MEMORANDUM

This memorandum is being reissued only to distribute the revised Climate Change Resolution Report. Table 2, now shown on Page 6, was previously omitted from the report. No changes were made to the content of this memorandum.

Date: July 20, 2017
Reissued: July 28, 2017

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Resolution 2017-39: Reaffirming County Commitment to Address Climate Change and Direction to County Departments and Resolution 2017-51: Furthering Pima County's Commitments to Climate Protection and Joining County Governments across the Nation in Signing on to the County Climate Coalition in Support of the Paris Climate Agreement**

As a follow-up to Board of Supervisors Resolution 2017-39 and Resolution 2017-51, I directed staff to prepare a report on actionable priorities Pima County should undertake to meet the Paris Climate Agreement's 2025 goals, which is to reduce greenhouse gas emissions (GHG) by 26 to 28 percent below 2005 levels.

Because some 89 percent of County operations' GHG emissions is the result of electricity produced from fossil fuels, the County will need to reduce our current GHG emissions by 40 percent. To reach this goal, the report concludes there are four core mitigation and adaptation means to achieve this target, and I am directing staff to take the following actions:

A. Solar Installations. Rapidly scale up renewable energy infrastructure by adding up to 40 to 42 megawatts (MW) of solar photovoltaics (PV) (estimated to require approximately 150 to 200 acres of surface area), combined with battery storage where feasible. Identifying sites where solar panels or covered parking can be easily installed will enable the County to take maximum advantage of current but soon to be revised Tucson Electric Power net metering benefits. Where possible, solar electrical energy facilities will be erected on all County parking facilities, either garages or surface parking areas. Areas of first priority will be those where the County has large electrical energy loads for building or other facilities.

1. All departments will review the attached report and provide their written assessment and recommendations for suitable solar sites (rooftop, covered parking, vacant but disturbed land, etc. that are adjacent to facilities) to me by September 1, 2017. Sites that are also suitable for battery storage and electric vehicle charging should also be noted. I will review the departmental assessments with the Office of Sustainability and Conservation, Regional Wastewater Reclamation Department (RWRD) and the Facilities Management Department (FMD) to determine which solar installations sites are priorities.

2. FMD and RWRD will serve as leads in working with the Procurement Department to develop contracts with approved solar contractors by mid-October 2017 at the latest so the highest priority solar installations can be constructed within six months of executing solar service agreements with providers.

3. FMD will continue to work with other departments to identify suitable solar sites and a schedule for installation in order to meet the goal of 40 MW production by 2025, or sooner.

4. All new County facility and building construction will require solar installations to meet at a minimum 60 to 80 percent of electricity load. Where feasible, "campus" types of developments sponsored by the County will consider district energy systems to further reduce electricity and water demands.

B. Energy Efficiency. Increase energy efficiency in the highest energy use buildings older than 40 years through a combination of retrofits and improving employee behavior to reduce electricity use by 20 percent. All older County-owned buildings in the downtown will have windows replaced and building insulation improved.

1. FMD should independently identify alternatives or confirm information in the attached report regarding increasing energy efficiency in the 10 highest electricity use/need buildings older than 40 years in the downtown complex through a combination of retrofits, operational controls and improved employee behavior change.

2. FMD will provide a written plan and schedule for increasing energy efficiency in existing buildings by December 1, 2017.

3. As part of the written plan, FMD will explore establishing a green revolving fund, whereby the savings accrued through efficiency measures and renewable energy are re-invested in continued and ongoing greenhouse emission reduction efforts in operations.

C. Downtown Energy District. Create a Pima County Downtown Energy District by interconnecting and adding County-owned buildings to the existing downtown Central Plant.

1. FMD will provide a written plan and schedule for the Downtown Energy District by December 1, 2017.

D. Fleet Vehicles. Continue improving fleet efficiency and electric vehicle (EV) infrastructure by replacing gasoline passenger sedans with electric vehicles and improving employee driver behavior (reduction in idling when possible, efficient routing, etc.). The County will purchase 20 electric vehicles per year for the next six years and will largely replace gasoline powered sedan-style vehicles in the current vehicle fleet.

1. Fleet Services will independently identify alternatives or confirm discovery information in the attached report regarding continuing to improve fleet efficiency and EV infrastructure by replacing gasoline passenger sedans with electric vehicles and improving employee driver behavior (reduction in idling of diesel vehicles/heavy equipment when safe and possible, efficient routing, etc.)

2. Fleet Services will provide a written plan and schedule by December 1, 2017 to improve fleet fuel efficiency by 10 percent (in nonelectric vehicles) and replace 120 gasoline sedans with electric vehicles by 2025 or sooner.

E. Green Infrastructure and Low Impact Development with Trees (GI-LID + Trees). Install GI-LID + Trees on County properties and rights of way (ROWs) where possible that are not vulnerable to removal or interference by utilities. This strategy would yield the highest return on investment in terms of carbon sequestration, building cooling, reduction in urban heat island effects and stormwater management and flooding abatement.

1. The Regional Flood Control District (RFCD), the Department of Transportation (DOT) and the Department of Environmental Quality (PDEQ) will serve as leads in collaboration with FMD, Natural Resources, Parks and Recreation, Development Services and OSC (and other stakeholders as needed) to identify best options and priorities for GI-LID + Trees on County properties and ROWs by December 1, 2017.

2. An AutoCASE™ study should provide a GIS layer & map for siting GI/LID + Trees and a cost-benefit analysis and to determine:

a. Value of sequestered carbon (GHG sequestration/storage benefits);

b. Avoided utility costs for water and electricity by reducing building temperatures and overall urban heat island effects. (A special emphasis should be placed on establishing trees in critical need areas – low canopy/above average heat – given the growth time required to realize full benefits and savings.);

c. Air quality benefits such as avoided costs in public health and reduced productivity and in maintaining regulatory compliance, as well as the calculated clean air benefits for tourism and economic development,

d. Identify infrastructure vulnerabilities to flooding and stormwater damage and opportunities to avoid capital improvement costs and to reduce insurance costs (associated with flooding) via the installation of GI-LID + Trees.

The AutoCASE™ findings and report will be presented to the Board of Supervisors for consideration as a budget expenditure to cover implementation over a period of seven years (completion by 2025).

3. The highest priority area for green infrastructure investment will be the County Regional River Park System.

F. Sustainable Action Plan for County Operations. Prepare an update to the *Sustainable Action Plan for County Operations* to reflect the County's alignment with the Paris Agreement.

1. I am requesting that the OSC prepare and deliver an outline to me to by March 1, 2018 with an update for how to revise the Sustainable Action Plan (SAPCO) to reflect the County's alignment with the Paris Agreement.

2. Based on the outline, I also anticipate streamlining and reorganizing how SAPCO is operationalized. In the past, much of the work has been undertaken voluntarily by departments; but given the priority need to accelerate this work, I will be assigning the appropriate directors and staff implementation responsibilities in the future.

G. Biogas Renewable Energy. The County will construct necessary infrastructure to make biogas generated from the wastewater treatment process into a clean form of methane gas capable for use as a commercial fuel. The County will then sell clean biogas for beneficial use.

The actions discussed above are also summarized in the attachment table.

CHH/mjk

Attachments

c: Jan Lesher, Chief Deputy County Administrator
Carmine DeBonis, Jr., Deputy County Administrator for Public Works
Tom Burke, Deputy County Administrator for Administration
Nanette Slusser, Assistant County Administrator for Public Works
Lisa Josker, Director, Facilities Management
Jackson Jenkins, Director, Regional Wastewater Reclamation
Frank Samaniego, Director, Fleet Services
Suzanne Shields, Director, Regional Flood Control District
Priscilla Cornelio, Transportation Director
Ursula Nelson, Director, Environmental Quality
Chris Cawein, Director, Natural Resources, Parks and Recreation
Carla Blackwell, Director, Development Services
Linda Mayro, Director, Sustainability and Conservation
Mary Jo Furphy, Director, Procurement

Immediate/near-term priorities and departmental assignments for Implementation of Board of Supervisors Resolutions 2017-39 and 2017-51

Actions to Reduce GHG Emissions	kWh Saved/ Yr	MTCO2 e/Yr Reduced	% of Target	Assigned To	Report Responses Due	Plan to Implement Due	Estimated Completion
a. Solar: Install 41 MW of Solar at County Facilities (considering battery storage where feasible)	86,739,000	79,000	106	**FMD*** **RWRD*** **OSC*** Procure. All Depts.	09/01/17	10/20/17	Interconnection Agreements mid-October 2017. Completion mid-February 2018.
**Leads FMD, RWRD and OSC should independently identify alternatives or confirm discovery information in the attached report to rapidly scale up renewable energy infrastructure by adding up to 40 to 42 megawatts (MW) of solar photovoltaics (PV), combined with battery storage where feasible, to take maximum advantage of current net metering rates. Solar electrical energy facilities will be erected on all County parking facilities, either garages or surface parking areas. Areas of first priority will be those where the County has large electrical energy loads for buildings or other facilities.*							
b. Energy Efficiency Buildings/ Operations: Improve EE by 20 percent in 10 Highest Energy Use Buildings	9,538,000	8,700	12	**FMD***	09/01/17	12/01/17	12/01/25
**Lead should independently identify alternatives or confirm discovery information in the attached report regarding increasing energy efficiency in the 10 highest use/need buildings older than 40 years through a combination of retrofits a combination of retrofits and improved employee behavior reduce electricity by 20 percent. All County-owned buildings in the downtown complex will be upgraded will be upgraded through window replacement and improved building insulation.*							
c. Downtown District Energy	TBD	TBD	TBD	**FMD***	N/A	12/01/17	12/01/25
**Lead will create a Pima County Downtown Energy district by interconnecting and adding County-owned buildings to the existing downtown Central Plant.*							
d. Fleet Efficiency: 1.) Improve Fleet Fuel Efficiency 10 percent (in nonelectric vehicles)	N/A	590	1	**Fleet***	09/01/17	12/01/17	12/01/25
2.) Replace 120 gasoline sedans with electric vehicles	N/A	91	<1	**Fleet***	09/01/17	12/01/17	12/01/25
**Lead will independently identify alternatives or confirm discovery information in the attached report regarding continuing to improve fleet efficiency and electric vehicle infrastructure by replacing gasoline passenger sedans with electric vehicles and improving employee driver behavior (reduction in idling of diesel vehicles/heavy equipment when safe and possible, efficient routing, etc.) The County will purchase 20 electric vehicles per year for the next six years and will largely replace gasoline powered sedan-style vehicles in the current vehicle fleet.*							
e. Green Infrastructure and Low Impact Development with Trees AutoCASE study	N/A	176	<1	**RFCD*** **DOT*** **PDEQ*** NRPR DSD OSC	N/A	12/01/2017	12/01/25

1.) GI-LID + Trees (proxy = 66,000 SF/1.5 acres rain garden & curb cuts)							
2.) Just Trees (10,000 desert trees low VOC)	970,000	700	1	**RFCD*** **DOT*** **PDEQ*** NRPR DSD OSC	N/A	12/01/2017	12/01/25

**Leads should independently identify alternatives or confirm discovery information in the attached report regarding strengthening the adaptive capacity and resilience of County operations and reduce infrastructure vulnerabilities to climate change through. An AutoCASE study should be undertaken to create a GIS layer and map as well as and cost-benefit analysis of installing GI/LID + Trees on County properties and rights of way that would yield the highest return on investment in terms of carbon sequestration, building cooling, reduction in urban heat island effects and stormwater management and flooding abatement as well reduced air pollution.*

f. Sustainable Action Plan for County Operations	N/A	N/A	N/A	**OSC***	N/A	03/30/17	12/01/25

**Lead should prepare an update to the Sustainable Action Plan for County Operations to reflect the County's alignment with the Paris Agreement.*

g. Biogas Renewable Energy	TBD	TBD	TBD	**RWRD***	N/A	03/30/17	12/01/25

**The County will construct necessary infrastructure to make biogas generated from the wastewater treatment process into a clean form of methane gas capable for use as a commercial fuel. The County will then sell clean biogas for beneficial use.*

PIMA COUNTY
Sustainability, Conservation
& Historic Preservation

Pima County Board of Supervisors Climate Change Resolution 2017-39 & Resolution 2017-51: Report & Recommendations to meet The Paris Agreement

July 11, 2017

EXECUTIVE SUMMARY

The Pima County Board of Supervisors adopted Resolution 2017-39 on June 6, 2017 and Resolution 2017-51 on July 11, 2017, which state that County government will align its operational efforts to meet the United States' commitment to the Paris Agreement on Climate Change that seeks to reduce global carbon emissions by 26% to 28% below 2005 levels by the year 2025. These targets would in effect safeguard regional high temperatures near or below 120°F.[i]

Additionally, climate change is expected to affect local water demand, groundwater withdrawals and aquifer recharge, reducing groundwater availability in some areas. Long term drought is also expected to intensify in the Southwest. A drought emergency declaration has been in effect for Arizona since June 1999 and a Stage One drought declaration has been in effect for Pima County since 2007.

Based on our sustainability work to date, however, Pima County is in fact already leading the way in many climate mitigation and adaptation efforts and could perhaps be one of the first counties in the country to meet this historic agreement.[ii] While achieving these goals will require deep commitments to mitigation and adaptation actions, the good news is that most of these can be accomplished through deliberate decision-making and the actions recommended below[iii]; which include a combination of positive or revenue neutral investments using new financing structures. There are also many co-benefits associated with these actions, which can viewed (and calculated) as avoided future costs in healthcare, infrastructure and air quality penalties.

Thus embracing this commitment not only secures our future but also creates enormous economic development opportunities and trade benefits. Certain investors and CEOs of the world's largest multinational companies, for example, have collectively called climate action "one of America's greatest economic opportunities of the 21st century." Furthermore, a 2016 survey on American attitudes toward climate change found that a majority of Americans in every state say the US should participate in the Paris

Agreement[iv] and that 75% of Pima County residents believe global warming is happening and 78% support policies to regulate CO2 as a pollutant.[v]

Pima County is uniquely positioned to effectively meet the Paris Agreement (PA);[1] indeed, we have already made a significant down payment on this effort. With over eight years of data collected for the Sustainable Action Plan for Pima County Operations (SAPCO) we can look at past and current greenhouse gas emissions and sources as well as energy and water use to calculate future trends. Additionally, we have a set of vetted climate goals and objectives in *Pima Prospers*, the County's comprehensive plan. These tools in combination with recently developed resources such as the Green Infrastructure Prioritization Tool available through Pima Association of Governments (PAG) and AutoCASE™ studies undertaken by the Flood Control District, provide smart resources for decision making. Through an initial discovery exercise, the following County actions are recommended for consideration to meet the Paris Agreement:

- **Cut County Greenhouse Gas Emissions (GHG) by up to 40-42%** from current levels to **74,332 MT CO2e/yr** by 2025 (PA Article 2, 3, 4, 6).
- **Increase Tree Canopy Cover** (and other vegetation) from only 7% currently to 25% to enhance the removal of greenhouse gases or carbon sequestration (PA Article 5) on County-owned properties. In addition to greenhouse gas reduction benefits, tree shade cooling reduces energy use by buildings and, along right-of ways, promotes employees' active modes of transportation.
- **Undertake Green Infrastructure and Low Impact Development Projects**, which utilizes stormwater harvesting to strengthen the adaptive capacity and resilience of government operations and reduce infrastructure vulnerabilities to climate change (PA Article 7). Nature-based solutions for stormwater management provide cost-effective practices for reducing flooding, conserving water and curbing urban heat island effects as well as ozone pollution.[vi]
- **Develop an Energy, Water & Economic Resilience Plan:** In combination with a briefing and review of draft findings from the Fourth National Climate Assessment for the Southwest, climate elements of *Pima Prospers*, and other regional climate plans, produce a roadmap for additional efforts needed to meet the Paris Agreement and long-term priorities.

Thus, based on the best available information and above considerations, staff have identified four actionable areas that will provide the most direct and cost-effective path for the County to meet the Paris Agreement goals. These have been further categorized into immediate and near-term priority actions based in Table 1. In accordance with the resolution, Pima County will also take a leadership role in regional collaborative efforts to address the draft findings form the Fourth National Climate Assessment for the Southwest. This is described in more detail in the Summary section of this report.

[1] Numerous counties, cities and corporations in the United States have formally pledged to support climate action to meet the Paris Agreement. Pima County is the only county in Arizona, thus far, to have passed a similar initiative.

Table 1. Proposed list of immediate and near-term carbon mitigation and climate adaptation actions for County operations.					
Paris Agreement GHG Target for Pima County Operations 74,332 MT CO2e/Yr[2]					
Actionable Items to Reduce GHG Emissions 2017 - 2025	**kWh Saved/ Yr**	**MT CO2e/ Yr**	**% of Target**	**ROI (Yrs)**	**Avoided Cost (Savings)**
Immediate Priority					
1. Solar: Install 41 MW of Solar at County Facilities	86,739,000	79,000	106%	2	$3,000,000/yr[3]
Near-term Priorities					
2. Energy Efficiency in Buildings & Operations: Improve EE by 20% in 10 Highest Energy Use Buildings (improve water efficiency by 10% is not included in cost calculations).	9,538,000	8,700	12%	0.4 - 2.5	$1,049,000/yr
3. Fleet Efficiency: **a.) Improve Fleet Fuel Efficiency 10% (in non-electric vehicles)**	N/A	590	1%	Varies	$49,000/yr
b.) Replace 120 gasoline sedans with electric vehicles	N/A	91	<1%	<1	$69,000/yr
4. Green Infrastructure/Low Impact Development Stormwater Management with Trees **a.) GI/LID+Trees (proxy = 66,000 SF/1.5 acres rain garden & curb cuts[vii])**	N/A	176[4]	<1%	8	$73,000/yr[5]
b.) Just Trees (10K desert-adapted low VOC)[viii]	970,000[6]	700	1%	NA	$460,000/yr[7]

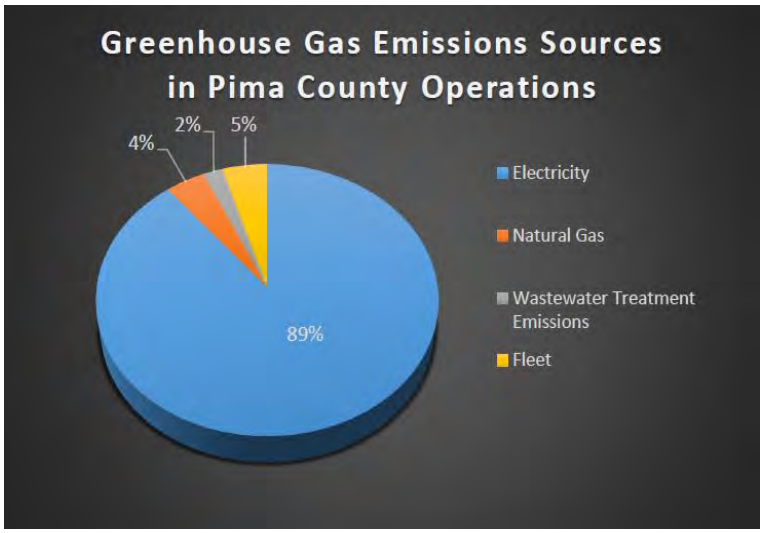
[2] Based on an estimated annual growth
[3] Average annual savings over 20 years

[4] The physical carbon value is 0.267 MT/yr for every 100 square feet of green stormwater infrastructure, approximate 1 tree for every 50 square feet. This includes carbon saved from energy to pump water, shading buildings as well as the carbon sequestered in the tree. (WMG, 2017)
[5] Includes indirect benefits (air quality, flood risk reduction, plus increase in properties values etc.)
[6] Assumes planting near large commercial buildings
[7] Less long-term maintenance

BACKGROUND TO THE REPORT

For this discovery exercise, several analyses were undertaken by Pima County Sustainability Program staff:

- First, carbon, solar and energy efficiency priority action items were pulled from the attached Mid-term Report for SAPCO (Appendix A). These priorities were previously identified through a scoring and ranking exercise and comparative analysis with *Pima Prospers* Action Items undertaken by staff in December 2016.
- Second, an analysis of current carbon emissions and electricity use by County buildings and operations was undertaken by the Sustainability Division in the pie chart below. As shown, approximately 89% of County greenhouse gas emissions are due to increased electricity use.



- Third, the GHG emission reductions and a cost/benefit analysis for electrifying a portion of the County's fleet were also produced by the Sustainability Division.
- Fourth, to better understand the potential for Green Infrastructure-Low Impact Development with Trees to support the mitigation and adaptation goals of the Paris Agreement, a preliminary analysis of surface temperature /tree canopy coverage for Pima county parcels and rights-of-way was produced by PAG. Additionally, the Flood Control District provided green infrastructure case studies which are also referenced.

While by no means a comprehensive study, this report, requested by the County Administrator, is intended to provide actionable direction on how and where the County might focus efforts to align and meet the Paris Agreement commitment through the most efficient and cost effective manner.

SOLUTIONS/RECOMMENDATIONS:

1. RENEWABLE ENERGY (+STORAGE)

Pima County has made great strides in increasing renewable energy use in operations while optimizing energy efficiency. Since 2009, the County has increased its solar energy portfolio from zero Megawatts to 12 Megawatts, enough to meet nearly 21% of its annual electricity consumption. Because of these solar projects, the County has saved an estimated $5 million in energy costs, avoided 79,000 metric tons

of CO2e emissions, conserved 21 million gallons of water, and helped to produce 700 local jobs,[ix] and infused more than $54 million into the local economy.[x]

Because 89 percent of Pima County GHG emissions derive from increased electricity use, switching to renewable energy such as solar provides the best opportunity to reduce its emissions. To date, Facilities Management (FMD) and the Regional Wastewater Reclamation Department (RWRD) have taken the lead in advancing renewable energy projects. A total of 22 Pima County solar projects have been completed thus far (see Table 2 and Figure 1). All but one of these projects have been installed at no cost to the County through Power Purchasing Agreements (PPAs)—also called Solar Service Agreements (SSAs). Installation costs are bundled in these types of contracts and paid for through the guaranteed return savings based on rates less than or equal to Tucson Electric Power Company (TEP) tariffs and fixed for 20 years. An example SSA is provided in Appendix C.

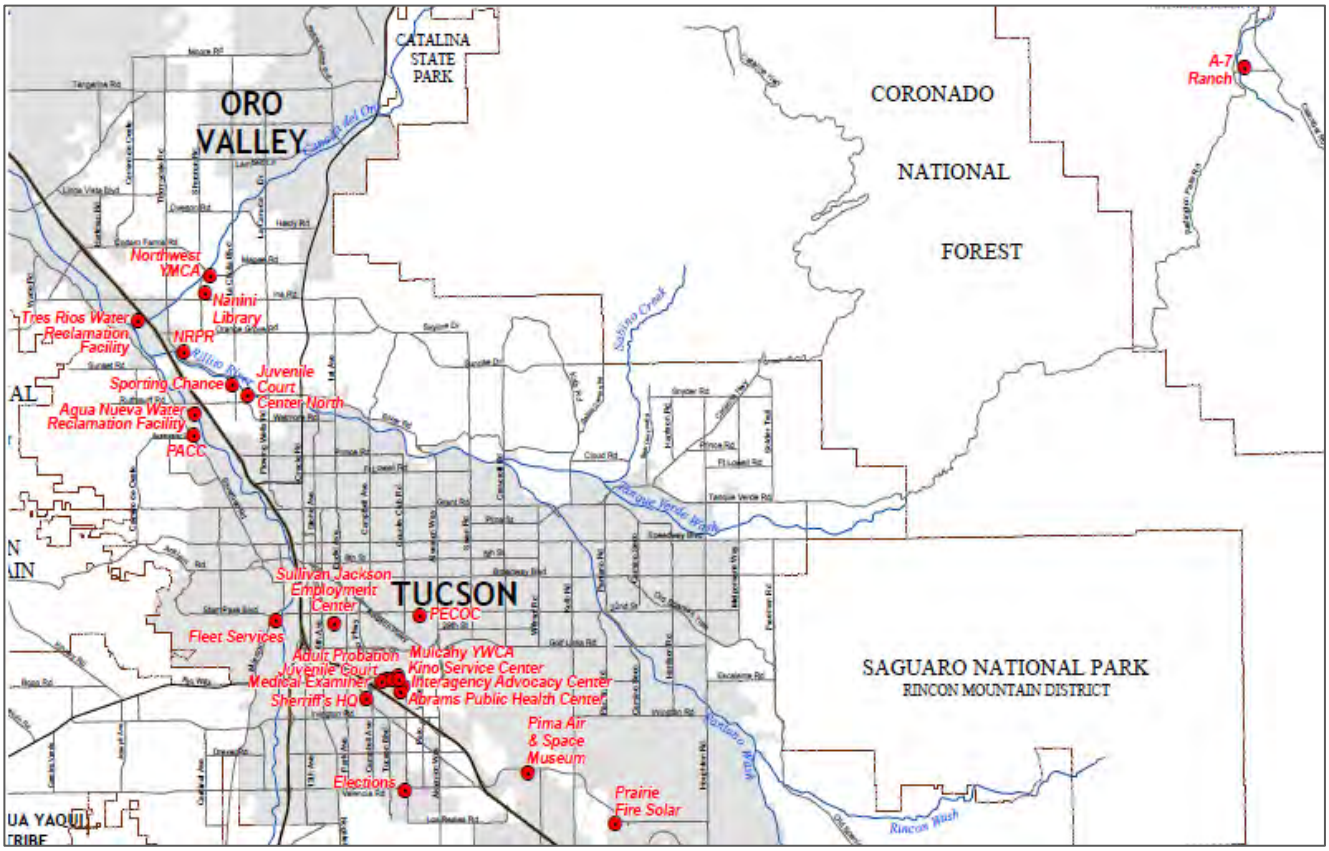


Figure 1. Map of current Pima County solar installations. Total current solar capacity is 12 MW, which supplies 21% of the County's electricity needs

Table 2. List of Current Pima County Solar Sites				
Site	**Address**	**Date Install**	**Production (kWh/yr)**	**Avoided (MTCO2e/yr)**
Sullivan Jackson Employment Center	400 E 26th St	Jul-09	7,972	15,975
Agua Nueva Wastewater Reclamation Facility	2955 Calle Agua Nueva	Aug-10	1,927,850	3,863,260
A 7 Ranch	Redington Road	Mar-11	14,600	29,257
Herbert K. Abrams Public Health Center	3950 S Country Club Rd	Apr-11	328,682	658,653
Tres Rios Wastewater Reclamation Facility	7101 N Casa Grande Hwy	Apr-11	1,771,811	3,550,570
Prairie Fire Solar	7540 E Old Vail Rd	Dec-12	9,639,250	19,316,298
Northwest YMCA	7770 N Shannon Rd	Jun-14	1,017,000	2,037,988
Fleet Services Center	1301 S Mission Rd	Oct-14	1,051,919	2,107,963
PECOC	3434 E 22nd St	Oct-14	732,274	1,467,419
Mulcahy YMCA	2805 E Ajo Way	Dec-15	609,418	1,221,225
Adult Probation	2695 E Ajo Way	Apr-16	333,963	669,235
Elections	6550 S Country Club Rd	Apr-16	479,293	960,466
Interagency Advocacy Center	2329 E Ajo Way	Apr-16	484,773	971,448
Juvenile Court Center	4955 N Shamrock Pl	Apr-16	2,211,256	4,431,183
Kino Service Center	2797 E Ajo Way	Apr-16	339,843	681,019
NRPR	3500 W River Rd	Apr-16	464,529	930,879
Pima Animal Care Center	4000 N Silverbell Rd	Apr-16	105,011	210,435
Sheriff's Department	1750 E Benson Hwy	Apr-16	910,711	1,824,994
Nanini Library	7300 N Shannon Rd	Nov-16	328,028	657,342
Pima Air and Space	6000 E Valencia Rd	Nov-16	518,369	1,038,770
Sporting Chance	2100 W Curtis Rd	Nov-16	483,410	968,715
Medical Examiner	2825 E District St	Feb-17	310,763	622,745
Total			**4,070,725**	**48,235,838**

Staff have determined the quickest and most cost effective pathway to meeting the Paris Agreement would be through substantially increasing the County's portfolio of renewable energy sources by installing approximately 41 MW of solar Photovoltaics (PV) on suitable County properties. Examples of potential sites are included in Table 3. based on the following parameters:

- Sufficient electricity demand by an existing building/facility (Arizona Corporation Commission regulations prohibit "pushing" electricity across right-of-way property boundaries).
- Space availability and orientation for solar PV, e.g. solar-covered parking, building roof-tops, vacant but already disturbed lands, and potentially some flood plain sites.

