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BEFORE THE ARIZONA CORPORATION COMMISSION

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AZ CORP COMMISSION
DOCKET CONTROL

2 COMMISSIONERS

3 KRISTIN K. MAYES, Chairman
4 GARY PIERCE
5 PAUL NEWMAN
6 SANDRA D. KENNEDY
7 BOB STUMP

7 IN THE MATTER OF THE APPLICATION
8 OF SOLARCITY FOR A DETERMINATION
9 THAT WHEN IT PROVIDES SOLAR
10 SERVICE TO ARIZONA SCHOOLS,
11 GOVERNMENTS, AND NON-PROFIT
12 ENTITIES IT IS NOT ACTING AS A
13 PUBLIC SERVICE CORPORATION
14 PURSUANT TO ART. 15, SECTION 2 OF
15 THE ARIZONA CONSTITUTION.

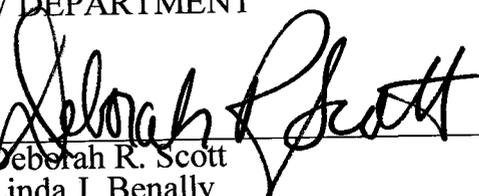
DOCKET NO. E-20690A-09-0346

ARIZONA PUBLIC SERVICE
COMPANY'S NOTICE OF FILING
TESTIMONY

14 Arizona Public Service Company ("APS" or "Company"), through undersigned
15 counsel, hereby provides notice of filing of the testimony of Barbara Lockwood in the above-
16 captioned docket.

17 RESPECTFULLY SUBMITTED this 30th day of September, 2009.

18 PINNACLE WEST CAPITAL CORPORATION
19 LAW DEPARTMENT

20 By: 
21 Deborah R. Scott
22 Linda J. Benally
23 Attorneys for Arizona Public Service Company

24 ORIGINAL and thirteen (13) copies
25 of the foregoing filed this 30th day of
26 September, 2009, with:

26 Docket Control
27 ARIZONA CORPORATION COMMISSION
28 1200 West Washington Street
Phoenix, Arizona 85007

Arizona Corporation Commission
DOCKETED

SEP 30 2009

DOCKETED BY 

1 COPY of the foregoing mailed/delivered this
2 30th day of September, 2009 to:

3 Attached list of parties.
4
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6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

Copies of the foregoing mailed or emailed this
30th day of September, 2009 to:

Timothy Hogan
202 E. McDowell Rd. - 153
Phoenix, AZ 85004

Michael Patten
Roshka DeWulf & Patten, PLC
400 E. Van Buren St. - 800
Phoenix, AZ 85004

Scott Wakefield
201 N. Central Ave., Suite 3300
Phoenix, AZ 85004

Bradley Carroll
400 E. Van Buren St.
Phoenix, AZ 85004

Kenneth Sundlof, Jr.
Jennings Strouss & Salmon, P.L.C.
201 E. Washington Street, 11th Floor
Phoenix, AZ 85004

Jay Moyes
1850 N. Central Ave, Suite 1100
Phoenix, AZ 85004

Steve Wene
1850 N. Central Ave, Suite 1100
Phoenix, AZ 85004

Phoenix Elementary District
1817 N. 7th St.
Phoenix, AZ 85006

Arizona State Board for Charter Schools
1700 W. Washington St. - 164
Phoenix, AZ 85007

Janice Alward
Arizona Corporation Commission
1200 W. Washington
Phoenix, AZ 85007

Daniel Pozefsky
RUCO
1110 West Washington, Suite 220
Phoenix, AZ 85007

Arizona Department of Education
1535 E. Jefferson St.
Phoenix, AZ 85007

Lyn Farmer
Arizona Corporation Commission
1200 W. Washington
Phoenix, AZ 85007

Steve Olea
Arizona Corporation Commission
1200 W. Washington
Phoenix, AZ 85007

Balsz Elementary District
4825 E. Roosevelt
Phoenix, AZ 85008

Wilson Elementary District
3025 E. Fillmore St
Phoenix, AZ 85008

Murphy Elementary District
2615 W. Buckeye Rd
Phoenix, AZ 85009

Isaac Elementary District
3348 W. McDowell Rd
Phoenix, AZ 85009

Phoenix Union High School District
4502 N. Central Ave
Phoenix, AZ 85012

Christopher Verde School District
4041 N. Central Ave., Suite 1100
Phoenix, AZ 85012

C. Webb Crockett
3003 N. Central Ave, Suite 2600
Phoenix, AZ 85012

Michael Curtis
501 East Thomas Road
Phoenix, AZ 85012

Osborn Elementary District
1226 W. Osborn Rd
Phoenix, AZ 85013

Madison Elementary District
5601 N. 16th Street
Phoenix, AZ 85016

Creighton Elementary District
2702 E. Flower St
Phoenix, AZ 85016
Michael Grant
2575 E. Camelback Road
Phoenix, AZ 85016

Scottsdale Unified District
3811 N. 44th Street
Phoenix, AZ 85018

Alhambra Elementary District
4510 N. 37th Ave
Phoenix, AZ 85019

Arizona Charter Schools Association
7500 N. Dreamy Draw Dr. #220
Phoenix, AZ 85020

