2015 Annual Report

Alternative Energy Portfolio Standards Act of 2004

Prepared by the
PA Public Utility Commission
in cooperation with the
PA Department of Environmental Protection

PENNSYLVANIA PUC PUBLIC UTILITY COMMISSION

pennsylvania DEPARTMENT OF ENVIRONMENTAL PROTECTION

2015 Annual Report
Alternative Energy Portfolio Standards Act of 2004

Published by the
Pennsylvania Public Utility Commission
P.O. Box 3265, Harrisburg, PA 17105-3265
www.puc.pa.gov

Prepared by the
PUC Bureau of Technical Utility Services
Paul Diskin, *Director*

In cooperation with the
Pennsylvania Department of Environmental Protection
Patrick McDonnell, *Acting Secretary*
www.dep.pa.gov

Front and back covers: Blue Ridge Landfill, Chambersburg

EXECUTIVE SUMMARY

INTRODUCTION

The Alternative Energy Portfolio Standards Act of 2004 (AEPS) requires electric distribution companies (EDCs) and electric generation suppliers (EGSs) to supply 18 percent of electricity through alternative energy resources by 2021.[1] Alternative energy sources in Pennsylvania are broken down in two tiers – Tier I and Tier II.[2] Solar photovoltaic (PV) is a Tier I resource but also has a stand-alone requirement. The percentage of Tier I, Tier II and solar PV alternative energy credits (AECs)[3] that must be included in sales to retail customers increases over the compliance period. EDCs and EGSs meet their AEPS requirements through the purchase of AECs in amounts corresponding to the percentage of electricity that is required from alternative energy sources. One AEC represents one megawatt hour (MWh) of electricity generated from a qualified alternative energy source and can be purchased separate from electricity.

Section 7(c) of the AEPS Act requires that the Pennsylvania Public Utility Commission (PUC) and the state Department of Environmental Protection (DEP) work cooperatively to monitor the performance of all aspects of the AEPS and prepare an annual report to the Chairman and Minority Chairman of the Senate Environmental Resources and Energy Committee and the Chairman and Minority Chairman of the House Environmental Resources and Energy Committee. This report satisfies that requirement.

[1] *See generally* 73 P.S. § 1648.1 et seq.

[2] Tier I sources include solar photovoltaic and solar thermal energy, wind power, low-impact hydropower, geothermal energy, biologically derived methane gas, fuel cells, biomass energy (including generation located inside Pennsylvania from by-products of the pulping process and wood manufacturing process including bark, wood chips, sawdust and lignin in spent pulping liquors) and coal mine methane. Tier II sources include waste coal, distributed generation systems, demand-side management, large-scale hydropower, municipal solid waste, generation of electricity outside of Pennsylvania utilizing by-products of the pulping process and wood manufacturing process including bark, wood chips, sawdust and lignin in spent pulping liquors and integrated combined coal gasification technology. *See* 73 P.S. § 1648.2 and 66 Pa.C.S. § 2814.

[3] Solar PV AECs will be referred to herein as solar AECs

OVERVIEW

For the 2015 reporting year (June 1, 2014, - May 31, 2015) all EDCs complied with the AEPS requirements by retiring the required number of Tier I, Tier II and Solar AECs needed to meet their obligations. Three EGSs did not meet their AEPS obligations by retiring the necessary AECs; alternative compliance payments (ACPs) were required of these three EGSs for their shortfall in AECs.

AECs retired by EDCs and EGSs for the 2015 reporting years originated from alternative energy resources located both inside and outside of Pennsylvania. Pennsylvania EDCs and EGSs are permitted to obtain AECs from within the entire PJM Interconnection, LLC (regional transmission organization) area. For the 2015 reporting year, 74 percent of solar AECs, 36 percent of Tier I AECs and 62 percent of Tier II AECs originated from generation facilities located in Pennsylvania.

Recent analyses of proposed and existing resources indicates sufficient Tier I resources are available to meet the AEPS requirements through the 2021 reporting year and sufficient Tier II resources exist to meet the requirements past the 2021 reporting year. Sufficient solar PV capacity exists or is planned, to meet AEPS obligations through the 2019 reporting year.

TABLE OF CONTENTS

SECTION 1 INTRODUCTION

PURPOSE

Act 213 of 2004 was signed into law on Nov. 30, 2004, establishing an alternative energy portfolio standard for Pennsylvania. The law took effect on Feb. 28, 2005, and required that an annually increasing percentage of electricity sold to Pennsylvania retail customers by EDCs and EGSs should be derived from alternative energy resources.

The PUC is responsible for carrying out and enforcing the provisions of the law. DEP is charged with rendering determinations of resource eligibility and ensuring compliance with all environmental, health and safety laws and standards relevant to the law's implementation. The PUC and DEP are charged with monitoring compliance with the Act, the development of the alternative energy market and the costs of alternative energy, and conducting an ongoing alternative energy planning assessment. The PUC and DEP are to report their findings and any recommendations for changes to the Act to the General Assembly via an annual report.

The law establishes a 15-year schedule for complying with its mandates. The percentage of Tier I, Tier II and solar PV alternative energy resources that must be included in sales to retail customers gradually increases over this period. Compliance is monitored for successive 12-month reporting years that begin annually on June 1 and conclude on the following May 31. The law provides for a true-up period, during which EDCs and EGSs may acquire any additional alternative energy credits needed for compliance, at the conclusion of each reporting year. This three-month true-up period runs from the conclusion of each reporting year until September 1 of the same calendar year. After the conclusion of the true-up period, the PUC verifies compliance and imposes alternative compliance payments (ACPs), as appropriate, by providing notice of the payment as well an opportunity to challenge whether the ACP was appropriately applied.

On July 19, 2007, Act 35 of 2007 was signed into law, amending Act 213 by changing the compliance schedule related to solar photovoltaic (PV) energy. Act 35 also amended other provisions of the law, including definitions for customer-generator and net metering. On Dec. 20, 2008, a PUC rulemaking based on the Act 35 changes became effective.

The final rule provides clarification of the solar PV obligation and includes the revised 15-year schedule for solar PV requirements. The clarification for solar PV obligation affirms that the percentage requirement is a percentage of all retail sales and that the solar percentage is a part of the total Tier I obligation. Table 1 provides an overview of the AEPS percentage sales requirements with the revised solar PV schedule.

TABLE 1: OVERVIEW OF AEPS PERCENTAGE SALES REQUIREMENTS

Year	Period	Tier I			Tier II
		Total	Solar PV	Non-Solar	
1	June 1, 2006 – May 31, 2007	1.50%	0.0013%	1.4987%	4.20%
2	June 1, 2007 – May 31, 2008	1.50%	0.0030%	1.4970%	4.20%
3	June 1, 2008 – May 31, 2009	2.00%	0.0063%	1.9937%	4.20%
4	June 1, 2009 – May 31, 2010	2.50%	0.0120%	2.4880%	4.20%
5	June 1, 2010 – May 31, 2011	3.00%	0.0203%	2.9797%	6.20%
6	June 1, 2011 – May 31, 2012	3.50%	0.0325%	3.4675%	6.20%
7	June 1, 2012 – May 31, 2013	4.00%	0.0510%	3.9490%	6.20%
8	June 1, 2013 – May 31, 2014	4.50%	0.0840%	4.4160%	6.20%
9	June 1, 2014 – May 31, 2015	5.00%	0.1440%	4.8560%	6.20%
10	June 1, 2015 – May 31, 2016	5.50%	0.2500%	5.2500%	8.20%
11	June 1, 2016 – May 31, 2017	6.00%	0.2933%	5.7067%	8.20%
12	June 1, 2017 – May 31, 2018	6.50%	0.3400%	6.1600%	8.20%
13	June 1, 2018 – May 31, 2019	7.00%	0.3900%	6.6100%	8.20%
14	June 1, 2019 – May 31,2020	7.50%	0.4433%	7.0567%	8.20%
15	June 1, 2020 – May 31, 2021	8.00%	0.5000%	7.5000%	10.00%

On Oct. 15, 2008, Act 129 of 2008 was signed into law, which, among other things, included additional energy sources in the definition of Tier 1. Further discussion of these additional resources is contained in Section 6, Quarterly Adjustment, page 26, of this report. To accommodate the newly added Tier I alternative energy sources, Act 129 directed the Commission, on a quarterly basis, to increase the percentage of Tier I requirements for EDCs and EGSs to reflect the amount of generation from the new resources added by the Act. On

May 28, 2009, the Commission approved a Final Order that established procedures to increase the non-solar PV Tier I percentage requirement on a quarterly basis to account for the new resources.

SECTION 2 STATUS OF COMPLIANCE

2015 COMPLIANCE SUMMARY

Table 2 provides a summary of compliance for all EDCs and EGSs subject to AEPS requirements during the 2015 reporting year. Included in the table are the combined MWhs sold, the number of AECs reserved for compliance, the weighted average credit price for each of the tiers, the cost of purchased credits and the number of ACPs made. An ACP is required for each AEC lacking at the end of the compliance period. For 2015, no EDCs were required to pay an ACP however; three EGSs were required to pay ACPs for either their solar, Tier I and/or Tier II obligations.

The weighted average credit prices reflected below are calculated using data for credits that have a known cost. Some credits that are retired to meet obligations are self-generated or purchased bundled with the electricity and a cost for those credits is not available. Therefore, dividing the cost of purchased credits by the number of credits reserved will not yield the weighted average credit price reflected in the table. The weighted average credit price is used to calculate the solar ACP. The solar ACP, as established in statute, is 200 percent of the sum of the weighted average credit price of solar AECs sold during the reporting year plus the value of any in-state and out-of-state solar rebates. The statutorily established ACP for Tier I and Tier II is $45.

For the 2015 reporting year, one EGS used 477 solar credits to meet their Tier I requirements. In Table 2, the ‘Number of Credits Reserved’ reported for Solar does not include the 477 solar credits used for Tier I. The 477 solar credits are instead included in the ‘Number of Credits Reserved’ reported for Tier I.

TABLE 2: 2015 AEPS COMPLIANCE REPORT BY TIER

MWhs	Alternative Energy Requirement		Number of Credits Reserved	Weighted Average Credit Price	Cost of Purchased Credits	Alternative Compliance Payments
	Tier	Percent of Total Energy Sold				
143,128,607	Solar	0.1440	206,121*	$78.62	$16,078,994	2*
	I	5.0	6,954,422	$12.51	$78,314,314	61
	II	6.2	8,873,904	$0.12	$996,215	79
	Total	11.3	16,034,447	N/A	$95,389,523	N/A

*There was an over-compliance by some companies resulting in the retirement of 11 additional solar credits but two EGSs also failed to comply, resulting in the need for 2 solar ACPs.