Table 3. List of Potential Pima County Properties to Consider for Solar PV Installation[8]

Paris Agreement GHG Target for Pima County Operations
74,332 MTCO2e/Yr[9]

Site	Total Use in kWh (FY 2015-16)	MW Required	kWh Generated	MTCO2e Avoided/Yr	% of Target
Tres Rios WRF	32,538,030	10.77	19,522,818	17,745.55	24%
Water Energy Sustainability Center	17,148,252	5.67	10,288,951	9,352.29	13%
Central Plant	12,223,056	4.04	7,333,834	6,666.19	9%
Public Works	5,168,000	1.71	3,100,800	2,818.52	4%
Main Jail Annex West Unit	4,615,200	1.53	2,769,120	2,517.03	3%
Adult Probation	3,757,680	1.24	2,254,608	2,049.36	3%
Bank Of America	3,754,560	1.24	2,252,736	2,047.66	3%
Public Service Center	3,236,800	1.07	1,942,080	1,765.28	2%
Pima County Legal Services	2,887,800	0.96	1,732,680	1,574.94	2%
Valencia Library	2,636,680	0.87	1,582,008	1,437.99	2%
Mount Lemmon Community Center	2,593,640	0.86	1,556,184	1,414.52	2%
Woods Library	2,452,060	0.81	1,471,236	1,337.30	2%
Bear Canyon Lib	2,169,700	0.72	1,301,820	1,183.31	2%
Murphy Wilmot Lib	2,128,420	0.7	1,277,052	1,160.79	2%
Property & Evidence Building	1,935,280	0.64	1,161,168	1,055.46	1%
Wheeler Taft Abbett Lib	1,875,760	0.62	1,125,456	1,023.00	1%
Valdez-Main Lib	1,848,000	0.61	1,108,800	1,007.86	1%
Quincie Douglas Library	1,772,960	0.59	1,063,776	966.93	1%
Ekstrom-Columbus Library	1,712,868	0.57	1,027,721	934.16	1%
Rillito Race Track (4502 N. 1st Ave)	1,689,264	0.56	1,013,558	921.29	1%
Fleet Services	1,635,600	0.54	981,360	892.02	1%
Mission Public Library	1,546,635	0.51	927,981	843.5	1%
PECOC	1,322,400	0.44	793,440	721.21	1%
Dusenberry Library	1,277,894	0.42	766,736	696.94	1%
Walter Rogers South Clinic	1,236,312	0.41	741,787	674.26	1%
Santa Rosa Lib	1,144,001	0.38	686,401	623.91	1%
Animal Care Center	1,093,280	0.36	655,968	596.25	1%
Martha Cooper Lib	1068327.5	0.35	640,997	582.64	1%
Flowing Wells Community Center	1,048,600	0.35	629,160	571.88	1%

[8] Assumes solar meets 60% of building electricity needs and available space, further analysis required to determine specific suitability of sites.
[9] Based on current emissions trends.

Medical Examiner	689,400	0.23	413,640	375.98	1%
97 E. Congress	679,140	0.22	407,484	370.39	<1%
Oro Valley Library	640,400	0.21	384,240	349.26	<1%
Minimum Security Annex	622,651	0.21	373,591	339.58	<1%
KSC South Clubhouse	463,595	0.15	278,157	252.83	<1%
Wheeler Taft Abbett Library	454,400	0.15	272,640	247.82	<1%
Sports Park (Sporting Chance)	431,395	0.14	258,837	235.27	<1%
Ajo Justice Courthouse	86,840	0.03	52,104	47.36	<1%
Pima County Animal Care - Ajo	50,609	0.02	30,365	27.6	<1%
Salazar-Ajo Library	42,793	0.01	25,676	23.34	<1%
Total	**123,678,283**	**40.92**	**74,206,970**	**67,451.50**	**91%**

The carbon reduction benefit for 41 MW of solar PV is 67,450 MT CO2e avoided emissions annually, and the estimated return on investment could be as high as $61 million over 20 years. *However, to achieve the maximum economic benefit associated with solar PV installations, interconnection agreements need to be executed and in place before the current net metering rates are revised by the Arizona Corporation Commission (expected revision in September 2017), and actual solar installations must be completed subsequently within six months.*

2. BUILDINGS (ENERGY AND WATER EFFICIENCY)

The growth and development of our communities has a large impact on our natural environment. The manufacturing, design, construction and operation of the buildings in which we live and work are responsible for the consumption of many of our natural resources.[xi] In the United States, buildings account for about 40% of total energy use, 70% of total electricity consumption, and 40% of carbon dioxide emissions.[xii]

Pima County-owned facilities account for more than 70% of County Government's total GHG emissions.[xiii] Furthermore, the SAPCO Report Card for FY2015-16 indicated that the Plan's Green Building chapter was an area of declining performance, and the SAPCO Midterm Report identified it as an area in need of immediate attention. Increasing building resource efficiency consequently became both a SAPCO and *Pima Prospers* priority item in 2017.

Thus, employing green building initiatives—that is, the practice of increasing the efficiency with which existing and new facilities use energy, water, and other resources—is an imperative part of reducing our GHG emissions and satisfying the targets of the Paris Agreement (PA Article 2, 3, 4, 6). Table 4 contains a list of buildings that could be could be potential candidates for energy efficiency improvements.

Table 4. List of 10 Highest Electricity-using County-owned Facilities[10]				
Site	**Annual Electricity Use (FY 2015-16)**	**Annual kWh Saved (20% Improvement)**	**Est. Annual Emissions Savings (MT CO2e)**	**Est. Annual Cost Savings[11]**
Central Plant: 190 W Pennington	103,535,400	20,707,080	19	$2,277,779
Public Works: 201 N Stone Ave	37,400,000	7,480,000	7	$822,800
Bank Of America: 33 N. Stone Ave	36,215,040	7,243,008	7	$796,731
Juvenile Courts Building: 2225 E Ajo Way	33,645,601	6,729,120	6	$740,203
Main Jail: 1270 W Silverlake Rd	29,421,900	5,884,380	5	$647,282
Legal Services Building: 32 N. Stone Ave.	26,056,240	5,211,248	5	$573,237
Abrams Public Health Center: 3950 S Country Club Rd	17,592,100	3,518,420	3	$387,026
Sheriff's Admin: 1750 E Benson Hwy	13,287,200	2,657,440	2	$292,318
Valdez-Main Library: 101 N Stone Ave	12,344,601	2,468,920	2	$271,581
Public Service Center: 240 N Stone Ave	8,579,200	1,715,840	2	$188,742
Total		**63,615,456**	**58**	**$6,997,700**

Common priorities for improving building energy (and water) efficiency, some of which are already being implemented by Facilities Management include (but are not limited to):

1. Maximizing efficiency and minimizing use of lighting
    a. *Turn off lights when not in use, and use sunlight in lieu of artificial lighting where applicable. This alone can reduce lighting expenses by 10% to 40%.*[xiv] *Use LEDs for lighting. They typically use about 25% - 80% less energy than incandescent bulbs, can last 3 – 25 times longer, and emit very little heat.*[xv]
2. Repairing damaged and/or missing insulation on all piping, ducting, and equipment, and ensuring all insulation is of appropriate thickness for the operating and ambient conditions of the building's HVAC system.
3. Sealing air leaks around walls, ceilings, floors, windows, doors, etc. This could potentially save 5% to 30% of energy use by reducing drafts.[xvi]
4. Investing in a high-performance, energy-efficient HVAC system

[10]Top ten highest electricity use buildings were selected. This combination produced a higher potential for overall kWh reduction than the ten highest use per square-foot buildings.
[11] Assumes an average cost of $0.11/kWh

    a. *Heating and cooling often accounts for almost half of a building's energy use.*[xvii] *Efforts to cut energy use here would likely result in large overall savings for County facilities.*
5. Considering the installation of DEVAP (desiccant enhanced evaporative air-conditioning) technology.
    a. *According to the U.S. Department of Energy, DEVAP uses up to 90% less electricity and as much as 80% less total energy than conventional air-conditioning.*[xviii]
6. Maximizing efficiency of building HVAC systems
    a. *Change air filters regularly, tune up HVAC equipment yearly, allow for more personalized control over office temperature, etc.*[xix]
7. Installing energy-efficient windows, and improving energy-efficiency of existing windows.
    a. *Adding storm windows, caulking and weather-stripping, and using window treatments/coverings will help to reduce overall energy use. Installing storm windows alone can reduce heat loss through windows by approximately 10%-20%.*[xx]
8. Include water efficiency in retrofits such as water efficient fixtures and water harvesting.
9. Fostering a work-force culture of energy and water efficiency through education and recognition of energy-saving behavior.

As highlighted in the SAPCO Mid-term Assessment, it is recommended that the County undertake an Energy Performance Contract (EPC), a proven cost-effective strategy to implement and maximize energy savings. An EPC would also effectively address the County's declining performance in water conservation, as also highlighted in the SAPCO Midterm Report (See Appendix A).

Additionally, exploring new ways to beneficially use the biogas from Wastewater Facilities and collected RIN (Renewable Identification Number) credits; embed energy and water efficiency (as economic resources saved) throughout the Integrated Infrastructure Plan as an overarching framework; and lastly developing a Master Energy, Water and Economic Resilience Plan for County Operations for resource planning, would further extend these efforts.

Improving efficiency in the 10 highest electricity-using buildings by 20% will save an estimated $7 million and 58 MT CO2e annually, with costs for improvements recovered within approximately six-eight years.[xxi] [xxii] **Improving water efficiency by 10% in the 10 highest-using buildings is a drought adaptation measure aligned with the Paris Agreement.**

3. FLEET SERVICES

In the United States, the transportation sector accounts for approximately 27% of GHG emissions.[xxiii] Fortunately for Pima County, Fleet Services not only accounts for a notably smaller percentage of County Government GHG emissions, but the Department also reduced its GHG emissions by 42% in FY2015-16, relative to its FY2013-14 baseline levels. That said, with an expanding number of viable alternatives to

gasoline-powered passenger cars now on the market, the use of electric vehicles (EVs) is an attractive and cost-competitive option for the County Fleet.

There are numerous benefits associated with EV use. One of the most salient advantages is having zero tailpipe emissions. The only GHG emissions connected to EVs are those released from electricity production. Though many of these production plants are still coal-powered, the electric grid is regulated and becoming cleaner and more advanced by the year. Managing GHG emissions at the source, in lieu of the millions of individual pollution factories (vehicle engines) on the road, is more efficient and effective.[xxiv]

After taking into account all sources of CO2 emissions—tailpipe emissions and emissions associated with the production and distribution of fuel—the total CO2 emissions for a 2017 Chevy Bolt EV in the Pima County region is 160 grams per mile. The total CO2 emissions rate for the average gasoline car in our region is 430 grams per mile - more than 2.5 times as an EV.[xxv] Thus, EVs are in fact a much more environmentally responsible option. Other benefits include reduced maintenance, a quieter drive, instant torque (the 2017 Chevy Bolt 0 to 60 mph in 6.5 seconds, and from 0 to 30 mph even more impressively in 2.9 seconds[xxvi]), and more energy security since an EV can run on 100% domestically-produced electricity.[xxvii] "In 2015, the United States imported about 24% of the petroleum it consumed, and transportation was responsible for nearly three-quarters of total U.S. petroleum consumption."[xxviii]

Is EV integration suitable for County use? Concerns regarding perceived low ground clearance, small size or lack of carrying capacity, and range limitations are important considerations. In anticipation of EV integration into the County's fleet, a survey was administered to employees in early 2017 to better understand vehicle use and needs and perceptions of EVs: 71% of respondents stated that they either never or infrequently need a vehicle with high ground clearance; 84.2% of respondents said they either never or infrequently needed a vehicle that could carry items six feet or longer; and 76% of respondents either never or rarely take trips that extend 100 miles round-trip per day. Even still, with technological advancements and investment in supporting infrastructure, the use of EVs will only become more viable. For example, the new 2017 Chevy Bolt provides at least 250 miles of travel on one charge as opposed to the Nissan Leaf's 107 miles. Thus, the integration of electric vehicles (EVs) in the County's fleet would be an important, feasible and appropriate step towards achieving the targets of the Paris Agreement (PA Article 2, 3, 4, 6).

Table 4. County Fleet Mitigation Strategies				
	MT CO2e/Yr Savings	**% of 2025 Target**	**Annual Cost Savings[12]**	**Payback[13]**
Replace 120 gasoline passenger sedans with an electric alternative (EV)	91	<1%	$69,000 (fuel and maintenance)	0.31 years
Use of solar to charge EVs	218.84	<1%	$3,400	TBD

Common priorities for improving fleet efficiency, some of which are already being implemented by Fleet Services include (but are not limited to):

1. Replacing aging cars with EVs so that eventually all passenger cars are EV
    a. *Other local governments are on their way to achieving this. The City of Los Angeles, for example, recently added 199 EVs--the largest fully battery-powered municipal fleet in the US.[xxix] Pima County government is also already making strides toward integrating more EVs. A recent memorandum has authorized the Fleet Services Department to purchase 20 electric vehicles that will be placed in departments in need of vehicle replacement.*
2. Considering the replacement of diesel-fueled heavy-duty vehicles with diesel hybrids (when available) and/or biodiesel-fueled vehicles where appropriate.
3. Considering the use of solar power to charge our electric fleet via solar-covered parking structures along with charging sites.
4. Developing supporting EV infrastructure, with an emphasis on DC fast chargers
5. Encouraging fuel-saving practices when operating County vehicles.
    a. *This may include efficient routing, idling mitigation, elimination of unnecessary weight from vehicles, and carpooling.*

The estimated return on investment for replacing 120 gasoline passenger sedans with EV's is less than one year, with an annual cost savings of $69,000 in fuel and maintenance. The carbon reduction benefit is 91 MT CO2e per year.

4. GREEN INFRASTRUCTURE & LOW IMPACT DEVELOPMENT WITH TREES

Climate change is already increasing urban heat island effects, energy and water use and is predicted to increase flooding in Pima County.[xxx] Green Infrastructure (GI)[14] is an adaptive practice designed to move

[12]Assumes solar is installed through a solar services agreement at a rate equal to $0.11/kWh.
[13]Assumes vehicles are replaced on a normal replacement schedule.
[14] Green infrastructure (GI): An array of products, technologies, and practices that use natural systems—or engineered systems that mimic natural processes—to enhance environmental quality and provide utility services including capturing, cleaning, and infiltrating stormwater;

urban stormwater and pollutants away from roads and buildings and treat it using vegetation and soils close to its source.[xxxi]

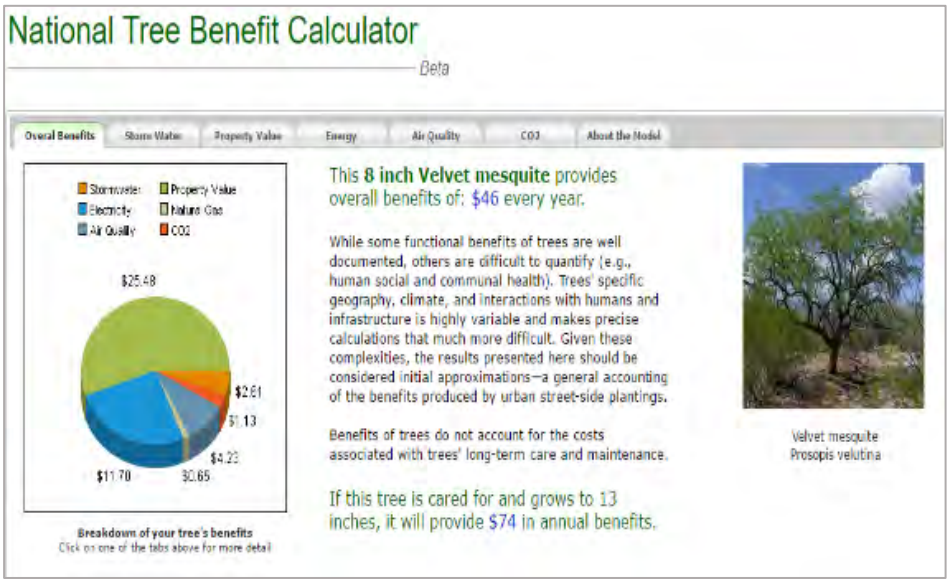
Combined with Low Impact Development,[15] the co-benefits of GI include a reduction in electricity demands via natural cooling (by as much as 40°F for building surfaces), improved air quality (important for meeting federal regulatory standards) and reduced heat mortalities. These benefits can be further expanded when native plants are used in GI Basins in the right-of-way and on properties, which create habitat and attract pollinator species. And, since harvested stormwater (through capture and detention) is a central part of GI/LID practices, many of these benefits include water planning aspects. Since water delivery is one of the biggest factors in fossil fuel energy consumption, in the state, we recommend that analysis be conducted using a tool such as AutoCASE to evaluate the impact water harvesting may have toward delivering further GHG emission benefits. Together GI/LID+Trees can provide powerful climate adaptation and mitigation benefits that support Articles 5 & 7 of the Paris Agreement.

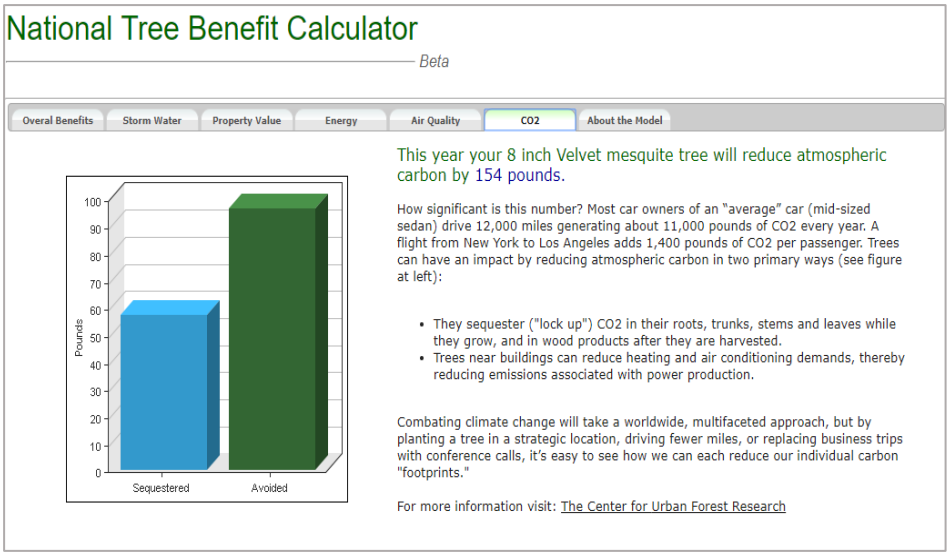
Using PAG's Green Infrastructure Prioritization Tool,[xxxii] it is possible to estimate the number of acres of property including right-of-ways (ROWs) that Pima County holds with low tree canopy and above average surface temperature areas that could be improved through GI/LID+Tree efforts. PAG has

creating wildlife habitat; shading and cooling streets and buildings; and calming traffic. As a general principle, GI techniques use soils and vegetation to infiltrate, evapotranspirate, and/or recycle stormwater runoff. (LID Manual, 2015),

[15] Low Impact Development (LID): LID employs preserves and recreates natural landscape features, minimizes imperviousness to create functional and site drainage that treats stormwater as a resource rather than a waste product.

determined that eastern urban Pima County has an average of 7% tree canopy and urban foresters recommend 20-25% cover for human habitat. A follow up analysis using AutoCASE™ (a tool Pima County, PAG and the City of Tucson invested in to calibrate for desert regions) could calculate the MT CO2 emissions per square foot or acre of County property with GI/LID+Tree improvements.



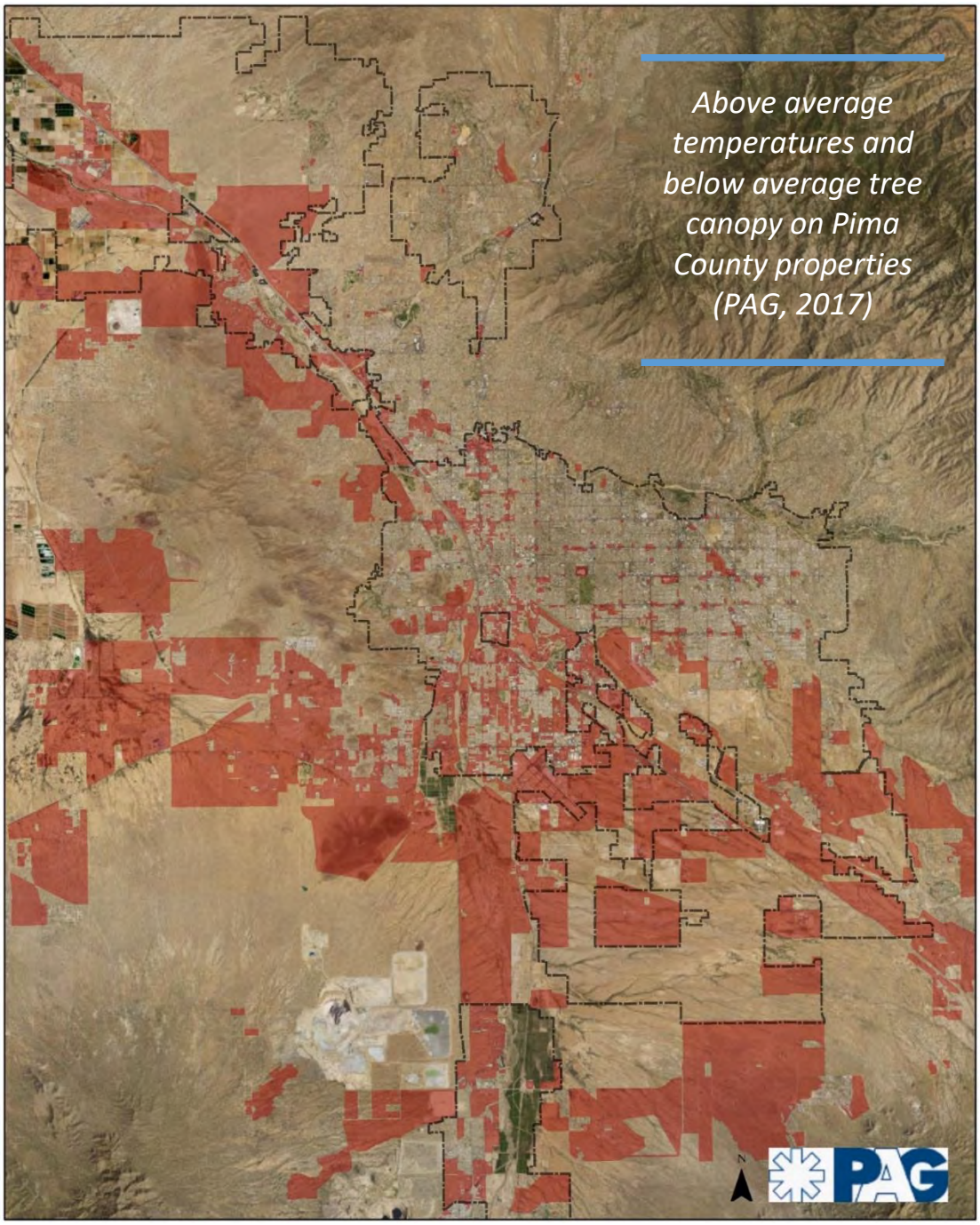


Specifically, regarding tree planting, climate mitigation and adaptation benefits can be calculated per species using the USFS tree calculators like iTree.[xxxiii] For example, an 8-inch native Velvet Mesquite tree (maintained by harvested rainwater supply after initial phase) can sequester or store 154 lbs. of CO2e a year. Fourteen, 8-inch mesquites would sequester up to one metric ton (MT) of CO2e per year.[xxxiv]

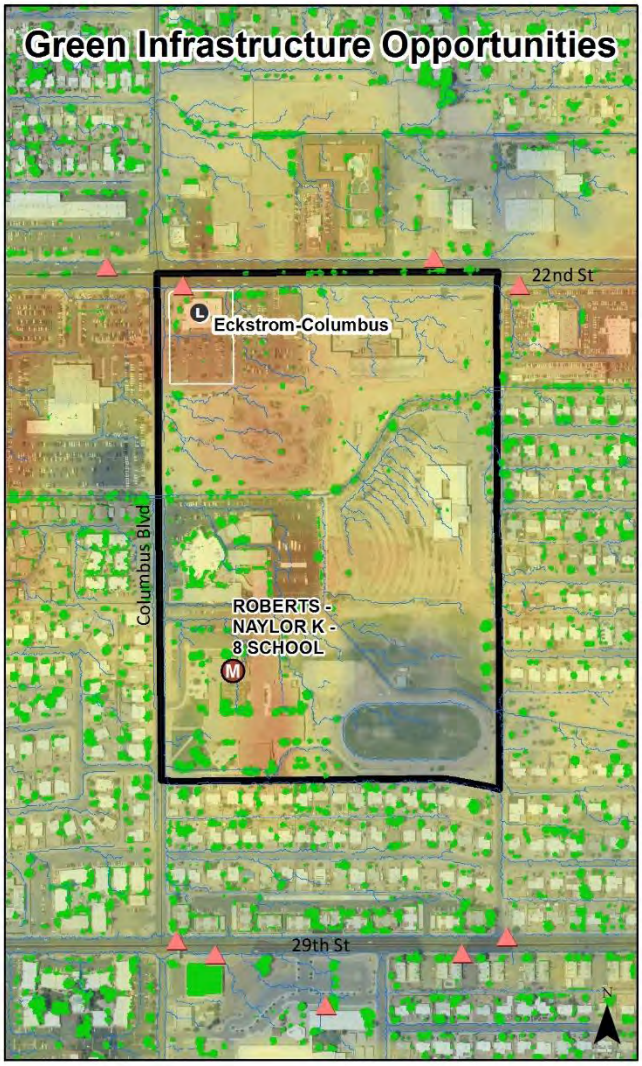
Planting 10,000 trees (similar to City of Tucson initiative) on County-owned properties would sequester nearly 700 metric tons of CO2e per year. Additional CO2e reduction benefits could be achieved through planting trees in strategic proximity to heat-absorbing buildings to reduce the urban heat island effect by as much as 9°F [xxxv] and thus reduce building cooling demands. Green infrastructure near roads and sidewalks encourages active modes of transportation, and reduces vehicle emissions, which may be calculated by tools such as AutoCASE. Furthermore, PAG recommends that the County utilize the GI Prioritization Tool if a data driven target is desired for canopy goals. The potential number of plantings needs to reach canopy goals can be calculated and best placement of these trees can be geographically analyzed for suitable planting locations and where need and number of benefits are greatest.

GI/LID+Trees also offer many indirect but important co-benefits as well. These range from improving public health through improved environmental quality. An emerging area of research, biophilic design (to intentionally reconnect people with nature or more specifically the ecology of place, culture and beauty through buildings) has demonstrated measurable benefits between nature and wellbeing.[xxxvi]

The Green Infrastructure Prioritization Tool can be used to identify priority GI/LID+Tree areas



Eckstrom - Columbus Library



2008 Stormwater Flow Lines produced by
Pima County Regional Flood Control District.

Potential Priority Blocks:
Census blocks with above average heat exposure and below average tree canopy in census blocks containing businesses or residences.
Sources:
2010 Census Blocks & Population
2013 infoUSA Employment data
2008 LANDSAT Thermal Surface
2007 NAIP Vegetation
2008 PAG LiDAR nDSM

▲ Bus Stop

2008 Stormwater Flow Lines produced by
Pima County Regional Flood Control District.

Tree Canopy Extent:
PAG's analysis of 2007 NAIP imagery and 2008 PAG LiDAR, representing trees over 6 feet above the ground.