Deer Valley Unified District
20402 N. 15th Ave
Phoenix, AZ 85027

Paradise Valley Unified District
15002 N. 32nd Street
Phoenix, AZ 85032

Cartwright Elementary District
3401 N. 67th Ave
Phoenix, AZ 85033

Pendergast Elementary District
3802 N. 91st Ave
Phoenix, AZ 85037

Roosevelt Elementary District
6000 S. 7th Street
Phoenix, AZ 85042

Riverside Elementary District
1414 S. 51st Ave
Phoenix, AZ 85043

Fowler Elementary District
1617 S. 67th Ave
Phoenix, AZ 85043

Kelly Barr
SRP
PO Box 52025, MS PAB221
Phoenix, AZ 85072

Jana Brandt
SRP
PO Box 52025, MS PAB221
Phoenix, AZ 85072

Kenneth Saline
160 N. Pasadena #101
Mesa, AZ 85201

Mesa Unified District
63 East Main Street
Mesa, AZ 85201

Apache Junction Unified District
1575 W. Southern Ave. #3
Apache Junction, AZ 85220

Casa Grande Union High School District
1362 N. Casa Grande Ave
Casa Grande, AZ 85222

Casa Grande Elementary District
220 W. Korsten Road
Casa Grande, AZ 85222

Chandler Unified District
1525 W. Frye Rd
Chandler, AZ 85224

Coolidge Unified District
221 W. Central Ave
Coolidge, AZ 85228

Eloy Elementary District
1011 Sunshine Blvd
Eloy, AZ 85231

Santa Cruz Valley Union High School District
900 N. Main St
Eloy, AZ 85231

Toltec Elementary District
3315 N. Toltec Road
Eloy, AZ 85231

Florence Unified School District
P.O. Box 2850
Florence, AZ 85232

Ray Unified District
P.O. Box 427
Kearny, AZ 85237

Mobile Elementary District
42798 S. 99th Ave
Maricopa, AZ 85239

Maricopa Unified School District
45012 W. Honeycutt Ave
Maricopa, AZ 85239

J O Combs Unified School District
301 E. Combs Rd
Queen Creek, AZ 85240

Picacho Elementary District
P.O. Box 8
Picacho, AZ 85241

Queen Creek Unified District
20740 S. Ellsworth Rd
Queen Creek, AZ 85242

Red Rock Elementary District
P.O. Box 1010
Red Rock, AZ 85245

Sacaton Elementary District
P.O. Box 98
Sacaton, AZ 85247

Jordan Rose
SolarCity Corporation
6613 N. Scottsdale Rd., Suite 200
Scottsdale, AZ 85250

David Berry
P.O. Box 1064
Scottsdale, AZ 85252

Fountain Hills Unified District
16000 E. Palisades Blvd
Fountain Hills, AZ 85268

Stanfield Elementary District
515 S. Stanfield Rd
Stanfield, AZ 85282

Superior Unified School District
1500 Sunset Drive 101
Superior, AZ 85273

Tempe Union High School District
500 W. Guadalupe Rd
Tempe, AZ 85283

Kyrene Elementary District
8700 S. Kyrene Road
Tempe, AZ 85284

Tempe School District
P.O. Box 27708
Tempe, AZ 85285

Hayden-Winkelman Unified District
P.O. Box 409
Winkelman, AZ 85292

Gilbert Unified District
140 S. Gilbert Rd
Gilbert, AZ 85296

Higley Unified School District
2935 S. Recker Road
Gilbert, AZ 85297

Glendale Elementary District
7301 N. 58th Ave
Glendale, AZ 85301

Glendale Union High School District
7650 N. 43rd Ave
Glendale, AZ 85301

Washington Elementary School District
4650 W. Sweetwater
Glendale, AZ 85304

Aqua Fria Union High School District
750 E. Riley Dr
Avondale, AZ 85320

Aguila Elementary District
P.O. Box 218
Aguila, AZ 85320

Arlington Elementary District
9410 S. 355th Ave
Arlington, AZ 85322

Littleton Elementary District
1252 S. Avondale Blvd
Avondale, AZ 85323

Liberty Elementary District
19871 W. Fremont Rd
Buckeye, AZ 85326

Buckeye Union High School District
902 E. Eason Ave
Buckeye, AZ 85326

Buckeye Elementary District
25555 West Durango St
Buckeye, AZ 85326

Cave Creek Unified District
P.O. Box 426
Cave Creek, AZ 85327

Congress Elementary District
P.O. Box 68
Congress, AZ 85332

Hyder Elementary District
P.O. Box 3001
Dateland, AZ 85333

Sentinel Elementary District
HC-1 Box 57
Dateland, AZ 85333

Quartzsite Elementary District
P.O. Box 130
Ehrenberg, AZ 85334

Paloma School District
38739 W. I-8
Gila Bend, AZ 85337

Gila Bend Unified District
P.O. Box V
Gila Bend, AZ 85337

Laveen Elementary District
P.O. Box 29
Laveen, AZ 85339

Litchfield Elementary District
553 Plaza Circle Suite A
Litchfield Park, AZ 85340

Champie Elementary District
HCR 1 Castle Hot Springs
Morristown, AZ 85342

Morristown Elementary District
P.O. Box 98
Morristown, AZ 85342

Palo Verde Elementary District
P.O. Box 108
Palo Verde, AZ 85383

Parker Unified School District
P.O. Box 1090
Parker, AZ 85344

Mohawk Valley Elementary District
5151 S. Ave 39E
Roll, AZ 85347

Salome Consolidated Elementary District
P.O. Box 339
Salome, AZ 85348

Gadsden Elementary District
P.O. Box 6870
San Luis, AZ 85349

Somerton Elementary District
P.O. Box 3200
Somerton, AZ 85350

Union Elementary District
3834 S. 91st Ave
Tolleson, AZ 85353

Tolleson Elementary District
9261 W. Van Buren
Tolleson, AZ 85353

Tolleson Union High School District
9801 W. Van Buren Street
Tolleson, AZ 85353

Saddle Mountain Unified School District
38201 W. Indian School Road
Tonopah, AZ 85354