For the 2015 reporting year, the base obligation for non-solar Tier I was 4.856 percent. The Tier I quarterly adjustment added a quarterly increase of: 0.0028 percent; 0.0020 percent; 0.0024 percent; and 0.0045 percent, respectively. This resulted in 4,159 AECs added to the 6,950,318 credits that were retired without the adjustment.

Table 3 presents the details of each EDC's compliance obligation and compliance status for reporting year 2015. The table presents reporting year data on the number of AECs retired by tier in the EDC territories. All EDCs achieved compliance in the reporting year by retiring the requisite number of AECs but three EGSs did not retire sufficient AECs and, as a result, were required to pay ACPs. Several EGSs retired excess credits beyond the required AEPS obligations and the overages are evident in the table below. Because specific EGS sales information is considered proprietary, their numbers were combined and are shown with the appropriate EDC.

During the 2015 reporting year, 11 EDCs and 107 EGSs had compliance obligations. Wellsboro Electric Company (Wellsboro Electric) was the only EDCs that did not have at least one EGS providing service within its territory. Many EGSs provide services in more than one EDC territory. When an EGS retires too few or too many AECs, the excess or deficiency is not always connected to a specific EDC service area.

TABLE 3: 2015 AEPS COMPLIANCE REPORT BY EDC SERVICE TERRITORY

Distribution Service Territory	Total Energy Sold (MWhs)	Alternative Energy Requirement	Credits Required	Credits Retired	Compliance Status
Citizens' Electric and EGSs	168,143				
Solar		0.144%	243	243	In Compliance
Tier I (non-solar)		4.856%	8,171	8,171	In Compliance
Tier II		6.20%	10,425	10,425	In Compliance
Duquesne Light and EGSs	13,523,019				
Solar		0.144%	19,475	19,952*	In Compliance
Tier I (non-solar)		4.856%	657,072	656,591*	In Compliance After ACP
Tier II		6.20%	838,432	838,427	In Compliance After ACP
Met Ed and EGSs	14,185,932				
Solar		0.144%	20,426	20,438	In Compliance
Tier I (non-solar)		4.856%	689,284	689,282	In Compliance After ACP
Tier II		6.20%	879,529	879,527	In Compliance After ACP
PECO and EGSs	38,144,960				
Solar		0.144%	54,923	54,934**	In Compliance After ACP
Tier I (non-solar)		4.856%	1,853,418	1,853,384	In Compliance After ACP
Tier II		6.20%	2,364,985	2,364,940	In Compliance After ACP

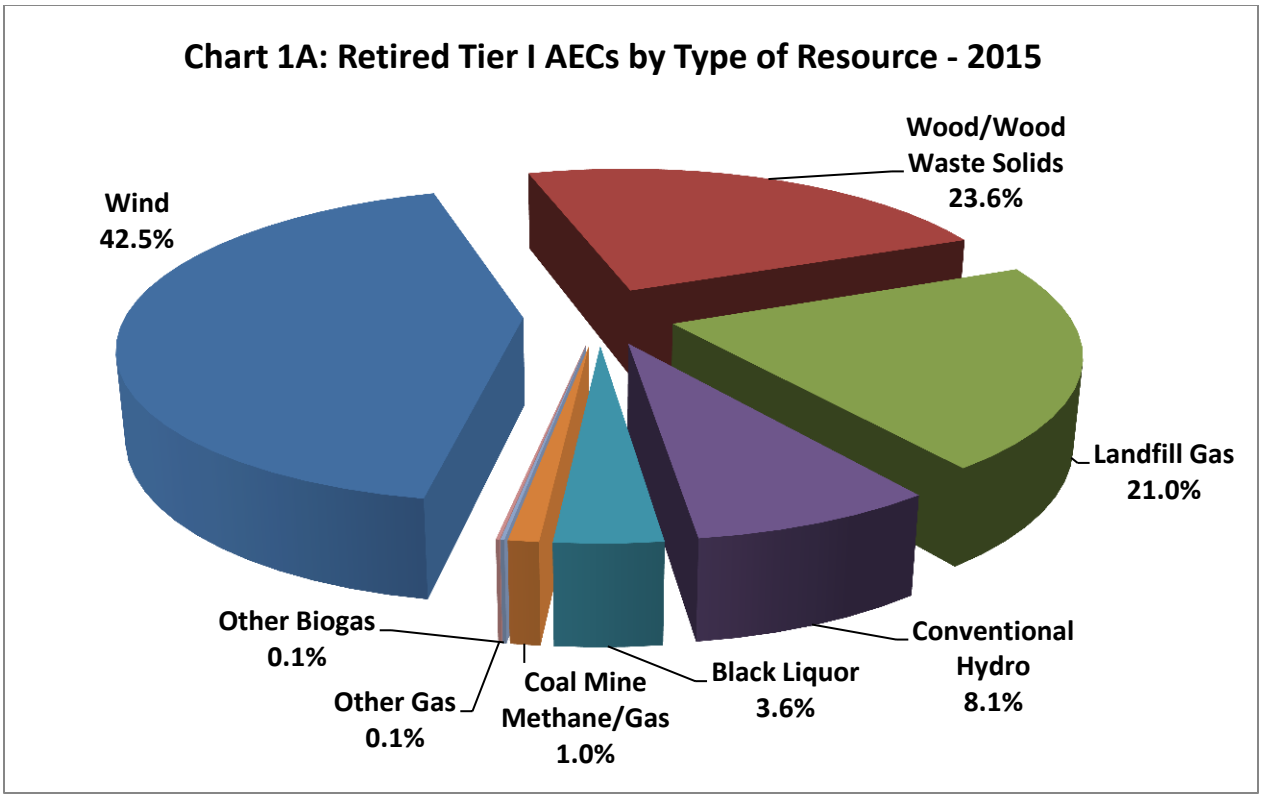
Distribution Service Territory	Total Energy Sold (MWhs)	Alternative Energy Requirement	Credits Required	Credits Retired	Compliance Status
Penelec and EGSs	13,992,870				
Solar		0.144%	20,144	20,150	In Compliance
Tier I (non-solar)		4.856%	679,901	679,901	In Compliance
Tier II		6.20%	867,561	867,561	In Compliance
Penn Power and EGSs	4,697,894				
Solar		0.144%	6,765	6,765	In Compliance
Tier I (non-solar)		4.856%	228,268	228,268	In Compliance
Tier II		6.20%	291,268	291,268	In Compliance
Pike County and EGSs	73,865				
Solar		0.144%	107	107	In Compliance
Tier I (non-solar)		4.856%	3,590	3,590	In Compliance
Tier II		6.20%	4,579	4,579	In Compliance
PPL and EGSs	36,707,956				
Solar		0.144%	52,859	52,859	In Compliance
Tier I (non-solar)		4.856%	1,783,595	1,783,580	In Compliance After ACP
Tier II		6.20%	2,275,896	2,275,869	In Compliance After ACP
UGI Electric and EGSs	1,005,004				
Solar		0.144%	1,447	1,447	In Compliance
Tier I (non-solar)		4.856%	48,834	48,834	In Compliance
Tier II		6.20%	62,309	62,309	In Compliance

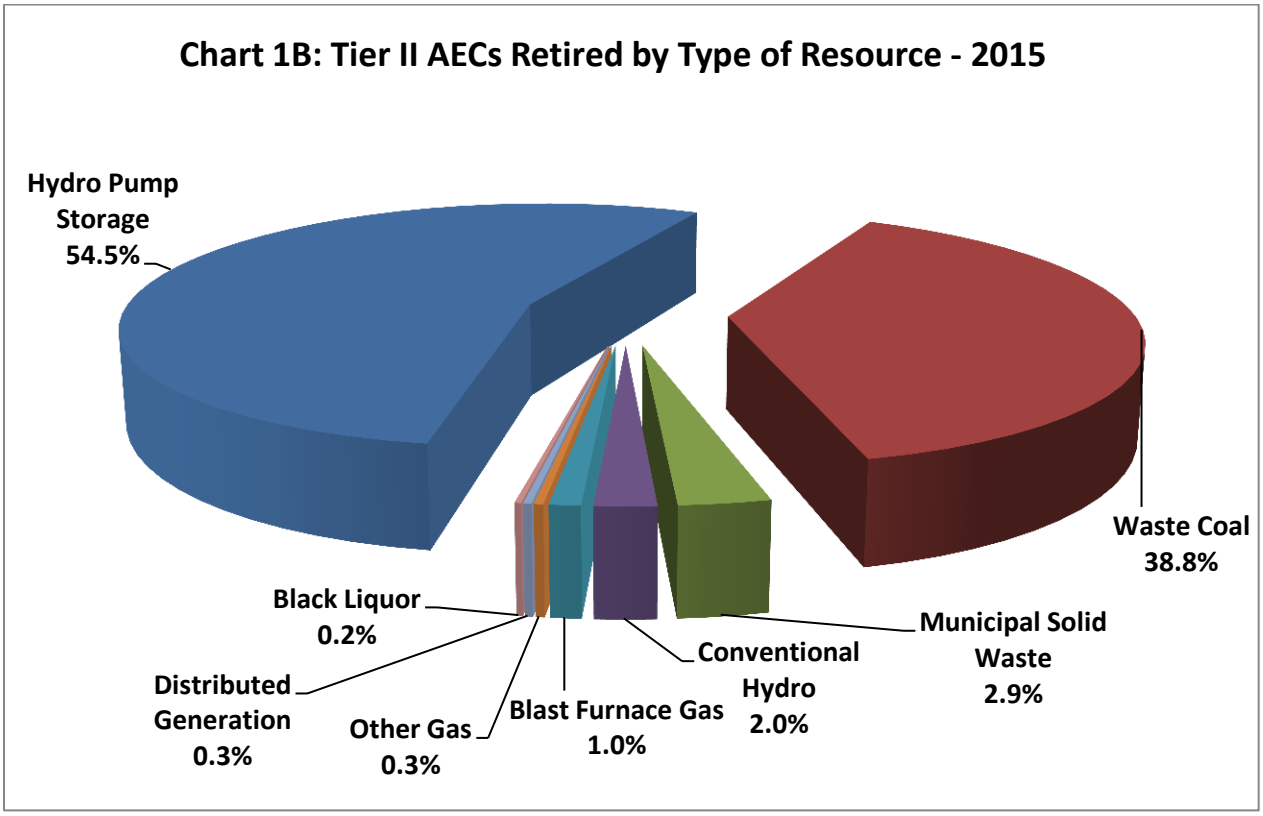
Distribution Service Territory	Total Energy Sold (MWhs)	Alternative Energy Requirement	Credits Required	Credits Retired	Compliance Status
Wellsboro Electric	120,339				
Solar		0.144%	173	173	In Compliance
Tier I (non-solar)		4.856%	5,850	5,850	In Compliance
Tier II		6.20%	7,465	7,465	In Compliance
West Penn Power and EGSs	20,508,565				
Solar		0.144%	29,530	29,530	In Compliance
Tier I (non-solar)		4.856%	996,494	996,494	In Compliance
Tier II		6.20%	1,271,534	1,271,534	In Compliance

* Within the Duquesne service territory 477 solar credits were retired and used towards complying with the non-solar Tier I obligation.