Regional Surface Temperature:
Analysis of 2008 LANDSAT thermal data.
Accurate for relative temperature comparisons only.
Eve B. Halper, Christopher A. Scott, Stephen R. Yool (2012).

Surface Temperature
Warm Warmer

AutoCASE™ can be used to calculate the cost and benefits of GI/LID+Tree projects as this example looking at the Silverbell Road expansion illustrates (Impact Infrastructure, LLC, 2014)

"The exercise of additional green infrastructure elements to a ½ mile segment of Silverbell Road [that] included incorporating new trees, bio retention, and water harvesting basins…leads to a highly positive SNPV [Sustainable Net Present Value]. The most substantial benefits are reduced heat stress mortality and traffic calming due to the installation of a roundabout and curb extension. Unlike the other benefits, these benefits are measuring direct impacts on human life by increasing the safety of a region, either in terms of reduced local temperatures or reduced likelihood of cars hitting pedestrians. The value of life-related costs have a large value over time and, as shown in Table 3, are more substantial than the other benefits as a result." (Impact Infrastructure, LLC et al., 2014).

Summary Results	Net Present Value of Benefits - Silverbell Road
Capital Expenditures	-$42,125
O&M Costs	-$3,897
Direct Financial NPV	***-$46,022***
Reduced Electricity Costs	$20,331
Reduced Natural Gas Costs	$57
Reduced Flood Risk	$25,645
Change in Property Values	$1,592
Reduced Heat Stress Mortality	$84,634
Value of Reduced CO2 Emissions	$12,095
Value of Reduced Air Pollution	$17,588
Reduced Direct Costs of Water	$43,823
Reduced Marginal Social Costs of Water Use	$39,868
Increased Pavement Longevity Benefit	$1,763
Traffic Calming - Roundabouts and Curb Extension	$117,737
Other Benefits	$3,412
S-NPV	***$322,523***

Figure 28 Silverbell Road Site Detail from Google Maps

"The Tucson region is a bellwether… [and] teaching the world that infrastructure money must be spent to deal with low probability, large impact events such as flooding. Because of its many benefits, including reduced loss of life, nature's green infrastructure, based on business case analysis, was determined to be the best solution. The implementation of green infrastructure elements can be an effective way to deal with problems of water quality, flooding, safety, urban heat islands, and preserving water as the precious (but undervalued) resource that it is." [1]

Embedded in GI/LID+Tree efforts are a number of co-benefits. In urban areas, GI/LID+Trees reduce flood risks (and insurance premiums) and costly infrastructure repairs which will increase with the predicted increase in the frequency and intensity of flooding modeled for the Southwest due to climate change. GI/LID+Trees adds value to properties, reduces CO2 emissions and reduces air pollution.

In fact, an analysis by Laitner (2017)[xxxvii] using the EPA's Cobra Model (a preliminary screening tool to identify those scenarios that might benefit from further evaluation with more sophisticated air quality approaches that are currently available) found Pima County could expect 1 billion to 2.3 billion dollars in economic benefits associated with maintaining clean air. Surrounding jurisdictions would also benefit.

GI/LID+Tree efforts also support aquifer recharge and thus provide adaptive strategies for coping with the threats posed by climate change to regional water supplies.

In general, for every $1 invested in GI, $4-6 dollars in direct and indirect economic benefits can be realized.[xxxviii]

SUMMARY:

To achieve the deep de-carbonization and adaptation measures required by the Paris Agreement, staff recommend that the County undertake and complete the following actions in order of priority within the next seven years to meet the Agreement's 2025 targets:

1. Rapidly scale up solar installations using power purchase agreements[xxxix] especially prior to the revision of the TEP's net metering benefits (estimated to be September 2017). Include battery storage systems at suitable sites, for example RWRD.

> **~ Estimated ROI for 41 MW is $61 million over 20 years, carbon reduction benefit is 67,000 MT CO2e avoided annually.**

2. Improve energy efficiency (upgrades in lighting, insulation, HVAC systems, etc.) by 20% in the 10 identified County-owned downtown properties through performance contracts or energy financing strategies.

> **~ Estimated ROI to achieve a 20% electricity use reduction is $7 million per year, carbon reduction benefit is 58 MT CO2e.**

3. Replace the County's gasoline passenger sedans with electric vehicles and EV charging infrastructure (including solar where feasible).

> **~ Estimated ROI for electric vehicles is $69,000 per year, carbon reduction benefit is 91 MT CO2e.**

4. Undertake Green Infrastructure & Low Impact Development + Trees to strengthen the adaptive capacity and resilience of government operations and reduce infrastructure vulnerabilities to climate change through actions to restore riparian corridors, conserve water and reduce urban flooding and heat island effects as well as air pollution.

> **~ Estimated the ROI for GI/LID+Trees (Airport Wash proxy 66,000 SF or 1.5 acres, including rain garden with curb cut) is $2,062,029, carbon reduction benefit is 176 MT CO2e.**

In summary, the four focus areas and key actions described above will create a roadmap for Pima County government to meet the Paris Agreement goals by 2025. Nearly all of these recommendations have a revenue neutral or positive returns on investment within a reasonable timeframe.

Pursuant to Resolution 2017-39 and Resolution 2017-51, the County has also committed to taking a leadership role in regional collaborative efforts to develop solutions and policy recommendations to address the Fourth National Climate Assessment's Southwest Chapter's findings. The regional effort should leverage and integrate the County's climate change goals and objectives as outlined in *Pima Prospers* (environment, economy, human and physical infrastructure) and in the Sustainable Action Plan for County Operations. Related to the findings of the Third National Climate Assessment and the status of drought and the emergency declaration that has been in effect for Arizona since June 1999 and the Stage One drought declaration that has been in effect for Pima County since 2007, the County should anticipate that:

- Climate change will likely affect water demand, groundwater withdrawals and aquifer recharge, reducing groundwater availability in some areas in the Southwest.
- Long-term drought will intensify and Colorado River flows, which have decreased 19% from historical average are may suffer additional losses greater than 20% by 2050 and 35% by 2100, due primarily to higher temperatures[xl].

Thus, staff should continue collaborating with local partners and the U.S Bureau of Reclamation to identify where physical water resources are needed in order to mitigate supply-demand imbalances and develop strategies to improve water reliability for Pima County's municipal, industrial, agricultural and environmental sectors. The County should also continue partnering with Southern Arizona Water Users Association and others on the Lower Santa Cruz River Basin Study to identify adaption measures for climate change impacts to local water supply and demand. Lastly, staff should, contingent on Board of Supervisors approval, be prepared to implement Stage Two response measures consistent with Pima County's Drought Response Plan. The core action areas described above along with a briefing and work session organized around the release of the Fourth National Climate Assessment's findings, can serve as a framework for developing a Master Energy, Water & Economic Resilience Plan to guide future planning under highly variable future conditions. The combined actions above, will promote regional infrastructure investments and new entrepreneurial activities to underpin a more robust and resilient local economy and protect the health and wellbeing of all residents under future climate scenarios.[xli]

Additional contributors to this report include John "Skip" Laitner, Evan Canfield (Pima County Regional Flood Control District), Ellen Alster (Transportation), Marie Light (PDEQ), Mead Mier and Josh Pope (PAG), Irene Ogata (Tucson Water) and Kieran Sikdar (Watershed Management Group).

The Pima County Office of Sustainability and Conservation is responsible for any errors or omissions.

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Appendix 1.

PIMA COUNTY

Sustainability ~ Conservation ~ Historic Preservation

SUSTAINABLE ACTION PLAN FOR PIMA COUNTY OPERATIONS MIDTERM REPORT & IMPLICATIONS FOR CLIMATE CHANGE RESOLUTION 2017-39

June 2017

EXECUTIVE SUMMARY

Many sustainability successes have been achieved since the Board adopted the second iteration of the *Sustainable Action Plan for County Operations* (SAPCO) in May 2014. Most recently, performance improved for nine *Targets* in the SAPCO, including the reduction of the "Carbon Footprint for County Operations – Fleet and Facilities," use of "Reclaimed Water for Parks and Natural Habitat" and an increase in the number of "Tobacco-free employees." Overall, since the 2008 Plan, the County has saved $11,514,273 in avoided costs and 74,314.09 MtCO2e in avoided greenhouse gas emissions. The County's most current progress in fulfilling the objectives of the SAPCO can be reviewed in the *FY 2015/16 Report Card*.

Now, two and half years into the implementation of the current five-year Plan, staff initiated a mid-term review to assess how well the County is on track to meet its final 2019 *Targets*, *Action Items* and *Continuing Actions*. This report presents the results of that effort and describes the methods used by the S-Teams and the Steering Committee to determine core priorities needing attention and possible solutions for consideration by leadership. Concurrently, the majority of these recommendations would serve to underpin the County's commitment (Resolution 2016-39) to align with the Paris Agreement and reduce our greenhouse gas (GHG) emissions 26-28% below 2005 levels by 2025. The taskforce assigned to review and prioritize the County's climate change priorities and actions should begin with considering these recommendations which have already been reviewed by the SAPCO Steering Committee.

ABOUT

Since 2004, the County's Sustainability Plan has been implemented through the efforts of staff who voluntarily participate in nine S-Teams affiliated with the nine focus areas of the Plan. A Steering Committee, comprised of Directors and S-Team Leads, advise and monitor the County's performance in meeting the Plan's 2019 *Targets*, *Continuing Actions* and *Action Items*.

Recently, the need to develop a pathway for advancing priority SAPCO work items to County leadership has become more salient. The Pima Prospers Steering Committee agreed to serve as an Executive Review Committee (Deputies and Leads) for priority SAPCO requests.

The SAPCO is a unique plan in that it embeds performance measures and data-driven evaluation, yet as a relatively new initiative, it also requires ongoing interdepartmental engagement and cooperation to achieve its goals and objectives. Directors undertake implementation through voluntary efforts, and the Plan itself is not directly funded through a stand-alone budget or a single departmental mandate.

Many of the Plan's no or low-cost items have or are currently being successfully implemented. However, implementation efforts in some crucial areas appear to have stalled and even regressed (see FY 2015-16 Report Card). Primary areas of concern include:

- Energy Efficiency
- Facility Construction
- Water Consumption in Facilities
- Solid Waste Diversion
- Green Purchasing

This acknowledgement prompted two responses by the SAPCO Steering Committee:

> First, a system was established to prioritize work items that were then brought to the Pima Prospers Steering Committee (PPSC). In January, 2017, the four highest scoring priorities across both the SAPCO *and* Pima Prospers were submitted for review and endorsement by the PPSC. Of the four items, two were already underway: 1. "A Proposal to Develop a Scope of Work and RFP to Reduce Waste, Improve Recycling and Cost Effectiveness for County Operations" (*Integrated Solid Waste Management Plan*), and 2. Participate in the *District Energy Feasibility Study* (although, this has since been cancelled). Items three and four included: "Integrate a Green Building Review in the CIP Gate Process" and "Consider a Performance Contract." These were approved in January by the PPSC as 2017 Priority Action Items.
>
> Second, all of the SAPCO's *Targets*, *Continuing Actions* and *Action Items* were reviewed to assess the likelihood of meeting the Plan's stated goals by 2019. The outcome of this effort is covered in the next section.

RESULTS

Currently, the County is on track to meet 16 out of 25 *Targets* (a majority of which fall in Land Conservation, Health and Wellness, and Alternative Fuel Vehicles); 74 out of 122 *Continuing Actions*; and 20 out of 59 *Action Items*. Based on the ranking and scoring priority method previously used to establish the SAPCO and Pima Prospers combined priority items (noted above), the following 15 items (representing *Targets* or *Items* scoring 19 or above) are noted as having the highest priority.

Furthermore, the Board of Supervisors reaffirmed the County's commitment to addressing climate change and aligning efforts with the Paris Agreement to reduce GHG emissions 26-28% below 2005 levels by the year 2025 in Resolution 2017-39. To meet its commitment, Pima County will need to reduce its overall carbon emissions by 40-42% by 2025 (see attached workbook). The resolution also directs staff to form a taskforce to identify climate change mitigation and adaptation priorities. The seven recommendations provided at the end of this report provide an excellent starting point for this discussion. Implementing actions will require a variety of creative and low-interest financing strategies, which are fortunately becoming increasingly available to local governments.

TOP FIFTEEN ITEMS NEEDING IMMEDIATE ATTENTION

<u>1. Chapter 1 Carbon Footprint. Target 2: Wastewater Treatment Operations</u>, By June 30, FY 2018/2019, the carbon intensity of County regional wastewater collection and treatment operations will not exceed the carbon intensity of County wastewater collection and treatment operations in FY 2013/14. (Plan Target)

<u>2. Chapter 1 Carbon Footprint Action Item 2</u>: Identify funding sources for programs and initiatives outlined in the Plan – this is similar to recommendation 12. (Score 19)

3. Chapter 2 Renewable Energy and Energy Efficiency. Target 1: By 2025, at least 15% of the electricity consumed by County facilities will be generated or offset by renewable sources. (Plan Target)

4. Chapter 2 Renewable Energy and Energy Efficiency. Target 2: Energy Efficiency, increase the overall energy efficiency of County facilities 10% by June 30, FY 2018/2019. (Plan Target).

5. Chapter 2 Renewable Energy and Energy Efficiency. Continuing Action 6: Systematically upgrade facilities with energy-conserving equipment and features to reduce overall energy consumption. (Score 19)

6. Chapter 2 Renewable Energy and Energy Efficiency. Action Item 4a: Continue to conduct countywide energy audits: Create an action plan based on audit recommendations. (Score 24)

7. Chapter 2 Renewable Energy and Energy Efficiency. Action Item 4b: Continue to conduct countywide energy audits: Implement audit recommendation measures with the greatest cost-benefit and return on investment. (Score 24)

8. Chapter 3 Green Building. Target 2: Facility Construction, 100% of all new County-funded buildings designed after June 30, 2008, and 100% of all building additions greater than 5,000 square feet to implement LEED elements sufficient to obtain 50 or more LEED points. (Target Priority)

9. Chapter 3 Green Building. Action Item 4: Design and construct at least (1) County building with a net-zero energy consumption. (Score 23)

10. Chapter 5 Water Conservation. Target 1: Water conservation, in facilities reduce building water consumption intensity (gallons/ ft2) by at least 10% by June 30, FY 2018/2019. (Target Priority)

11. Chapter 5 Water Conservation. Target 2: Increase the number of County parks and miles of trail served by reclaimed water by 10% by June 30, FY 2018/2019. (Target Priority)

12. Chapter 6 Land Conservation. Continuing Action 8: Implement information and educational programs to improve educational programs and improve environmental literacy in the County. (Score 24)

13. Chapter 7 Waste Reduction. Target 1: Increase the quantity of recyclable materials diverted from landfills by 10% by June 30, FY 2018/2019. (Target Priority)*

14. Chapter 8 Green Purchasing. Target 5: Printer paper, by June 30, FY 2018/2019, at least 20% of printer, copier, and multi-purpose paper purchases will be for 100% recycled content paper and 90% of all other printer, copier, and multi-purpose paper purchases will be for 30% recycled content paper. (Target Priority)*

15. Chapter 9 Employee Health. Target 3: Tobacco-free workforce. (Target Priority)†

SEVEN RECOMMENDATIONS

Based on the results of the mid-term assessment, the Steering Committee recommends the following actions to address programmatic gaps and barriers in implementing core items by 2019. Additionally, early research suggests that many of the proposed recommendations would likely yield a calculable return on investment (ROI).

1. Undertake an Energy (& Water) Performance Contract (EPC) for the downtown campus and high water use parks (addresses items 3, 4, 5, 6, 7, 10; *Economic Development Plan* Chapters 11, 14; Pima Prospers 2017 Priority Action Item; BOS Climate Change Resolution 2017-39).
2. ~~Participate in the *District Energy Feasibility Study* (supports items 3, 4, 5, 6, 7, 10, plus *Economic Development Plan* Chapters 2, 11, 14; Pima Prospers 2016, 2017 Priority Action Item; BOS Climate Change Resolution 2017-39~~). (Note: This recommendation is no longer available as of June 8, 2017, the City of Tucson opted to move ahead without County participation owing to delays).
3. Undertake a Rapid Solar Assessment to determine remaining sites for solar installations at County facilities using lease agreements before the close of the estimated September 15, 2017 TEP grandfather date in order to maximize existing net metering benefits and returns on investment (addresses items 1 & 3; BOS Climate Change Resolution 2017-39).
4. Develop an Economic Resource Plan (a *Master Energy and Water Plan for Pima County Operations* using the results of recommendations one, two and three above, which supports items 1, 3, 4, 5, 6, 7, 10, plus *Economic Development Plan* Chapters 2, 11, 14; BOS Climate Change Resolution 2017-39).
5. Embed energy and water efficiency (as economic resources saved), throughout the CIP Integrated Infrastructure Plan as an overarching framework, for example a 50-50-50 goal to reduce energy, water and transportation resource costs over existing traditional infrastructure by 50 percent (supports items 3, 4, 5, 6, 7, 10, plus *Economic Development Plan* Chapters 2, 11, 14; BOS Climate Change Resolution 2017-39).
6. Establish a Green Revolving Fund with a seed grant and fund annually through a portion of efficiency savings (addresses items 2, 4, 5, 6, 12).
7. Rely on six above to expand and fund recycling at all Pima County Parks (and strategic Loop stations) and Stadiums (supports item 13, *Economic Development Plan* Chapter 6; BOS Climate Change Resolution 2017-39).

In lieu of item 2 above being removed from consideration, the following recommendation has been added:

8. Scale up green infrastructure (GI), including desert-adapted tree planting on County-owned properties (addresses need for additional strategies to meet Paris Agreement targets)

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*Items 13 and 14 are already being addressed through recent initiatives, the "Integrated Solid Waste Management Plan" and the "Green Purchasing" update, respectively.

†Item 15 is being addressed through Pima County Human Resources Department.

Appendix 2.

Board of Supervisors Memorandum

June 6, 2017

Resolution 2017-_____ Reaffirming Pima County's Commitment and Efforts to Address Climate Change

On June 1, 2017, President Donald Trump announced his decision to withdraw the United States (US) from the Paris Climate Accord, a nonbinding agreement signed by 195 countries that directs each nation to develop their own plans to reduce greenhouse gas emissions with the goal of limiting global temperature increases to 1.5° C above pre-industrial period levels. President Trump directed the federal government to immediately "cease all implementation of" the agreement and to use the official withdrawal process outlined in the agreement, which could take up to four years to complete.

Climate change threatens many of the County's conservation initiatives, including the award-winning Sonoran Desert Conservation Plan. It greatly increases the risk of increased heat, prolonged drought, devastating wildfires, and increased flooding and is already increasing stress on the native plant and animal species protected under the SDCP. Climate change also increases the likelihood Pima County will fall out of attainment with state and federal air quality standards, thereby making it more costly and difficult for businesses to operate and expand in Pima County.

Pima County has already recognized the need to take action on climate change. In 2007, the Board of Supervisors passed Resolution 2007-84 to support County sustainability initiatives, stating that, *"Pima County recognizes that the scientific community has developed a consensus that increasing emissions of carbon dioxide, methane and other greenhouse gases into the atmosphere is affecting the Earth's climate."*

This resolution paved the way for the development and implementation of the *Sustainable Action Plan for County Operations*. This plan represents a systematic approach to integrating the goals of sustainability into virtually all facets of the way Pima County government operates—from the cars we drive, to the energy and water we consume, to the construction of our buildings, to the products we purchase, to the way in which we view and handle our "used" materials.

In 2015, the Board unanimously passed the County's comprehensive plan, *Pima Prospers*. Within the Plan are numerous items that bolster the County's climate mitigation and adaptation efforts. These include reducing carbon emissions through the increased use of cost-effective clean energy alternatives, encouraging transportation alternatives, reducing the adverse health impacts related to air quality, and preparing for climate change and reducing risk in vulnerable communities.

Through the implementation of these Board-approved programs, Pima County has strived to set an example for other communities to achieve a high quality of life for their residents, protect their natural environment, and provide for meaningful and sustainable economic opportunities. Pima County is well positioned to become a leader in addressing climate change and in this region.

Recommendation

I recommend the Board of Supervisors adopt Resolution 2017-_____ reaffirming Pima County's commitment and efforts to address climate change.

Respectfully submitted,

C.H. Huckelberry
County Administrator

CHH/mjk – June 2, 2017

Attachment

RESOLUTION 2017 - ___

RESOLUTION OF THE PIMA COUNTY BOARD OF SUPERVISORS RECOGNIZING THE IMPORTANCE OF THE THREATS OF CLIMATE CHANGE AND REAFFIRMING PIMA COUNTY'S COMMITMENTS TO CLIMATE PROTECTION, THE SUSTAINABLE ACTION PLAN FOR COUNTY OPERATIONS AND GREEN HOUSE GAS EMISSIONS AND WATER AND WASTE REDUCTION TARGETS FOR COUNTY SERVICES AND OPERATIONS

The Board of Supervisors of Pima County, Arizona finds:

1. Concentrations of the greenhouse gases carbon dioxide, methane, and nitrous oxide in the atmosphere have all increased since 1750;[1] and

2. The Intergovernmental Panel on Climate Change, the leading international body for the assessment of climate change, has found with very high confidence that the rates of increase in these greenhouse gases over the past century are unprecedented,[2] and

3. August 2016 was the hottest August ever recorded (following 2014 and 2015) making it the 11th straight month to break the previous monthly heat record, and it tied July 2016 as the hottest month ever recorded;[3] and

4. The Information Statement produced by the American Meteorological Society Council on August 20, 2012 concludes, "There is unequivocal evidence that Earth's lower atmosphere, ocean, and land surface are warming; sea level is rising; and snow cover, mountain glaciers, and Arctic sea ice are shrinking. The dominant cause of the warming since the 1950s is human activities. This scientific finding is based on a large and persuasive body of research. The observed warming will be irreversible for many

years into the future, and even larger temperature increases will occur as greenhouse gases continue to accumulate in the atmosphere. Avoiding this future warming will require a large and rapid reduction in global greenhouse gas emissions. The ongoing warming will increase risks and stresses to human societies, economies, ecosystems, and wildlife through the 21st century and beyond, making it imperative that society respond to a changing climate.[4]

5. Ninety-seven percent of global climate scientists agree that climate warming trends are very likely due to human activities;[5] and

6. Carbon dioxide levels in the atmosphere have risen to 409 parts per million (PPM)[6] (from 320 PPM in 1965, the course of one human lifespan), which climate scientists agree is well beyond the safe operating space (350 PPM or below[7]) for humanity to avoid catastrophic and irreversible climate change;[8] and

7. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions;[9] and

8. International efforts to address climate change began in earnest with the UN Framework Convention on Climate Change (UNFCCC), a treaty which entered into force in 1994;[10] and

9. International efforts to implement the UNFCC have continued over the last 25 years with the 1997 Kyoto Protocol[11] and most recently with the 2015 Paris Agreement, which has been signed by over 190 countries and calls for nationally-determined contributions toward the goal of limiting global temperature increases to 1.5° C above pre-industrial levels;[12] and

10. In 2007 the U.S. Supreme Court ruled the Environmental Protection Agency has the authority to regulate greenhouse gas emissions;[13] and

11. In 2015, the U.S. government announced the Clean Power Plan, a new federal policy aimed at combatting climate change by reducing greenhouse gas emissions from US power stations and increasing the use of renewable energy and energy conservation;[14] and Tucson Electric Power states in their 2017 Draft Integrated Resource Plan it "will continue to diversify its generation portfolio and reduce its significant reliance on coal by expanding cost-effective renewable resources, particularly solar. Our goal is to serve at least 30 percent of our retail load from renewable resources by 2030 – twice the level TEP must achieve by 2025 under Arizona's Renewable Energy Standard."[15]

12. State governments have pursued their own policies aimed at reducing greenhouse gas emissions, including the Regional Greenhouse Gas Initiative, a cooperative effort of nine northeastern and mid-Atlantic states to cap and reduce greenhouse gas emissions from power stations,[16] and California's groundbreaking 2016 legislation

requiring all state agencies to take steps to reduce greenhouse gas pollution 40 percent by 2030;[17] and

13. On January 28, 2016, the Pima Association of Governments' Regional Council approved Resolution 2016-7 which "commends the region and its jurisdictions for developing climate resilience strategies that safeguard transportation, water, energy, health, the environment, and food security in the region" and "encourages proactive regional collaboration on climate resilience activities through information sharing and combining resources that benefit our community, and in particular, address the needs of our vulnerable populations."[18]

14. The U.S. Conference of Mayors issued a statement on Executive Order 13783: Promoting Energy Independence and Economic Growth, advocating the need to address climate change and support for the Paris agreement, to position the world's nations, including the United States, to be energy independent, self-reliant, and resilient. The Mayors further committed their cities to address climate change by investing in renewable energy, increasing the energy efficiency of buildings, addressing the water-energy nexus, and providing more energy-efficient transportation options.[19]

15. Pima County has a long-term history of taking action to preserve natural resources for current and future generations and is committed to sustainability; and

16. Global climate change is one of the most significant threats facing the County and will affect the future social, environmental and economic well-being of its residents; and

17. Recognizing the magnitude and severity of these impacts, as well as reducing County operating costs through increased energy efficiency, renewable energy production, green building standards, alternative fuel use, waste reduction, and green purchasing, the Board of Supervisors adopted Resolution 2007-84, which was the basis for the 2008 and 2014 "Sustainable Action Plan for County Operations," setting targets for reduced greenhouse gas emissions.

NOW, THEREFORE, BE IT RESOLVED that the Pima County Board of Supervisors:

1. Supports the Paris Agreement's central aim, "to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change."[20]

2. Affirms that climate change will increase stress on the County's rich diversity of plant and animal species, including those protected by the Sonoran Desert Conservation Plan. The County is incredibly fortunate to encompass portions of both the Sonoran Desert, the most biologically diverse desert in the United States that includes the

greatest diversity of plants found anywhere in the world, and the Sky Island mountain region, considered a global biodiversity hotspot that is home to species found nowhere else. Prolonged drought, increased wildfires, and widespread tree death, which already have caused millions of dollars in economic losses, are projected to increase, forcing wholesale changes to desert, forest, and grassland ecosystems, landscapes, and the plant, animal, and human communities that depend on them.[21]

3. Affirms that climate change will affect tourism and recreation revenues through increased heat and lower air quality, reduced stream flow and shorter snow seasons.[22]

4. Concludes that beyond the numerous social and environmental benefits accrued through participating in the Paris Agreement, additional opportunities to realize enormous economic benefits in the "next economy" revolving around clean energy technologies, sustainable food production, and energy and water efficiency to produce cost savings and new business growth is vital to our region.

5. Finds that through aligning efforts with the Paris Agreement, Pima County will also avoid numerous costs associated with lower worker productivity and medical, social and behavioral health services from climate-related illnesses precipitated by worsening air quality, increased heat, greater exposure to harmful disease vectors and increased behavioral health stressors.

6. Finds that human activities causing the release of greenhouse gases, including those by County operations, pose a threat to infrastructure, food production, human health and the economy.

7. Authorizes and directs the County Administrator and staff to prioritize and align efforts with the Paris Agreement by convening a taskforce to identify which climate adaptation and mitigation needs should be given the highest operational priorities based on scientific evidence, community health and economic co-benefits through:

   a) Implementing the greenhouse gas and carbon and water intensity reduction targets and actions in the adopted 2014 Sustainable Action Plan for Pima County Operations (SAPCO) (Resolutions 2007-84 and 2014-63), which states, "Climate change is one of the greatest challenges facing society," in acknowledgement that human activities causing the release of greenhouse gases, including those by County operations, pose a threat to infrastructure, food production, human health and the economy.

   a) Implementing the climate adaptation and mitigation elements of the adopted Pima Prospers, the County's Comprehensive Plan (Resolution 2015-62), which states "Climate impact mitigation measures were created to address impacts on our unique desert environment and population" and that "sustaining healthy communities means addressing climate resiliency".

b) Taking a leadership role in regional collaborative efforts to develop solutions and policy recommendations to address the Fourth National Climate Assessment's Southwest Chapter upcoming report findings (estimated delivery, December 2017).[23]

Passed, adopted and approved, this ___ day of _____, 2017.