Antelope Union High School District
9168 Ave 36 E
Wellton, AZ 85356

Wellton Elementary District
P.O. Box 517
Wellton, AZ 85356

Wenden Elementary District
P.O. Box 8
Wenden, AZ 85357

Owens-Whitney Elementary District
P.O. Box 38
Wikieup, AZ 85360

Nadaburg Unified School District
32919 Center St
Wittmann, AZ 85361

Yarnell Elementary District
P.O. Box 575
Yarnell, AZ 85362

Yuma Elementary District
450 West 6th Street
Yuma, AZ 85364

Crane Elementary District
4250 W. 16th Street
Yuma, AZ 85364

Dysart Unified District
15802 N. Parkview Place
Surprise, AZ 85374

Peoria Unified School District
P.O. Box 39
Peoria, AZ 85380

Wickenburg Unified District
40 West Yavapai St
Wickenburg, AZ 85390

Globe Unified District
455 N. Willow
Globe, AZ 85501

Eagle Elementary District
P.O. Box 1566
Clifton, AZ 85533

Clifton Unified District
P.O. Box 1567
Clifton, AZ 85533

Duncan Unified District
P.O. Box 710
Duncan, AZ 85534

Ft Thomas Unified District
P.O. Box 300
Fort Thomas, AZ 85536

Miami Unified District
P.O. Drawer H
Miami, AZ 85539

Morenci Unified District
P.O. Box 1060
Morenci, AZ 85540

Payson Unified District
P.O. Box 919
Payson, AZ 85541

Pima Unified District
P.O. Box 429
Pima, AZ 85543

Pine Strawberry Elementary District
P.O. Box 1150
Pine, AZ 85544

Safford Unified District
734 11th Street
Safford, AZ 85546

Klondyke Elementary District
921 Thatcher Blvd
Safford, AZ 85546

San Carlos Unified District
P.O. Box 207
San Carlos, AZ 85550

Solomon Elementary District
P.O. Box 167
Solomon, AZ 85551

Thatcher Unified District
P.O. Box 610
Thatcher, AZ 85552

Tonto Bason Elementary District
P.O. Box 337
Tonto Basin, AZ 85553

Young Elementary District
P.O. Box 3890
Young, AZ 85554

Benson Unified School District
360 S. Patagonia St
Benson, AZ 85602

Bisbee Unified District
100 Old Douglas Rd
Bisbee, AZ 85603

Bowie Unified District
P.O. Box 157
Bowie, AZ 85605

Cochise Elementary District
P.O. Box 1088
Cochise, AZ 85606

Douglas Unified District
1132 12th Street
Douglas, AZ 85607

Valley Union High School District
P.O. Box 158
Elfrida, AZ 85610

Elfrida Elementary District
P.O. Box 328
Elfrida, AZ 85610

Rucker Elementary District
P.O. Box 618
Elfrida, AZ 85610

Sonoita Elementary District
HC 1 Box 36
Elgin, AZ 85611

Palominas Elementary District
P.O. Box 38
Hereford, AZ 85615

Forrest Elementary District
P.O. Box 122
McNeal, AZ 85617

McNeal Elementary District
P.O. Box 8
McNeal, AZ 85617

Double Adobe Elementary District
7081 N. Central Hwy.
McNeal, AZ 85617

Naco Elementary District
P.O. Box 397
Naco, AZ 85620

Santa Cruz Elementary District
HC2 Box 50
Nogales, AZ 85621

Nogales Unified District
310 W. Plum St
Nogales, AZ 85621

Continental Elementary District
P.O. Box 547
Green Valley, AZ 85622

Oracle Elementary District
725 N. Carpenter Drive
Oracle, AZ 85623

Patagonia Union High School District
P.O. Box 254
Patagonia, AZ 85624

Patagonia Elementary District
P.O. Box 254
Patagonia, AZ 85624

Ash Creek Elementary District
6460 E. Hwy 181
Pearce, AZ 85625

Pearce Elementary District
1487 E. School Rd
Pearce, AZ 85625

Pomerene Elementary District
P.O. Box 7
Pomerene, AZ 85627

Sahuarita Unified District
350 W. Sahuarita Rd
Sahuarita, AZ 85629

St. David Unified District
P.O. Box 70
St David, AZ 85630

Mammoth-San Manuel Unified District
P.O. Box 406
San Manuel, AZ 85631

San Simon Unified District
P.O. Box 38
San Simon, AZ 85632

San Fernando Elementary District
P.O. Box 80
Sasabe, AZ 85633

Indian Oasis-Baboquivari Unified District
P.O. Box 248
Sells, AZ 85634

Sierra Vista Unified District
3555 Fry Blvd
Sierra Vista, AZ 85635

Empire Elementary District
HC1 Box 1100
Sonoita, AZ 85637

Tombstone Unified District
P.O. Box 1000
Tombstone, AZ 85638

Vail Unified District
P.O. Box 800
Vail, AZ 85641

Bonita Elementary District
18008 S. Ft Grand Rd
Bonita, AZ 85643

Wilcox Unified District
480 N. Bisbee
Wilcox, AZ 85643

Lawrence Robertson, Jr
P.O. Box 1448
Tubac, AZ 85646

Santa Cruz Valley Unified District
1374 W. Frontage Rd
Rio Rico, AZ 85641

Marana Unified District
11279 W. Grier Rd., Suite 115A
Marana, AZ 85653

Redington Elementary District
130 W. Congress St., 4th Floor
Tucson, AZ 85701

Philip Dion
Unisource Energy Corporation
One South Church Ave, Suite 200
Tucson, AZ 85701