**Within the PECO service territory there were excess solar credits retired for compliance, as a whole, but one EGS did make ACPs for failing to retire the requisite number of solar credits.

Charts 1A and 1B, below, indicate alternative energy types that were retired to meet the Tier I and Tier II obligations for the 2015 reporting year. During this reporting year some of the Tier I obligation (.007%) was met using solar credits as a Tier I resource. In the charts below, resources contributing less than one-tenth of one percent are not displayed.





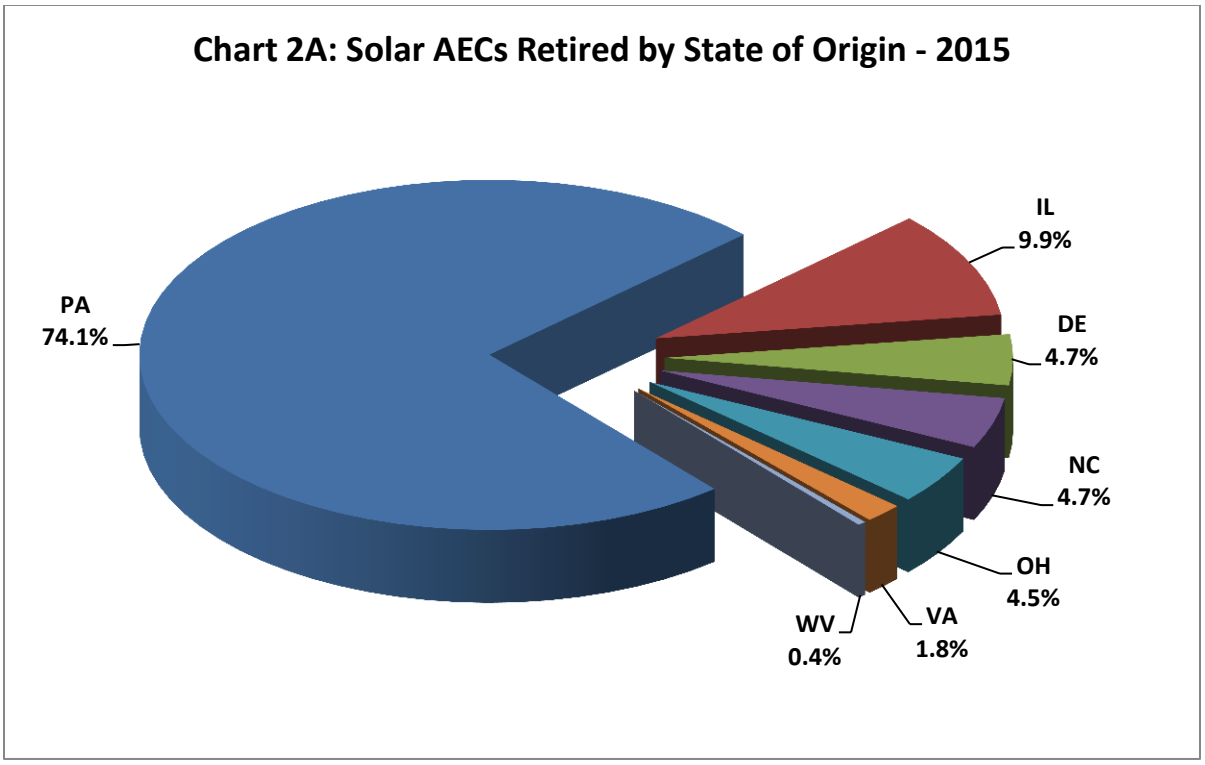
Note: Resources comprising less than 0.1% are not shown in these charts.

For the 2015 reporting year, 74.1 percent of solar AECs, 35.8 percent of Tier I and 62.3 percent of Tier II AECs retired by EDCs and EGSs originated from generation facilities located in Pennsylvania. Table 4 shows the state of origin for the AECS retired for AEPS compliance for reporting period 2015. This data is further illustrated in Charts 2A through 2C

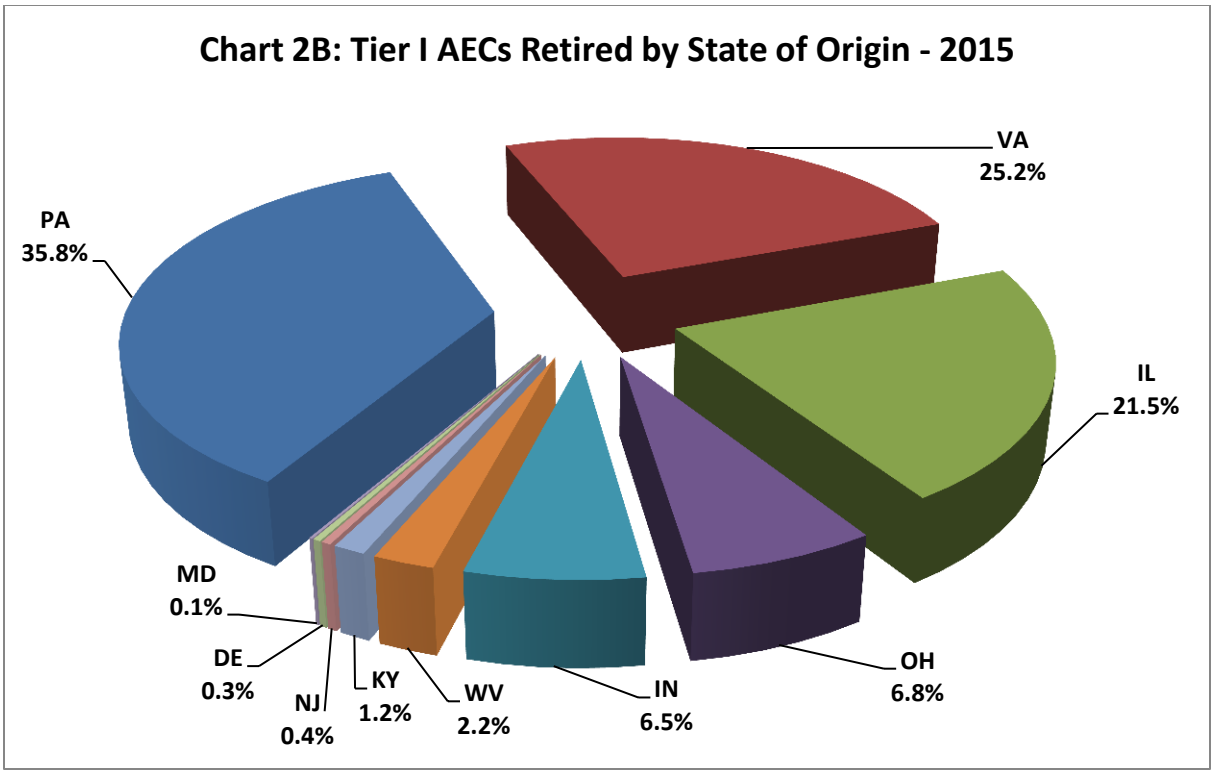
TABLE 4: AEC STATE OF ORIGIN - 2015

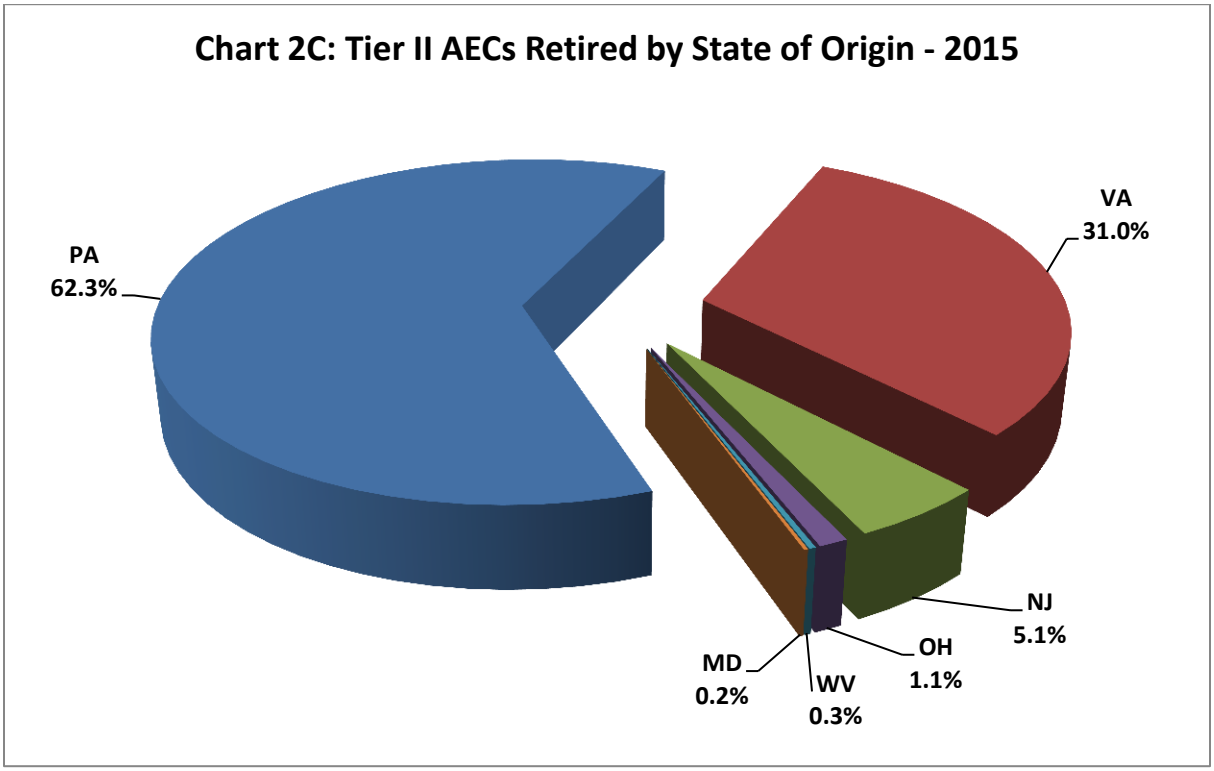
Tier	PA	NJ	MD	VA	WV	IL	OH	DE	NC	IN	KY
Solar	152,610	41	21	3,689	800	20,352	9,258	9,678	9,655	10	0
Tier I	2,491,373	24,970	8,832	1,750,726	156,157	1,495,634	474,711	19,718	0	449,857	82,444
Tier II	5,528,377	456,808	14,035	2,753,797	22,447	0	97,080	0	1,360	0	0
Total	**8,172,360**	**481,819**	**22,888**	**4,508,212**	**179,404**	**1,515,986**	**581,049**	**29,396**	**11,015**	**449,867**	**82,444**

* - Table 4 does not include 6 Solar from TN and 1 Solar from DC.