_____
Sharon Bronson, Chair
Pima County Board of Supervisors

ATTEST:

_____
Julie Castañeda, Clerk of the Board

APPROVED AS TO FORM:

_____
County Attorney
TOM WEAVER

---

[1] IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA (p. 11).
[2] *Id.*
[3] "NASA Finds August 2016 Another Record Month." National Aeronautics and Space Administration (NASA) Goddard Institute for Space Studies. September 12, 2016. Accessed June 1, 2017. https://data.giss.nasa.gov/gistemp/news/20160912/
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[6] "Vial Signs of the Planet." NASA Global Climate Change website. Accessed June 1, 2017. https://climate.nasa.gov/vital-signs/carbon-dioxide/
[7] *See* Rockstrom, J., W. Steffen, K. Noone, A. Persson, F.S. Chapin, E.F. Lambin, T.M. Lenton, M. Scheffer, C. Folke, H.J. Schellnhuber, B. Nykvist, C.A. deWit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sorlin, P.K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R.W. Corell, V.J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J.A. Foley. 2009. A safe operating space for humanity. Nature 461:472-475 and Hansen, J., M. Sato, P. Kharecha, D. Beerling, V. Masson-Delmotte, M. Pagani, M. Raymo, D.L. Royer, and J.C. Zachos. 2008. Target atmospheric CO2: Where should humanity aim? Open Atmospheric Science Journal 2:217-231.
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[11] *Id.*

[12] "Paris Agreement." United Nations Treaty Collection. July 8, 2016. Accessed June 1, 2017. http://www.consilium.europa.eu/en/policies/climate-change/international-agreements-climate-action/

[13] *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007).

[14] "Climate change: Obama unveils Clean Power Plan," BBC News. August 3, 2015. Accessed June 1, 2017. http://www.bbc.com/news/world-us-canada-33753067

[15] "2017 Integrated Resource Plan." Tucson Electric Power Company. April 3, 2017. Accessed June 1, 2017. https://www.tep.com/wp-content/uploads/2016/04/TEP-2017-Integrated-Resource-FINAL-Low-Resolution.pdf

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[21] "Climate Change Impacts in the United States: Chapter 20: Southwest." National Climate Assessment. 2014. Accessed June 1, 2017. http://nca2014.globalchange.gov/report/regions/southwest

[22] *Id.*

[23] *Id.*

Appendix 3.

NEW APPLICATION
ORIGINAL

0000112887

Court S. Rich AZ Bar No. 021290
M. Ryan Hurley AZ Bar No. 024620
Rose Law Group pc
6613 N. Scottsdale Road, Suite 200
Scottsdale, Arizona 85250
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Attorneys for Applicant SunEdison Origination1, LLC

BEFORE THE ARIZONA CORPORATION COMMISSION

KRISTIN K. MAYES CHAIRMAN	SANDRA D. KENNEDY COMMISSIONER	PAUL NEWMAN COMMISSIONER
GARY PIERCE COMMISSIONER	BOB STUMP COMMISSIONER	

IN THE MATTER OF SUNEDISON ORIGINATION1, LLC REGARDING ITS REQUEST FOR SPECIAL CONTRACT APPROVAL FOR SOLAR SERVICES AGREEMENT	) **DOCKET NO.** E-20746A-10-0241)) **APPLICATION FOR SPECIAL CONTRACT**) **APPROVAL: EXPEDITED REVIEW**) **REQUESTED**	

Applicant, SunEdison Origination1, LLC, a Delaware limited liability company ("**SunEdison Origination1**") by and through its undersigned counsel hereby submits its Application for Special Contract Approval seeking expedited review.

I. Background

SunEdison Origination1's parent company, Sun Edison LLC (together with SunEdison Origination1 and its other affiliates and subsidiaries, referred to herein as "**SunEdison**"), is North America's largest solar energy services provider, and operates across a global marketplace. Headquartered in Maryland with offices throughout the United States, SunEdison provides a fully managed service. The company finances, installs, operates, monitors and maintains photovoltaic power plants for commercial, government and utility customers without

the high capital outlays to customers traditionally associated with solar equipment. To date, SunEdison has installed more than 113 MW (DC) of solar capacity worldwide.

SunEdison Origination1 herein seeks Special Contract Approval of a solar services agreement ("**SSA**") between SunEdison Origination1 and Pima County, a political subdivision of the State of Arizona (the "**County**"). The SSA is attached to this Application as **Exhibit A**. Pima County is one of the leaders in the State of Arizona in the adoption of solar and renewable energy and SunEdison is proud to be teaming up with Pima County on this project.

SunEdison Origination1 respectfully requests that the Commission issue an Order approving the rate agreed to between SunEdison Origination1 and the County in the SSA as a special contract rate. SunEdison Origination1 asks that the Commission's Decision in this matter be substantially similar to the Decision issued to SolarCity in Track One of Docket No. E-20690A-09-0346.

SunEdison believes that under the Arizona Constitution the Commission does not have jurisdiction over SunEdison or any of its subsidiaries, including SunEdison Origination1, when they provide services to customers utilizing SSA financing. As a result, nothing contained herein should be construed as an admission of Commission regulatory authority over SunEdison or SunEdison Origination1. SunEdison Origination1 files this Application merely as a precaution given the still unresolved issues in Track Two of Docket No. E-20690A-09-0346 (the "SolarCity Adjudication"). It is SunEdison's intent that any Commission Decision specifically indicates that the Decision should be of no force and no further effect if the Commission later determines that SSA providers are not subject to Commission regulation. This request is consistent with language the Commission has included in all other Decisions issued on similar Applications concerning SSA providers.

II. Details

Pursuant to the SSA, SunEdison Origination1 will provide an approximately 212 kWdc photovoltaic solar installation to the County (the "**System**") to be located on the roof of the County's Abrams Building, located at 2825 E. District, Tucson, Arizona 85714 (the "**Site**").

The Abrams Building houses medical offices and support services for the County hospital. This Application is similar to the request the Commission just granted in favor of SOLON Corporation for its installation at the Pima County Roger Road Wastewater Reclamation Facility in Decision No. 71721.

The County selected SunEdison Origination1 to be the SSA provider on this project via a County Request for Proposal ("**RFP**") pursuant to the County's competitive procurement process. During the RFP process the County independently determined that SunEdison Origination1's proposed System provides the County with the greatest cumulative benefit.

Under the SSA, SunEdison Origination1 will design, install, maintain and finance the System for the County with no upfront cost pursuant to all applicable rules and regulations including the Commission's Interconnection Document and Tucson Electric Power's ("**TEP**") Interconnection Standards.

The SSA provides a rate for all solar services equaling $0.094 per/kWh fixed for 20 years (the "**SSA Rate**"). SunEdison Origination1 and the County have already secured a reservation with TEP for a rebate associated with the System and its Renewable Energy Credits ("**RECs**") (*see* **Exhibit B,** REC Purchase Agreement). The SSA Rate is set forth in Exhibit 1 to the SSA (Exhibit A attached hereto) and contemplates that the County will provide the REC payments directly to SunEdison Origination1 along with the SSA Rate in exchange for the solar services.

III. Customer and Public Benefit

The installation of the System pursuant to the SSA provides the County and public with numerous important benefits in addition to the fact that County expects to save significant money on its electric bill over 20 years as a result of the locked in SSA rate: 1) In May 2007 the Pima County Board of Supervisors adopted its Sustainable Community Resolution (Resolution 2007-84) which requires that the County acquire 15 percent of the power it consumes from renewable energy sources by 2025. This project helps Pima County meet that requirement; 2) Approval of the SSA rate proposed in this Application will further the Commission's goals under the REST standards and the Utility's ability to comply with those standards; 3) Any power that this

photovoltaic System creates will reduce the need for traditional "brown" power generation and will reduce the consumption of water in relation to the amount of brown power generation avoided over the life of the System.

IV. Time is of the essence: expedited review request

SunEdison Origination1 respectfully requests that this item be reviewed expeditiously. The REC Purchase Agreement provides that the System must be installed within 365 days from the date the REC Purchase Agreement was executed. That Agreement was entered into in January of 2010 and the expiration date is quickly approaching. SunEdison Origination1 must have this approval in hand prior to commencing the construction of the System. In order to have a comfortable amount of time to complete the project and in order to not risk forfeiting the REC rebate payments from TEP, a decision on this issue is required promptly. SunEdison had hoped that the SolarCity Adjudication would be resolved and would have precluded any need for this Application, however, given the status of that proceeding and the prospect for potential appeals that will deprive the industry of regulatory certainty SunEdison Origination1 simply could not wait any longer to make this Application.

V. Conclusion

For these reasons, SunEdison Origination1 hereby respectfully requests that the Commission expeditiously approve the rate proposed in the attached SSA as a special contract pursuant to the framework utilized in Track One of Docket No. E-20690A-09-0346.

RESPECTFULLY SUBMITTED this 15th day of June, 2010.

Rose Law Group pc

Court S. Rich
M. Ryan Hurley
6613 N. Scottsdale Road, Suite 200
Scottsdale, Arizona 85250
Attorneys for Applicant SunEdison.

Original and 13 copies filed on this 15 day of June 2010 with:

Docket Control
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

I hereby certify that I have this day served the foregoing documents on all parties of record in this proceeding by sending a copy via electronic mail to:

Steve Olea
Director, Utilities Division
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

Lyn Farmer
Chief Administrative Law Judge
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007-2927

Janice Alward
Chief Counsel, Legal Division
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

EXHIBIT A

Execution Version

Abrahms Berg

Solar PV Energy Project
SOLAR SERVICES AGREEMENT

CONTRACT
NO. 11-13-S-142732-0609
AMENDMENT NO. _____
This number must appear on all invoices, correspondence and documents pertaining to this contract.

Solar Services Agreement Attachments and Exhibits

Solar Services Agreement ("SSA")

Exhibit 1 - Electricity Pricing, Minimum Output Guarantees and Billing Methodology
Exhibit 2 - Billing Formulas and Examples
Exhibit 3—Sample Solar Invoice
Exhibit 4—[Not used]
Exhibit 5 - Termination Fee Schedule and Purchase Option
Exhibit 6— Solar License Agreement ("SLA")
Exhibit 7 – Lender Accommodations

SOLAR SERVICES AGREEMENT

THIS SOLAR SERVICES AGREEMENT ("SSA" or this "Agreement") is made this 3rd day of , 2010 (the "Effective Date") by and between PIMA COUNTY (hereinafter "COUNTY"), a body politic and corporate of the State of Arizona, and SunEdison Origination1, LLC, a Delaware limited liability company ("LICENSEE"). COUNTY and LICENSEE are sometimes individually referred to herein as a "Party" or, collectively, as the "Parties." Any terms not defined herein shall have the mean ascribed to them in the SLA (as defined below).

Whereas, COUNTY and LICENSEE desire to agree to terms whereby LICENSEE will supply certain services to COUNTY including the sizing and placement of a solar power generation facility, the financing of costs, including the possible monetizing of tax benefits, the production of solar generated electricity to serve COUNTY's facilities by way of this SSA and the continuing maintenance in connection with the solar facility; and

Whereas, concurrent with this SSA the COUNTY will grant to LICENSEE a license pursuant to a Solar License Agreement ("SLA") to design, finance, construct, own, maintain, and operate solar electric generating System(s) on COUNTY's facilities to serve COUNTY's electric loads;

Now, therefore, the COUNTY and LICENSEE agree as follows:

1. DEFINITIONS

In addition to the terms that are defined elsewhere in this SSA, the following terms have the following meanings when used herein:

1.1 "Access Procedures" has the meaning set forth in Section 6.7 of the SLA and in its Exhibit "IV."
1.2 "Alterations" has the meaning set forth in Section 6.8 of the SLA.
1.3 "Applicable Laws" has the meaning set forth in Section 12.11 of the SLA.
1.4 "Commercial Operation Date" means the date that the COUNTY has issued a *Certification of Completion for the construction and installation of the System(s)* pursuant to Section 6.3 of the SLA.
1.5 "Contract Price" means the price of Electricity pursuant to Exhibit 1 of the SSA.
1.6 "Day" means calendar day unless otherwise specified herein.
1.6 "Electricity" means electrical energy, measured in kilowatts and kilowatt-hours that (a) is produced by the System, (b) is delivered by LICENSEE to the COUNTY at the Electrical Interconnection Point, (c) meets the Green-e standard and (d) conforms to applicable utility and/or authoritative regulatory body standards.
1.7 "Electrical Interconnection Point" means the point(s) specified in the Project Design where the System connects to the existing electrical systems serving the Facility.
1.8 "Energy Management System" means the County's automatic controls system capable of receiving energy production data from the System
1.9 "Energy Service Provider" means an investor owned utility, a municipal utility or other electricity provider that serves electricity commodity to the Facility or to the

campus where the Facility is located.

1.10 "Environmental Law(s)" means each and every applicable federal, state, COUNTY and local law, statute, ordinance, regulation, rule, judicial or administrative order or decree, permit, license, approval, authorization or similar requirement of each and every federal, state, COUNTY and local governmental agency or other governmental authority pertaining to the protection of human health and safety or the environment.

1.11 "Facility" or "Facilities" means the land or improvements owned and operated by COUNTY on which the System will be installed. Facility and Facilities may be used interchangeably.

1.12 "Fiscal Year" means the COUNTY's Fiscal Year, beginning on July 1 of each calendar year and ending on June 30 of the following calendar year.

1.13 "Force Majeure" means an act of God (such as earthquakes, fires, riots), actions or inactions of a regulatory authority, or actions of others such as strikes, lockouts, or other industrial disturbances, not within the control or arising from the fault of the party claiming Force Majeure. Any party claiming Force Majeure shall advise the other party as soon as possible of the occurrence of the event and shall provide the other party with the basis of the claim, in writing, within ten (10) days of the occurrence of the event. Parties shall make reasonable efforts to avoid the adverse impacts of a Force Majeure and to resolve the event or occurrence once it has occurred in order to resume performance.

1.14 [Intentionally left blank.]

1.15 "Interest Rate" means the then-current prime rate, as that rate is announced from time to time in The Wall Street Journal.

1.16 "Hazardous Material" means, without limitation, any substance defined as "hazardous substance," "hazardous waste," "extremely hazardous waste,", under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. Section 9601, et seq.; the Hazardous Materials Transportation Act, 49 U.S.C. Section 1801, et seq.; the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 et seq.; the Federal Water Pollution Control Act, 33 U.S.C. Section 1317 et seq.; Ariz. Rev. Stat. §§ 49-201(19) and 49-921(5); and any substance regulated pursuant to any federal or Arizona Environmental Law(s). The term "Hazardous Material" includes, but is not restricted to, asbestos, polychlorinated biphenyls (PCBs), and petroleum.

1.17 "Lender" has the definition provided for in Section 19.1.

1.18 "Licensed Area" means the area of the Facility used by LICENSEE to install, operate and maintain the System, as described in Exhibit "II" of the SLA.

1.19 "LICENSEE" means the party to this SSA that will install, own and operate the System and sell Electricity to COUNTY at the Facility.

1.20 "Lost Savings" means the cost to COUNTY of Electricity not provided by the System as calculated in Exhibit 1 to the SSA, Section 3.

1.21 "Operational Year" means each twelve-month period commencing on the Commercial Operation Date.

1.22 "Renewable Energy Credit" means renewable energy credit(s) or certificates, emission reduction credits, investment credits, production tax credits, emission allowances, green tags, tradable renewable credits, related to renewable energy productions or environmental characteristics that are attribute to the electricity produced by the System or is a commodity that is separated or unbundled from the underlying

electricity supplied System.

1.23 "Savings Value" means the difference between the annual average otherwise applicable tariff prices as calculated per Exhibit 1 to the SSA, Section 3, and the contract price for Electricity.

1.24 "Solar License Agreement" or "SLA" means that certain Solar License Agreement between COUNTY and LICENSEE, of even date herewith, for the installation and operation of the System at the Facility.

1.25 "SSA" means this agreement between the COUNTY and LICENSEE as described in the recitals above.

1.26 "State" means the State of Arizona.

1.27 "System" means the integrated assembly of any solar concentrator components, photovoltaic panels, mounting assemblies, inverters, converters, meters, lighting fixtures, transformers, ballasts, disconnects, combiners, switches, wiring devices and wiring, together with the Electrical Interconnection Point identified in Exhibit IX of the SLA on the primary side of the existing Tucson Electric Power meter at the Facility and the high voltage power lines from the solar system to the Electrical Interconnection Point, installed in the Licensed Area for the purpose of generating Electricity for purchase by the COUNTY, as more particularly described in Exhibit III of the Solar License Agreement.

1.28 "Term" means the term of this SSA as set forth in Section 3.

1.29 "Termination Fee" means the payment by the COUNTY, described in Exhibit 5 hereof, upon early termination of this SSA.

1.30 "Utility" means the local provider of electric transmission and distribution services to the COUNTY in the absence of the System.

2. AGREEMENT

2.1 Sale of Electricity by LICENSEE. LICENSEE will sell to COUNTY all Electricity supplied by the System during the Term, at the price per kilowatt-hour as specified in Exhibit 1 Section 1. LICENSEE shall not offer or sell such Electricity to anyone other than the COUNTY without the prior written consent of the COUNTY. Notwithstanding the preceding sentence, LICENSEE may sell unbundled Renewable Energy Credits consistent with Section 6 and Exhibit 1 Section 1.

2.2 Purchase of Electricity by COUNTY. COUNTY will purchase from LICENSEE all Electricity that meets the specifications set forth in Exhibit 1, up to the available output of the System, on the terms stated in Exhibit 1. COUNTY represents and warrants that it has received all necessary authorizations and approvals required to enter into this SSA and when executed the SSA and SLA will be binding upon the COUNTY.

2.3 Installation of System. LICENSEE will install the System at or on the Facility in accordance with the SLA attached hereto as Exhibit 6.

2.4 [Not used.]

2.4.1 Meter. LICENSEE will measure the actual amount of Electricity delivered

to the COUNTY by the System at the solar site 480 volt meter utilizing a commercially available revenue grade interval data-recording meter (the "Meter").

2.4.1.1 The Meter shall be installed and maintained at LICENSEE's expense and shall have standard industry telemetry capabilities that will provide the COUNTY with the ability to monitor the Meter for the purpose of incorporating the System electrical output data into the energy usage database.

2.4.1.2 LICENSEE will have the Meter tested every three years at LICENSEE's expense by a certified, independent, third party approved by the COUNTY. COUNTY shall be allowed to observe the Meter test, and LICENSEE shall provide notice of the testing to the COUNTY at least ten (10) business days prior to the test date. LICENSEE shall provide signed copies of the results of the Meter test to the COUNTY. In addition to the triennial test, LICENSEE shall test the Meter at any reasonable time upon the request of the COUNTY. COUNTY shall reimburse LICENSEE for the cost of any test requested by the COUNTY, unless such testing demonstrates that the Meter was operating outside of industry standard tolerance allowances or as such defined by the Arizona Corporation Commission for meter calibration and operation.

2.4.1.3 If a Meter is determined to be inaccurate and such inaccuracy exceeds industry standard tolerance allowances, as such are defined by the Arizona Corporation Commission for electric meters, and if it is unknown when the Meter inaccuracy commenced, then the invoices covering the period of time since the last Meter test shall be adjusted for the amount of the inaccuracy on the assumption that the inaccuracy persisted during one half of such period. Adjustments that benefit the COUNTY shall be reflected on the next invoice following the date of determination of the inaccuracy. Adjustments that benefit LICENSEE shall be included on LICENSEE's next invoice to the COUNTY.

2.4.2 Billing System: LICENSEE will bill COUNTY and COUNTY will pay LICENSEE for Electricity at the rate and in the manner set forth in Exhibits 1, 2, and 3.

2.4.3 Customer Service: LICENSEE will provide the following during the Term:

2.4.3.1 LICENSEE will produce and send bills to COUNTY or its designee within fifteen (15) business days after the end of each billing cycle. Invoices shall be sent to:

County Billing Contact: Marc Lynn	Copy Invoice To:
Section/Unit: Pima County Facilities Management	
Attention: Marc Lynn	
Address: 150 W. Congress St. Tucson, AZ 85701	
Phone: 520-740-3093	

Fax: 520-740-3900	
Email: Marc.Lynn@pima.gov	

2.4.3.2 LICENSEE will post meter reads to a password protected web site and make this web site available to COUNTY.

2.5 Billing Validation and Verification. COUNTY may during the Term conduct occasional billing inquiries, validation and verification activities, or reconciliation procedures. During such COUNTY inquiries, activities, and procedures, LICENSEE shall provide COUNTY with the data and other information, including any billing algorithms and interval Meter data representing System output, used to generate billing determinants. COUNTY will use its best efforts to provide or arrange for Utility metered interval data and billing data and information that can support LICENSEE's billing process, either directly through a data file transmission, receipt through regular mail services, or through the appropriate and established arrangement with the Utility. For purposes of this paragraph, Parties agree that best efforts" means that the COUNTY will authorize the applicable Utility to provide metered interval data and billing data and information directly to the LICENSEE, as per the Utility's rules and applicable regulations.

2.6 O&M Services. LICENSEE may provide operation and maintenance services for the System through a wholly-owned subsidiary of Sun Edison LLC. LICENSEE may not enter into an operation and maintenance agreement with respect to the System with an unaffiliated third party without the prior written consent of COUNTY, which consent shall not be unreasonably withheld.

3. TERM AND TERMINATION

The Term of this SSA shall commence on the Effective Date and end at 11:59 P.M. of the day preceding the twentieth (20th) anniversary of the Commercial Operation Date unless earlier terminated by a Party pursuant to the terms of this SSA, or pursuant to termination of the SLA.

3.1 COUNTY Termination Rights. COUNTY shall have the right to terminate the SSA as follows:

3.1.1 For Cause. COUNTY may terminate this SSA (a) pursuant to Section 11.2, below a result of LICENSEE's material default; or (b) thirty (30) days after delivery of written notice to LICENSEE and any Lender if a Force Majeure event has occurred and LICENSEE is unable to produce Electricity for more than 180 consecutive days.

3.1.2 For Convenience. In addition to the termination rights in Section 3.1.1 above, COUNTY may terminate this SSA for convenience, sixty (60) days after delivery of written notice to LICENSEE and any Lender. If COUNTY terminates this SSA for convenience pursuant to this section, COUNTY shall pay LICENSEE a Termination Fee as described and calculated in Exhibit 5 hereto. In addition, COUNTY may terminate this SSA, without liability to either COUNTY or LICENSEE, in the event that COUNTY does not enter into a REC Purchase Agreement (as defined in Section 6).

3.1.3 Both parties acknowledge that the Arizona Constitution, Art. 15, § 2 defines the term "public service corporation" ("PSC") and the Arizona Corporation Commission ("ACC") has broad authority to regulate any such PSC. The parties further acknowledge that clear guidance does not exist regarding whether LICENSEE may be considered a PSC by the ACC based on the services provided under this SSA. Due to the foregoing, there is a level of uncertainty that the ACC could determine that LICENSEE as a provider under this SSA is subject to regulation by the ACC as a PSC. Each party hereto covenants and agrees that in the event that the ACC determines that LICENSEE is subject to its regulation as a PSC or the ACC makes any other determination that would make it commercially unreasonable, in the sole discretion of LICENSEE, to fulfill its obligations under this Agreement or the SLA (each of the foregoing ACC determinations is referred to herein as an "ACC Determination"), both parties will discuss all commercially reasonable steps to amend this Agreement (and the SLA) or may negotiate in good faith to establish an alternative structure, arrangement and agreement whereby each party receives substantially similar consideration provided for under this Agreement. Notwithstanding the foregoing, either party may immediately terminate this SSA in the event of an ACC Determination. Furthermore, each party hereto covenants and agrees that in the event that the ACC has issued an order or guidance that declares that providers of services under agreements similar to this SSA that conform to certain criteria are not PSCs and are not subject to the ACC's regulations related thereto then both parties will take commercially reasonable steps to amend this SSA and the SLA to implement and reflect the ACC's order, guidance and criteria as soon as reasonably practicable following the issuance thereof. Notwithstanding the foregoing, COUNTY and LICENSEE shall not be required to make any amendments to this SSA or the SLA pursuant to this Section 3.1.3 that would put them in a materially adverse position to the terms and conditions of this Agreement as originally executed.

3.1.4 Termination of SLA. This SSA shall terminate simultaneously with any termination of the SLA.

3.2 LICENSEE Termination Rights. LICENSEE shall have the right to terminate this SSA at any time upon written notice to COUNTY, without further liability, if any of the following occur: a) If, prior to the first date of scheduled delivery of Electricity, LICENSEE determines that the System cannot be built as planned or that its construction and operation would not be economically viable for the LICENSEE, including LICENSEE's determination that (i) the installation of the System is not economically viable as a result of the need to comply with any environmental regulation or (ii) LICENSEE does not obtain third-party financing for the System acceptable to LICENSEE in its sole discretion or (iii) LICENSEE has not received assurance reasonably acceptable to it that LICENSEE will be able to enter into an interconnection agreement with the Utility. LICENSEE will be responsible for repairing any damage to the Facility arising from activities conducted by LICENSEE pursuant to the SSA or SLA; b) Upon occurrence of a Force Majeure event, including, but not limited to, LICENSEE's inability, after diligent efforts, to obtain or maintain required approval or permits from any governmental authority for the installation or operation of the System; c) In the event that, through no fault of LICENSEE and for other than a Force Majeure event, the System is

permanently shut down due to renovation, damage, destruction, or closure of the Facility, and COUNTY and LICENSEE cannot agree upon an alternative location for the System; or d) Upon an Event of Default by COUNTY (as defined in Section 11.4). COUNTY shall pay LICENSEE a Termination Fee as described and calculated in Exhibit 5 in the event of a termination by COUNTY under Section 3.1.2 above or pursuant to a termination under Sections 11.4.2, 13, 14 and 18.6 below. Appropriate remedies in connection with other termination events triggered by this provision will be determined pursuant to Section 11.8.

4. CONFLICT OF INTEREST

This Contract is subject to cancellation for conflict of interest pursuant to A.R.S. § 38-511, the pertinent provisions of which are incorporated into this Contract by reference.

5. GUARANTEE OF MINIMUM OUTPUT PERFORMANCE/TECHNOLOGY ASSESSMENTS AND UPGRADES

LICENSEE has estimated that the System will deliver the Expected Performance Output as indicated in Exhibit 1. LICENSEE guarantees a Minimum Output Performance from the System of 90% of the Expected Performance Output from the System over the course of an Operational Year commencing with the Commercial Operation Date. If LICENSEE fails to meet the Minimum Output Performance requirement on an Operational Year basis, for reasons other than the COUNTY's shading of the System, as described in Section 14 below, LICENSEE will pay the COUNTY, or COUNTY may, at its option, offset against future payments due LICENSEE, an amount equal to COUNTY's Lost Savings. The formula for calculating Lost Savings is found in Exhibit 1 to this SSA. If LICENSEE fails to pay the COUNTY the amount due for any annual shortfall of the Guaranteed Minimum Output Performance within 60 days after notice to make such payment (and such shortfall is not under dispute by LICENSEE pursuant to written notice to COUNTY), COUNTY shall have the express right to withhold payment, up to the shortfall amount due, from any payments otherwise payable to LICENSEE for Electricity, regardless of any mortgage or assignment of payments given as security by LICENSEE under the provisions hereof. LICENSEE and COUNTY agree that System performance will degrade by an Annual Degradation Factor as indicated in Exhibit 1 Section 2 of this SSA for every year of operation. The Expected Performance Output will be reduced by the Annual Degradation Factor every Operational Year for the term of this SSA. The degradation factor will be applied to the kWh energy values of the Expected Performance Output at the beginning of each Operational Year to determine whether or not the LICENSEE has met the Minimum Output Performance guarantee at the end of the Operational Year. The degradation factor will be applied on a pro rata basis for System operations that do not span an entire Operational Year by multiplying the Annual Degradation Factor times the fraction of the Operational Year.

