to \$7,500, based on each vehicle's traction battery capacity and the gross vehicle weight rating. The credit will begin to be phased out for each manufacturer in the second quarter following the calendar quarter in which a minimum of 200,000 qualified plug-in electric drive vehicles have been sold by that manufacturer for use in the United States. The state of Arizona offers a tax credit of up to \$75 for EV charging equipment and a reduced vehicle license tax for alternative fuel vehicles. As previously discussed, incentives are also available through the federal *EV Project* for EV charging equipment.

Since tax credits and incentives are the main driver of early EV adoption, and because the continuation of credits and incentives is political and uncertain, it is hard to forecast the specific number of electric vehicles that will exist within APS’ service territory at any particular point in the future. APS has taken the approach of using multiple forecast scenarios to provide a range of EV adoption figures. These scenarios are labeled “Curve A”, “Curve B”, and “Curve C” on the following table. Curve A is based on the Navigant V2G Study filed in this docket. Curve B is based on a Credit Suisse report on EVs prepared in 2009, modified with Arizona vehicle sales percentages from the National Auto Dealers Association (“NADA”). Curve C is based on a Deloitte report on EVs prepared in 2010, again modified with the NADA sales percentages for Arizona.

Table IV
Cumulative PHEV/EV Population Within APS Service Territory

	Curve A	Curve B	Curve C
2011	406	449	533
2012	560	538	629
2013	837	694	867
2014	1,262	957	1,344
2015	2,015	1,340	2,060
2016	3,051	2,106	3,253
2017	4,993	3,682	5,161
2018	8,048	6,093	8,263
2019	8,852	8,717	13,034
2020	9,329	12,037	21,049
2021	9,922	15,414	31,069

Based on this range of potential electric vehicles within its service territory, APS has calculated the potential additional energy and demand requirements resulting from the adoption of EVs. The design standard for Level 2 charging stations is 6.6 kW. APS has assumed that PHEVs will typically require 12 kWh per day for battery charging, and EVs will require 18.9 kWh per day. To determine the peak load added by electric vehicles, APS has assumed that all charging can occur simultaneously. The calculated ranges of peak loads added by the adoption of electric vehicles within the APS service territory is presented in the following Table V. APS has not included any DC Fast Charging in these scenarios; however, these types of chargers draw between 40-60 kW with a design standard up to 200 kW.

Table V
Electric Vehicle Peak Load Forecast

	Curve A		Curve B		Curve C	
	MWh	MW	MWh	MW	MWh	MW
2011	1,895	3	2,164	3	2,561	4
2012	2,438	4	2,525	4	2,910	4
2013	3,395	6	3,173	5	3,783	6
2014	4,874	8	4,289	6	5,557	9
2015	7,453	13	5,934	9	8,219	14
2016	11,121	20	9,222	14	12,723	21
2017	18,140	33	16,104	24	20,080	34
2018	29,213	53	26,700	40	32,103	55
2019	32,218	58	38,335	58	50,984	86
2020	34,164	62	53,208	79	84,303	139
2021	36,541	65	68,353	102	125,631	205

APS has used Curve B as the basis for its public EV charging station infrastructure installation plan.

Time-Of-Use Rates

Table V demonstrates that the projected adoption of electric vehicles within the APS service territory will lead to modest increases in energy and demand requirements. While this increase represents an opportunity for increased revenue, APS will be challenged to find ways to integrate the new demand into its existing distribution system while minimizing negative system impacts. APS is largely relying on its proposed time-of-use (“TOU”) rate (i.e. ET-EV) to incent home vehicle charging during off-peak hours to minimize distribution system impacts.

Experimental Rate Schedule ET-EV is a “whole house” TOU rate that provides residential customers with a “Super Off-Peak” time period designed to encourage off-peak EV charging. The “Super Off-Peak” pricing period will be from 11 p.m. to 5 a.m. Monday through Friday, a time period during which APS residential customers traditionally use the least amount of energy, and APS’ marginal generation sources are least expensive.

The term “whole house” refers to the fact that electric energy consumption for the customer’s entire house is measured through a single meter. Therefore, all electric usage within the house is subject to the time/price signals contained in the TOU rate. This approach can be contrasted with a TOU rate established for a separately metered service that feeds only the in-home EV charging station.