Note: States contributing less than 0.1% are not shown in the charts.





Note: States contributing less than 0.1% are not shown in the charts.

AEPS CERTIFICATES/CREDITS CREATED

Table 5 shows the number of AECs by tier that are eligible for use in Pennsylvania, created in PJM-EIS[4] for reporting years 2005 through 2015. The data in Table 5 reveals a trend whereby the total number of AECs created has increased over time. While the number of solar and Tier I credits have shown an increase each year, the number of Tier II credits has fluctuated.

When comparing the number of credits created to the estimated number of credits needed in 2021, Table 5 shows that more Tier II credits were created in each year from 2006 through 2015 than will be needed in 2021. As described in more detail in Section 4 of this report, it is anticipated that Tier II credits will continue to be over-subscribed and that adequate Tier I credits exist through the 2021 reporting year.

AECs eligible for use in Pennsylvania may also be eligible to meet alternative energy requirements in other states. However, provisions are in place to ensure credits are used only once.

TABLE 5: CREDITS ELIGIBLE FOR USE IN PENNSYLVANIA AND ESTIMATED 2021 REQUIREMENTS

	Solar	Tier I	Tier II
2005	33	570,865	9,902,928
2006	132	1,814,577	23,851,760
2007	428	3,151,280	28,388,588
2008	933	4,833,109	29,167,430
2009	5,101	7,419,360	28,031,587
2010	19,989	9,337,463	31,021,789
2011	88,114	12,742,693	29,848,858
2012	227,390	14,989,799	29,029,366
2013	326,616	16,803,554	27,556,244
2014	403,271	19,631,182	28,659,166
2015	494,601	21,452,414	26,055,940
Estimated 2021 Requirement	734,469	11,017,041	14,689,388

STATUS OF CUSTOMER-GENERATOR INTERCONNECTIONS

PUC regulations for net metering and interconnection require EDCs to submit annual reports to the Commission on June 30. EDCs are required to review interconnection requests using one or more of four review procedures depending upon a proposed system's nameplate capacity and the type of interconnection.[5] The reports contain the number of customer-generators interconnected to the distribution system, the status of interconnection requests, as well as the

[4] The PJM-EIS database is available at http://www.pjm-eis.com. Data as of April 18, 2016.
[5] 52 Pa. Code §75.34

length of time to complete these interconnection requests as processed by the EDCs within the past year. The data on customer-generator interconnects is summarized below in Table 6.

Descriptions of the varying interconnection levels and other data, as referenced above, can be found in the Net-Metering & Interconnection Report 2013 – 2015.[6] As of May 31, 2015, which marks the end of the 2015 program year, Pennsylvania's EDCs reported 9,245 Tier I and 13 Tier II customer-generators were interconnected to the distribution system. Those customer generators represented 218,271 kW of generation capacity. Solar PV accounted for about 97 percent of the Tier I customer-generators and 85 percent of Tier I generation capacity.

Of the 9,258 customer-generators, the EDCs received 614 interconnection requests between June 1, 2014, and May 31, 2015. There were two denials. The average time for EDCs to finalize an interconnection request was: Level 1 – four days; Level 2 – nine days; Level 3 – 15 days; and Level 4 – zero days.

TABLE 6: NUMBER OF CUSTOMER-GENERATORS INTERCONNECTED: 2013-2015

	Data as of May 31, 2013				Data as of May 31, 2014				Data as of May 31, 2015			
	Tier I		Tier II	Total	Tier I		Tier II	Total	Tier I		Tier II	Total
	Total	Solar PV			Total	Solar PV			Total	Solar PV		
Number of Customer Generators	7,595	7,327	12	7,607	8,707	8,407	13	8,720	9,245	8,960	13	9,258
Estimated Generation Capacity in kW	172,912	158,381	5,443	178,355	200,019	170,532	5,449	205,468	212,822	181,361	5,449	218,271

*Solar PV is a Tier I resource. The Solar PV column separately identifies the Solar PV component of Tier I.

[6] http://www.puc.pa.gov/Electric/pdf/AEPS/Net_Metering-Interconnection_Report_2013-15.pdf

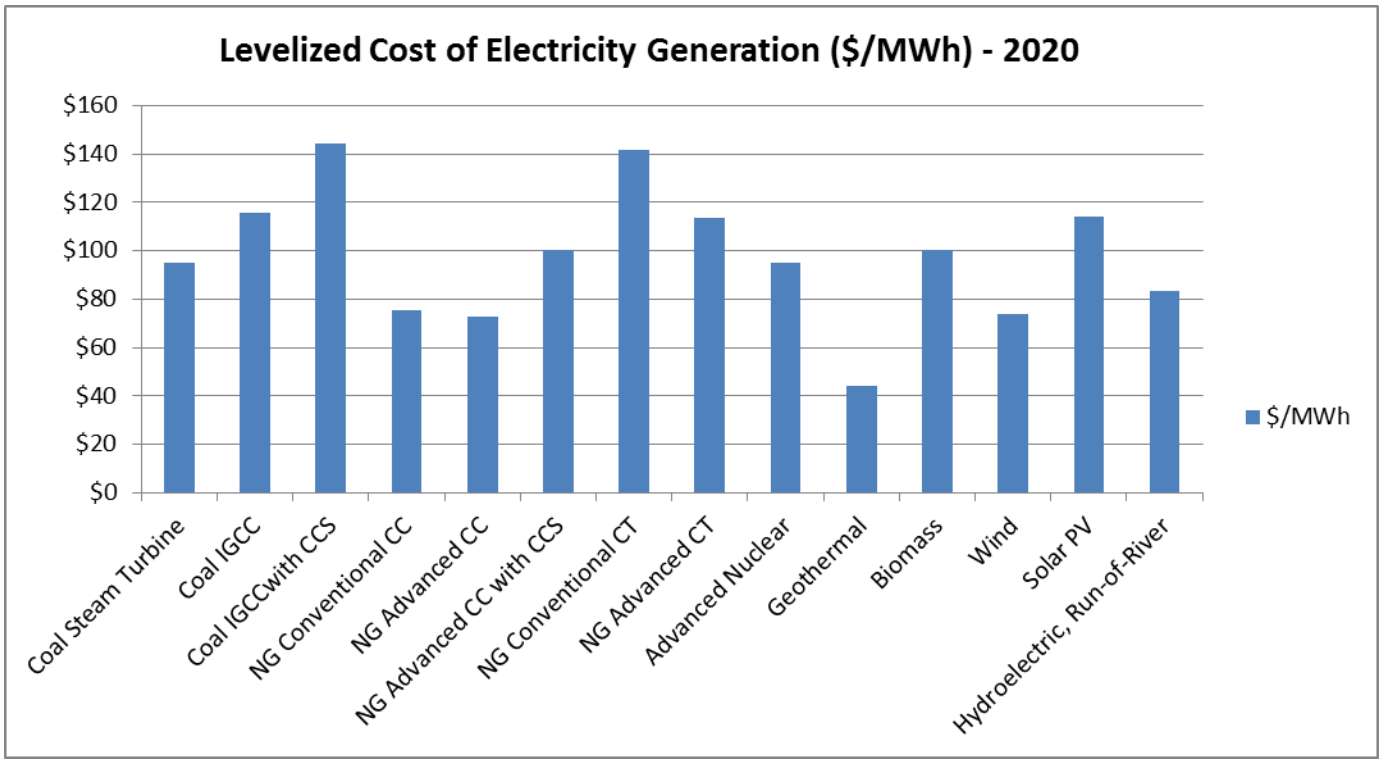
SECTION 3 COSTS AND BENEFITS OF ALTERNATIVE ENERGY GENERATION

CURRENT ESTIMATED COSTS OF FUTURE ALTERNATIVE ENERGY GENERATION

The Energy Information Administration (EIA) provided estimated cost data for the construction and operation of utility-scale generation plants that may be brought online in 2020.[7] It should be pointed out however, that most of the resources used to comply with the AEPS are smaller than utility-scale. The EIA data is used as the most consistently reliable information available. In using this data, 2020 was selected to account for the lead time needed by some technologies to be brought on line. EIA uses average data, including capacity factors, from across the country. Chart 3 compares these levelized costs, in 2013 dollars, for differing generation technologies on a dollars per megawatt-hour ($/MWh) basis over an assumed financial life of the plant. Levelized cost components include: overnight capital costs, construction, operation and maintenance (O&M) costs, and an assumed utilization rate for each plant type. O&M costs include items such as fuel costs, maintenance, insurance and taxes and do not include state or federal incentives. EIA notes actual plant investment decisions are affected by the specific technological and regional characteristics of a project and levelized costs are a convenient summary measure of overall competiveness of generation technologies.

[7] *See* EIA document titled *Levelized Cost of New Generation Resources in the Annual Energy Outlook 2015* from EIA *Annual Energy Outlook 2015 with Projections to 2040*, April 2015, DOE/EIA-0383(2015). Available at http://www.eia.gov/forecasts/aeo/index.cfm

CHART 3: ESTIMATED LEVELIZED COST OF NEW GENERATION RESOURCES



FUTURE ESTIMATED STATEWIDE AEPS COST OF COMPLIANCE

For analytical purposes, the Commission has estimated the statewide costs of AEPS compliance for 2021, the year of maturation for this standard. These cost projections are presented in 2015 dollars, using a 6 percent discount rate and projected AEC costs.[8] We use 6 percent as a proxy value for the weighted average cost of capital for the utilities and renewable energy development firms. The projected total compliance costs are expected to increase each year as the percentage requirements of alternative energy increase. Two key variables, however, have been shown to have a demonstrable beneficial impact on containing AEPS compliance costs. First, Pennsylvania's energy efficiency and conservation program, known as Act 129, coupled with higher energy efficiency standards for appliances has curtailed the rate of energy consumption and therefore limits the number of AECs required for annual compliance. Second, a large influx of out-of-state solar development that is eligible for use towards AEPS compliance has significantly impacted the solar AEC values in Pennsylvania.