All services, equipment, materials or parts shall be models of current production. The output from the System shall not have any adverse effects on County electrical distribution systems or the operations or performance of existing electrical equipment and shall be free of any quality issues, including surges, under voltage, overvoltage or harmonics conditions.

LICENSEE may perform technological and financial reviews at its discretion to determine the feasibility of upgrading the existing System utilizing improved solar products, strategies and/or

solutions. Should an upgrade be deemed advantageous to LICENSEE (in its sole discretion), LICENSEE may upgrade the System or processes associated with the same at its sole expense and LICENSEE shall be entitled to the entirety of the benefit associated with or related to such upgrades. Notwithstanding anything to the contrary in this Section 5, LICENSEE may not materially alter the System in a manner that increases the obligations or burden on the COUNTY as set forth in this SSA and the SLA, and, in particular, LICENSEE cannot undertake any upgrade that results in an increase in COUNTY's rates for power purchased from TEP.

In the alternative, LICENSEE and COUNTY may (each, at its sole discretion) agree to jointly fund an upgrade of the System utilizing improved solar products, strategies and/or solutions. In such event, the benefit achieved as the result of such upgrade shall be allocated to LICENSEE and COUNTY in proportion to the amount each contributed to the upgrade.

6. POTENTIAL REVENUE FROM RENEWABLE ENERGY CREDITS (RECs)

The County will maintain ownership of all Renewable Energy Credits associated with this Agreement and the SLA.

LICENSEE agrees and understands that TEP requires that COUNTY execute a Renewable Energy Credit Purchase Agreement ("REC Purchase Agreement"). LICENSEE (i) shall be responsible for fulfilling all representations and warranties and performing all duties and obligations of COUNTY under that certain REC Purchase Agreement executed between TEP and County related to the Project, (ii) forever waives any claim, suit or other action against COUNTY arising out of the terms and conditions of the REC Purchase Agreement, including any claim that COUNTY has breached this SSA or the SLA by executing the REC Purchase Agreement (but excluding any breach by COUNTY of its duties listed in clauses (A) through (D) below), and (iii) further indemnifies, defends and holds COUNTY harmless against any and all suits, actions, legal or administrative proceedings, claims, demands, or damages of any kind or nature arising out of the terms and conditions of the REC Purchase Agreement.

In connection with the REC Purchase Agreement and Provider's obligations under this Section 6, COUNTY agrees as follows:

(A) It shall reasonably cooperate with LICENSEE in order for LICENSEE to meet its obligations under this Section 6;

(B) Without the prior written consent of Provider, it shall not enter into amend or modify the REC Purchase Agreement;

(C) It shall promptly provide upon receipt from TEP, any written or other notices received from TEP in connection with the REC Purchase Agreement; and

(D) It shall not settle any claims or suits brought by TEP in connection with the REC Purchase Agreement without the prior consent of Provider and Provider shall control the defense of the COUNTY in connection with any claim brought by TEP against the COUNTY in connection with the REC Purchase Agreement;

The provisions of this Section 6 shall survive the termination of this SSA, the SLA, and the termination of the REC Purchase Agreement.

7. REBATES AND OTHER INCENTIVES

Any grantor incentive payment, rebate or credit by the Utility, the Federal Government, the State of Arizona, or any other agency paid as a result of the design, construction, and operation of the System shall inure to the benefit of the LICENSEE or as provided in Article 6 above. COUNTY will cooperate in good faith by, among other things, taking all reasonable actions requested by LICENSEE, at no cost to COUNTY, as necessary to enable LICENSEE to obtain all available incentives and rebates, including transfer to LICENSEE of any incentive received by COUNTY, as consistent with this SSA and the SLA, provided that RECs have not been sold, traded, assigned or otherwise transferred to any party other than TEP, and are free and clear of all liens and encumbrances.

8. INDEMNIFICATION

LICENSEE shall indemnify, defend, and hold harmless COUNTY, its officers, employees, and agents from and against any and all suits, actions, legal administrative proceedings, claims, or demands and all costs attendant thereto, arising out of any negligence or intentional misconduct by LICENSEE, its agents, employees, or anyone under its direction or control or on its behalf in connection with performance of this Agreement. Notwithstanding anything to the contrary contained herein, no individual representative of LICENSEE shall have any personal liability to the other party as a result of a breach of any representation, warranty, covenant or agreement contained herein.

LICENSEE warrants that the System provided under this Agreement does not infringe third-party intellectual property rights. LICENSEE will indemnify, defend, and hold COUNTY harmless from any claim of infringement of intellectual property arising from the System provided for under this Agreement.

COUNTY agrees that, from and after the execution of this Agreement, except as expressly set forth in this Agreement, with respect to any breach or violation (other than any willful, intentional or fraudulent breach or violation) by LICENSEE of any representation or warranty or covenant set forth in the Agreement, the only relief available to COUNTY for such breach in respect of such breach shall be as set forth in this Section 8. Other than as explicitly set forth in this SSA or the SLA, LICENSEE shall not be liable to COUNTY for any special, punitive, exemplary, indirect, or consequential damages, or losses or damages for lost revenue or lost profits, whether foreseeable or not, arising out of, or in connection with this SSA.

9. EMERGENCIES

In cases of emergency in which COUNTY determines that the continued operation of the System

presents an imminent threat requiring immediate action to prevent or mitigate the loss or impairment of life, health, property, or essential public services, the Parties agree that COUNTY may disconnect the System from the Facility prior to notification of LICENSEE. If COUNTY disconnects the System pursuant to this provision, COUNTY will notify LICENSEE no later than eight (8) hours after the System is disconnected. The Parties agree that only LICENSEE or an agent designated by LICENSEE will be authorized to reconnect the System after the System is disconnected by COUNTY pursuant to this emergency section.

10. COMMUNICATIONS AND CONTACTS

The representatives of the Parties during the term of this SSA will be:

COUNTY	LICENSEE
Name: Reid Spaulding	Name: Jared Schoch
Address: Pima County Facilities Management Department 150 W. Congress, 5th Flr. Tucson AZ 85701	Address: 12500 Baltimore Avenue Beltsville, MD 20705
Phone: 520-740-3703	Phone: (720) 255-7382
Email: reid.spaulding@pima.gov	Email: jschoch@sunedison.com
	With a copy to: General Counsel 12500 Baltimore Avenue Beltsville, MD 20705

11. DEFAULT

11.1 Waiver. A waiver by either party of any term, covenant, or condition of this SSA shall not constitute a subsequent waiver of the same or any performance thereof by the other party.

11.2 Default by LICENSEE. At the option of COUNTY as the non-defaulting party, the occurrence of any of the following shall constitute a material default and breach of this SSA:

11.2.1 LICENSEE's failure to deliver Electricity from the System for a continuous period of sixty (60) days or for a cumulative ninety (90) days within any continuous six month period.

11.2.2 Unreasonable interference by LICENSEE with the operations of COUNTY at the Facility if the interference is curable by suspension of operation of the System and

LICENSEE fails to suspend operation of the System within forty-eight (48) hours of COUNTY's notice to LICENSEE regarding the unreasonable interference.

11.2.3 The making by LICENSEE of any general assignment for the benefit of creditors, or the filing of a petition to have LICENSEE adjudicated as bankrupt, or the filing of a petition for reorganization or arrangement under any law relating to bankruptcy unless in the case of a petition filed against LICENSEE, the same is dismissed within sixty (60) days; or the appointment of a trustee or receiver to take possession of substantially all of LICENSEE's assets located on the Facility or of LICENSEE's interest in this SSA, when possession is not restored to LICENSEE within thirty (30) days; or the attachment, execution or other judicial seizure of substantially all of LICENSEE's assets located on the Facility or of LICENSEE's interest in the License, when such seizure is not discharged within sixty (60) days.

11.2.4 Failure by LICENSEE to perform or comply with any other material term of the SSA within thirty (30) days after written notice to LICENSEE and any Lender by COUNTY, unless COUNTY agrees in writing to a longer period to cure the default.

11.2.5 Occurrence of an "Event of Default" as defined in Section 10.1 of the SLA.

11.3 COUNTY Remedies. If any default by LICENSEE shall continue uncured, following notice of default where required herein, for the period applicable to the default alleged, COUNTY may resort to any one or more of the following remedies:

11.3.1 Termination. COUNTY may terminate the SSA by providing written notice to LICENSEE indicating that the SSA and the SLA have been terminated and requesting that the System be removed and the Facility restored to the pre-installation condition subject to ordinary wear and tear. If the LICENSEE fails to remove the System and restore the Facility within one hundred twenty (120) days of notice by COUNTY, COUNTY may consider the System abandoned and may remove the System and any other property owned by the LICENSEE from the Facility and dispose of LICENSEE's property in any manner within COUNTY's discretion, but subject to applicable law.

11.3.2 Recovery of Damages and Expenses. COUNTY may recover from LICENSEE any damages and expenses reasonably incurred as a result of LICENSEE's Default, including attorneys' fees and the cost to repair the Facility to pre-installation condition.

11.3.3 Right of Offset. COUNTY may elect to offset any damages resulting from LICENSEE's default against any monies owing or to be owed to LICENSEE under this SSA. If the COUNTY elects not to terminate the SSA and SLA following an Event of Default by LICENSEE, this election shall not constitute a waiver by COUNTY as to any subsequent Event of Default by LICENSEE.

11.4 Default by COUNTY. At the option of LICENSEE as the non-defaulting party, the occurrence of any of the following shall constitute a material default and breach of this SSA:

11.4.1 COUNTY's failure to pay undisputed invoices for a continuous period of 60 or more days.

11.4.2 The renovation, damage, destruction, or closure of the Facility for other than a Force Majeure event, which results in the permanent shutdown of the System at the Facility, if COUNTY and LICENSEE are unable to agree upon an alternative location for the System as defined in Section 13 below.

11.4.3 COUNTY's refusal to sign authorizations (and other documents) reasonably required by LICENSEE to obtain any rebate or subsidy contemplated in Section 7 above or COUNTY's refusal to sign or comply with any material term of the approved interconnection agreement required by the Utility for interconnection of the System.

11.4.4 Failure by COUNTY to perform or comply with any other material term of the SSA within sixty (60) days after written notice by LICENSEE, unless LICENSEE agrees to a longer period to cure the default.

11.4.5 COUNTY's material alteration or interference with the Electrical Interconnection Point and such failure does not result from LICENSEE's negligence or willful misconduct or failure to comply with its interconnection agreement; provided that in the event of any such material alteration or interference with the Electrical Interconnection Point by COUNTY, including relating to growth plans or changes in circumstances, COUNTY shall reimburse LICENSEE for additional Utility demand fees, labor and materials, including additional equipment related to establishing a new electrical interconnection point, and lost revenue or lost profits, including related to foregone Renewable Energy Credits, during the period in which the System does not operate.

11.4.6 The occurrence of any default by the COUNTY pursuant to Section 10.3 of the SLA.

11.5 LICENSEE Remedies. If any default by COUNTY shall continue uncured, following notice of default where required herein, for the period applicable to the default alleged, LICENSEE may resort to any one or more of the following remedies:

11.5.1 Termination. LICENSEE may terminate the SSA and the SLA by providing written notice to COUNTY indicating that the SSA and the SLA have been terminated.

11.5.2 Damages. In the event of a termination under Section 11.4.2 above, COUNTY shall pay to LICENSEE a Termination Fee, calculated as set forth in Exhibit 5. The Parties acknowledge and agree that in the Event of Default of this SSA by COUNTY, LICENSEE's actual damages would be difficult or impossible to compute and that this Termination Fee calculation provision represents the reasonable estimate of such

damages established by the parties in good faith consideration of the facts and circumstances surrounding the transactions contemplated by this SSA as of the effective date.

11.5.3 Removal. In addition to the other remedies specified herein, LICENSEE may remove the System at LICENSEE's cost, provided the Facility is restored to a condition substantially similar to the pre-installation condition subject to ordinary wear and tear as called for by this SSA.

11.6 [Intentionally left blank]

11.7 Force Majeure. Any Party claiming Force Majeure with respect to its performance hereunder shall advise the other Party as soon as possible of the occurrence of the event and shall provide the other Party with the basis of the claim, in writing, within ten (10) days of the occurrence of the event. Each Party shall make reasonable efforts to avoid the adverse impacts of a Force Majeure event and to resolve the event or occurrence once it has occurred in order to resume performance

11.8 Disputes. Each party shall continue to perform its responsibilities under this SSA during any dispute, except for a dispute alleging non-payment of payments due by the COUNTY to LICENSEE. In the event that disputes arise between the Parties which cannot be resolved through conference and negotiation, such disputes shall be controlled by Arizona law and both Parties shall have the right to have the dispute adjudicated by the Arizona courts, provided however, that it shall be a condition precedent to the filing of any lawsuit that the Parties shall first submit the dispute to non-binding mediation with a qualified mediator, with relevant experience in the industry, mutually agreed to by the Parties as governed by the rules and procedures of the American Arbitration Association. The Parties shall be bound to participate in such non-binding mediation in good faith and in confidence.

12. TEMPORARY SHUTDOWN OF SYSTEM

12.1 In-lieu Payments. If, during the Term, renovations or damage to the Facility occurs, for reasons other than a Force Majeure and through no fault of LICENSEE, which reduces to a level less than 98% of Expected Performance Output or eliminates the use by COUNTY of Electricity from the System or requires the temporary shutdown of the System, LICENSEE may, in its sole discretion, choose to do the following as a means of avoiding default under this SSA:

12.1.1 If such renovation or damage can be completed during the Term hereof, and if COUNTY elects to proceed with such renovation or repair, then COUNTY shall pay in lieu fees to LICENSEE during the duration of the reduction or shutdown as set forth in the next sentence. Such in-lieu fees shall equal the actual payments made by the COUNTY during the same period on a daily basis in the previous calendar year less the appropriate system degradation factor unless the COUNTY and LICENSEE mutually agree to an alternative in-lieu fee methodology. The in lieu payments are made to

LICENSEE to offset foregone consideration in this SSA and do not entitle COUNTY to Electricity at a later date.

12.2 Notice. COUNTY will make a good faith effort to give as much notice as possible to LICENSEE prior to any act or omission to act which may occur in a shutdown of the System or reduction in the Expected Performance Output of the System below the threshold specified in Section 12.1.

13. PERMANENT SHUTDOWN OF THE SYSTEM AT FACILITY

If, through no fault of LICENSEE and for reasons other than Force Majeure, the System is permanently shut down due to renovation, damage, destruction, or closure of any of the Facilities, or if COUNTY elects to relocate the System, LICENSEE shall be entitled to the following:

13.1 Notice of Shutdown. Within thirty (30) days after shutdown of the System, COUNTY shall provide written notice to LICENSEE indicating whether or not the COUNTY intends to restore operation of any of the Facilities or whether relocation(s) of the System will be pursued.

13.2 Alternative Location(s) If, within ninety (90) days after permanent shutdown of the System, COUNTY and LICENSEE agree on an alternative location(s) from which LICENSEE can provide Electricity to COUNTY, then COUNTY shall pay the costs associated with relocation of the System. This alternative location(s), in the reasonable opinion of LICENSEE, shall have the potential to provide substantially similar overall system output as the original Facility, measured in total kilowatt-hours over a 12-month period, unless COUNTY and LICENSEE mutually agree that this output level is not required. If COUNTY and LICENSEE mutually agree upon an alternative location(s) that is substantially inferior to the Facility for purposes of installation or Utility rates (assuming different portions of the Facility have different Utility rates), then the pricing formula identified in Exhibits 2 and 3 will be equitably adjusted to compensate for the alternative location(s) such that LICENSEE receives payments comparable to those which it would have received from the System at the Facility. LICENSEE shall be reimbursed for the period of System shutdown prior to relocation, if any, under the payment mechanisms specified in Section 12.1 above for Temporary Shutdown of the System. If, within sixty (60) days after permanent shutdown of the System, COUNTY and LICENSEE have not agreed upon an alternative location(s) for the System, LICENSEE may terminate this SSA and receive a Termination Fee (as defined in Section described in section 11.5.2, above, and in Exhibit 5).

14. RESTRICTIONS ON SHADING

COUNTY will make all good faith efforts to avoid activities which result in overshadowing or shading of the System in a manner that would prevent LICENSEE from meeting the Expected Performance Output as described in Exhibit 1. In the event that COUNTY's activities result in the System being overshadowed in manner that causes the System to produce less than 98% of

the Expected Performance Output on a kWh basis over any twelve (12) month period, COUNTY agrees to pay "in lieu" fees up to the Expected Performance Output as described in Section 12.1.1 above for the duration of the period for which the shadowing occurs. LICENSEE shall provide and justify data that reasonably demonstrates the approximate loss of generation that occurred due to shading. In the event COUNTY reasonably determines that additional information is necessary to support LICENSEE's calculations of lost generation due to shading, COUNTY may submit a written request to LICENSEE within thirty (30) days of receipt of LICENSEE's calculations that specifies what information it believes necessary to confirm the accuracy of such calculations. If COUNTY does not deliver such written request for additional information, then COUNTY shall be deemed to agree to LICENSEE's calculations of lost generation due to shading, including any in lieu fees associated with the same. If COUNTY delivers a written request to LICENSEE for additional information, then LICENSEE and COUNTY shall work in good-faith to timely agree to an amount of lost generation due to shading, including the in lieu fees associated with the same. If LICENSEE and COUNTY cannot come to an agreement on such amounts within thirty (30) days of the delivery of COUNTY's notice, then the matter shall be submitted to binding mediation or arbitration with the proceedings governed under the provisions of the American Arbitration Association, the costs of which shall be paid by LICENSEE and COUNTY equally. Any mediator or arbitrator chosen by mutual agreement of the parties shall have requisite knowledge of the industry in which LICENSEE operates. Notwithstanding any other provision of this SSA, the Parties agree that if COUNTY's actions, directly or indirectly, result in shadowing of the System such that the System produces less than 98 percent of the Expected Performance Output, the Parties shall make every effort to relocate the System to a mutually agreeable location. If the Parties cannot agree on an alternative location for the System and the shadowing of the System is a result of COUNTY's action, then LICENSEE is entitled to a Termination Fee pursuant to Section 13, "Permanent Shutdown of the System at the Facility," and Exhibit 5. The Parties agree that shading resulting from actions outside of the control of COUNTY shall not give rise to a Termination Fee provided for in this Section.

15. COMPLIANCE WITH APPLICABLE LAWS, INCLUDING UTILITY INTERCONNECTION STANDARDS

LICENSEE, at its own cost and expense, shall comply with all Applicable Laws relating to the operation of the System and the generation and sale of Electricity to COUNTY, including obtaining and maintaining all relevant approvals and permits. In particular, LICENSEE, throughout the Term of the SSA, will fully comply with any and all operational standards and requirements imposed by the Utility, and comply with the electrical interconnection requirements as stated in the applicable and controlling Utility tariff. COUNTY will cooperate with LICENSEE and, if necessary, will provide consents and execute with the Utility such agreements (if such agreements do not have unacceptable or prohibited terms and/or conditions, or impose additional costs on COUNTY) as are necessary to permit the interconnection of the System. This electrical interconnection shall be done at no cost or liability to COUNTY, and LICENSEE shall reimburse COUNTY for all reasonable out of pocket costs incurred in connection with any interconnection agreement. Should the Utility demand fees or equipment at a cost exceeding $ 25,000 for electrical interconnection requirements, LICENSEE may at its sole discretion cease to proceed with installation of the System without further obligation to COUNTY other than

obligations which were incurred prior to notice from the Utility of the fees or the equipment costs and the obligation to restore the Facility to pre-installation condition if installation was initiated.

16. NON-DISCRIMINATION AND AMERICANS WITH DISABILITIES ACT

16.1 LICENSEE shall not discriminate against any COUNTY employee, client or any other individual in any way because of that person's age, race, creed, color, religion, sex, disability, or national origin in the course of carrying out LICENSEE's duties pursuant to this Contract. LICENSEE shall comply with the provisions of Executive Orders 75-5, as amended by Executive Order 99-4, which are incorporated into this Contract by reference as if set forth in full herein.

16.2 CONTRACTOR shall comply with all applicable provisions of the Americans with Disabilities Act (or "ADA") (Public Law 101-336, 42 U.S.C. 12101-12213) and all applicable federal regulations under the Act, including 28 CFR Parts 35 and 36.

16.3 Inclusion in Subcontracts. LICENSEE represents and warrants that it shall include the substance of the nondiscrimination, ADA, and compliance provisions of this clause in all subcontracts in connection with its obligations hereunder.

17. TAXES

LICENSEE shall pay all taxes, assessments or charges that at any time may be lawfully imposed upon LICENSEE as the owner of the System. COUNTY shall pay all taxes, assessments or charges that at any time may be lawfully imposed upon County including any taxes, assessments, or charges imposed upon COUNTY where LICENSEE is required to withhold or collect such imposed taxes, assessments, or charges and pay over such taxes, assessments, or charges to the taxing authorities such as any excise taxes (is any) that are levied upon the user of Electricity and are collected by LICENSEE as the producer of such electricity and paid over to the taxing jurisdiction.

18. ASSIGNMENT

The duties and obligations of LICENSEE under this SSA shall not be assignable by the LICENSEE in whole or in part without the written consent of COUNTY, which consent shall not be unreasonably withheld after due diligence confirms the ability of the proposed assignee to operate and maintain the System in a manner consistent with independent solar power producers using similar standards and practices to LICENSEE. COUNTY's consent to one assignment shall not be deemed consent to any subsequent assignment.

18.1 Event of Default. In the event of default by any assignee of LICENSEE or any successor to LICENSEE in the performance of the terms hereof, COUNTY may proceed directly against LICENSEE for any claims that it may have against LICENSEE for its actions without the necessity of exhausting remedies against such assignee; provided, however, SunEdison Origination3 LLC shall not be liable following any assignment by to a wholly-owned subsidiary

of Sun Edison LLC made within ninety (90) days after the commercial operation date of the System where such assignment is made to facilitate the long-term financing of the Facility.

18.2 Unique Expertise. Notwithstanding the foregoing, LICENSEE acknowledges that COUNTY is relying upon the unique expertise and capability of LICENSEE. LICENSEE must demonstrate that any proposed assignee has both the financial capacity and the technical ability to perform the obligations required under the SSA at a level deemed reasonably appropriate by COUNTY and the proposed assignee is willing and sufficiently fund to assume the indemnification obligations set forth in this SSA, as reasonably determined by COUNTY

18.3 Definition of Assignment. For purposes of this section, the sale, assignment, transfer, or disposition, directly or indirectly, of any type which results in a change of control of LICENSEE shall be deemed an assignment of this SSA. Change of control shall be as defined in common law, and may be the result of a single or multiple related transactions which result in the cumulative transfer of more than fifty percent (50%) of the voting stock or equity interests of LICENSEE. However, in no event shall the transfer of shares: (i) to a Lender which assumes LICENSEE's obligations hereunder; or (ii) to another limited liability company of which LICENSEE is the managing member; or (iii) in an open market transaction sale of shares of a public held company; or (iv) a merger of sale of substantially all of the shares of membership interests of LICENSEE's highest tier parent company be considered an assignment needing COUNTY's approval. LICENSEE shall have a continuing duty to provide COUNTY with written notice of any material change in the LICENSEE'S business structure and/or financial status.

18.4 Consent to Assignment. COUNTY shall consent to the assignment by LICENSEE to the Lender, of LICENSEE' s right, title, and interest in and to this SSA, provided that, in the reasonable opinion of the COUNTY, the proposed assignee is reasonably capable of fulfilling LICENSEE's financial and System management obligations hereunder.

18.5 Assignment for Security. Nothing in this paragraph 18 shall: (i) prohibit LICENSEE from assigning or granting a lien on LICENSEE's rights to payments under this SSA for purposes of collateral security; or (ii) except as permitted under section 18.3 above or with COUNTY's consent in accordance with section 18.4, above, allow LICENSEE to assign its duties and obligations under this SSA.

18.6 Assignment by COUNTY. COUNTY may not assign or otherwise transfer any of its rights under this Agreement ; provided, however, that if COUNTY sells, assigns or otherwise transfers ownership of the Facilities or the Licensed Area and it is determined (by an independent mediator or pursuant to the procedures in Section 11.8 hereof) that this sale, assignment or transfer materially affects LICENSEE's ability to perform its obligations hereunder or under the SLA then LICENSEE may terminate the SSA and SLA and the termination schedule set forth in Exhibit 5 hereto shall apply to any such termination by LICENSEE pursuant to this Section 18.6.

19. FINANCING

19.1 Non-Subordination. COUNTY will not subordinate its interest in the Facility as security for any loans or financing (a "LICENSEE Loan") provided to LICENSEE by one or more financial institutions (each a "Lender") in connection with LICENSEE's acquisition, development, construction and installation of the System; provided, however, notwithstanding the provisions of Section 19.2 below, LICENSEE may pledge or otherwise encumber LICENSEE's right, title and interest in the SSA, including any rights to payment from COUNTY under the SSA, and LICENSEE's right, title and interest in the System as security for any LICENSEE Loan. If a Lender requests additional terms and conditions to those already provided for in this SSA, COUNTY will consider any such requests, but may refuse such requests in its reasonable discretion and may withhold consent or approval of such additional terms and conditions in its reasonable discretion.

19.2 Security Interests in System. COUNTY acknowledges that LICENSEE may finance LICENSEE's acquisition, development, construction and installation of the System with a LICENSEE Loan from one or more Lenders and that LICENSEE's obligations to a Lender may be secured by, among other property, a pledge or collateral assignment of this SSA and LICENSEE's rights to payment and a first priority security interest in the System. In order to facilitate a LICENSEE Loan, and with respect to any LICENSEE Lender of which LICENSEE has notified COUNTY in writing, COUNTY agrees as follows:

19.2.1 Classification of System as Personal Property. COUNTY acknowledges that as part of the collateral securing the LICENSEE Loan, LICENSEE may grant a first priority security interest ("Security Interest") in the System to a Lender, which Security Interest may require, among other things, the filing of financing statement(s) ("Financing Statements") under the Uniform Commercial Code ("UCC") to perfect such Security Interest. COUNTY consents to the filing of any Financing Statements so long as such filings reflect the Parties' intent that the System is personal property only and is not a fixture to the Facility.

19.2.2 Neither the filing if the Financing Statements, nor any other document or instrument executed in connection with the LICENSEE Loan shall create any interest in or lien upon the real property underlying the Facility, the Facility, or the interest of the COUNTY therein and shall expressly disclaim the creation of such an interest or a lien.

19.2.3 COUNTY will notify its successors and assigns of the ownership of the System by LICENSEE, the existence of the Lender's Security Interest, and the fact that the System is not part of the Facility or a fixture thereof.

19.2.4 With the exception of its revenue bond covenants and the conditions of its Water Infrastructure Authority of Arizona ("WIFA") loan, no lease, mortgage, security interest or other interest in or lien upon the Facility currently exists and, so long as this SSA or the SLA have not been terminated, COUNTY shall not sign any lease, mortgage, document or instrument that creates a security interest or other interest in, or lien upon, the System without LICENSEE's written consent.

19.2.5 In connection with any collateral assignment of this Agreement to a Lender, County will be bound by those "lender accommodations" described in Exhibit 7. Lessee's Lender shall be a third party beneficiary of this Section 19.2.5.

20. AMENDMENT

No amendment or variation of the terms of this SSA shall be valid unless made in writing, signed by the Parties and approved as required; provided, however, that the Chair of the Pima County Board of Supervisors and authorized representatives of LICENSEE are hereby authorized to execute additional agreements that are determined by both parties to be necessary to meet the goals and objectives of this Agreement. No oral understanding or agreement not incorporated in this SSA is binding on either Party.