Several utility companies across the country have instituted TOU rates for separately metered EV charging stations. For example, The Detroit Edison Company (“DEC”) has an Experimental Electric Vehicle Tariff that is available to the first 2,550 customers seeking a separately metered vehicle charging station. Under this tariff, DEC will provide and install the required separately metered circuit and the charging station up to a cost of \$2,500. Customers are provided with two rate options: a TOU rate with off-peak hours between 11:00 pm and 9:00 am, or a monthly flat fee of \$40 per vehicle.

Southern California Edison Company, Pacific Gas & Electric Company, and San Diego Gas & Electric Company all offer separately metered TOU rates for EV charging. These separately metered rates are offered in addition to “whole-house” TOU rates for EV charging.

APS has accepted Staff’s recommendation to look into the feasibility of offering a separately metered, non-tiered, TOU rate for EV charging as an additional customer rate option to the “whole-house” TOU rate proposed in this application. APS has committed to conducting this feasibility study and would report its findings in the Company’s first annual report of Study findings.

Staff believes that the proposed electric vehicle-only ET-EV time-of-use rate schedule could be an effective method of shifting electric consumption to non-peak periods through the

use of time / pricing signals. APS would implement an EV certification process similar to low-income certification. Staff recommends approval of proposed Experimental Rate Schedule ET-EV.

Staff has considered the proposed rate schedule in terms of fair value implications. In Decision No. 71448, APS' fair value rate base was determined by the Commission to be \$7,665,727,000. Although Staff considered this information when evaluating APS' proposed Rate ET-EV, the proposed rate schedule would have no significant impact on the Company's revenue or rate of return. Staff has determined that the revenue generated by the proposed rate schedule would be de minimus when considered in the context of the Company's overall revenue requirement and rate of return.

Study Expenses and Funding

Staff believes that the role of EV market stimulation is being adequately addressed by federally funded incentive programs. Staff further believes that the introduction of EVs into APS' service territory represents a load and revenue growth opportunity for APS. Indeed, APS will sell electricity to all EV charging systems within its service territory, regardless of charger infrastructure ownership. However, APS' role in providing charging infrastructure is presently unclear, in light of the federally funded efforts.

Staff further believes that a three-year study with an estimated cost of \$1.5 million is unnecessary at this early stage of EV market development. Therefore, Staff has recommended that APS be directed to monitor the adoption of electric vehicles within its service territory and provide annual reports to the Commission detailing the status of EV adoption, beginning with the first annual report due on May 1, 2012. Subsequent annual reports are to be filed until such time as the Commission orders otherwise.

Although the proposed public point-of-sale rate EV-PS has been designed to self-fund the installation and maintenance of public charging infrastructure, the "Administration" and "Public Education and Outreach" line items of the Study's estimated costs would be paid through APS' general Operations & Maintenance budget, meaning these costs will ultimately be born by all ratepayers. Rather than spending relatively large sums of money in an effort to provide charging services to the relatively small number of EVs anticipated in the foreseeable future, Staff believes that it may be more prudent to direct APS to work cooperatively with the federally-funded EV infrastructure contractors for the first year of the proposed Study. Should APS identify a specific gap in charging infrastructure deployment, or other deficiency in the federally-funded EV infrastructure efforts, APS could request approval of a public point-of-sale rate in APS' first annual report of Study findings to the Commission.

Waiver of Rules

APS has requested a waiver of the billing requirements contained in A.A.C. R14-2-210 to accommodate point-of-sale EV charging transactions as contemplated in Experimental Rate

Schedule EV-PS. Under the Company's proposed Experimental Rate Schedule EV-PS, Electric Vehicle Point-of-Sale customers would render instantaneous payment for energy utilized to charge an EV at a public charging station owned by APS. Payment for point-of-sale service would generally be accomplished through the use of either a personal credit card or a specifically targeted pre-paid card. No bills would be rendered to customers for this service, as the customer would be paying for electricity at the time service is rendered.

A.A.C. R14-2-210 sets forth billing transaction requirements for electric utilities and their customers. As no bills would be rendered under point-of-sale service, APS believes this entire section would not be applicable to service provided under Schedule EV-PS.

Staff believes that point-of-sale recharging of EV batteries via APS-owned charging stations may not be necessary for the wide-spread adoption of EVs. Therefore, Staff recommends that the Commission not approve Experimental Rate Schedule EV-PS and not grant a waiver of the billing requirements contained in A.A.C.R14-2-210 for this specific tariff, until such time as APS can demonstrate a need for company-owned charging stations.