As shown in Table 7 below, the estimated cost of AEPS compliance in 2021 is approximately $158.5 million. To put these figures in perspective, the average annual statewide customer

[8] U.S. Energy Information Administration - Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2015
https://www.eia.gov/forecasts/archive/aeo15/pdf/electricity_generation_2015.pdf

expenditures on electric service totaled approximately $15.1 billion in 2014.[9] The cost estimates were broken down by the types of AECs, namely Solar, Tier I (non-solar) and Tier II. The AEC prices used in this analysis are based on historical pricing as reported by the AEPS Program Administrator (available on the PUC's website[10]), as well as the results of EDC default service solicitations, with preferential weighting given to more recent solicitation results, and some assumptions as to the potential credit pricing into the near future.

TABLE 7: ESTIMATED STATEWIDE AEPS COST OF COMPLIANCE IN 2021*

EDC	Solar Credits		Tier I Credits		Tier II Credits		Total Cost
	Credits Needed	Solar Credits @ $20	Credits Needed	Tier I Credits @ $20	Credits Needed	Tier II Credits @ $0.20	
Duquesne	67,141	$842,505	1,007,119	$ 12,637,577	1,342,825	$168,501	$ 13,648,583
Met Ed	70,837	$888,876	1,062,550	$ 13,333,141	1,416,733	$177,775	$ 14,399,792
Penelec	70,792	$888,322	1,061,887	$ 13,324,827	1,415,850	$177,664	$ 14,390,813
Penn Power	24,069	$302,029	361,042	$ 4,530,438	481,389	$60,406	$ 4,892,873
PECO	194,027	$2,434,701	2,910,408	$ 36,520,521	3,880,544	$486,940	$ 39,442,163
PPL	185,630	$2,329,331	2,784,449	$ 34,939,958	3,712,599	$465,866	$ 37,735,154
UGI	5112	$64,152	76,686	$ 962,276	102,248	$12,830	$ 1,039,258
West Penn	114,875	$1,441,481	1,723,126	$ 21,622,214	2,297,502	$288,296	$ 23,351,992
Citizens'	942	$11,822	14,132	$ 177,328	18,842	$2,364	$ 191,515
Pike County	408	$5,116	6,116	$ 76,742	8,154	$1,023	$ 82,882
Wellsboro	635	$7,969	9,526	$ 119,535	12,701	$1,594	$ 129,098
Totals	734,469	$9,216,304	11,017,041	$138,244,557	14,689,388	$1,843,261	$149,304,122

*Estimated costs reflect application of a 6% discount rate

RENEWABLE ENERGY ECONOMIC BENEFITS - JOBS, EXPORTS, WAGES

Economic development associated with the development and deployment of renewable and alternative energy sources was a significant consideration in support of the passage of the AEPS. Since its inception, the AEPS has resulted in sustaining and creating thousands of jobs and business ventures associated with all aspects of renewable and alternative energy generation.

The *Clean Jobs Pennsylvania* report cites that Pennsylvania has a renewable energy workforce of 13,345. The companies supporting these jobs are typically small businesses of

[9] *See* U.S. Energy Information Administration – Electric Power Annual 2014 February, 2016, Table 2.9 http://www.eia.gov/electricity/annual/

[10] *See* PA PUC – Pricing for AEC Sales - http://www.puc.pa.gov/consumer_info/electricity/alternative_energy.aspx

25 or fewer employees. The report also states that 37,468 Pennsylvanian's are employed in the energy efficiency sector, a Tier II resource of the AEPS.[11]

In 2015 approximately 13.5 MW of solar-electric generating capacity was installed in PA. Of this total, 445 systems, amounting 9.3 MW, were eligible for net metering. One system was installed at a commercial facility, with a nameplate capacity of 4.2 MW. These installations at private residences, businesses and institutions help sustain a Pennsylvania workforce of nearly 2,500 that are engaged in all aspects from manufacturing, sales, distribution and installation of solar power components and systems and related support services.[12] Nationally, the average hourly wage for those engaged in the actual installation of solar energy systems is $21; higher still for those involved in the installation of utility-scale solar farms.[13]

There was no in-state commercial wind energy capacity installed in 2015 although, at least one wind farm was moving through the planning and approvals phase with construction expected to begin in 2016. In its most recent reports, the American Wind Energy Association (AWEA) reports the total number of direct and indirect jobs, supporting the wind industry in 2015 in Pennsylvania was in excess of 1,000. This includes jobs at 26 in-state manufacturing facilities. Companies such as the Spanish wind energy firm, Gamesa and wind farm development firm EverPower Wind Holdings have located their North American headquarters in Pennsylvania. In its Pittsburgh headquarters, EverPower employs 40 full-time and three part-time employees. Although Gamesa shuttered its in-state manufacturing shortly after the recession, the company has provided information indicating that it maintains warehousing, repair facilities and a team of field technicians. Combined, Gamesa's presence in Pennsylvania employs over 200 people. Additionally, wind farm development employs hundreds of highly-skilled people from an array of well-paying technical trades with each wind farm typically requiring a permanent crew of up to 15 people to oversee the maintenance and continued operation of the turbines. AWEA has generally reported that every megawatt of installed wind generating capacity creates $1 million in economic development, which would equate to approximately $1.4 billion however; AWEA specifically states in its "Pennsylvania Wind Energy" fact sheet that the development of wind farms in the Commonwealth has resulted in a $2.7 billion investment. Aggregated data reported by various news and media sources indicates that Pennsylvania school tax payments, other municipal property tax payments and landowner lease payments made by wind energy companies is equal to about $8 million annually.

With respect to hydropower, in 2014, Pennsylvania realized incremental generating capacity additions of 133 MW. Most of this incremental growth was larger-scale hydropower; all of this

---

[11] Clean Jobs Pennsylvania – Sizing Up Pennsylvania's Clean Energy Jobs Base and its Potential, 2014 http://www.cleanjobspa.com/

[12] *State Solar Jobs Census Compendium 2015*, The Solar Foundation, available at: http://www.thesolarfoundation.org/

[13] *National Solar Jobs Census 2015*, The Solar Foundation, available at: http://www.thesolarfoundation.org/

capacity was certified according to the Low Impact Hydropower Institute and therefore received Tier I certification. Supporting part of this growth in hydropower are two of the world's largest turbine manufacturers, Voith Hydro and Weir American Hydro, both Pennsylvania companies. According to the National Hydropower Association, approximately 325 Pennsylvania businesses are part of the hydropower supply chain. The largest of these businesses is Voith Hydro whose York County manufacturing facility employs more than 550 people. There is a renewed interest in Pennsylvania to consider developing other low-impact hydropower resources, many of which can simply take advantage of existing infrastructure. Analysis of a 2014 study issued by the Oak Ridge National Laboratory indicates more than 600 MW of potential hydropower could be developed at sites with existing water control infrastructure.[14] An earlier Navigant Consulting study indicates that for every 1 MW of hydropower generating capacity developed, the equivalent of 5.3 full time jobs is created.[15] From February 2014 through May 2015, the Federal Energy Regulatory Commission (FERC), which has permitting oversight for hydropower projects, has issued Active Preliminary Permits and/or Pending Licenses to Pennsylvania hydropower projects with an aggregate nameplate generating capacity of 335 MW. The passage of the federal Hydropower Regulatory Efficiency Act of 2013 helps to streamline some of the FERC permitting/licensing requirements for smaller hydropower projects and undoubtedly will facilitate the development of some smaller projects.

Pennsylvania continues to invest in renewable and alternative energy projects. In 2014, the Pennsylvania Energy Development Authority (PEDA) provided financial assistance to 17 projects across the commonwealth deploying solar, biomass, anaerobic digesters and energy efficiency/demand management projects. In doing so, PEDA provided $8.6 million in grant funding to these projects to leverage $65 million of private investment and in-kind resources. These projects are estimated to result in a combination of 700 temporary and full-time jobs, including aspects such as site design, construction and long-term O&M. The combined lifetime economic impact of these investments is estimated at more than $357 million.

[14] *New Stream-reach Development: A Comprehensive Assessment of Hydropower Energy Potential in the United States, 2014*

[15] *Job Creation Opportunities in Hydropower, 2009*

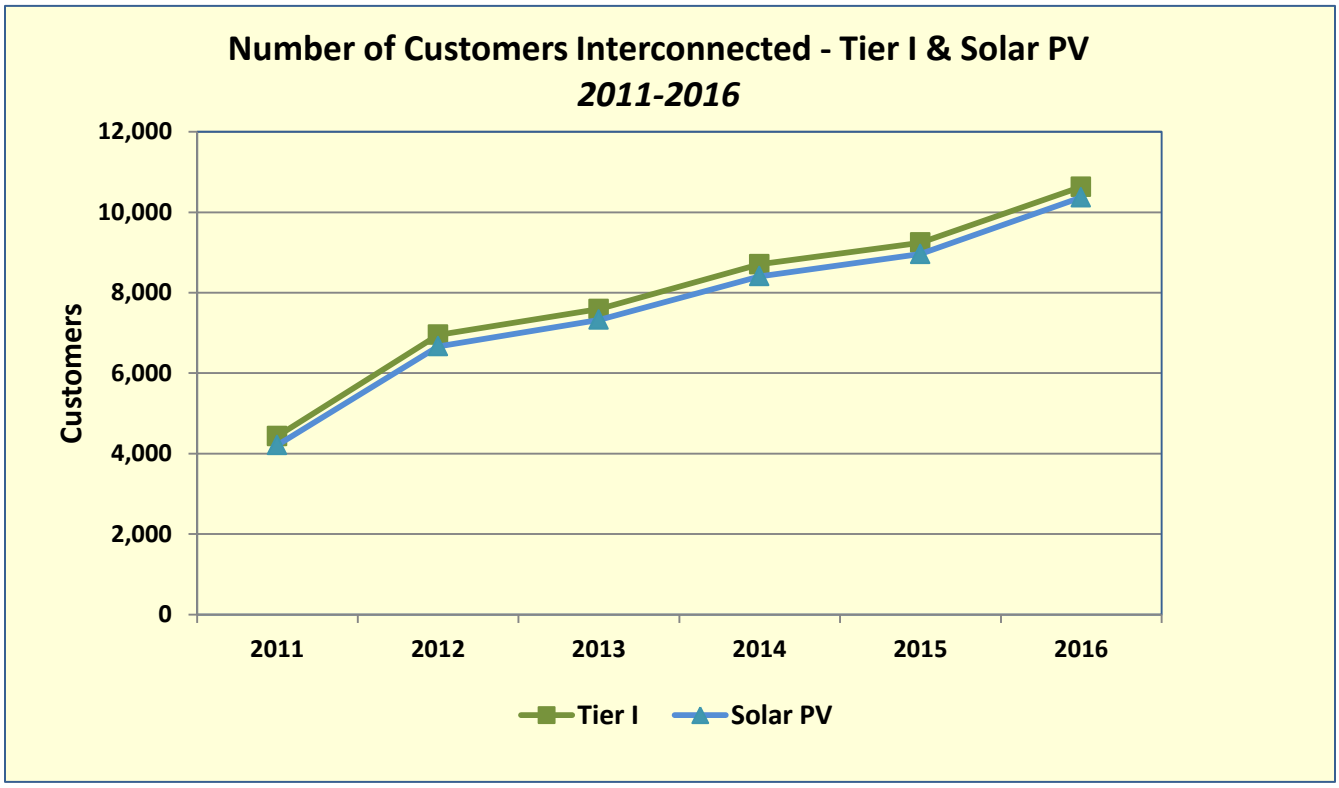
SECTION 4 STATUS OF PA'S ALTERNATIVE ENERGY PORTFOLIO STANDARDS MARKETPLACE

This section discusses renewable and alternative energy data trends and generation capacity both in Pennsylvania and in the PJM region. Specifically, this section compares the amount of renewable and alternative generation available and that which will be needed to meet future AEPS requirements.