Amphitheater Unified District
701 W. Wetmore
Tucson, AZ 85705

Flowing Wells Unified District
1556 W. Prince Rd
Tucson, AZ 85705

Sunnyside Unified District
2238 E. Ginter Rd
Tucson, AZ 85706

Russell Jones
5210 E. Williams Circle Suite 800
Tucson, AZ 85711

Catalina Foothills Unified District
2101 E. River Rd
Tucson, AZ 85718

Tucson Unified District
1010 E. 10th Street
Tucson, AZ 85719

Tanque Verde Unified District
11150 E. Tanque Verde Rd
Tucson, AZ 85749

Show Low Unified District
500 W. Old Linden Rd
Show Low, AZ 85901

Concho Elementary District
P.O. Box 200
Concho, AZ 85924

Heber-Over Unified District
P.O. Box 547
Heber, AZ 85928

Blue Ridge Unified District
1200 W. White Mountain Blvd
Lakeside, AZ 85929

McNary Elementary District
P.O. Box 598
McNary, AZ 85930

Chevelon Butte School District
P.O. Box 1574
Forest Lakes, AZ 85931

St Johns Unified District
P.O. Box 3030
St Johns, AZ 85936

Snowflake Unified District
682 School Bus LN.
Snowflake, AZ 85937

Round Valley Unified District
P.O. Box 610
Springerville, AZ 85938

Vernon Elementary District
P.O. Box 89
Vernon, AZ 85940

Whiteriver Unified District
P.O. Box 190
Whiteriver, AZ 85941

Flagstaff Unified District
3285 E. Sparrow
Flagstaff, AZ 86004

Maine Consolidated School District
P.O. Box 50010
Parks, AZ 86018

Colorado City Unified District
P.O. Box 309
Colorado City, AZ 86021

Fredonia-Moccasin Unified District
P.O. Box 214
Fredonia, AZ 86022

Grand Canyon Unified District
P.O. Box 519
Grand Canyon, AZ 86023

Holbrook Unified District
P.O. Box 640
Holbrook, AZ 86025

Joseph City Unified District
P.O. Box 8
Joseph City, AZ 86032

Kayenta Unified District
P.O. Box 337
Kayenta, AZ 86033

Cedar Unified District
P.O. Box 367
Keams Canyon, AZ 86034

Page Unified District
P.O. Box 1927
Page, AZ 86040

Tuba City Unified District
P.O. Box 67
Tuba City, AZ 86045

Williams Unified District
P.O. Box 427
Williams, AZ 86046

Winslow Unified District
P.O. Box 580
Winslow, AZ 86047

Prescott Unified District
146 S. Granite St
Prescott, AZ 86303

Williams Valley Elementary School District
7295 N. Bridle Path
Prescott, AZ 86305

Humboldt Unified District
8766 E. Hwy 69
Prescott Valley, AZ 86314

Bagdad Unified District
P.O. Box 427
Bagdad, AZ 86321

Hillside Elementary District
HC 01 Box 3056
Bagdad, AZ 86321

Camp Verde Unified District
410 Camp Lincoln
Camp Verde, AZ 86322

Chino Valley Unified District
P.O. Box 225
Chino Valley, AZ 86323

Clarkdale-Jerome Elementary District
P.O. Box 248
Clarkdale, AZ 86324

Mingus Union High School District
1801 E. First
Cottonwood, AZ 86326

Cottonwood - Oak Creek Elementary District
One North Willard St
Cottonwood, AZ 86326

Kirkland Elementary District
P.O. Box 120
Kirkland, AZ 86332

Walnut Grove Elementary District
P.O. Box 912
Kirkland, AZ 86332

Mayer Unified School District
P.O. Box 1059
Mayer, AZ 86333

Beaver Creek Elementary District
4810 E. Beaver Creek Rd
Rimrock, AZ 86335

Sedona-Oak Creek Usd #9
221 Brewer Rd., Suite 100
Sedona, AZ 86336

Seligman Unified District
P.O. Box 650
Seligman, AZ 86337

Skull Valley Elementary District
P.O. Box 127
Skull Valley, AZ 86338

Crown King Elementary District
P.O. Box 188
Crown King, AZ 86343

Hackberry School District
HC 30 Box 300
Kingman, AZ 86401

Kingman Unified School District
3033 MacDonald Ave
Kingman, AZ 86401

Lake Havasu Unified District
2200 Havasupai Blvd
Lake Havasu City, AZ 86403

Littlefield Unified District
P.O. Box 730
Beaver Dam, AZ 86432

Peach Springs Unified District
P.O. Box 360
Peach Springs, AZ 86434

Valentine Elementary District
HC 35 Box 50
Peach Springs, AZ 86535

Topock Elementary District
P.O. Box 370
Topock, AZ 86436

Yucca Elementary District
P.O. Box 128
Yucca, AZ 86438

Colorado River Union High School District
P.O. Box 21479
Bullhead City, AZ 86439

Bullhead City School District
1004 Hancock Rd
Bullhead City, AZ 86442

Mohave Valley Elementary District
P.O. Box 5070
Mohave Valley, AZ 86446

Chinle Unified District
P.O. Box 587
Chinle, AZ 86503

Window Rock Unified District
P.O. Box 559
Fort Defiance, AZ 86504

Ganado Unified School District
P.O. Box 1757
Ganado, AZ 86505

Pinon Unified District
P.O. Box 839
Pinon, AZ 86510

Sanders Unified District
P.O. Box 250
Sanders, AZ 86512

Red Mesa Unified District
HC 61 Box 40
Teec Nos Pos, AZ 86514

Kevin Fox
Keyes & Fox LLP
5727 Keith Avenue
Oakland, CA 94618

1
2
3
4
5
6
7
8
9
10
11
12
13
14
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DIRECT TESTIMONY OF BARBARA D. LOCKWOOD