Summary of Recommendations

Staff recommends that APS be directed to file annual reports, beginning in May, 2012, detailing the development of the EV market within APS' service territory.

Staff recommends approval of Experimental Rate Schedule ET-EV.

Staff further recommends that APS be directed to conduct a feasibility study of offering a separately metered, non-tiered, TOU rate for EV charging with a report of the findings of this study to be included in APS first annual report to the Commission

Staff further recommends that APS be directed to work cooperatively with the federally-funded EV infrastructure contractors for the first year of the proposed Study. Should APS identify a specific gap in charging infrastructure deployment, or other deficiency in the federally-funded EV infrastructure efforts, APS could request approval of a public point-of-sale rate in APS' first annual report of Study findings to the Commission.

Staff further recommends that Experimental Rate Schedule EV-PS not be approved.

Staff further recommends that APS file its annual status reports with the Commission in this docket.

THE COMMISSION

August 24, 2011

Page 12

In addition, Staff recommends that APS file Experimental Rate Schedule ET-EV in compliance with the Decision in this case within 15 days of the effective date of the Decision.

A handwritten signature in black ink, appearing to read 'Steven M. Olea', with a stylized flourish at the end.

Steven M. Olea
Director
Utilities Division

SMO:RBL:lh\CH

ORIGINATOR: Rick Lloyd

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BEFORE THE ARIZONA CORPORATION COMMISSION

- GARY PIERCE
Chairman
- BOB STUMP
Commissioner
- SANDRA D. KENNEDY
Commissioner
- PAUL NEWMAN
Commissioner
- BRENDA BURNS
Commissioner

IN THE MATTER OF ARIZONA PUBLIC
SERVICE COMPANY'S APPLICATION
FOR APPROVAL OF PROPOSED
ELECTRIC VEHICLE READINESS
DEMONSTRATION PROJECT

DOCKET NO. E-01345A-10-0123
DECISION NO. _____
ORDER

Open Meeting
September 6 and 7, 2011
Phoenix, Arizona

BY THE COMMISSION:

FINDINGS OF FACT

Background

1. Arizona Public Service Company ("APS" or "Company") is certificated to provide electric service as a public service corporation in the State of Arizona.
2. Pursuant to Commission Decision No. 71104, dated June 5, 2009, APS was required to conduct a Vehicle to Grid ("V2G") feasibility and cost benefit study ("V2G Study"). Subsequent to completion of the V2G Study, APS was required to propose a V2G program for Commission consideration, no later than April 2, 2010. The V2G Study was docketed on April 1, 2010, along with an overview of the proposed Electric Vehicle ("EV") Readiness Demonstration Program. On October 1, 2010, APS filed its application for the proposed Electric Vehicle Readiness Demonstration Project.
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27 _____
28 ¹ Neighborhood Electric Vehicles as defined by A.R.S. §28-101(36) do not qualify for this rate schedule.

² These rates would also be subject to all applicable Adjustment Schedules, taxes and service fees.

1 APS-Owned Public EV Charging Stations

2 10. APS proposes a public charging program that would provide EV drivers the ability
3 to charge EVs in convenient and accessible locations outside the home, and to enable longer-
4 distance travel throughout the state.

5 11. The APS public EV charging program would be available to all EV drivers (not just
6 APS customers) on a point-of-sale basis under proposed Experimental Rate Schedule EV-PS
7 (Electric Vehicle – Point of Sale) (“Rate EV-PS”). Under this rate schedule, the EV driver would
8 render payment for the transaction amount at the point and time of purchase via a credit card, a
9 pre-paid card, or other method acceptable to APS.

10 12. The proposed EV-PS rate schedule includes an “Infrastructure Charge” in addition
11 to a time-of-use energy rate. The Infrastructure Charge has been designed to recover the fixed and
12 variable costs associated with the purchase, installation, and on-going operations and maintenance
13 of charging stations in a variable manner, based on a 10-year book life of the charging stations.
14 The Infrastructure Charge is proposed at \$0.18249 per kWh. This rate schedule is designed to be
15 “self-funding”, meaning that the revenue generated from the Infrastructure Charge will be utilized
16 to fund the installation of the public charging infrastructure. In the event the Study is not
17 continued beyond the initial three years, the remaining cost of the charging stations would be
18 recovered through the normal ratemaking process.