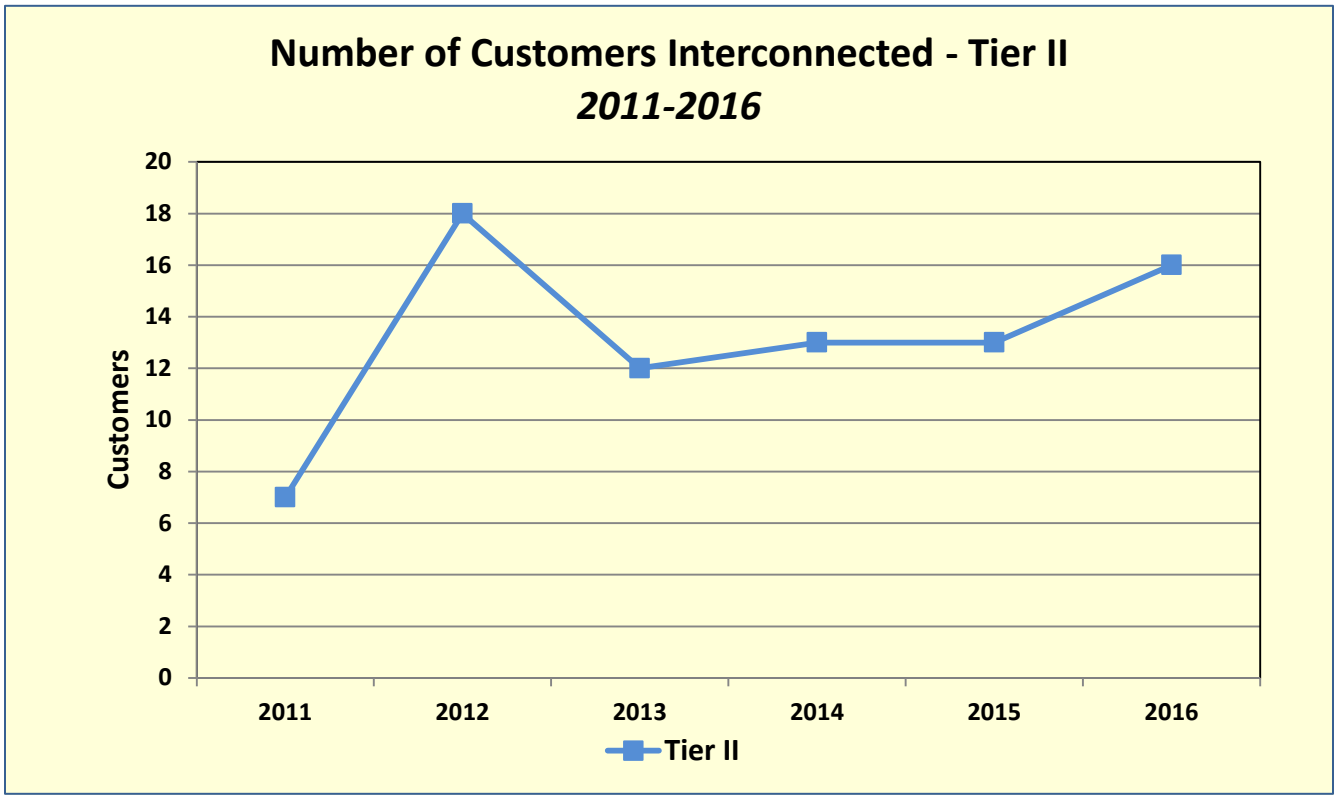
AEPS DATA TRENDS

The following graphs are illustrative of the growth of AEPS resources, within Pennsylvania, from 2011 through May 31, 2016 and of the AEC price trend through this same time period. Graphs 1 and 2 reveal the cumulative number of Pennsylvania customers who received electrical interconnections for their Solar, total Tier I (inclusive of solar) and Tier II generation systems. Graphs 3 and 4 show the cumulative nameplate electric generating capacities for Solar, Tier I non-solar, and Tier II installations. As noted in Graphs 2 and 4 there have been gains and losses of Tier II resources.