On Behalf of Arizona Public Service Company

Docket No. E-20690A-09-0346

September 30, 2009

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1 **DIRECT TESTIMONY OF BARBARA D. LOCKWOOD**
2 **ON BEHALF OF ARIZONA PUBLIC SERVICE COMPANY**
3 **(Docket No. E-20690A-09-0346)**

4 I. INTRODUCTION

5 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

6 A. My name is Barbara D. Lockwood. My business address is 400 North Fifth Street,
7 Phoenix, Arizona 85004.

8 **Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?**

9 A. I am employed by Arizona Public Service Company (“APS” or “Company”) as the
10 Director of Renewable Energy. In that position, I am responsible for APS’s
11 renewable energy programs, including generation planning, customer programs
12 and policy.

13
14 **Q. WOULD YOU DISCUSS YOUR EDUCATIONAL BACKGROUND AND**
 BUSINESS EXPERIENCE?

15 A. I hold a Bachelor of Science degree in Chemical Engineering from Clemson
16 University and a Master of Science degree in Environmental Engineering from
17 Georgia Institute of Technology. I am a registered professional chemical engineer
18 in Arizona, and I began my career in the chemical industry at E.I. DuPont de
19 Nemours (“DuPont”) in various engineering and management roles. Subsequent
20 to DuPont, I worked in the consulting field and managed diverse projects for
21 national clients across the United States. I have been with APS since 1999. I
22 currently serve on the Solar Advisory Board for the Department of Energy’s
23 National Renewable Energy Laboratory.

24
25 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

1 A. My testimony will address the Company's position on the issues raised by
2 SolarCity regarding the service provided pursuant to the Solar Service Agreements
3 ("SSA") it has entered into with the Scottsdale Unified School District (the
4 "School District"); describe how the Company addresses SSA arrangements as a
5 part of its Renewable Energy Standard ("RES") incentive program; and address
6 the safety and reliability implications related to SSAs, as well as any associated
7 resource planning issues.

8 II. SUMMARY

9 Q. **WOULD YOU PLEASE SUMMARIZE YOUR TESTIMONY?**

10 A. Yes. Solar service providers, such as SolarCity, play an important role in the
11 development and deployment of renewable distributed energy systems, and in
12 advancing consumer acceptance of these systems. Accordingly, providers like
13 SolarCity are critical players in advancing both the Arizona Corporation
14 Commission's ("Commission") overall goals for renewable generation, as well as
15 APS's specific distributed energy goals and requirements.

16
17 APS does not object to SolarCity's SSA arrangements as they are outlined in the
18 School District contracts that have been filed in this Docket. These SSA
19 arrangements apply to a single customer premises. The distributed energy
20 system is serving one customer—in this case, a school. APS believes it could be
21 reasonable to construe the SSA as primarily a financing mechanism between
22 SolarCity and the single customer having the system installed at its premises.
23 This could be contrasted with a situation where a generation service provider
24 (renewable or otherwise) seeks to provide electricity from a generation resource
25 to multiple sites or multiple customers—circumstances that would likely result
26 in that provider being considered a public service corporation ("PSC").

1 Under the terms of the SSA, which identifies SolarCity as a third-party provider of
2 solar services, the School District will be able to take advantage of the Company's
3 renewable incentive program if the project meets all other applicable requirements
4 under APS's Distributed Energy Administration Plan ("DEAP"). In fact, most
5 projects such as this will need to utilize those incentives to be commercially
6 viable.

7 Additionally, it is important that SolarCity and other solar providers do not
8 adversely impact the reliability of the APS distribution system and the safety of
9 the Company's employees and customers. Thus, they will need to follow the
10 Commission's Interconnection Rules approved in Decision No. 69674. Similarly,
11 one of the primary reasons the Company engages in resource planning is to
12 provide reliable service to its customers. As distributed energy becomes more
13 prevalent, it will be important for APS to be informed of the expansion plans of
14 solar providers so the Company may plan, design and build a cost-effective
15 reliable system to serve our customers. APS recommends that the Commission
16 consider periodic solar provider reporting requirements to facilitate this planning
17 process.

18
19 **III. SOLARCITY APPLICATION**

20 **Q. WHAT IS APS'S POSITION REGARDING THIS DOCKET?**

21 **A.** APS recognizes the need for solar facility installers, such as SolarCity, to increase
22 the likelihood that electric utilities meet the RES requirements for distributed
23 generation. In addition, APS has observed that non-residential customers have a
24 growing interest in a distributed energy model where a third party installs, owns,
25 and operates renewable systems. While APS recognizes that solar providers, such
26 as SolarCity, are essential for the implementation of the distributed energy

1 requirements of the RES Rules, the Company acknowledges that parties in this
2 Docket have raised important legal questions that will require a determination
3 from the Commission.

4 APS believes that similar to an individual's right to drill a well on one's property,
5 an electric customer has a right to install or lease renewable energy facilities on
6 their premise to offset the amount of energy they need to procure from the electric
7 company. Additionally, it appears to APS from the contractual terms of the
8 SolarCity SSA provided in this Docket that it is the customer, not SolarCity, that
9 owns the electricity which is produced on their premises. Therefore, APS does not
10 object to SolarCity's SSA arrangements, because SolarCity has structured its SSA
11 arrangements as a "one-customer one-rooftop" model. Should SolarCity change
12 its business model so that it provides electricity to multiple customers from a
13 single facility, such as a master-planned community with a central solar facility
14 providing power to multiple residences, or a shopping center with a central solar
15 facility that sells the solar electricity to multiple commercial tenants, it is my
16 understanding that SolarCity would be considered a PSC under the Arizona
17 Constitution.