19 13. The energy charges on the proposed Rate EV-PS rate are as follows:³

20 **Table II**
21 **Experimental Rate Schedule EV-PS (Electric Vehicle – Point of Sale)**

May - October Billing Cycles (Summer)	November - April Billing Cycles (Winter)
\$0.14133 per kWh during On-Peak hours, plus \$0.05413 per kWh during Off-Peak hours	\$0.12190 per kWh during On-Peak hours, plus \$0.05413 per kWh during Off-Peak hours

22
23
24
25 14. The number and location of public charging stations to be deployed by APS is
26 based on estimates of EV sales within APS’ service territory and would be adjusted based on
27

28 ³ These rates will also be subject to all applicable Adjustment Schedules, taxes and service fees.

1 actual EV purchases during the Study period. APS' proposed public EV charging program would
2 complement the Department of Energy's *EV Project*,⁴ which is focused solely on roll-out and
3 testing of charging stations within the Phoenix and Tucson metropolitan areas and along the I-10
4 corridor between those cities, but not in the balance of APS' service territory.

5 Public Education and Outreach

6 15. APS is in the process of developing several communication tools in order to reach
7 and inform customers regarding the benefits of electric vehicles and the availability of Company
8 programs to support the adoption of EVs. First, APS has launched a website (aps.com/cars) that is
9 intended to be a "one-stop shop" for customers to learn the basics of EV ownership.

10 16. APS has also partnered with leading automobile manufacturers, other utilities, and
11 battery and charging station manufacturers to establish a website to educate consumers,
12 policymakers, and key industry sectors on the benefits of EVs. This collaborative site,
13 GoElectricDrive.com, contains comprehensive information about owning and operating an EV,
14 including available federal and state incentives and other EV benefits.

15 17. The Company is also investigating additional consumer outreach channels to
16 broaden the awareness of the proposed Rate ET-EV and the availability of public charging stations
17 within APS' service territory. In addition, detailed information will be made available to EV
18 dealerships to educate the sales force regarding the availability of the proposed EV rates.

19 Reporting

20 18. At the end of each Study year, APS proposes to provide a detailed report to
21 Commission Staff which would include a Study status report, a current analysis of the EV market,
22 an analysis of data gathered, and the Company's recommendations for moving forward with the
23 Study. Staff has recommended that these reports be filed with the Commission in this docket.

24 ...

26 ⁴ The DOE's *EV Project* is a federal project to deploy EVs and EV charging infrastructure in 18 major cities and
27 metropolitan areas across the United States. By 2012, the EV Project will deploy approximately 14,000 Level 2
28 charging stations and 300-400 Level 3, DC Fast Charging Stations. The ultimate goal of the EV Project is to take the
lessons learned from the deployment of the first 8,300 EVs, and the charging infrastructure supporting them, to enable
the streamlined deployment of the next 5,000,000 EVs.

1 Study Expenses

2 19. APS anticipates the cost of the three-year Study to be approximately \$1.5 million⁵.
 3 Of this amount, approximately \$1 million is related to the capital expenditures for procuring and
 4 deploying vehicle chargers. These expenses would begin at the time the Commission approves the
 5 Study and would be staggered over the initial Study period based on the level of market activity.

6 **Table III**
 7 **Estimated EV-Ready Study Expenses by Year⁶**

	2012	2013	2014
Infrastructure	\$670,000	\$ 30,000	\$180,000
Administration	\$120,000	\$120,000	\$120,000
Public Education and Outreach	\$ 55,000	\$ 55,000	\$ 55,000
Total Forecast Annual Expense	\$845,000	\$305,000	\$355,000
Estimated Cumulative EV Population in APS Territory	538	694	957
APS Level 2 Public Chargers	27	8	13
APS Level 3 Public DC Fast Chargers	3	1	1
Annual Number of Public APS Chargers	30	9	14

14
 15 Analysis

16 V2G Study Findings

17 20. Under terms of Decision No. 71104, APS was required to prepare a report on the
 18 feasibility and cost benefits of a V2G program. Accordingly, APS contracted with Navigant
 19 Consulting, Inc. ("Navigant") to prepare a study. APS asked Navigant to assess the potential for
 20 the emergence of a plug-in hybrid electric vehicle ("PHEV")/EV fleet and how it might affect
 21 utilities in general and APS in particular. Navigant also examined the potential for using
 22 PHEV/EV as energy storage devices to redeliver energy in V2G or Vehicle-to-Building ("V2B")
 23 applications. APS filed the "*PHEV/EV⁷ and V2G Impacts and Valuation Study*", dated March 10,
 24 2010 ("V2G Study") in this docket on April 1, 2010.