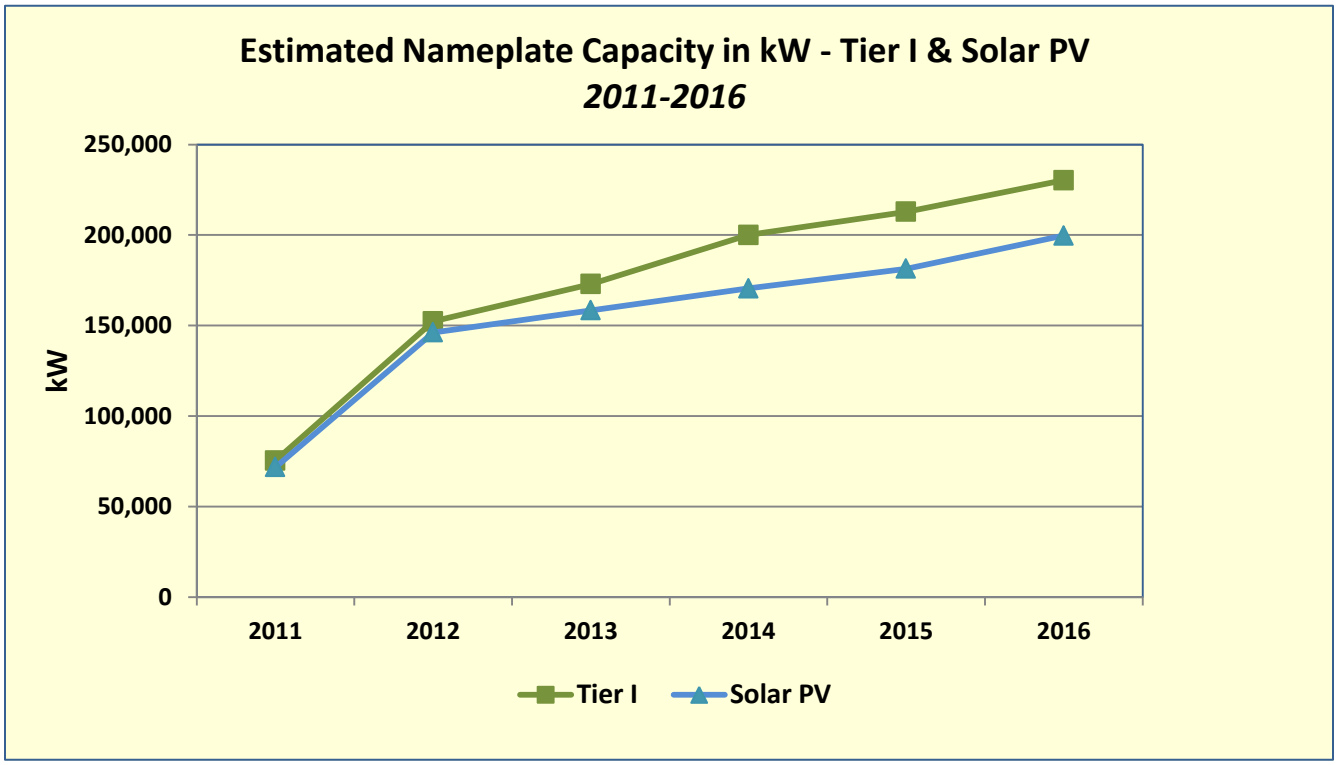
GRAPH 1: NUMBER OF TIER I AND SOLAR PV CUSTOMERS INTERCONNECTED PER YEAR



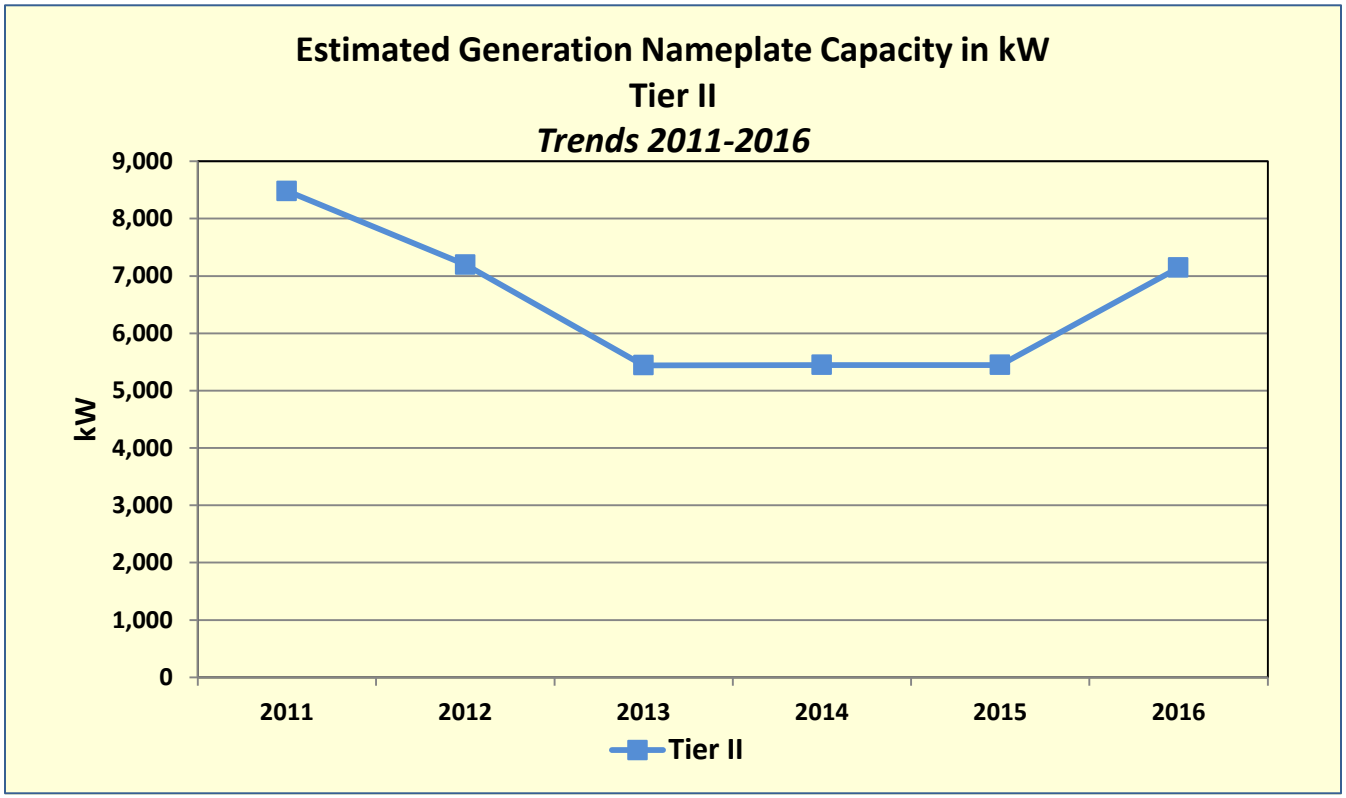
GRAPH 2: NUMBER OF TIER II CUSTOMERS INTERCONNECTED PER YEAR



GRAPH 3: CUMULATIVE TIER I AND SOLAR NAMEPLATE CAPACITY

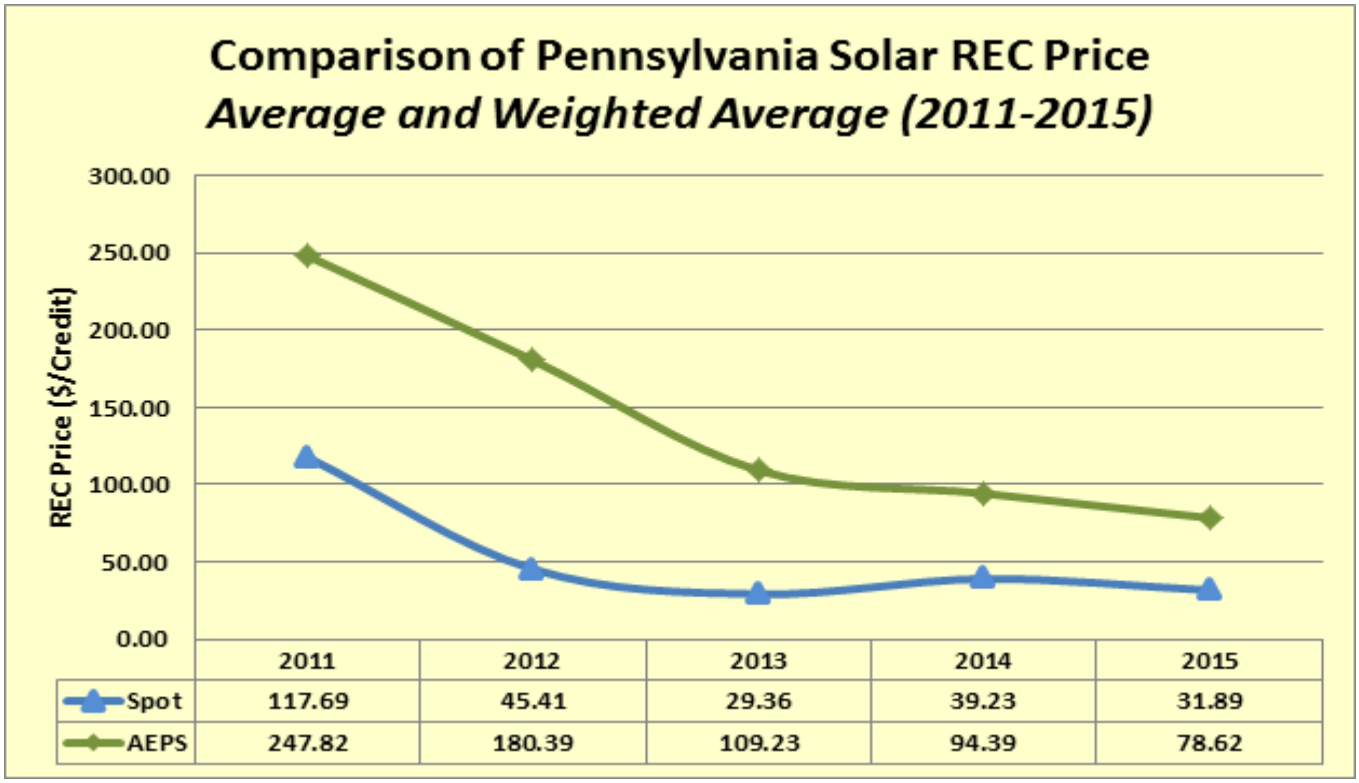


GRAPH 4: CUMULATIVE TIER II NAMEPLATE CAPACITY

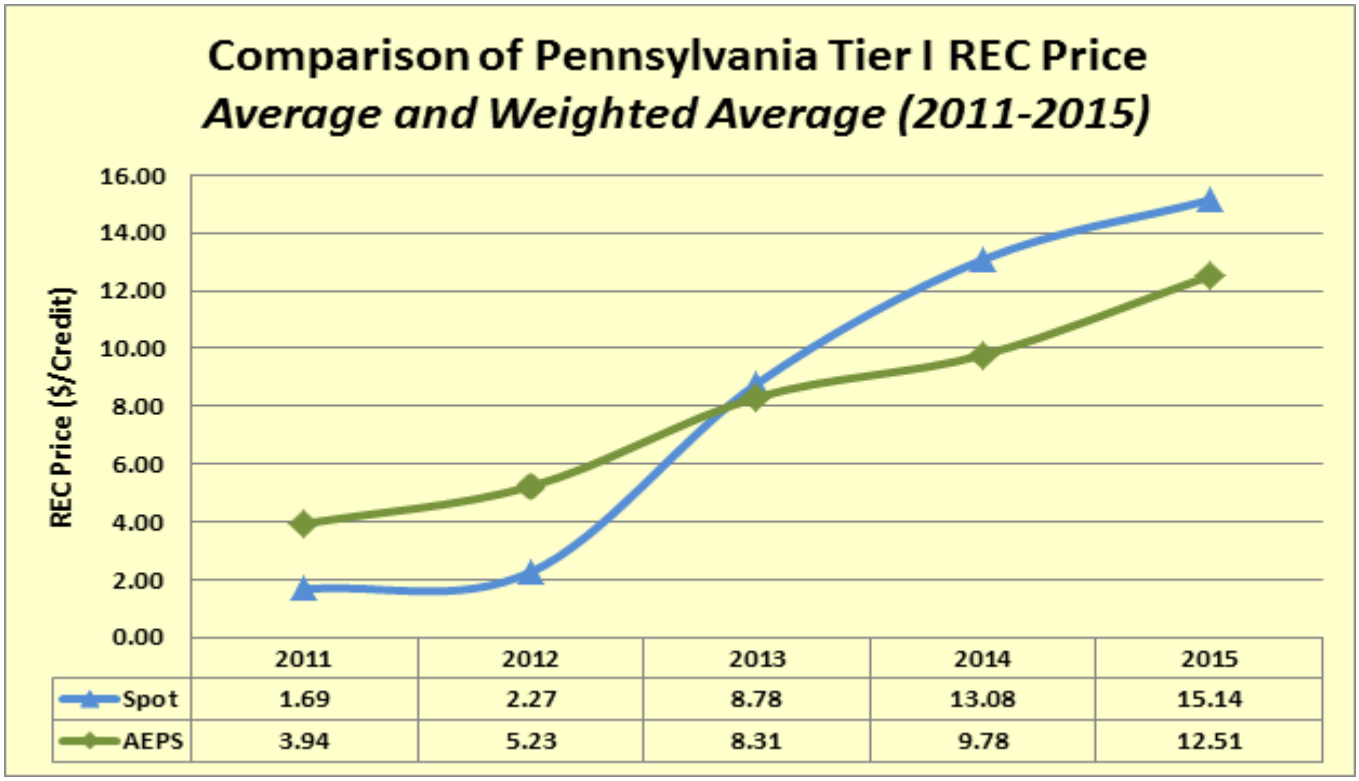


Graphs 5, 6 and 7, on the following pages, provide a comparison of average spot market prices for the given AEPS tiers, as compared to the weighted average credit prices that have been retired for AEPS compliance. These graphs illustrate the differences between average spot market prices that most readers may be accustomed to seeing and the weighted average prices of credits retired for AEPS compliance. The reason for this difference is because a significant volume of credits retired for AEPS compliance are purchased as part of long-term procurement processes.