21. [Intentionally left blank.]

22. AUDIT

Each Party has the right, at its sole expense and during normal working hours, to examine copies of the records and supporting documentation of the other Party to the extent reasonably necessary to verify the accuracy of any statement, charge or computation made pursuant to this SSA. Each Party will maintain such records for possible audit for a minimum of three (3) years, unless a longer period of records retention is stipulated. Each Party will allow the auditor(s) access to such records during normal business hours after reasonable notice and to allow interviews of any employees who might reasonably have information related to such records. If any examination reveals any inaccuracy in any statement, the necessary adjustments in such statement and the payments thereof will be made promptly and shall bear interest calculated at the Interest Rate from the date the overpayment or underpayment was made until paid; provided, however, that no adjustment for any statement or payment will be made unless objection to the accuracy thereof was made prior to the lapse of twelve (12) months from the rendition thereof, and thereafter any objection shall be deemed waived.

23. INDEPENDENT CONTRACTOR

LICENSEE, and its agents and employees, shall act in an independent capacity and not as officers or employees or agents of the COUNTY in the performance of this SSA.

24. TIMELINESS

Time is of the essence in this SSA.

25. GOVERNING LAW

This contract is governed by and shall be interpreted in accordance with the laws of the State of Arizona. All actions by LICENSEE must be brought and heard in the Pima County Superior Court.

26. UNENFORCEABLE PROVISION

In the event that any provision of this SSA is unenforceable or held to be unenforceable, then the parties agree that all other provisions of this SSA have force and effect and shall not be affected thereby.

27. COUNTERPARTS

This SSA may be executed in multiple copies, each of which shall be deemed an original, but all of which shall constitute one agreement after each Party has signed such a counterpart.

28. SCRUTINIZED BUSINESS OPERATIONS

Pursuant to A.R.S. §§ 35-391.06 and 35-393.06, contractor hereby certifies that it does not have scrutinized business operations in Iran or Sudan. The submission of a false certification by contractor may result in action up to and including termination of this contract.

29. CODE SECTION 7701(e)

It is the intention of the parties that the provisions in this SSA shall meet all of the requirements set forth in Section 7701(e)(4) of the Internal Revenue Code of 1986, as amended (the "Code"), and any related Treasury Regulations and IRS administrative pronouncements, so that the SSA is deemed to be treated as a "service contract" and not as a "lease" pursuant to Code Section 7701(e). All duty and responsibility for such compliance rests with LICENSEE and amendments to this SSA required to achieve such compliance require COUNTY approval, with such approval not to be unreasonably withheld.

30. INTEGRATION

This Agreement, along with the SLA entered into on the date hereof, constitute the entire agreement among the parties hereto pertaining to the subject matter hereof and supersedes all prior agreements and understandings of the parties hereto in connection herewith and therewith, and no covenant, representation or condition not expressed in this Agreement or in the SLA shall affect, or be effective to interpret, change or restrict the express provisions of this Agreement.

[Signature page follows]

EXHIBIT 1

ELECTRICITY PRICING, MINIMUM OUTPUT GUARANTEES AND BILLING METHODOLOGY

1. Electricity Pricing:

Site Name: 2825 East District, Abrams Building

LICENSEE: SunEdison Origination1 LLC

Price: $0.2625/kWh

Term: Twenty (20) Years

LICENSEE's starting electricity price will be $0.2625 per kWh. This price shall be adjusted by multiplying the starting price by the escalation rate specified in the table below on each anniversary of the Commercial Operation Date for the term of the contract. In the event that County accepts electricity produced by the System prior to the Commercial Operation Date, County shall also pay the rate identified below for any accepted electricity.

The "REC Rate" shall no longer be payable to LICENSEE by County in the event TEP terminates the REC Agreement (and County has assigned to licensee any claim it might have against TEP as a result of such termination) or if TEP has satisfied purchase obligations under the REC Agreement. Upon the occurrence of either of the foregoing events, LICENSEE shall be deemed to own and shall have the right to freely market all RECs subsequently produced by the System, notwithstanding anything to the contrary in Section 6 of this SSA.

Year	Escalation Rate (%)	Electricity Rate ($/kWh)	REC Rate ($/kWh)	Price ($/kWh)
1	0	$0.094	$0.1685	$0.2625
2	0	$0.094	$0.1685	$0.2625
3	0	$0.094	$0.1685	$0.2625
4	0	$0.094	$0.1685	$0.2625
5	0	$0.094	$0.1685	$0.2625
6	0	$0.094	$0.1685	$0.2625
7	0	$0.094	$0.1685	$0.2625
8	0	$0.094	$0.1685	$0.2625
9	0	$0.094	$0.1685	$0.2625
10	0	$0.094	$0.1685	$0.2625
11	0	$0.094	$0.1685	$0.2625
12	0	$0.094	$0.1685	$0.2625
13	0	$0.094	$0.1685	$0.2625
14	0	$0.094	$0.1685	$0.2625
15	0	$0.094	$0.1685	$0.2625
16	0	$0.094	$0.1685	$0.2625
17	0	$0.094	$0.1685	$0.2625
18	0	$0.094	$0.1685	$0.2625
19	0	$0.094	$0.1685	$0.2625
20	0	$0.094	$0.1685	$0.2625

First year will be based on 12 full months from Commercial Operation Date.

2. Expected Performance Output for the First and Subsequent Operational Years:

For the first Operational Year the Expected Performance Output is:

Electricity: **350,767** Total kWh (AC)

The Guaranteed Minimum Output Performance shall be calculated as 90% of the Expected Performance per Section 5 of this SSA and as tabulated below.

Project Electricity Output

Year	Expected Performance Output	Guaranteed Minimum Output
1	350,767	315,690
2	347,961	313,165
3	345,177	310,659
4	342,416	308,174
5	339,676	305,709
6	336,959	303,263
7	334,263	300,837
8	331,589	298,430
9	328,937	296,043
10	326,305	293,675
11	323,695	291,325
12	321,105	288,995
13	318,536	286,683
14	315,988	284,389
15	313,460	282,114
16	310,952	279,857
17	308,465	277,618
18	305,997	275,397
19	303,549	273,194
20	301,121	271,009

First year will be based on 12 full months from Commercial Operation Date

3. Calculation of Lost Savings Payment to County

The first year shall be defined as 12-months from the Commercial Operation date and will also define the *commencement* date of each subsequent year during the term of this agreement. Calculation for each complete prior year, and payment if due, shall be documented and submitted to County by the Licensee within 60 calendar days after the commencement of each year.

MOP = The Minimum Output Performance, quantity of annual kWh, for each year as tabulated above

AE = the quantity of electricity in kWh actually delivered by the LICENSEE to the COUNTY

LE = Lost Energy in kWh = MOP less AE
Note: If LE quantity is zero or less, AE is greater than MOP, no loss was incurred by COUNTY and no payment is due to COUNTY. If LE value is positive, AE is less than MOP, then lost consideration has been incurred by the COUNTY and payment is due from LICENSEE as follows:

ATP = Annual average local utility tariff price ($/kWh) applicable to the County during the year being measured. This value is determined by dividing the total cost for delivered electricity billed by the Energy Service Provider during the previous 12 month period by the total quantity of KWH's delivered to the COUNTY by the Energy Service Provider

ACP is the electriicty price paid to LICENSEE by COUNTY for period, presently contracted to be $0.094/kwh.

PD = Payment Due from LICENSEE = (ATP less ACP) multiplied by LE
Note: ATP must be greater than ACP for this Payment Due calculation to be valid.

4. Electricity Purchase and Sales.

a. General Provisions:

LICENSEE will generate, deliver and sell Electricity, when available from the System, to the COUNTY at the Electrical Interconnection Point during the term of this SSA.

LICENSEE agrees to generate, deliver and sell a quantity of Electricity as noted in Exhibit 1 Section 2 (above) and as guaranteed in SSA Section 5 to the COUNTY from the System and COUNTY agrees to purchase Electricity as measured at the Electrical Interconnection Point.

b. Formulas for Pricing:

LICENSEE shall prepare invoices in accordance with the formulas set forth in Exhibit 2 in the format set forth in Exhibit 3. LICENSEE shall render to COUNTY an invoice each month for the preceding billing period during the Term of this SSA setting forth the actual amount of kWH delivered (Actual Production") and the amounts due *LICENSEE for Electricity generated* and delivered by the System. COUNTY will remit full payment with each invoice to LICENSEE, subject to any offsets for Guaranteed Minimum Output shortfalls, due under SSA, Section 5.

In the event COUNTY disputes all or any part of any bill submitted by LICENSEE under this SSA, COUNTY shall pay the undisputed portion of the invoice when due and shall notify LICENSEE in writing within three (3) months from the date of receipt of any disputed invoice or adjusted invoice. The Parties shall use best efforts to resolve the dispute amicably and promptly, and upon determination of the correct billing amount, COUNTY shall promptly pay or be paid the remaining portion or refund due (if any), with interest at the Interest Rate from the date payment was due until paid (in the case of an underpayment) or from the date paid until refunded (in the case of an overpayment). Late payment fees shall not be applied to amounts that are subject to a good faith dispute until the dispute is resolved and interest is calculated in accordance with this Section. In the event that disputed amounts cannot be resolved through the process of conference, disputes shall be addressed through the process provided in Section 11 of the SSA.

LICENSEE shall submit invoices to the COUNTY at the address as set forth below. LICENSEE shall also submit a duplicate invoice (copy only) to the COUNTY at the address as noted on the subsequent page.

Billing Contacts

County Billing Contact: Marc Lynn
Section/Unit: Pima County Energy Program Manager
Address: 150 West Congress 5th Floor Tucson, AZ 85701
Phone: 520-740-3093
Email Marc.Lynn@pima.gov

Payment Address Notice:
COUNTY shall submit all payments under this SSA to LICENSEE's project representative at the address listed in SSA Section 9. Parties agree that if COUNTY receives notification to change the LICENSEE's designated address for purposes of payment, COUNTY will notify the project representative at the address listed in SSA Section 9 and any Lender designated by LICENSEE pursuant to Section 12.1.1 of the SLA at least sixty (60) days prior to the first submittal of payment to the new address. Parties also agree that COUNTY will submit payments under this SSA by *electronic funds transfer when electronic transfer becomes a readily* available payment method for the COUNTY.

EXHIBIT 2

BILLING FORMULAS AND EXAMPLES

LICENSEE shall provide invoices as indicated in this Exhibit and shall indicate the source and calculation of each variable set forth below in a manner so that the COUNTY can readily confirm the accuracy and appropriateness of each invoice. An example of a monthly invoice is attached as Exhibit 3 to this SSA.

The total invoice for Electricity delivered by LICENSEE for the month in question shall be determined as follows:

P = AE * ACP

Where:

P = Monthly payment made to LICENSEE for electricity delivered during the billing period.

AE = The quantity of electricity in kWh actually delivered by the LICENSEE to the COUNTY during the billing period

ACP is the contract price for the monthly or quarterly billing period in $/kWh as set forth in Exhibit 1

EXHIBIT 3

SAMPLE SOLAR INVOICE

Solar Energy Invoice

SunEdison
simplifying solar

For Solar Services to †
as billed by billing agent, SunEdison LLC.

Store #585

Invoice Date	Invoice Number	Meter Number	Amount Due	Date Due
03/03/2009	00140903000468		$3,338.65	04/02/2009

SunE Solar Fund III, LLC

Service Address

Madison Ave
Murrieta,CA 92562

Charge Detail

Service Period	2/1/2009 - 2/28/2009	
Service Charges	30,856 kWh at 0.1082 $/kWh	$3,338.65
Current Charges		$3,338.65
Total Amount Due		$3,338.65

Terms: Net 30

Payment Instructions

Please wire payment to:
Wachovia Bank, N.A.
ABA# 055003201
For credit to SunE Solar Fund III Project Account

OR

Payment may be mailed to:
SunEdison, LLC
Attn: Accounts Receivable
12500 Baltimore Avenue
Beltsville, MD 20705

Contacts:

For questions about this invoice, please contact Accounts Receivable at receivable@sunedison.com or at (443)909-7958

SunEdison, LLC | 12500 Baltimore Ave | Beltsville, MD 20705 | P: (443) 909-7200 | F: (443) 909-7177

EXHIBIT 5

TERMINATION FEE SCHEDULE AND PURCHASE OPTION

In the event of a termination of this SSA pursuant to Sections 3.1.2, 11.4.2, 13.2, 14, or 18.6 COUNTY shall pay to LICENSEE an Early Termination Payment corresponding to the year in which early termination occurs.

The Early Termination Payment shall be calculated as outlined below.

Early Termination Payment = Net Present Value of the annual contract price (per site) multiplied by the Guaranteed Minimum Output, less the operating costs avoided due to the early termination, for each of the remaining years of the contract. The Early Termination Payment is also intended to include the amount of "recapture" damages imposed by the Internal Revenue Service upon LICENSEE (or its assigns or successors) in connection with the Investment Tax Credit (or related cash grants) as a result of an early termination by COUNTY.

If an early termination occurs on date other than an anniversary of the Commercial Operation Date, the unpaid amount for that year will be calculated by multiplying the Early Termination Payment by a simple ratio of the number of months remaining until the anniversary of the Commercial Operation Date divided by 12 months.

Termination for Convenience

Early Termination Occurs in Year:	Column 1 Early Termination Fee where Host does not take Title ($/Wdc including costs of removal)		Purchase Date Occurs on: (Each "Anniversary" below shall refer to the anniversary of the Commercial Operation Date, as such definition is modified in the Agreement)	Column 2 Early Termination Fee where Host takes Title ($/Wdc, does not include costs of removal)
1	$ 7.47			
2	$ 7.03	#		
3	$ 6.52			
4	$ 5.98			
5	$ 5.40			
6	$ 4.79		91st day following 5th Anniversary	$ 4.29
7	$ 4.68		91st day following 6th Anniversary	$ 4.18
8	$ 4.56		91st day following 7th Anniversary	$ 4.06
9	$ 4.42		91st day following 8th Anniversary	$ 3.92
10	$ 4.27	#	91st day following 9th Anniversary	$ 3.77
11	$ 4.05	#	91st day following 10th Anniversary	$ 3.55

12	$ 3.79	#	91st day following 11th Anniversary	$ 3.29
13	$ 3.52	#	91st day following 12th Anniversary	$ 3.02
14	$ 3.23	#	91st day following 13th Anniversary	$ 2.73
15	$ 2.93	#	91st day following 14th Anniversary	$ 2.43
16	$ 2.61	#	91st day following 15th Anniversary	$ 2.11
17	$ 2.28	#	91st day following 16th Anniversary	$ 1.78
18	$ 2.03	#	91st day following 17th Anniversary	$ 1.53
19	$ 1.77	#	91st day following 18th Anniversary	$ 1.27
20	$ 1.50	#	91st day following 19th Anniversary	$ 1.00

Purchase option: It is intended by the parties that the above amounts set forth in the "Purchase Option Price" column will be the "fair market value" of the System on a date determined by the LICENSEE within nine months of the time of termination. In the event COUNTY has paid the appropriate Early Termination Payment as provided in the above table, and elects to acquire the System by paying the Purchase Option Price for the System, title to the System shall pass to COUNTY; provided, however, that it is understood by the parties that LICENSEE's designated tax advisors must make a final reasonable determination that the Purchase Option Price for the System is actually at or above "fair market value," as such term is defined under applicable Internal Revenue Service rules and regulations, at the time the System is purchased; provided, further, that if it is reasonably determined by LICENSEE's designated tax advisors that the Purchase Option Price for the System is below "fair market value" then COUNTY must pay the remaining fair market value of the System (above the initial Purchase Option Price) to LICENSEE if it wishes to acquire the system.

Exhibit 6

SOLAR LICENSE AGREEMENT

[AS ATTACHED]

Exhibit 7

LENDER ACCOMODATIONS

Certain Agreements for the Benefit of the Financing Parties

County acknowledges that Licensee will be financing the installation of the System either through a lessor, lender or with financing accommodations from one or more financial institutions and that the Licensee may sell or assign the System and/or may secure the Licensee's obligations by, among other collateral, a pledge or collateral assignment of this Agreement and a first security interest in the System. In order to facilitate such necessary sale, conveyance, or financing, and with respect to any such financial institutions of which Licensee has notified County in writing County agrees as follows:

(a) Consent to Collateral Assignment. County consents to either the sale or conveyance to a lessor or the collateral assignment by Licensee to the a lender that has provided financing of the System, of the Licensee's right, title and interest in and to this Agreement.

(b) Notices of Default. County will deliver to the Lender, concurrently with delivery thereof to Licensee, a copy of each notice of default given by County under the Agreement, inclusive of a reasonable description of Licensee default. No such notice will be effective absent delivery to the Lender. County will not mutually agree with Licensee to terminate the Agreement without the written consent of the Lender, but notwithstanding any provision to the contrary in this Exhibit 7, may unilaterally terminate this SSA or the SLA (collectively, the "Agreements") as provided for by the terms and conditions of the Agreements.

(c) Rights Upon Event of Default. Notwithstanding any contrary term of this Agreement:

i. The Lender, as collateral assignee, shall be entitled to exercise, in the place and stead of Licensee, any and all rights and remedies of Licensee under this Agreement in accordance with the terms of this Agreement and only in the event of Licensee's or Host's default. The Lender shall also be entitled to exercise all rights and remedies of secured parties generally with respect to this Agreement and the System. Define "host" above.

ii. The Lender shall have the right, but not the obligation, to pay all sums due under this Agreement and to perform any other act, duty or obligation required of Licensee thereunder or cause to be cured any default of Licensee thereunder in the time and manner provided by the terms of this Agreement. Nothing herein requires the Lender to cure any default of Licensee under this Agreement or (unless the Lender has succeeded to Licensee's interests under this Agreement) to perform any act, duty or obligation of Licensee under this Agreement, but County hereby gives it the option to do so.

iii. Upon the exercise of remedies under its security interest in the System, including any sale thereof by the Lender, whether by judicial proceeding or under any power of sale contained therein, or any conveyance from Licensee to the Lender (or any assignee of the Lender) in lieu thereof, the Lender shall give notice to Host of the transferee or assignee of this Agreement. Any such exercise of remedies shall not constitute a default under this Agreement.

iv. Upon any rejection or other termination of this Agreement pursuant to any process undertaken with respect to Licensee under the United States Bankruptcy Code, at the request of the Lender made within ninety (90) days of such termination or rejection, Host shall enter into a new agreement with the Lender or its assignee having the same terms and conditions as this Agreement, provided that Lender or Lender's assignee, in sole discretion of County, is deemed reasonably capable of operating and maintaining the System

(d) Right to Cure.

i. County will not exercise any right to terminate or suspend this Agreement unless it shall have given the Lender prior written notice by sending notice to the Lender (at the address provided by Licensee) of its intent to terminate or suspend this Agreement, specifying the condition giving rise to such right, and the Lender shall not have caused to be cured the condition giving rise to the right of termination or suspension within the periods

provided for in this Agreement. The Parties respective obligations will otherwise remain in effect during any cure period; provided that if such Licensee default reasonably cannot be cured by the Lender within such period and the Lender commences and continuously pursues cure of such default within such period, such period for cure will be extended for a reasonable period of time under the circumstances, such period not to exceed additional ninety (30) days.

ii. If the Lender (including any purchaser or transferee), pursuant to an exercise of remedies by the Lender, shall acquire title to or control of Licensee's assets and shall, within the time periods described in Sub-section (c)(i). above, cure all defaults under this Agreement existing as of the date of such change in title or control in the manner required by this Agreement, then such person or entity shall no longer be in default under this Agreement, and this Agreement shall continue in full force and effect.

***

EXHIBIT B

EXECUTION VERSION

A UniSource Energy Company

Non-Residential
20 kW or Greater Solar Program Grid-Tied Performance Based Incentive Renewable Energy Credit Purchase Agreement

(Abrams Building)

This Non-Residential 20 kW or Greater Solar Program Grid-Tied Performance Based Incentive Renewable Energy Credit Purchase Agreement (the "Agreement") is hereby made and entered into as of the 31st day of January , 2010 (the "Effective Date"), by and between Tucson Electric Power Company, an Arizona corporation ("Company"), and Pima County , a body politic and corporate of the State of Arizona ("Customer"). Company and Customer may be referred to individually herein as a "Party" or collectively as the "Parties."

RECITALS

A. Company desires to increase the number of renewable electricity generation facilities and the consumption of renewable electricity within its service territory, while concurrently reducing the cost of renewable electric generation systems for its customers;

B. Customer intends to install, maintain and own a renewable electricity generation facility, or otherwise have title to the RECs (as defined below) associated with such facility;

C. Company is subject to certain state regulatory requirements governing its use of renewable resources to supply energy to its customers, including those provided under the Renewable Energy Standard and Tariff (as defined below);

D. To further Company's continuing commitment to develop and encourage the use of renewable energy resources and to better ensure compliance with regulatory requirements, Company has implemented the Tucson Electric Power Renewable Energy Credit Purchase Program to provide financial incentives to its customers to install renewable generating equipment; and

E. Customer desires to participate in the Program and to sell to Company the RECs associated with Customer's renewable generation facility and Company desires to purchase such RECs under the terms and conditions contained in this Agreement.

AGREEMENT

1. DEFINITIONS

1.1. "Annual Contract Quantity" means the Contract Quantity divided by the number of years in the Term, which is equal to 337,630 kWh.

1.2. "Commissioning Package" means written verification signed by the Customer System installer and the Customer confirming that the Customer System has been installed in conformance with the Customer's approved Program reservation and is ready for operation.

1.3. "Contract Quantity" means 6,752,600 kilowatt-hours ("kWh").

1.4. "Customer System" means the 211.68 kW output (DC) photovoltaic renewable electricity generation facility located at the Premises.

1.5. "Installation Deadline" means the date that is three hundred sixty-five (365) days after the Reservation Confirmation Date.

1.6. "Minimum Contract Quantity" means the fifty percent (50%) of the Annual Contract Quantity, which is equal to 168,815 kWh per year.

1.7. "Premises" means Customer's facilities located at 2825 E. District, Tucson, Arizona, 85714.

1.8. "Program" means the Tucson Electric Power Renewable Energy Credit Purchase Program in effect as of the Effective Date.

1.9. "Reservation Confirmation Date" means the date Customer's Program reservation request is approved by Company under the Program.

1.10. "REC" means any and all environmental credits, attributes and benefits, including greenhouse gas or emissions reductions and any associated credits, environmental air quality credits, offsets, allowances and benefits howsoever entitled, actual SO_2, NOx, CO_2, CO, Carbon, VOC, mercury, and other emissions avoided, credits towards achieving local, national or international renewable portfolio standards, green tags, and any and all other green energy or other environmental benefits associated with the generation of renewable energy (regardless of how any present or future law or regulation attributes or allocates such characteristics), including those created under the REST (as defined below).

1.11. "Renewable Energy Standard and Tariff" or "REST" means the Arizona Renewable Energy Standard and Tariff codified at A.A.C. R14-2-1801 *et. seq.*, as may be amended from time to time.

1.12. "System Qualifications" means the Program Requirements set forth in Attachment A and Attachment B, each of which are attached hereto and incorporated herein.

1.13. "Term" shall have the meaning set forth in Section 14.1 below.

2. CUSTOMER RENEWABLE ENERGY SYSTEM

Customer or its designee has constructed the Customer System at the Premises. Customer or its designee owns the Customer System and will be solely responsible for its cost, operation and maintenance. The Parties acknowledge and agree that to qualify for participation in the Program the Customer System must comply with all System Qualifications and Program requirements.

3. SYSTEM INSTALLATION

The Customer System must have been installed by a qualified installer in accordance with the installation requirements set forth in the System Qualifications and the Program, including without limitation, a proper interconnection with Company's power grid. Customer or its designee shall be solely responsible for the installation of the Customer System, including selecting a qualified installer, and paying all associated installation costs and expenses.

4. SYSTEM INSPECTION

Customer will notify Company when the installation of the Customer System is complete by providing Company with a Commissioning Package and a copy of the applicable construction permits associated with the installation. Company shall thereafter inspect the Customer System to verify the installation and system performance are in compliance with the System Qualifications ("Conformance Inspection"). If the Company determines the Customer System is not in compliance with the System Qualifications consistent with the terms and conditions of Attachments A and B, Company will notify Customer of such noncompliance. Company will have no further obligation under this Agreement until all such deficiencies are remedied by Customer to Company's reasonable satisfaction and the Customer System is in compliance with the System Qualifications.

Upon notice to Customer, Company shall have the right to conduct annual inspections of the Customer System as reasonably necessary during the Term to verify compliance with the System Qualifications. Customer shall provide Company with reasonable access to the Customer System to conduct any such inspection.

5. PERFORMANCE BASED INCENTIVE PAYMENT

5.1. Conditions Precedent. Subject to Customer's execution and delivery of this Agreement and the Customer System passing the Conformance Inspection by the

Installation Deadline, Company shall pay Customer the performance based incentive ("PBI") as described in this Section 5.

5.2. Contract Quantity and Price. Company shall pay Customer $0.1685 for each delivered REC associated with each kWh of energy produced by the Customer System up to the Contract Quantity. The amount of any RECs derived from the Customer System and the resultant PBI payment shall be calculated based on the metered AC kWh of net renewable energy produced by the Customer System.

5.3. Payments. The Company will make the first PBI payment hereunder within thirty (30) days of the end of the first calendar quarter after the Customer System passes the Conformance Inspection. PBI payments shall be made within thirty (30) days of the beginning of each calendar quarter thereafter based on the metered AC kWh of net renewable energy produced by the Customer System in the previous calendar quarter. Provided, if the PBI owing for a particular calendar quarter is less than $25.00, Company will carry over such amount until the earlier of the next payment due date that the current PBI plus any carry-over amount exceeds $25.00, or when at least twelve (12) months have elapsed since the last PBI payment. Notwithstanding the foregoing, Company reserves the right to make PBI payments more frequently than quarterly (e.g., monthly) upon notice to Customer. Company shall be obligated to pay Customer the PBI for RECs delivered hereunder until the earlier of: (i) the expiration or termination of this Agreement; or (ii) when the Company has purchased the Contract Quantity of RECs.

6. RENEWABLE ENERGY CREDIT TRANSFER

Customer hereby assigns and transfers to Company any and all RECs derived from the installation and use of the Customer System. Unless otherwise agreed by the Parties, the RECs shall be deemed to be transferred at such time Customer receives the PBI payment associated with such RECs. Company's right to RECs hereunder shall commence when the Customer System passes the Conformance Inspection and continue thereafter for the Term of the Agreement.

Upon Company's request, Customer shall provide Company with reasonable documentation evidencing its ownership of such RECs and transfer thereof to Company. If Customer fails to provide such documentation, Company (as its sole remedy) shall not be required to pay for the RECs for which such reasonable documentation was requested.

7. OWNERSHIP OF RENEWABLE ENERGY CREDITS

Customer shall not sell, trade, assign or otherwise transfer, any RECs derived from the installation and use of the Customer System to any party other than Company during such time Company is entitled to receive such RECs hereunder.

8. SYSTEM ELECTRICAL OUTPUT

The transfer of rights concerning the electrical output of the Customer System is addressed in a separate agreement.

9. CUSTOMER SYSTEM REMOVAL

Neither the Customer System nor any components thereof may be removed from the Premises during the Term without Company's prior written consent. If the Customer System is removed from the Premises in violation of this Section 9, Customer shall immediately reimburse Company for any PBI amounts paid to Customer hereunder for which Company has not received the associated RECs. In addition, any such removal of the Customer System shall constitute a material breach of this Agreement.

10. METER READING

No less than quarterly the Term, Company shall read the Customer System renewable energy production meter for the purpose of determining the payment amount under Section 5 above. Customer shall provide Company with reasonable access to the Customer System to conduct any such readings.