25 _____
 26 ⁵ APS may spend more or less than the forecasted \$1.5 million based upon EV market indicators.

27 ⁶ Infrastructure expense during the first year includes software and system upgrades for the remainder of the Study.
 Infrastructure equipment costs are preliminary and are subject to formal quotes from vendors.

28 ⁷ "PHEV/EV" is an acronym that stands for Plug-in Hybrid Electric Vehicle / Electric Vehicle. The V2G Study makes
 a distinction between PHEVs that contain an internal combustion engine in addition to a battery driven electric motor,
 and EVs which contain only a battery and electric motor. Both PHEVs and EVs have the capability to recharge their

1 21. The V2G Study concludes that the market penetration of PHEV/EVs is likely to be
2 gradual, especially within the next 15 years. PHEV/EVs are likely to comprise about 2 percent of
3 motor vehicle sales in the APS service territory by 2018. After 2025, however, sales are expected
4 to increase substantially, and by 2035, PHEV/EV could account for about 17 percent of sales.
5 This equates to sales of about 29,000 EVs and 12,000 PHEVs in 2035 for a total PHEV/EV
6 population of about 174,000.

7 22. The V2G Study states that the case for V2G services, defined as utility customers
8 selling energy stored in vehicle batteries back to the grid, is less optimistic than for PHEV/EV
9 market penetration. V2G is currently at the research and pilot stage, and none of the V2G
10 concepts reviewed by the study are presently commercially viable. V2G services are not forecast
11 to be economic for the utility until vehicle batteries achieve a much higher level of battery cycle
12 life and affordability.

13 23. The V2G Study concludes: "Overall, PHEV/EV will have relatively minor impacts
14 on the APS system in the next 10 years with the exception of the local distribution system.
15 Impacts in the next 20 to 30 years, although growing, will also be relatively minor. V2G/V2B
16 services will play only a minor role within the next 20 to 30 years in providing energy services
17 within the APS service territory."

18 EV Market Development

19 24. Several programs at the national level are working in concert to stimulate the rapid
20 adoption of EVs and their attendant infrastructure. The Department of Energy's *EV Project*, in
21 partnership with General Motors and Nissan, and through their implementation contractor,
22 ECotality, will deploy approximately 14,000 chargers in 18 major cities and metropolitan areas
23 located in six states and the District of Columbia. Both Chevrolet Volt and Nissan LEAF drivers
24 who qualify to participate in the *EV Project* will receive a residential charger at no cost. In
25 addition, most, if not all, of the installation cost will be paid for by the *EV Project*. The Phoenix
26 and Tucson metropolitan areas are designated deployment communities in the *EV Project*. The
27

28 batteries from the grid. Unless otherwise noted, the term "EV" as used in this document refers collectively to both PHEVs and EVs

1 ultimate goal of the *EV Project* is to take the lessons learned from the deployment of the first 8,300
2 EVs, and the charging infrastructure supporting them, to enable the streamlined deployment of the
3 next 5,000,000 EVs.

4 25. *ChargePoint America* is another national program designed to quickly roll out EV
5 charging infrastructure. The program is sponsored by Coulomb Technologies to provide electric
6 vehicle charging infrastructure to nine selected regions in the United States. The program is made
7 possible by the American Recovery and Reinvestment Act through the Transportation
8 Electrification Initiative administered by the Department of Energy. The objective is to accelerate
9 the development and production of electric vehicles to substantially reduce petroleum
10 consumption, reduce greenhouse gas production, and create jobs. To build the electric vehicle-
11 charging infrastructure, Coulomb Technologies will provide a total of nearly 5,000 fully
12 networked Level II charging stations at no cost in the participating regions. There are two types of
13 networked charging stations being offered through the program: home and public/commercial.
14 Installation of these charging stations in most cases will be paid by the station owner (host) or the
15 individual.

16 26. Also working at the national level, *The Electrification Coalition* is a nonpartisan,
17 not-for-profit group of business leaders committed to promoting policies and actions that facilitate
18 the deployment of electric vehicles on a mass scale. The Coalition seeks to achieve its goals
19 through a combination of public policy research and the education of policymakers, opinion
20 leaders, and the public. The Coalition has published several comprehensive "roadmap" guides to
21 electrification of company fleets and private passenger fleets. The Coalition's most recent
22 publication is an analysis of the economic impact of implementing their "Electrification
23 Roadmap". The Coalition's analysis predicts numerous societal benefits including job creation,
24 increased federal revenues, increased household income, and decreased oil imports.