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19 **Q. ARE YOU FAMILIAR WITH THE SSA BETWEEN SOLARCITY AND
20 THE SCHOOL DISTRICT PROVIDED IN THIS DOCKET?**

21 A. I have reviewed the SSA for Desert Mountain High School. That high school is
22 located in APS's service territory and is, therefore, of particular interest to APS.

23 **Q. UNDER THE TERMS OF THAT SSA, DO YOU BELIEVE THAT
24 SOLARCITY IS FURNISHING ELECTRICITY TO THE SCHOOL
25 DISTRICT?**

26 A. From a practical perspective, it is apparent that electricity will be generated by a
system that SolarCity will own, and that the electricity will be consumed by the

1 school. However, it appears that the SSA is primarily a financing vehicle for the
2 School District. In addition, the SSA states that the School District owns the
3 electricity when it is generated. The SSA's contractual terms agreed to by the
4 parties state "that [School District] will take title to all electric energy that the
5 System generates from the moment the System produces such energy and that
6 such energy will be delivered to [School District] at the delivery point . . . and
7 [School District] shall purchase all such electric energy as and when produced by
8 the System."¹

9 **Q. BRIEFLY DESCRIBE HOW THE ONE-CUSTOMER ONE-ROOFTOP**
10 **MODEL WORKS UNDER APS'S SERVICE SCHEDULE 4.**

11 A. APS's Service Schedule 4 ("Schedule 4") details the requirements for a customer
12 to use totalized metering of multiple service entrance sections at a single site. APS
13 believes that the definitions and requirements for a "customer site" in Schedule 4
14 are reasonable for determining what loads can be served through the SSA model.
15 Schedule 4 has been approved by the Commission, and is consistent with other
16 Company practices and policies that pertain to a customer site. Therefore,
17 Schedule 4 provides a transparent, well-established bright line for the permitted
18 scope of service under SSAs. If an entity provides solar equipment and services
19 through the SSA arrangement described above, the service should be limited to the
20 following conditions:

- 21 1. The solar facilities must be located on the customer's premises and tied into
22 the electric system on the load side of the utility's meter at the point of
23 delivery (referred to as "behind the meter").

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26 ¹ Solar Services Agreement between Scottsdale Unified School District and SolarCity, dated June 25,
2009, Section 4(a).

- 1 2. The solar facilities must be used solely to serve the customer's load at their
2 point of delivery. (The point of delivery for the customer's electrical
3 service typically includes a service panel, a supply meter, and other
4 electrical equipment necessary to interconnect with the customer's
5 electrical system). The solar energy may not be used to serve the loads at
6 other points of delivery, unless those points of delivery are "totalized"
7 pursuant to Schedule 4, which allows individual meters at separate points of
8 delivery to be combined for billing purposes under certain circumstances.
- 9 3. The solar facilities must be operated in parallel with the utility's power grid
10 and comply with all interconnection requirements, and the customer must
11 be served through a partial requirements rate schedule.

12 **Q. IF A SOLAR PROVIDER EXPANDS ITS BUSINESS MODEL BEYOND**
13 **THE ONE-CUSTOMER ONE-ROOFTOP MODEL, DOES APS BELIEVE**
14 **THE SOLAR PROVIDER WOULD BE A PSC?**

15 A. APS believes that if a solar provider provides renewable energy from a single
16 installation to multiple customers, the solar provider is both furnishing electricity
17 and is dedicating its facilities to the public use. It is my understanding that these
18 characteristics would make such a provider a PSC.

19 **IV. APS RENEWABLE ENERGY STANDARD INCENTIVE PROGRAM**

20 **Q. PLEASE DESCRIBE APS'S RES INCENTIVE PROGRAM AS IT**
21 **RELATES TO SOLARCITY'S APPLICATION.**

22 A. APS's DEAP, which was provided as part of the Company's Implementation Plan
23 under the RES Rules,² does not preclude customers from entering into third party
24 ownership arrangements. As a result, APS pays incentives to customers if the
25 third-party arrangement meets all requirements otherwise applicable under the

26 ² The Commission approved APS's 2008 Implementation Plan in Decision No. 70313 (April 28, 2008).

1 DEAP. The payment arrangements between the customer (School District) and the
2 third party (SolarCity), or whether the customer “owns” the system are not
3 considerations in paying customer incentives. The key component for payment of
4 customer incentives is that the customer (School District) is the owner of the
5 Renewable Energy Credits, which is the unit created to track the kilowatt hours
6 derived from renewable energy resources and, in this specific instance, the
7 distributed energy resource. The Company believes that this approach provides
8 customers flexibility to acquiring distributed energy systems and facilities, and
9 furthers APS’s opportunity for compliance with the distributed energy
10 requirements of the RES Rules.