11. CUSTOMER REPRESENTATIONS

Customer hereby represents and warrants to Company that the following statements are true and correct as of the Effective Date and will be true and correct at the time of any transfer by Customer to Company of any RECs hereunder:

11.1. Customer is the owner of, all RECs transferred from Customer to Company hereunder, which are, to the actual knowledge of Customer, free and clear of all liens and encumbrances; and

11.2. Neither Customer, nor, to the actual knowledge of the Customer, any third party, has sold, traded, assigned or otherwise transferred any RECs to be transferred from Customer to Company hereunder to any party other than Company or from the Customer System owner to Customer.

12. WARRANTY

EXCEPT AS SET FORTH IN SECTION 11, EACH OF COMPANY AND CUSTOMER MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND HEREUNDER, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PERFORMANCE HEREUNDER. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, COMPANY MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE CUSTOMER SYSTEM, ITS OPERATION, SAFETY, INSTALLATION OR COMPLIANCE WITH ANY BUILDING OR SAFETY CODES, RULES OR REGULATIONS, AND TO THE MAXIMUM EXTENT PERMITTED BY LAW, COMPANY HEREBY EXPRESSLY DISCLAIMS ANY AND ALL LIABILITY ASSOCIATED THEREWITH.

13. LIMITATION OF LIABILITY

COMPANY'S ENTIRE LIABILITY ARISING OUT OF THIS AGREEMENT SHALL BE LIMITED TO DIRECT ACTUAL DAMAGES STEMMING FROM CLAIMS DIRECTLY ATTRIBUTABLE TO COMPANY'S NEGLIGENCE OR WILLFUL MISCONDUCT. IN NO EVENT SHALL COMPANY, ITS EMPLOYEES OR AGENTS BE LIABLE TO CUSTOMER FOR ANY SPECIAL, INDIRECT, PUNITIVE OR CONSEQUENTIAL DAMAGE, HOWEVER CAUSED, ARISING OUT OF THIS AGREEMENT.

CUSTOMER'S ENTIRE LIABILITY ARISING OUT OF THIS AGREEMENT SHALL BE LIMITED TO DIRECT ACTUAL DAMAGES STEMMING FROM CLAIMS DIRECTLY ATTRIBUTABLE TO CUSTOMER'S NEGLIGENCE OR WILLFUL MISCONDUCT. IN NO EVENT SHALL CUSTOMER , ITS EMPLOYEES OR AGENTS BE LIABLE TO COMPANY FOR ANY SPECIAL, INDIRECT, PUNITIVE OR CONSEQUENTIAL DAMAGE, HOWEVER CAUSED, ARISING OUT OF THIS AGREEMENT.

14. TERM AND TERMINATION

14.1. This Agreement shall commence on the Effective Date and, unless earlier terminated as provided herein, shall continue for the number of years in the term selected by Customer in the Customer's Program application (being 20 years) relating to the Customer System after the Customer System passes the Conformance Inspection (the "Term").

14.2. Either Party may terminate this Agreement:

i. on thirty (30) days written notice in the event the other Party commits a material breach of this Agreement or the Program and fails to cure the same within such thirty (30) day period.

ii. immediately in the event that the other Party: (a) makes an assignment or any general arrangement for the benefit of creditors; (b) files a petition or otherwise commences, authorizes or acquiesces in the commencement of a proceeding or cause under the bankruptcy or similar law for the protection of creditors, or have such petition filed against it and such proceeding remains undismissed for 30 days after filing; or (c) otherwise becomes bankrupt or insolvent (however evidenced).

iii. as provided in Section 15.8 below.

14.3. Notwithstanding anything contained herein to the contrary, unless the Company grants an extension, if the Customer System does not pass the Conformance Inspection by the Installation Deadline, Company or Customer may terminate this Agreement upon (30) days prior written notice. In the event of such termination, neither Party shall have any further obligation to the other hereunder and neither Party shall have any liability to the other stemming from such termination.

14.4. Company, in its sole discretion, may immediately terminate this Agreement upon written notice to Customer in the event the Customer's Program reservation relating to the Customer System is cancelled by Company in accordance with the Program, including for a failure to meet any project advancement requirements under the Program. In the event of such termination, neither Party shall have any further obligation to the other hereunder and neither Party shall have any liability to the other stemming from such termination.

14.5. Company, in its sole discretion, may immediately terminate this Agreement upon written notice to Customer in the event the Customer System fails to produce at least the Minimum Contract Quantity during any twelve (12) month period during the Term.

14.6. Notwithstanding anything contained herein to the contrary, this Agreement shall immediately terminate, without any further action by either Party, when Company has purchased the Contract Quantity of RECs from Customer as set forth in Section 5.2 above.

14.7. This Agreement may also be terminated at any time by mutual written agreement of the Parties.

Except in the event of a termination by Company pursuant to Section 14.2 arising from Customer's breach of its obligations under Sections 7, 9 (to the extent that the System is removed by Customer) or 11 above, Customer shall have no liability to Company in connection with any termination of this Agreement.

15. MISCELLANEOUS

15.1. Modification, Waiver and Severability. This Agreement may not be modified or supplemented except by written instrument signed by the Parties. No waiver of any default or breach hereof shall be deemed a waiver of any other default or breach thereof. If any part of this Agreement is declared void and/or unenforceable, such part shall be deemed severed from this Agreement which shall otherwise remain in full force and effect.

15.2. Assignment. This Agreement and the rights, duties, and obligations hereunder may not be assigned or delegated by the Customer without the prior written consent of Company, which consent shall not be unreasonably withheld.

15.3. Governing Law and Venue. This Agreement shall be governed by the laws of the State of Arizona, without regard to the choice of law provisions thereof. Venue for any dispute arising hereunder shall be any court of competent jurisdiction located in Pima County, Arizona.

15.4. Entire Agreement. This Agreement is the final integration of the agreement between the Parties with respect to the matters covered by it and supersedes any prior understanding or agreements, oral or written, with respect thereto.

15.5. Counterparts. This Agreement may be executed in any number of counterparts, all of which taken together shall constitute one and the same Agreement.

15.6. Titles and Captions. Titles or captions contained in this Agreement are inserted for convenience and for reference only and in no way define, limit, extend, or describe the scope of this Agreement or the intent of any provision hereof.

15.7. Expenses and Attorney's Fees. In any actions between the Parties to enforce any of the terms of this Agreement, the prevailing Party shall be entitled to recover expenses, including reasonable attorney's fees.

15.8. Force Majeure. Neither Party shall be liable to the other for failure to perform its obligations hereunder to the extent such failure results from causes beyond its reasonable control, including strikes, climatic conditions, acts of God, governmental laws, regulations, orders or requirements, interruptions of power or unavailability of equipment or supplies (each a "Force Majeure Event"). Provided, if any Force Majeure Event claimed by a Party continues for an uninterrupted period of more than one hundred and eighty (180) days, then the other Party may, at any time following the end of such period, terminate this Agreement immediately upon written notice to the affected Party, without further obligation to either Party, except as to payment of any costs and liabilities incurred before the effective date of such termination.

15.9. Forward Contract. The Parties agree that this Agreement and the transactions contemplated hereunder shall constitute a "forward contract," and that the Parties are "forward contract merchants," within the meaning of the United States Bankruptcy Code.

15.10. Customer Transfer of Rights. Subject to Section 15.2 above, in the event Customer assigns or otherwise transfers its rights to the RECs from the Customer System, Customer's successor-in-interest shall expressly assume all of Customer's obligations hereunder in writing, and the terms and conditions of this Agreement shall not be affected, nor shall Company's rights hereunder be disturbed in any way, including, without limitation, Company's continued right to all RECs assigned pursuant to Section 5 hereunder. Customer shall provide Company with an executed assignment agreement in a form satisfactory to Company at the time of the transfer of the right to receive such RECs. Any failure to comply with this provision shall be considered a material breach of the Agreement.

15.11. Compliance with Law. Customer and Company shall comply with all applicable federal, state and local laws, regulations, ordinances and codes at all times in performing under this Agreement.

15.12. Survival. After expiration or termination of this Agreement, those provisions which specifically provide for survival beyond expiration or termination, and all provisions, regarding warranty and limitation of liability shall survive indefinitely or until the expiration of the time period specified elsewhere in this Agreement with respect to the provision in question.

15.13. No Third Party Beneficiaries. This Agreement shall not confer any rights or remedies upon any person other than the Parties and their respective successors and permitted assigns.

15.14. [Not Used.]

15.15. Notices. All notices under this Agreement shall be in writing and shall be given by personal service (including receipted confirmed facsimile), or by certified or registered mail, return receipt requested, or by recognized overnight courier service, to the Parties at the addresses set forth below. All notices shall be deemed given upon the actual receipt thereof.

Company: **Tucson Electric Power Company**
PO Box 711
Tucson, Arizona 85702
Fax: (520) 918-8350
Attn: Renewable Energy & Energy Efficiency Group

[***signatures on following page***]

ACCEPTED AND AGREED as of the Effective Date set forth above.

TUCSON ELECTRIC POWER COMPANY

By: _____

Title: David G. Hutchens
Vice President

PIMA COUNTY

By: _____
JUN 1 6 2009

Print Name: RICHARD ELIAS,
Address: CHAIRMAN

Phone:

APPROVED AS TO FORM
Civil Deputy
County Attorney

ATTEST:

Robin Brigode, Deputy
Clerk, Board of Supervisors
Pima County, Arizona

TO BE FILLED IN BY COMPANY

Estimated Annual Energy Reserved: 337,630 kWh

Estimated Annual Payment $56,890.66

Date Reserved: October 19 2010

ATTACHMENT A
Non-Residential 20 kW or Greater Grid-Tied Solar Program System Qualifications

All non-residential grid-tied 20 kW or greater solar Customer Systems must meet the following system and installation requirements to qualify for Tucson Electric Power Company's ("TEP" or the "Company") Renewable Energy Credit Purchase Program. Capitalized terms not defined herein shall have the meanings ascribed to them in the Non-Residential 20 kW or Greater Solar Program Grid-Tied Performance Based Incentive Renewable Energy Credit Purchase Program Agreement between Company and Customer.

1. All systems shall be installed with a horizontal tilt angle between 10 degrees and 60 degrees, and an azimuth angle of +/- 100 degrees of due south.

2. Photovoltaic modules must be covered by a manufacturer's warranty of at least 20 years.

3. Inverters must be covered by a manufacturer's warranty of at least five years to receive a PBI.

4. All photovoltaic modules must be certified by a nationally recognized testing laboratory as meeting the requirements of UL Standard 1703.

5. All other electrical components must be UL listed.

6. The inverter must be certified as meeting the requirements of IEEE-1547 - Recommended Practice for Utility Interface of Photovoltaic Systems and it must be UL 1741 certified.

7. The Customer System design and installation must meet all requirements of the latest edition of the National Electrical Code, including Article 690 and all grounding, conductor, raceway, overcurrent protection, disconnect and labeling requirements.

8. The Customer System and installation must meet the requirements of all federal, state and local building codes and have been successfully inspected by the building official having jurisdiction. Accordingly, the installation must be completed in accordance with the requirements of the latest edition of National Electrical Code in effect in the jurisdiction where the installation is being completed.

9. The Customer System must meet Company and Arizona Corporation Commission interconnection requirements for self-generation equipment.

10. The Customer System installation must meet the TEP Service Requirements 2000 Edition, Page 1.20, as follows:

    "AN AC DISCONNECT MEANS SHALL BE PROVIDED ON ALL UNGROUNDED AC CONDUCTORS and SHALL CONSIST OF A LOCKABLE GANG OPERATED DISCONNECT CLEARLY INDICATING OPEN OR CLOSED. THE SWITCH SHALL BE VISUALLY INSPECTED TO DETERMINE THAT THE SWITCH IS OPEN. THE SWITCH SHALL BE CLEARLY LABELED

STATING "DG SERVICE DISCONNECT."

11. For non-residential Customer Systems, Company shall provide the meter only, to be installed in a Customer supplied meter socket to be installed in a readily accessible outdoor location by the Customer between the Customer System and the connection to the overcurrent device in the Customer's electric service panel.

12. Energy storage devices are not allowed as part of the Customer System unless the energy storage device is a separate component and Company can locate the meter at the Customer System's output.

13. Installation must have been made after January 1, 1997.

14. The Customer must be connected to the Company's electric grid.

15. All Customer System installations must be completed in a professional, workmanlike and safe manner.

ATTACHMENT B
Supplemental Non-Residential System Qualifications
(Applicable only for Customer Systems of capacity larger than 20,000 watts AC)

1. All solar electric generating Non-Residential Customer Systems must meet the following additional system and installation requirements to qualify for Tucson Electric Power Company's ("TEP" or the "Company") Renewable Energy Credit Purchase Program. Capitalized terms not defined herein shall have the meanings ascribed to them in the Non-Residential 20 kW or Greater Solar Program Grid-Tied Performance Based Incentive Renewable Energy Credit Purchase Program Agreement between TEP and Customer.

2. The Non-Residential Customer System shall be operating, substantially complete and have produced an AC output at least 70% of the total array nameplate DC rating at PTC as described below.

3. Operation, Maintenance and Repair. The Customer shall be solely responsible for the operation, maintenance and repair of the Non-Residential Customer System and any and all costs and expenses associated therewith. Company will notify Customer of all Non-Residential Customer System repairs the Company determines are reasonably necessary to support proper continued electrical production of the Non-Residential Customer System. The Customer will notify the Company within five (5) business days of its receipt of any such Company repair notice if the repair requires the installation of a new inverter and/or PV module. The Customer shall complete any such repair that affects the Non-Residential Customer System performance and does not require the purchase of a new inverter or photovoltaic ("PV") module(s) within five (5) business days of the Company's notice of the need for such repair. For any such repair that does require the purchase and installation of a new inverter and/or PV module, the Customer shall promptly commence and diligently pursue such repair to completion, provided, in no event shall such repair take more than thirty (30) days to complete. At all times while Company is receiving the environmental credits from the Non-Residential Customer System, Customer shall clean all PV modules in the Non-Residential Customer System as necessary to keep them free from foreign material that would visibly obscure the modules, including any dirt and/or oils.

4. Non-Residential Customer System Security. At all times during and after installation of the Non-Residential Customer System, the Customer shall use commercially reasonable efforts to provide adequate security to prevent damage or vandalism to the Non-Residential Customer System.

5. Company shall provide Customer with a revenue grade AC meter to be installed between the Non-Residential Customer System and the grid interconnection. This meter will not be used for billing, but shall be used for any official Non-Residential Customer System production output data. Company will retain ownership of the meter and be responsible for its repair if needed.

6. The utility interactive solar generation Non-Residential Customer System shall deliver an AC output in AC watts at least equal to 70% of the total array nameplate rating in DC watts as measured at performance test conditions (PTC) of 1000 watts/m^2 irradiance, 68

degrees Farenheit ambient temperature and a maximum of a 2.4 mph wind speed. The Customer will verify performance of the system with a 30 day test using a temporary data monitor and acquisition system or make a single point measurement to determine the output of the system.

7. The Customer shall verify and demonstrate to Company the proper calibration and operation, through a temporary data monitor and acquisition system, of the solar insolation sensor, the ambient temperature sensor, the wind speed sensor and the AC power meter within +/- 2% of Company independent sensor data. If performance test data is not available at PTC, the indicated AC power output of the Non-Residential Customer System will be corrected to PTC by the following formula:

   Power(PTC)=
   ((Power(Meter)*(1000/SolarSensor(W/M^2))*(1+(((AmbientTempSensor(DegF))-68)*0.0026))

   (On the condition that data used in the formula is taken on a cloudless day at a solar insolation of at least 950 watts per square meter and wind speed is less than 2.4 mph.)

8. Company shall have the right to challenge the accurate calibration of the sensors and temporary data monitor and acquisition system with proper documentation demonstrating the reasons for the challenge. The Customer shall resolve the challenged sensor or temporary data monitor and acquisition system calibration to the satisfaction of Company prior to the data being used in the performance test being recorded.

9. Customer shall provide Company with no less than ten (10) days prior notice of any planned Customer tests to the Non-Residential Customer System. Company shall have the right to be present at any and all tests of the Non-Residential Customer System. The Customer shall provide Company notice as soon as the Non-Residential Customer System has been installed and has passed all Customer tests.

10. Customer shall provide Company with all documentation reasonably requested by Company to demonstrate to the Arizona Corporation Commission that any environmental credits transferred under the Agreement were derived from an eligible technology, that the kWh generated are accurately reported and that the environmental credits have not expired or been used by any other entity for any purpose.

11. If certified proof cannot be provided of complete galvanic isolation of any and all DC from the AC output of the inverter(s) used in the Non-Residential Customer System through IEEE-1547 certification of the inverter, the Non-Residential Customer System shall include an isolation transformer installed between the inverter(s) and the grid interconnection. The transformer will be rated at full load continuous operation at 50 degrees Celsius at 125% of nameplate DC array rating and have an efficiency rating at nameplate DC array rating power of at least 98% as tested. The transformer will have at least one tap each of 2.5% and 5% both above and below the nominal voltage tap.

Appendix 4.

Transportation Planning Survey

Results Summary

February 2017

Objective: **Part 1**: To better inform the planning around and appropriateness of integrating electric vehicles (EVs) into the County's fleet by understanding the behaviors of work-related trips and requirements of the vehicles used for work-related trips.

Part 2: To better understand County employees' perceptions of electric vehicles for personal use.

Number of questions: 17 total

Total number of respondents: 1671

Participant demographic: Pima County employees

Departments with highest number of respondents: RWRD, Health Department, Department of Transportation, NRPR, Facilities Management, Finance and Risk Management, Assessor's Office

Part 1

When asked about department-assigned vehicle use:

- 51.6% of participants have driven a passenger or light duty vehicle assigned to their department.
- Of those who drive a department vehicle at all, 53.1% use it at most a few times a month while 46.9% use it at least once a week.
- 87.2% of participants made trips in department vehicles that extended 100 miles round-trip per day a few times a month at most while only 11.1% of participants made these trips at least once a week.
- 71% of respondents either never or infrequently use a vehicle on roads requiring high ground clearance, while the remaining 29% require a vehicle with high ground clearance at least half of the time.
- 84.2% of participants either never or infrequently use a vehicle to carry items greater than six feet in length, while the remaining 15.8% require a vehicle that can carry items longer than six feet at least half of the time.

When asked about motor pool use:

- 88.1% of responders do not use vehicles in the motor pool
- Of the 11.9% that have driven vehicles from the motor pool, 95.8% do not require a vehicle with high ground clearance
- 100% of responders either never or infrequently require a vehicle that carry items greater than six feet in length
- 79.3% either never or infrequently take trips that extend 100 miles round-trip per day, while 19.5% take round-trips of this distance or more at least half of the time.

Part 2

When asked about personal use/opinion of EVs:

- 87.7% do not currently drive an EV to commute to and from work; 1.1% do; and 11.3% bicycle, walk, or use public transportation
- 88.2% of those who drive an EV to and from work do not have access to a charging station at work
- 86.1% of respondents are not considering purchasing or leasing a personal electric vehicle in the next five years.

Reasons for not considering an EV for personal use in next five years:

Reason	Number of Respondents	Percentage of Respondents
Low ground clearance	39	2.9%
Too small	117	8.8%
Range is too limited	135	10.2%
Inadequate access to fast charging facilities	120	9.0%
Too unfamiliar to me	125	9.4%
Too complicated	11	0.8%
I do not like them	148	11.1%
I am concerned about safety	51	3.8%
Other: All/most of the above	105	7.9%
Other: Cost	199	15%
Other: Already have a viable alternative (e.g. hybrid) or a car that will presumably last longer than said time-frame (5 years)	163	12.3%
Other: Don't drive; EVs are not actually better for environment; not suitable for needs (esp. hauling capability); or no interest	~115	8.7%

General perception/opinion of EVs derived from write-in comments:

Attitude toward electric vehicle use	Number of Comments
Wholly favorable	61
Neutral/mixed/positive but nuanced opinion	68
Wholly unfavorable	32
Not Applicable/other	85

Conclusions/Recommendations

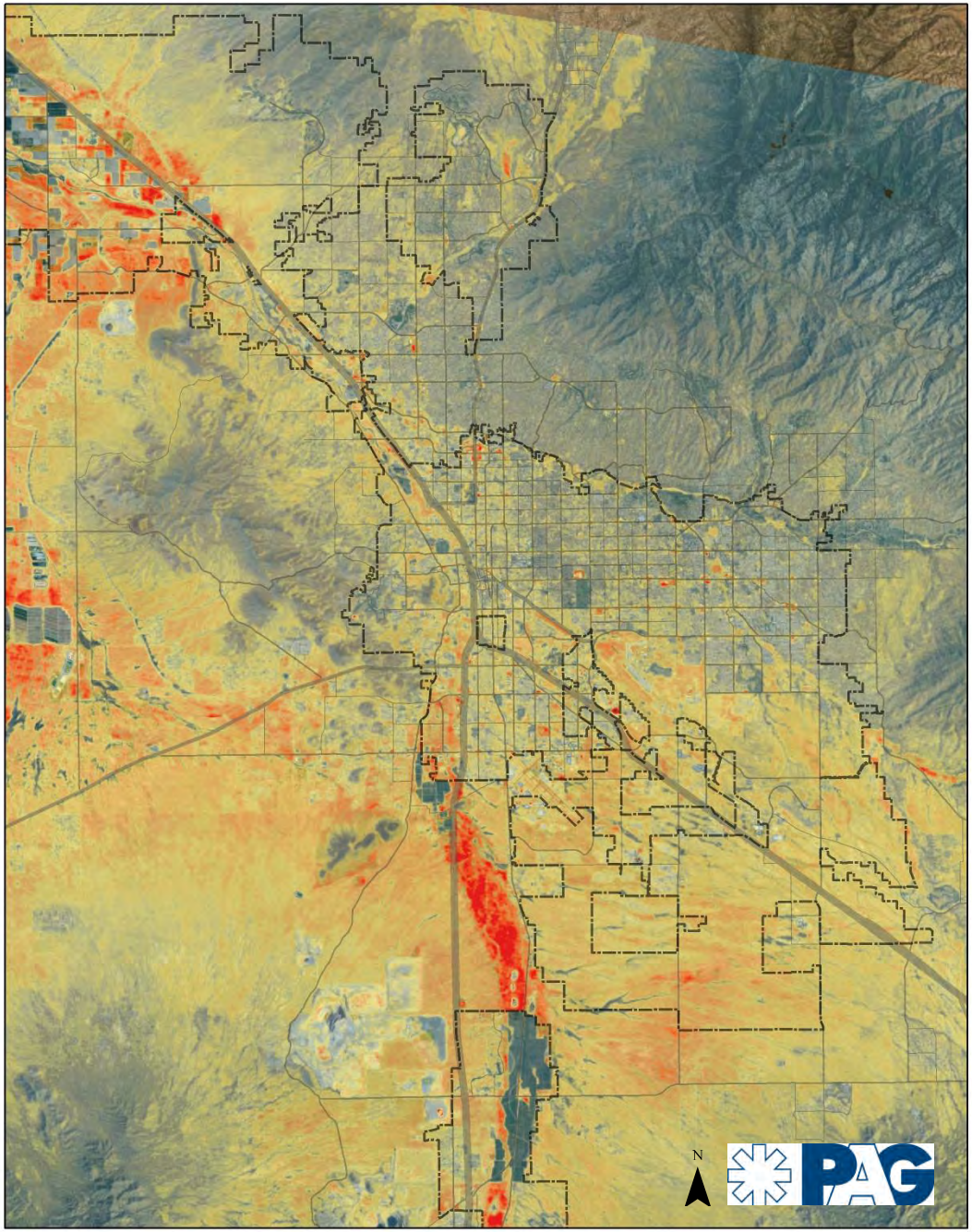
- The integration of EVs and gradual replacement of gasoline-fueled department–assigned passenger cars (not including SUVS, trucks and other light-duty vehicles) to electric vehicles may be an appropriate course of action, given the trip mileage, car size, and ground clearance of work-related trips.
- The integration of EVs and gradual replacement of gasoline-fueled passenger cars in the County's motor pool to EVs may be an appropriate course of action, given the trip mileage, car size, and ground clearance of work-related trips.
- A reduction in the size of the County's motor pool may be appropriate, given the use (or lack thereof) of these vehicles by County employees
- Education and outreach regarding electric vehicles, supporting infrastructure, and developing EV technologies are imperative in mitigating misconceptions surrounding this topic.

Considerations for future surveys on transportation planning

- Include more answer options for those who do not own a vehicle and/or only rely on alternative forms of transportation
- Clarify terms that may be unfamiliar to respondents, as there were a couple of questions in which the vast majority of participants skipped.

Appendix 5.