25 27. The primary driver of the expected near term adoption of EVs is federal tax credits
26 and other tax credits and incentives that help offset the price differential between an EV and a
27 comparable conventional vehicle. Presently, the minimum federal credit amount for typical
28 passenger vehicles is \$2,500, and the credit may be up to \$7,500, based on each vehicle's traction

1 battery capacity and the gross vehicle weight rating. The credit will begin to be phased out for
 2 each manufacturer in the second quarter following the calendar quarter in which a minimum of
 3 200,000 qualified plug-in electric drive vehicles have been sold by that manufacturer for use in the
 4 United States. The state of Arizona offers a tax credit of up to \$75 for EV charging equipment and
 5 a reduced vehicle license tax for alternative fuel vehicles. As previously discussed, incentives are
 6 also available through the federal *EV Project* for EV charging equipment.

7 28. Since tax credits and incentives are the main driver of early EV adoption, and
 8 because the continuation of credits and incentives is political and uncertain, it is hard to forecast
 9 the specific number of electric vehicles that will exist within APS' service territory at any
 10 particular point in the future. APS has taken the approach of using multiple forecast scenarios to
 11 provide a range of EV adoption figures. These scenarios are labeled "Curve A", "Curve B", and
 12 "Curve C" on the following table. Curve A is based on the Navigant V2G Study filed in this
 13 docket. Curve B is based on a Credit Suisse report on EVs prepared in 2009, modified with
 14 Arizona vehicle sales percentages from the National Auto Dealers Association ("NADA"). Curve
 15 C is based on a Deloitte report on EVs prepared in 2010, again modified with the NADA sales
 16 percentages for Arizona.

17 **Table IV**
 18 **Cumulative PHEV/EV Population Within APS Service Territory**

	Curve A	Curve B	Curve C
2011	406	449	533
2012	560	538	629
2013	837	694	867
2014	1,262	957	1,344
2015	2,015	1,340	2,060
2016	3,051	2,106	3,253
2017	4,993	3,682	5,161
2018	8,048	6,093	8,263
2019	8,852	8,717	13,034
2020	9,329	12,037	21,049
2021	9,922	15,414	31,069

27 29. Based on this range of potential electric vehicles within its service territory, APS
 28 has calculated the potential additional energy and demand requirements resulting from the

1 adoption of EVs. The design standard for Level 2 charging stations is 6.6 kW. APS has assumed
 2 that PHEVs will typically require 12 kWh per day for battery charging, and EVs will require 18.9
 3 kWh per day. To determine the peak load added by electric vehicles, APS has assumed that all
 4 charging can occur simultaneously. The calculated ranges of peak loads added by the adoption of
 5 electric vehicles within the APS service territory is presented in the following Table V. APS has
 6 not included any DC Fast Charging in these scenarios; however, these types of chargers draw
 7 between 40-60 kW with a design standard up to 200 kW.

8 **Table V**
 9 **Electric Vehicle Peak Load Forecast**

	Curve A		Curve B		Curve C	
	MWh	MW	MWh	MW	MWh	MW
2011	1,895	3	2,164	3	2,561	4
2012	2,438	4	2,525	4	2,910	4
2013	3,395	6	3,173	5	3,783	6
2014	4,874	8	4,289	6	5,557	9
2015	7,453	13	5,934	9	8,219	14
2016	11,121	20	9,222	14	12,723	21
2017	18,140	33	16,104	24	20,080	34
2018	29,213	53	26,700	40	32,103	55
2019	32,218	58	38,335	58	50,984	86
2020	34,164	62	53,208	79	84,303	139
2021	36,541	65	68,353	102	125,631	205

17 30. APS has used Curve B as the basis for its public EV charging station infrastructure
 18 installation plan.

19 Time-Of-Use Rates

20 31. Table V demonstrates that the projected adoption of electric vehicles within the
 21 APS service territory will lead to modest increases in energy and demand requirements. While this
 22 increase represents an opportunity for increased revenue, APS will be challenged to find ways to
 23 integrate the new demand into its existing distribution system while minimizing negative system
 24 impacts. APS is largely relying on its proposed time-of-use ("TOU") rate (i.e. ET-EV) to incent
 25 home vehicle charging during off-peak hours to minimize distribution system impacts.