11 **Q. ON A TYPICAL CUSTOMER SOLAR ROOFTOP INSTALLATION, HOW**
12 **MUCH OF THE COST IS COVERED BY THE RES INCENTIVE?**

13 A. For a typical non-residential system under the Production Based Incentive (“PBI”)
14 program, APS’s RES incentive covers up to 60 percent of the total installation
15 cost, thus significantly reducing the overall cost of the system. Approximately 25
16 percent of the PBI projects that are currently in the various stages of our program
17 would hit the 60 percent cap. (Including installed, reserved, and pending projects,
18 there are currently approximately 100 projects.) If customers include project
19 financing as part of the total project costs, that number will be slightly less. If they
20 do not include project financing as part of the total project costs, that number will
21 be slightly higher. For smaller non-residential systems that are eligible for an Up-
22 front Incentive (“UFI”), APS’s RES incentive caps at 50 percent of the total
23 installation cost, up to \$75,000. Desert Mountain High School, the subject of an
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1 SSA in this docket, may qualify for UFIs of \$2.25 per watt and a waiver of the
2 \$75,000 UFI cap, pursuant to a recent Commission decision.³

3 **Q. HOW ARE CUSTOMERS' OVERALL ENERGY COSTS IMPACTED BY**
4 **INSTALLING SOLAR SYSTEMS?**

5 A. As a result of installing a solar system, some customers may experience a decrease
6 in energy costs, and others may experience an increase. Although some customers
7 may observe this increase in their near-term energy costs, one of the purposes of a
8 solar system installation is to manage long-term energy costs.

9 **Q. HOW MANY SSAs DOES APS ESTIMATE COULD BE EXECUTED BY**
10 **APS CUSTOMERS BY 2015, 2020 AND 2025?**

11 A. These numbers are very hard to predict with any degree of accuracy. In 2009,
12 approximately 65% of the PBI projects are commercial systems owned by a third
13 party. Assuming an average of 400 kilowatts per system, and an annual lifetime
14 commitment cap of \$100 million per year, there could be more than 300 SSAs by
15 2015, more than 550 SSAs by 2020, and more than 800 SSAs by 2025. This
16 number could dramatically increase if third party owners offered SSAs to smaller
17 UFI projects as well.

18 **Q. WITHOUT THE AVAILABILITY OF APS'S INCENTIVE PROGRAM,**
19 **WOULD THE NUMBER OF RENEWABLE INSTALLATIONS AND SSAs**
20 **BE REDUCED?**

21 A. Without the availability of APS's incentive program, we do not believe that SSAs
22 would be a viable option for most customers. Therefore, it would dramatically
23 reduce the number of installations and the number of SSAs.

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³ Decision No. 71275 (Sept. 17, 2009).

1 V. SAFETY AND RELIABILITY

2 Q. **ARE THERE SAFETY CONCERNS WITH SOLAR SYSTEMS**
3 **CONNECTED TO THE UTILITY DISTRIBUTION SYSTEM?**

4 A. The safety of the customer, utility worker and the overall general public must be
5 considered when interconnecting with the utility's distribution system. With solar
6 distributed generation, APS must be integrated into the interconnection and design
7 process to assure that its delivery system is not compromised, or that undesirable
8 conditions, such as unintentional islanding, do not occur. This will become more
9 important as distributed energy becomes more widespread. APS currently
10 implements extensive interconnection and inspection processes to assure safety of
11 all distributed energy that is interconnected to the Company's electric system and
12 follows the Commission's Interconnection Rules, which were approved in
13 Decision No. 69674.

14 Q. **ARE THERE RELIABILITY CONCERNS WITH SOLAR SYSTEMS**
15 **CONNECTED TO THE UTILITY DISTRIBUTION SYSTEM?**

16 A. To assure reliability, APS's electric system must be designed to meet the peak
17 demand needs of customers whenever the power is required. Currently, solar
18 distributed generation is not concentrated at a level that significantly impacts the
19 Company's energy grid. However, because the amount of solar distributed
20 generation necessary to comply with the RES Rules in the future is substantial,
21 understanding the impacts to the reliability and stability of the system will become
22 more critical. The intermittency of solar insolation generation (such as on cloudy
23 days) will provide a challenge to the utility, because the utility must provide
24 continuous reliable power to the electrical grid and to customers during these
25 periods. APS continues to analyze and develop processes to monitor and manage
26 distributed energy to assure reliability as this resource becomes more prevalent.

1 **Q. ARE THERE ANY EXISTING SAFEGUARDS AGAINST SAFETY AND**
2 **RELIABILITY ISSUES ASSOCIATED WITH SOLAR SYSTEMS?**

3 A. In addition to compliance with the Commission's Interconnection Rules, there are
4 several existing recommendations and standards, including the National Electric
5 Code Article 690, UL 1741, and IEEE 154.

6 **Q. DOES THE EXISTENCE OF AN SSA CHANGE THE DISTRIBUTION**
7 **UTILITY'S RESPONSIBILITY TO PROVIDE RELIABLE SERVICE TO**
8 **MEET ALL OF THE SSA CUSTOMER'S LOAD?**

9 A. No. APS must continue to deliver reliable power to the customer when the solar
10 system is not operating.

11 **Q. DOES SOLARCITY HAVE ANY RESPONSIBILITY FOR THE SAFETY**
12 **AND RELIABILITY OF THE OVERALL ELECTRIC SYSTEM?**

13 A. SolarCity has responsibility as it relates to its installed solar systems. The
14 regulated utility has responsibility for the safety and reliability of the energy
15 delivery system and its interconnection. APS will continue to have overall electric
16 service responsibility for our customers during system outages, times of limited
17 solar availability and non-daylight periods.

18 **Q. HOW CAN THESE ISSUES BE AVOIDED OR MITIGATED WHEN A**
19 **CUSTOMER IS RECEIVING SERVICE THROUGH AN SSA?**

20 A. SSA providers must comply with the Commission's Interconnection Rules and the
21 design review, which is part of APS's interconnection process, in order to assure
22 that safe and reliable conditions are maintained. The Company must approve the
23 interconnection of the SolarCity facilities.