Regional Surface Temperature

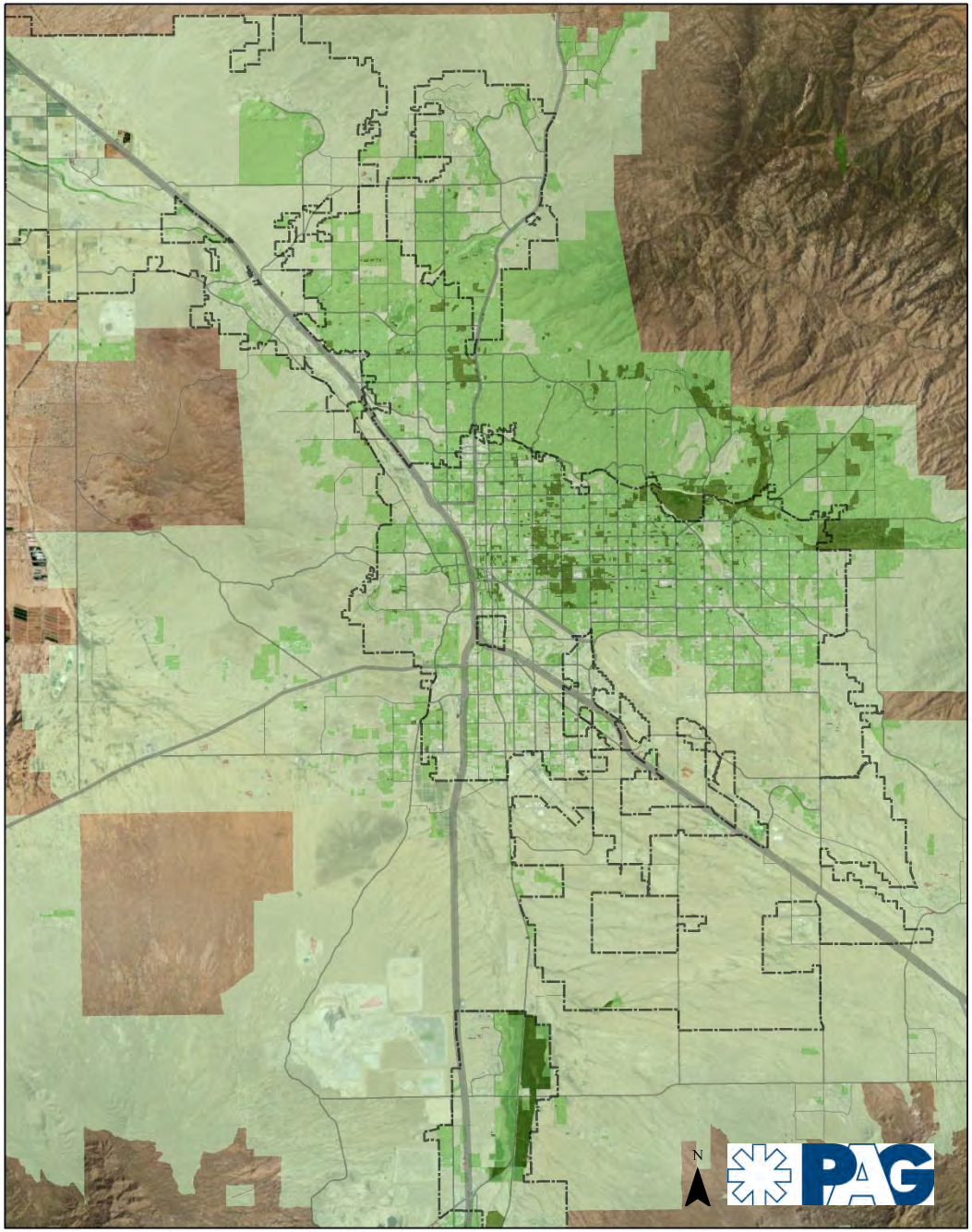


Surface Temperature

Warm Warmer

Regional Surface Temperature:
Analysis of 2008 LANDSAT thermal data.
Accurate for relative temperature comparisons only.
Eve B. Halper, Christopher A. Scott, Stephen R. Yool (2012),

Regional Percent Tree Canopy



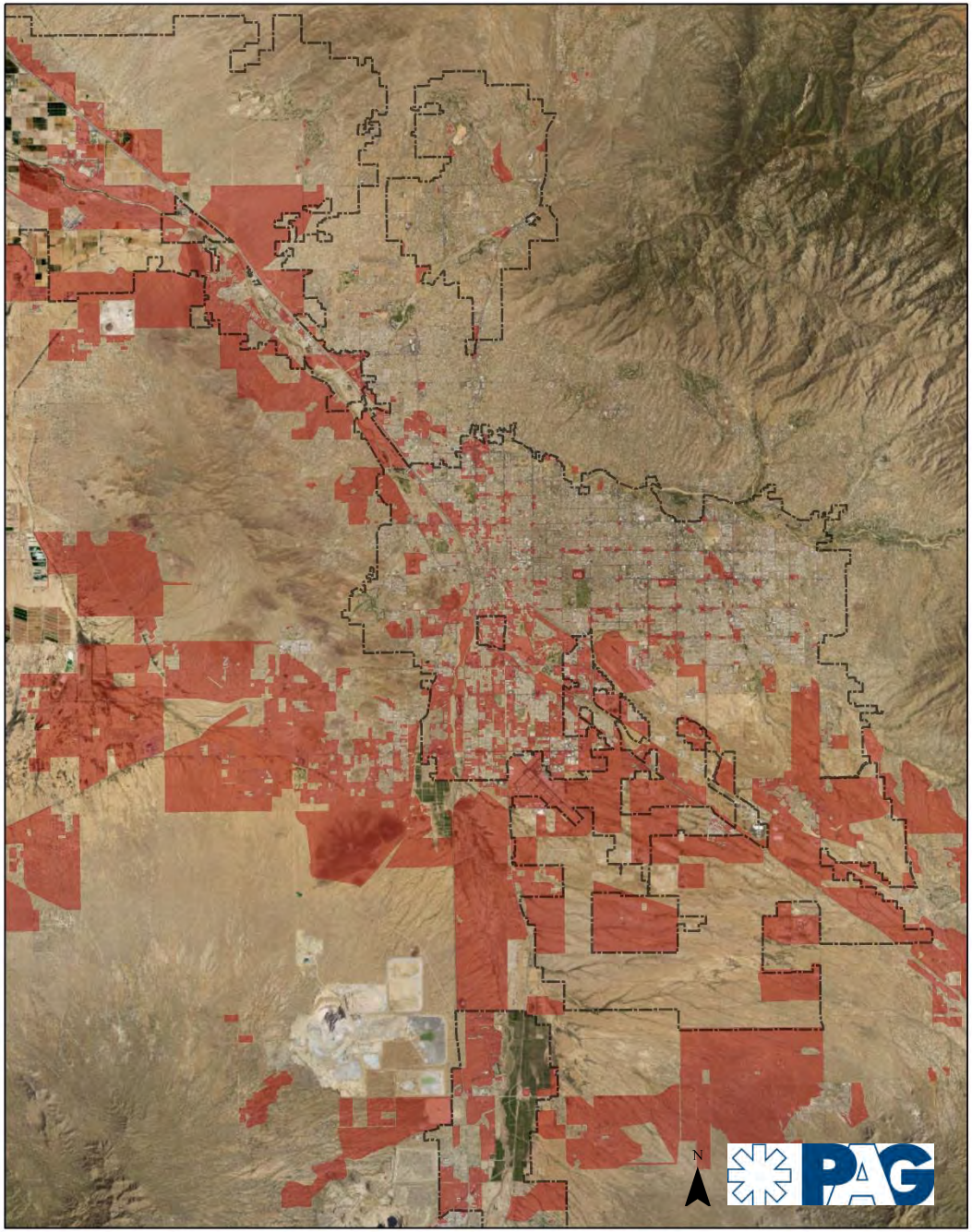
Percent Tree Canopy by Census Block

- 0% - 7%
- 7% - 20% — *City Avg Canopy*
- +20% — *Target Canopy*

Percent Tree Canopy Cover by Census Block:
PAG's analysis of 2007 NAIP imagery and 2008 PAG LiDAR, representing trees over 6 feet above the ground, summarized to the 2010 census block geography.

Potential Priority Blocks:

Above Average Surface Temperature
Below Average Tree Canopy

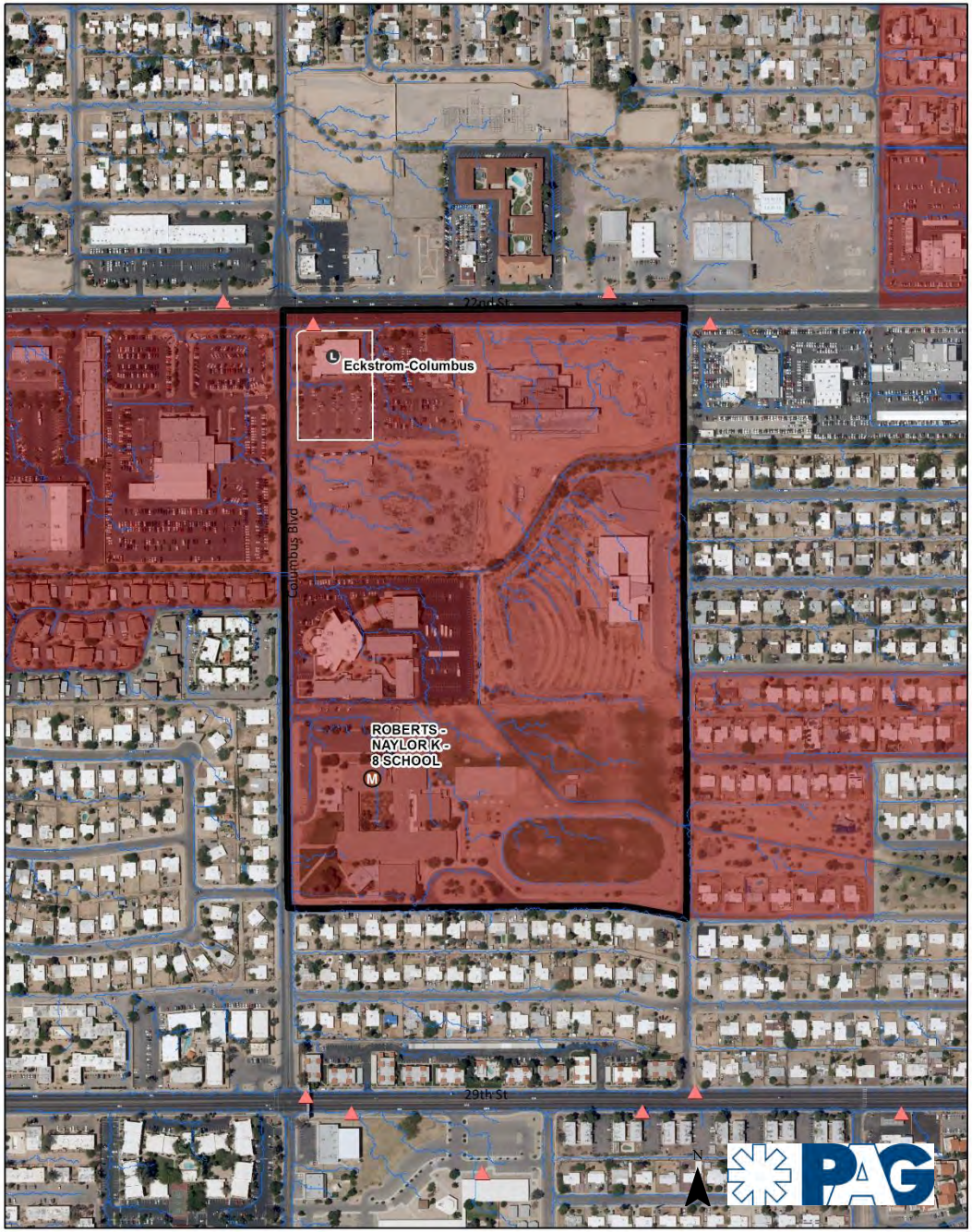


Census blocks with above average heat exposure and below average tree canopy in census blocks containing businesses or residences.

Sources:
2010 Census Blocks & Population
2013 infoUSA Employment data
2008 LANDSAT Thermal Surface
2007 NAIP Vegetation
2008 PAG LiDAR nDSM

Sample Priority Block:

Eckstrom – Columbus Library



▲ Bus Stop

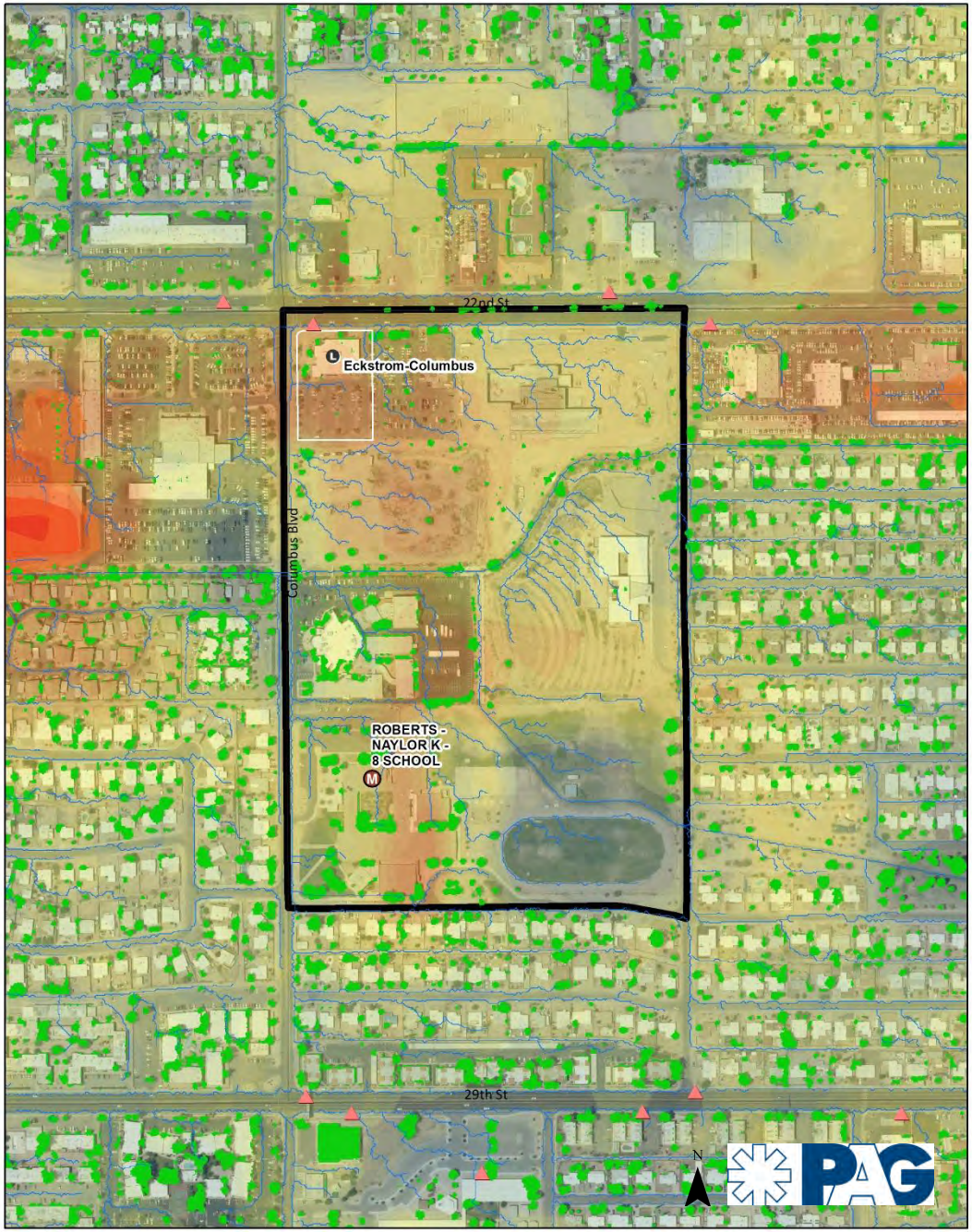
2008 Stormwater Flow Lines produced by
Pima County Regional Flood Control District.

Census blocks with above average heat exposure and below average tree canopy in census blocks containing businesses or residences.

Sources:
2010 Census Blocks & Population
2013 infoUSA Employment data
2008 LANDSAT Thermal Surface
2007 NAIP Vegetation
2008 PAG LiDAR nDSM

Sample Priority Block:

Eckstrom – Columbus Library
Green Infrastructure Opportunities



Bus Stop

Tree Canopy Extent:
PAG's analysis of 2007 NAIP imagery and 2008 PAG LiDAR, representing trees over 6 feet above the ground.

Surface Temperature

Warm Warmer

Regional Surface Temperature:
Analysis of 2008 LANDSAT thermal data.
Accurate for relative temperature comparisons only.
Eve B. Halper, Christopher A. Scott, Stephen R. Yool (2012),

2008 Stormwater Flow Lines produced by
Pima County Regional Flood Control District.

Sample Enhancement:

Flowing Wells Library
Green Infrastructure Impact
2008 to 2016

Flowing Wells Library Improvements

2008

2016

Flowing Wells Library is a great demonstration of impact that investment in green infrastructure can have in a community.

Appendix 6.

COMMENT

ASTROBIOLOGY A profile of the indomitable woman at the helm of SETI **p.596**

HEALTH Documentary traces the roots and legacy of a pioneering aid agency **p.598**

ENERGY Call for caution following China's gas-hydrate extraction **p.599**

TAXONOMY Rebuttals on bureaucracy, hypotheses, conservation and more **p.600**

REUBEN WU

Decarbonizing the world economy will require renewable energy generation from vast solar farms, such as this one in Nevada.

Three years to safeguard our climate

Christiana Figueres and colleagues set out a six-point plan for turning the tide of the world's carbon dioxide by 2020.

In the past three years, global emissions of carbon dioxide from the burning of fossil fuels have levelled after rising for decades. This is a sign that policies and investments in climate mitigation are starting to pay off. The United States, China and other nations are replacing coal with natural gas and boosting renewable energy sources. There is almost unanimous international agreement that the risks of abandoning the planet to climate change are too great to ignore.

The technology-driven transition to low-carbon energy is well under way, a trend that made the 2015 Paris climate agreement possible. But there is still a long way to go to decarbonize the world economy. The political winds are blustery. President Donald Trump has announced that the United States will withdraw from the Paris agreement when it is legally able to do so, in November 2020.

The year 2020 is crucially important for another reason, one that has more to do with physics than politics. When it comes to climate, timing is everything. According to an April report[1] (prepared by Carbon Tracker in London, the Climate Action Tracker consortium, the Potsdam Institute for Climate Impact Research in Germany and Yale University in New Haven, Connecticut), should emissions continue to rise beyond 2020, or even remain level, the temperature goals set in Paris become almost unattainable. The UN Sustainable Development Goals that were agreed in 2015 would also be at grave risk.

That's why we launched Mission 2020 — a collaborative campaign to raise ambition and action across key sectors to bend the greenhouse-gas emissions curve downwards by 2020 (www.mission2020.global).

As 20 leaders of the world's largest economies gather on 7–8 July at the G20 summit in Hamburg, Germany, we call on them to highlight the importance of the 2020 climate turning point for greenhouse-gas emissions, and to demonstrate what they and others are doing to meet this challenge. Lowering emissions globally is a monumental task, but research tells us that it is necessary, desirable and achievable.

After roughly 1°C of global warming driven by human activity, ice sheets in Greenland ▶

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and Antarctica are already losing mass at an increasing rate. Summer sea ice is disappearing in the Arctic and coral reefs are dying from heat stress — entire ecosystems are starting to collapse. The social impacts of climate change from intensified heatwaves, droughts and sea-level rise are inexorable and affect the poorest and weakest first.

The magnitude of the challenge can be grasped by computing a budget for CO_2 emissions — the maximum amount of the gas that can be released before the temperature limit is breached. After subtracting past emissions, humanity is left with a 'carbon credit' of between 150 and 1,050 gigatonnes (Gt; one Gt is 1×10^9 tonnes) of CO_2 to meet the Paris target of 1.5 °C or well below 2 °C (see go.nature.com/2rytztf). The wide range reflects different ways of calculating the budgets using the most recent figures.

At the current emission rate of 41 Gt of CO_2 per year, the lower limit of this range would be crossed in 4 years, and the midpoint of 600 Gt of CO_2 would be passed in 15 years. If the current rate of annual emissions stays at this level, we would have to drop them almost immediately to zero once we exhaust the budget. Such a 'jump to distress' is in no one's interest. A more gradual descent would allow the global economy time to adapt smoothly.

HARNESS MOMENTUM

The good news is that it is still possible to meet the Paris temperature goals if emissions begin to fall by 2020 (see 'Carbon crunch').

Greenhouse-gas emissions are already decoupling from production and consumption. For the past three years, worldwide CO_2 emissions from fossil fuels have stayed flat, while the global economy and the gross domestic product (GDP) of major developed and developing nations have grown by at least 3.1% per year (see go.nature.com/2rthjje). This is only the fourth occasion in the past 40 years on which emission levels have stagnated or fallen. The previous three instances — in the early 1980s, 1992 and 2009 — were associated with global economic predicaments, but the current one is not[2].

Emissions from the United States fell the most: by 3% last year, while its GDP grew by 1.6%. In China, CO_2 emissions fell by 1% in 2016, and its economy expanded by 6.7% (ref. 2). Although it is too early to tell whether this plateau will presage a fall, the signs are encouraging.

In 2016, two-thirds of China's 5.4% extra demand for electricity was supplied by carbon-free energy resources, mostly hydropower and wind[2]. In the European Union, wind and solar made up more than three-quarters of new energy capacity installed; coal demand was reduced by 10% (ref. 3). In the United States, almost two-thirds of the electricity-generating capacity installed by utility companies was based on renewables (see go.nature.com/2skv20g).

The International Energy Agency (IEA) has predicted that, by 2020, renewable sources could deliver 26–27% of the world's electricity needs, compared with 23.7% of electric power at the end of 2015. But that underestimates the pace of change in energy systems.

Growth in electric vehicles alone could displace 2 million barrels of oil per day by 2025, according to a February report[4]. It suggests that, by 2050, this could reach 25 million barrels of oil per day — a stark contrast to expectations from the fossil-fuel industry that demand for oil will rise. And solar power alone could supply 29% of global electricity generation by 2050. This would remove the need for coal and leave natural gas with only a 1% market share. However, the oil firm ExxonMobil predicts that all renewables will supply just 11% of global power generation by 2040 (ref. 4).

THE FOSSIL-FREE ECONOMY IS ALREADY PROFITABLE.

Investors, meanwhile, are growing wary of carbon risks. BlackRock and Vanguard, the two largest fund managers, voted — along with many others — against ExxonMobil management at its annual general meeting on 31 May and instructed the company to report on the profit impact of global measures to keep climate change below 2 °C. Earlier this month, Norway's US$960-billion sovereign-wealth fund declared that it will ask the banks in which it has invested to disclose how their lending contributes to global greenhouse-gas emissions.

Last year, the installed capacity of renewable energy set a new record of 161 gigawatts; in 2015, investment levels reached $286 billion worldwide, more than 6 times that in 2004. Over half of that investment, $156 billion, was for projects in developing and emerging economies[5].

There is a strong headwind against the low-carbon transition in some places, which may impede progress. For example, the Financial CHOICE Act — a bill passed by the US House of Representatives on 8 June — would make it nearly impossible for investors to challenge companies on climate-risk disclosure through shareholder proposal processes, as at ExxonMobil. However, as the UN Secretary General, António Guterres, said in New York last month: "The sustainability train has left the station." The fossil-free economy is already profitable[6] and creating jobs (www.clean200.org). A report this year by the International Renewable Energy Agency and the IEA shows that efforts to stop climate change could boost the global economy by $19 trillion[7]. The IEA has also said that implementing the Paris agreement will unlock $13.5 trillion or more before 2050.

Recent geopolitical events, too, have galvanized activity in support of the Paris agreement. For example, the #WeAreStillIn campaign — involving more than 1,000 governors, mayors, businesses, investors and universities from across the United States — has declared that it will ensure the nation remains a leader in reducing carbon emissions.

SIX MILESTONES

To prioritize actions, we've identified milestones in six sectors. Developed with knowledge leaders, these were reviewed and refined in collaboration with analysts at Yale University, the Climate Action Tracker consortium, Carbon Tracker, the low-carbon coalition We Mean Business, the Partnership on Sustainable, Low Carbon Transport (SLoCaT), advisory firm SYSTEMIQ, the New Climate Economy project and Conservation International.

These goals may be idealistic at best, unrealistic at worst. However, we are in the age of exponential transformation and think that such a focus will unleash ingenuity. By 2020, here's where the world needs to be:

Energy. Renewables make up at least 30% of the world's electricity supply — up from 23.7% in 2015 (ref. 8). No coal-fired power plants are approved beyond 2020, and all existing ones are being retired.

Infrastructure. Cities and states have initiated action plans to fully decarbonize buildings and infrastructures by 2050, with funding of $300 billion annually. Cities are upgrading at least 3% of their building stock to zero- or near-zero emissions structures each year[9].

Transport. Electric vehicles make up at least 15% of new car sales globally, a major increase from the almost 1% market share that battery-powered and plug-in hybrid vehicles now claim. Also required are commitments for a doubling of mass-transit utilization in cities, a 20% increase in fuel efficiencies for heavy-duty vehicles and a 20% decrease in greenhouse-gas emissions from aviation per kilometre travelled.

Land. Land-use policies are enacted that reduce forest destruction and shift to reforestation and afforestation efforts. Current net emissions from deforestation and land-use changes form about 12% of the global total. If these can be cut to zero next decade, and afforestation and reforestation can instead be used to create a carbon sink by 2030, it will help to push total net global emissions to zero, while supporting water

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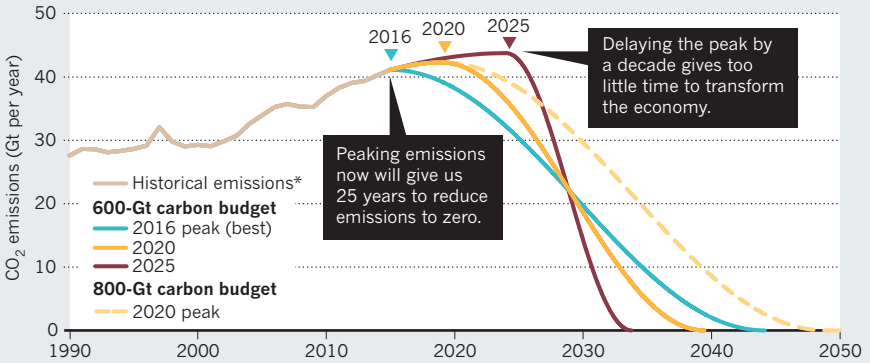
SOURCES: STEFAN RAHMSTORF/GLOBAL CARBON PROJECT; HTTP://GO.NATURE.COM/2RCPCRU

CARBON CRUNCH

There is a mean budget of around 600 gigatonnes (Gt) of carbon dioxide left to emit before the planet warms dangerously, by more than 1.5–2°C. Stretching the budget to 800 Gt buys another 10 years, but at a greater risk of exceeding the temperature limit.



*Data from The Global Carbon Project.

supplies and other benefits. Sustainable agricultural practices can reduce emissions and increase CO_2 sequestration in healthy, well-managed soils.

Industry. Heavy industry is developing and publishing plans for increasing efficiencies and cutting emissions, with a goal of halving emissions well before 2050. Carbon-intensive industries — such as iron and steel, cement, chemicals, and oil and gas — currently emit more than one-fifth of the world's CO_2, excluding their electricity and heat demands.

Finance. The financial sector has rethought how it deploys capital and is mobilizing at least $1 trillion a year for climate action. Most will come from the private sector. Governments, private banks and lenders such as the World Bank need to issue many more 'green bonds' to finance climate-mitigation efforts. This would create an annual market that, by 2020, processes more than 10 times the $81 billion of bonds issued in 2016.

FURTHER, FASTER, TOGETHER

If we delay, the conditions for human prosperity will be severely curtailed. There are three pressing and practical steps to avoid this.

First, use science to guide decisions and set targets. Policies and actions must be based on robust evidence. Uncensored and transparent communication of peer-reviewed science to global decision-makers is crucial. Academic journal articles are not easily read or digested by non-experts, so we need a new kind of communication in which *Nature* meets *Harvard Business Review*. Science associations should provide more media training to young scientists and hold communication boot camps on how to make climate science relevant to corporate boards and investors.

Those in power must also stand up for science. French President Emmanuel Macron's Make Our Planet Great Again campaign is a compelling example. He has spoken out to a global audience in support of climate scientists, and invited researchers to move to France to help accelerate action and deliver on the Paris agreement. To encourage others to speak, scientists should forge connections with leaders from policy, business and civil society. The Arctic Basecamp at Davos in January, for instance, brought scientists into high-level discussions on global risk at the World Economic Forum's annual meeting in Switzerland.

Second, existing solutions must be scaled up rapidly. With no time to wait, all countries should adopt plans for achieving 100% renewable electricity production, while ensuring that markets can be designed to enable renewable-energy expansion.

Third, encourage optimism. Recent political events have thrown the future of our world into sharp focus. But as before Paris, we must remember that impossible is not a fact, it's an attitude. It is crucial that success stories are shared. Demonstrating where countries and businesses have over-achieved on their targets will raise the bar for others. More-ambitious targets become easier to set.

The upcoming G20 meeting in Hamburg is the perfect moment for heads of state to integrate the six milestones into their discussions on how to ensure a resilient, prosperous, inclusive and interconnected global economy. This would pave the way for a year of raised ambition in 2018, when nations take stock of progress and revise national commitments under the Paris agreement.

The G20 is due to adopt the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures, on how the global finance system will manage the risk of climate change. It requires financial institutions to design, disclose and implement a transition strategy with a view to full decarbonization of operations, value chains and portfolios by 2050. National governments and financial regulators must enact these recommendations swiftly.

Cities and provincial governments must help to drive the ambition of national governments on climate change, particularly through smart infrastructure and transport policy. C40 Cities, a network of megacities committed to addressing climate change, has adopted a strategy called Deadline 2020 that aligns its emissions-reductions plans with the Paris agreement. Other cities now have an opportunity to follow suit, for example through the Global Covenant of Mayors for Climate and Energy.

Our co-signatory list, which includes eminent scientists, business leaders, economists, analysts, influencers and representatives of non-governmental organizations, is an example of the strength of radical collaboration across unusual partners, who all share a mission to seize this opportunity to improve people's lives, the planet and the global economy.

There will always be those who hide their heads in the sand and ignore the global risks of climate change. But there are many more of us committed to overcoming this inertia. Let us stay optimistic and act boldly together. ■

Christiana Figueres *is vice-chair of the Global Covenant of Mayors for Climate and Energy, and Convener of Mission 2020.* **Hans Joachim Schellnhuber** *is director of the Potsdam Institute for Climate Impact Research, Germany.* **Gail Whiteman** *is director of the Pentland Centre for Sustainability in Business, Lancaster University, UK.* **Johan Rockström** *is executive director of the Stockholm Resilience Centre, Stockholm University, Sweden.* **Anthony Hobley** *is chief executive of Carbon Tracker, London, UK.* **Stefan Rahmstorf** *is head of Earth system analysis at the Potsdam Institute for Climate Impact Research, Germany.*
e-mail: cfigueres@mission2020.global

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A list of co-signatories accompanies this Comment online (see go.nature.com/2sucret).

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