26 32. Experimental Rate Schedule ET-EV is a "whole house" TOU rate that provides
 27 residential customers with a "Super Off-Peak" time period designed to encourage off-peak EV
 28 charging. The "Super Off-Peak" pricing period will be from 11 p.m. to 5 a.m. Monday through

1 Friday, a time period during which APS residential customers traditionally use the least amount of
2 energy, and APS; marginal generation sources are least expensive.

3 33. The term "whole house" refers to the fact that electric energy consumption for the
4 customer's entire house is measured through a single meter. Therefore, all electric usage within
5 the house is subject to the time/price signals contained in the TOU rate. This approach can be
6 contrasted with a TOU rate established for a separately metered service that feeds only the in-
7 home EV charging station.

8 34. Several utility companies across the country have instituted TOU rates for
9 separately metered EV charging stations. For example, The Detroit Edison Company ("DEC") has
10 an Experimental Electric Vehicle Tariff that is available to the first 2,550 customers seeking a
11 separately metered vehicle charging station. Under this tariff, DEC will provide and install the
12 required separately metered circuit and the charging station up to a cost of \$2,500. Customers are
13 provided with two rate options: a TOU rate with off-peak hours between 11:00 p.m. and 9:00 a.m.,
14 or a monthly flat fee of \$40 per vehicle.

15 35. Southern California Edison Company, Pacific Gas & Electric Company, and San
16 Diego Gas & Electric Company all offer separately metered TOU rates for EV charging. These
17 separately metered rates are offered in addition to "whole house" TOU rates for EV charging.

18 36. APS has accepted Staff's recommendation to look into the feasibility of offering a
19 separately metered, non-tiered, TOU rate for EV charging as an additional customer rate option to
20 the "whole house" TOU rate proposed in this application. APS has committed to conducting this
21 feasibility study and would report its findings in the Company's first annual report of Study
22 findings.

23 37. Staff believes that the proposed electric vehicle-only ET-EV time-of-use rate
24 schedule could be an effective method of shifting electric consumption to non-peak periods
25 through the use of time / pricing signals. APS would implement an EV certification process
26 similar to low-income certification. Staff has recommended approval of proposed Experimental
27 Rate Schedule ET-EV.

28 ...

1 38. Staff has considered the proposed rate schedule in terms of fair value implications.
2 In Decision No. 71448, APS' fair value rate base was determined by the Commission to be
3 \$7,665,727,000. Although Staff considered this information when evaluating APS' proposed Rate
4 ET-EV. The proposed rate schedule would have no significant impact on the Company's revenue
5 or rate of return. Staff has determined that the revenue generated by the proposed rate schedule
6 would be de minimus when considered in the context of the Company's overall revenue
7 requirement and rate of return.

8 Study Expenses and Funding

9 39. Staff believes that the role of EV market stimulation is being adequately addressed
10 by federally funded incentive programs. Staff further believes that the introduction of EVs into
11 APS' service territory represents a load and revenue growth opportunity for APS. Indeed, APS
12 will sell electricity to all EV charging systems within its service territory, regardless of charger
13 infrastructure ownership. However, APS' role in providing charging infrastructure is presently
14 unclear, in light of the federally funded efforts.

15 40. Staff further believes that a three-year study with an estimated cost of \$1.5 million
16 is unnecessary at this early stage of EV market development. Therefore, Staff has recommended
17 that APS be directed to monitor the adoption of electric vehicles within its service territory and
18 provide annual reports to the Commission detailing the status of EV adoption, beginning with the
19 first annual report due on May 1, 2012. Subsequent annual reports are to be filed until such time
20 as the Commission orders otherwise.

21 41. Although the proposed public point-of-sale rate EV-PS has been designed to self-
22 fund the installation and maintenance of public charging infrastructure, the "Administration" and
23 "Public Education and Outreach" line items of the Study's estimated costs would be paid through
24 APS' general Operations & Maintenance budget, meaning these costs will ultimately be born by
25 all ratepayers. Rather than spending relatively large sums of money in an effort to provide
26 charging services to the relatively small number of EVs anticipated in the foreseeable future, Staff
27 believes that it may be more prudent to direct APS to work cooperatively with the federally-funded
28 EV infrastructure contractors for the first year of the proposed Study. Should APS identify a

1 specific gap in charging infrastructure deployment, or other deficiency in the federally-funded EV
2 infrastructure efforts, APS could request approval of a public point-of-sale rate in APS; first
3 annual report of Study findings to the Commission.