24 **VI. INTEGRATED RESOURCE PLANNING**

25 **Q. PLEASE EXPLAIN THE COMPANY'S RESOURCE PLANNING**
26 **PROCESS.**

1 A. The overall purpose of the resource planning process is to identify a set of
2 resources that meets the future electricity needs of APS's customers in a balanced
3 and cost-effective manner, while also satisfying our customers' desire for reliable
4 electric service, price stability, and environmental responsibility. The resource
5 planning process involves extensive quantitative and qualitative analysis to
6 determine future customer energy needs and assess the different resource options
7 for fulfilling those needs. The end result of the resource planning process is a
8 specific set of actions or steps that will provide for a robust set of resources to
9 meet future customer needs. Some of these actions or steps will involve actual
10 resource acquisition, while others might involve preliminary steps, such as issuing
11 a Request for Proposal to evaluate demand response alternatives, or completing
12 the initial permitting of a new baseload resource. Resource planning is a
13 continuous process and is frequently referred to as a "learning process." An
14 important aspect of resource planning is monitoring external market factors (e.g.,
15 new technologies, commodity markets, local economic conditions, interest rates,
16 and legislative proposals) for key changes that could impact APS's resource
17 strategies.

18 **Q. WHY IS IT IMPORTANT FOR THE COMPANY TO HAVE THE MOST**
19 **ACCURATE FORECAST POSSIBLE OF FUTURE CUSTOMER ENERGY**
20 **REQUIREMENTS?**

21 A. The assessment of future customer energy requirements is one of the most critical
22 parts of the resource planning process. APS's resource plan is developed based
23 upon our forecast of customer energy requirements. The resulting resource plan
24 serves as the basis for procuring the necessary resources to satisfy the projected
25 customer needs, and these procurement decisions are often times very large
26 financial commitments. (For example, a large concentrated solar power plant

1 involves a financial commitment of several billion dollars.) In the nearer term,
2 APS's procurement of energy commodities (like natural gas) also relies upon the
3 forecast of customer energy requirements. Therefore, because of the large
4 financial commitments that rely upon the load forecast, it is very important to have
5 the best possible information on conditions and activities within the service
6 territory to develop the forecast of customer energy requirements.

7 **Q. PLEASE EXPLAIN THE COMPANY'S DISTRIBUTION SYSTEM**
8 **PLANNING PROCESS.**

9 A. The Company does distribution system planning throughout the year. APS
10 reviews all new loads as they become known, and if necessary, models to assess
11 the effects the new load may have on the distribution system. After each system
12 peak, APS analyzes the distribution feeders and substation transformers to
13 determine if feeder reconfiguration is needed to serve loads within the planning
14 guideline. APS develops feeder and transformer forecasts to determine system
15 improvement work that will be required before the next system peak to serve
16 loads, and to plan ahead for new load development.

17 **Q. HOW DO DISTRIBUTED SOLAR SYSTEMS IMPACT DISTRIBUTION**
18 **PLANNING?**

19 A. APS models solar systems as generators on the distribution system and evaluates
20 generation characteristics to the existing system so that lines and transformers are
21 not overloaded and the appropriate protection schemes are in place.

22 **Q. ASSUMING SOLARCITY'S APPLICATION IS ACCEPTED AND MORE**
23 **AND MORE CUSTOMERS ARE SERVED UNDER SSAs, WHAT ARE THE**
24 **POTENTIAL CHALLENGES TO APS IN PROVIDING RELIABLE AND**
25 **COST EFFECTIVE ELECTRIC SERVICE TO ITS CUSTOMERS?**

26 A. As discussed in a previous question concerning accurately forecasting customer
energy requirements, APS needs to have the best possible information on

1 conditions and activities within the Company's service territory that could impact
2 our forecast of customer energy requirements. This is important for providing the
3 most cost efficient and reliable service to our customers. APS would certainly
4 need to be informed if a SSA provider of distributed solar systems was planning a
5 major increase in system deployment in the next couple of years. If APS were not
6 advised of these plans, it could result in the needless over-procurement of both
7 resources and energy commodities for our customers, which would clearly not be
8 the most cost efficient way to serve their needs. For these reasons, APS
9 recommends that the Commission consider periodic reporting requirements from
10 solar providers to facilitate the utility's resource planning process.

11 **Q. DO DISTRIBUTED SOLAR TECHNOLOGIES POSE ANY UNIQUE**
12 **RESOURCE OR DISTRIBUTION PLANNING CHALLENGES?**

13 A. APS expects that a large portion of the distributed renewable energy will come
14 from rooftop solar photovoltaic ("PV") systems. The Company recognizes that
15 while solar PV systems will provide a valuable energy source, they also have some
16 unique characteristics that are important to consider for resource and distribution
17 planning purposes. First, solar PV is an inflexible electric generation source that
18 produces energy in a reasonably predictable and defined pattern throughout the
19 course of the day. Absent the deployment of energy storage devices, the energy
20 produced by solar PV systems cannot be shifted to better match customer energy
21 consumption patterns, or to respond to unanticipated outages of other generation
22 sources. Second, solar PV is an intermittent generation source. The energy
23 production from solar PV systems will rise and fall in response to solar insolation
24 and can be affected by passing clouds or monsoon storms. With respect to
25 distribution planning, distribution facilities must be capable of serving the total
26 load requirement customers will need, as well as the maximum amount customers

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may deliver to the grid. For these reasons, APS must consider these unique characteristics in the resource and distribution planning processes so that the correct resources are in place to complement the solar PV systems and ensure that our customers continue to receive highly reliable electric service at all times.

Many of the challenges described above can be effectively mitigated by requiring the SSA providers to report on their activities on a periodic basis. This would allow APS to maintain a good understanding of the actual performance of the solar PV systems already deployed and to have a clearer picture of what to expect in the future in terms of numbers of new solar PV systems.

Q. DOES THAT CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.