4 Waiver of Rules

5 42. APS has requested a waiver of the billing requirements contained in A.A.C. R14-2-
6 210 to accommodate point-of-sale EV charging transactions as contemplated in Experimental Rate
7 Schedule EV-PS. Under the Company's proposed Experimental Rate Schedule EV-PS, Electric
8 Vehicle Point-of-Sale customers would render instantaneous payment for energy utilized to charge
9 an EV at a public charging station owned by APS. Payment for point-of-sale service would
10 generally be accomplished through the use of either a personal credit card or a specifically targeted
11 pre-paid card. No bills would be rendered to customers for this service, as the customer would be
12 paying for electricity at the time service is rendered.

13 43. A.A.C. R14-2-210 sets forth billing transaction requirements for electric utilities
14 and their customers. As no bills would be rendered under point-of-sale service, APS believes this
15 entire section would not be applicable to service provided under Schedule EV-PS.

16 44. Staff believes that point-of-sale recharging of EV batteries via APS-owned charging
17 stations may not be necessary for the wide-spread adoption of EVs. Therefore, Staff has
18 recommended that the Commission not approve Experimental Rate Schedule EV-PS and not grant
19 a waiver of the billing requirements contained in A.A.C. R14-2-210 for this specific tariff, until
20 such time as APS can demonstrate a need for company-owned charging stations.

21 Summary of Recommendations

22 45. Staff has recommended that APS be directed to file annual reports, beginning in
23 May 2012, detailing the development of the EV market within APS' service territory.

24 46. Staff has further recommended approval of Experimental Rate Schedule ET-EV.

25 47. Staff has further recommended that APS be directed to conduct a feasibility study
26 of offering a separately metered, non-tiered, TOU rate for EV charging with a report of the
27 findings of this study to be included in APS' first annual report to the Commission.

28 ...

1 IT IS FURTHER ORDERED that Arizona Public Service Company shall conduct a
2 feasibility study of offering a separately metered, non-tiered, TOU rate for EV charging with a
3 report of the findings of this study to be included in the Company's first annual report to the
4 Commission.

5 IT IS FURTHER ORDERED that Arizona Public Service Company shall work
6 cooperatively with the federally-funded EV infrastructure contractors for the first year of the
7 proposed Study. Should APS identify a specific gap in charging infrastructure deployment, or
8 other deficiency in the federally-funded EV infrastructure efforts, APS may request approval of a
9 public point-of-sale rate in APS' first annual report of Study findings to the Commission.

10 IT IS FURTHER ORDERED that Experimental Rate Schedule ET-EV is not approved.

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IT IS FURTHER ORDERED that Arizona Public Service Company file Experimental Rate Schedule ET-EV in compliance with the Decision in this case within 15 days of the effective date of the Decision.

IT IS FURTHER ORDERED that this Decision become effective immediately.

BY THE ORDER OF THE ARIZONA CORPORATION COMMISSION

CHAIRMAN	COMMISSIONER	
COMMISSIONER	COMMISSIONER	COMMISSIONER

IN WITNESS WHEREOF, I, ERNEST G. JOHNSON, Executive Director of the Arizona Corporation Commission, have hereunto, set my hand and caused the official seal of this Commission to be affixed at the Capitol, in the City of Phoenix, this _____ day of _____, 2011.

ERNEST G. JOHNSON
EXECUTIVE DIRECTOR

DISSENT: _____

DISSENT: _____

SMO:RBL:lh\CH

1 SERVICE LIST FOR: Arizona Public Service Company
2 DOCKET NO. E-01345A-10-0123

3 Ms. Alana Chavez-Langdon
4 ECOTality
5 80 East Rio Salado Parkway, Suite 710
6 Tempe, Arizona 85281

7 Ms. Linda J. Arnold
8 Ms. Deborah R. Scott
9 Pinnacle West Capital Corporation
10 400 North Fifth Street
11 Post Office Box 53999, MS 8695
12 Phoenix, Arizona 85072

13 Mr. Daniel Pozefsky
14 RUCO
15 1110 West Washington Street, Suite 220
16 Phoenix, Arizona 85007

17 Mr. Steven M. Olea
18 Director, Utilities Division
19 Arizona Corporation Commission
20 1200 West Washington Street
21 Phoenix, Arizona 85007

22 Ms. Janice M. Alward
23 Chief Counsel, Legal Division
24 Arizona Corporation Commission
25 1200 West Washington Street
26 Phoenix, Arizona 85007

27
28