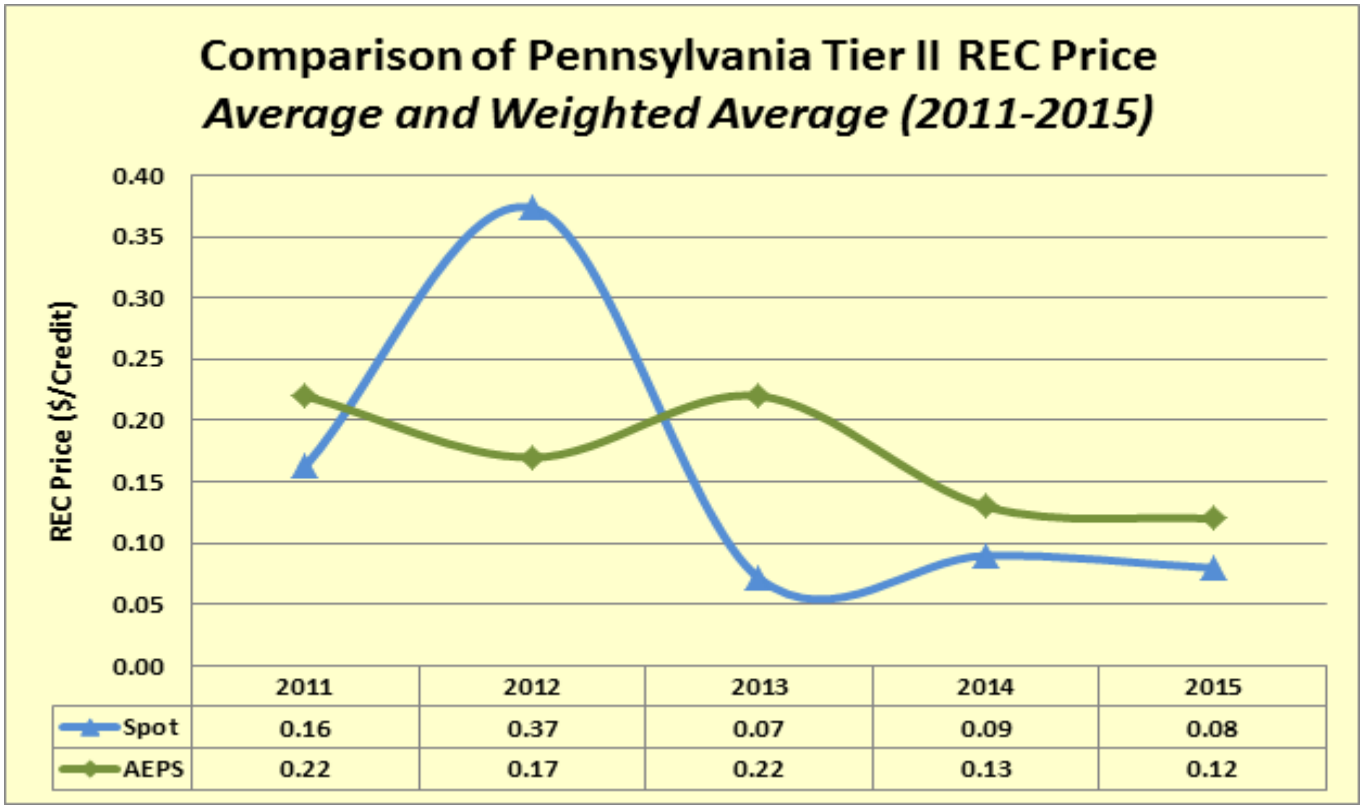
GRAPH 5: SOLAR AVERAGE SPOT MARKET VS. WEIGHTED AVERAGE AEPS CREDIT PRICES



GRAPH 6: TIER I AVERAGE SPOT MARKET VS. WEIGHTED AVERAGE AEPS CREDIT PRICES



GRAPH 7: TIER II AVERAGE SPOT MARKET VS. WEIGHTED AVERAGE AEPS CREDIT PRICES



	2011	2012	2013	2014	2015
Spot	0.16	0.37	0.07	0.09	0.08
AEPS	0.22	0.17	0.22	0.13	0.12

RENEWABLE AND ALTERNATIVE ENERGY GENERATION CAPACITY IN PENNSYLVANIA AND PJM

The Pennsylvania AEPS website[16] maintains a summary of qualified generation facilities and qualified energy efficiency and demand-side management (EE/DSM) resources. There were 10,775 qualified generation facilities certified as of May 31, 2015. Of those qualified generation facilities, 7,923 facilities (74 percent) are located in Pennsylvania and 2,864 facilities are located outside of Pennsylvania.

Statistics for AEPS-registered generators, as of May 31, 2015, include:

- 7,923 generators located in Pennsylvania with a total nameplate generating capacity of 7,635 MW (see footnote below Table 8 for additional clarifications of totals)
- 2,864 generators located outside of Pennsylvania with a total nameplate generating capacity of 12,852 MW
- 7,780 solar facilities in Pennsylvania with a total nameplate generating capacity of 219 MW
- 2,678 solar facilities outside of Pennsylvania with a total nameplate generating capacity of 269 MW

[16] http://paaeps.com/credit/

Table 8 summarizes the active, certified alternative energy resources by type, as defined within the AEPS, and the capacity of each type in and outside of Pennsylvania. Generator facilities using biomass are further disaggregated by those using cellulosic or woody biomass and those using black liquor, a by-product of the wood pulping industry. Similarly, biologically derived methane gas is separated into anaerobic digester gas and landfill gas. In some instances a qualifying AEPS fuel may not be the primary fuel used at a facility for generating electricity. In such cases listing the nameplate capacity of the generator can cause confusion so we have indicated when an AEPS fuel resource is not the primary fuel used in electricity generation.

TABLE 8: AEPS EXISTING CAPACITIES OF CERTIFIED, ACTIVE FACILITIES

AEPS Tier	Alternative Energy Resource Types	Nameplate Capacity of Facilities in PA (MWs)	Nameplate Capacity of Facilities Outside of PA (MWs)	Total Nameplate Capacity (MWs)
I	**Biomass Energy**	**212.0**	**1,030.2**	**1,242.2**
	Cellulosic (woody) Biomass	48.5	1,030.2	1,078.7
	Black Liquor	163.5	0.0	163.5
I	**Coal Mine Methane (primary fuel source)**	**0.8**	**0.0**	**0.8**
I	**Coal Mine Methane (secondary fuel source)**	**0.0**	**88.0**	**88.8**
I	**Low-Impact Hydropower**	**175.8**	**2.2**	**178.0**
I	**Biologically Derived Methane Gas**	**1,570.2**	**1,106.3**	**2,676.5**
	Anaerobic Digester Gas (primary fuel source)	13.6	2.4	19.0
	Anaerobic Digester Gas (secondary fuel source)	0.0	446.0	446.0
	Landfill Gas (primary fuel source)	218.6	600.9	819.5
	Landfill Gas (secondary fuel source)	1,338.0	57.0	1,395.0
I	**Solar PV**	**223.2**	**269.5**	**492.7**
I	**Wind**	**1,304.6**	**4,606.4**	**5,911.0**
I	**TOTAL of Tier I**	**3,486.6**	**7,105.6**	**10,592.2**
II	**Biomass Energy**	**0.0**	**429.4**	**429.4**
	Cellulosic (woody) Biomass	0.0	0.0	0.0
	Black Liquor	0.0	429.4*	429.4*
II	**Distributed Generation**	**5.0**	**0.0**	**5.0**
II	**Hydropower**	**2,217.8**	**3,575.3**	**5,793.1**
	Conventional, Non-Low Impact	677.8	1,475.3	2,153.1
	Pumped Storage	1,540.0	2,100.0	3,640.0
II	**Municipal Solid Waste**	**252.4**	**449.6**	**702.0**
II	**Demand Side Management**	**88.5**	**137.6**	**226.1**

AEPS Tier	Alternative Energy Resource Types	Nameplate Capacity of Facilities in PA (MWs)	Nameplate Capacity of Facilities Outside of PA (MWs)	Total Nameplate Capacity (MWs)
	Energy Efficiency	0.0	3.5	3.5
	Blast Furnace Gas	52.5	126.9	179.4
	Other Gases	31.0	0.0	31.0
	Waste Heat	5.0	0.0	5.0
	Industrial By-product	0.0	7.2	7.2
II	**Waste Coal**	**1,582.9**	**244.6**	**1,827.5**
II	**TOTAL of TIER II**	**4,146.6**	**4,833.0**	**8,979.6**
I & II	**TOTAL of TIERS I & II**	**7,633.2**	**11,938.6**	**19,571.8**

* Several facilities have the capability of utilizing multiple fuel sources that may include a combination of Tier I, Tier II or even non-eligible AEPS fuels to generate electricity. For example, a facility may co-fire coal and biomass or blend landfill gas and natural gas. Methodologies are in place to ensure that only AEPS-qualified generation is awarded AEPS credits but it is not possible to designate a single, static AEPS nameplate capacity associated with these generators.

PJM manages grid interconnection requests in construction queues. Not all projects submitted to PJM for interconnection are constructed. Historically, for Pennsylvania, only about 24 percent of the interconnection requests from 1999 through 2015 led to projects that were actually built.[17] Table 9 summarizes the renewable generation in the queue for Pennsylvania as of May 31, 2015. Withdrawn projects and projects that are in service are not included.

TABLE 9: RENEWABLE GENERATION IN THE PJM CONSTRUCTION QUEUE FOR PENNSYLVANIA

Fuel Type	Nameplate MW
Wind	727
Solar	9
Biomass	16
Hydropower	
Conventional	0
Pumped Storage	40
Landfill Gas	16
Total	**808**

AEPS allows Pennsylvania EDCs and EGSs to purchase AECs from the entire PJM region and not just those generated in Pennsylvania. PJM has substantial existing and proposed renewable generation capacity as detailed in Table 10.

[17] *See* PJM 2015 Regional Transmission Expansion Plan.

TABLE 10: INSTALLED (AS OF 5/31/15) AND PROPOSED RENEWABLE CAPACITY IN PJM

Fuel Type	Installed Capacity Nameplate MW[18]	Proposed Capacity Nameplate MW[19]
Wind	6,717	10,826
Solar	2,360	3,456
Hydro	2,591	1,387
Landfill Gas	846	78
Other Biogas	38	0
Wood	404	80
Total	**12,956**	**15,827**

PJM states with Renewable Portfolio Standards (RPS) include Pennsylvania, Michigan, Ohio, North Carolina, Illinois, Delaware, District of Columbia, Maryland, and New Jersey. Virginia and Indiana have RPS goals, Tennessee and Kentucky do not yet have a final RPS, and West Virginia has entirely rescinded its RPS program. In states with RPS requirements, the final requirements range from 10 percent of retail sales of electricity in North Carolina and Ohio (currently in a state of suspension) to 25 percent in Illinois and Delaware by 2025.

The RPS requirements of the PJM states and the District of Columbia vary considerably regarding generation resources eligible to meet the requirements. Differences are found in the types of renewable and/or alternative energy generation resources that qualify. Some states allow resources that are not permitted by other states. Also, some states use credit multipliers for certain generation resources, allowing certain resources to earn double or triple the amount of credits per MWh of generation. Generation facility location is another matter where the states differ. Some states require acceptable generation facilities to be located within that state. Other states accept credits from qualifying resources that originate from anywhere within the PJM control area and some states accept credits from resources outside of PJM. Also, within some states, EDCs, EGSs and municipal utilities have different requirements under their RPS.

Understanding the potential marketplace for Pennsylvania's AEPS is an arduous task due to numerous factors which must be considered, such as those previously referenced. To meet our AEPS requirements, EDCs and EGSs can purchase AECs from sources outside of Pennsylvania but within the PJM region. Based on existing resources within PJM and with some assessment of other state requirements, staff estimates that adequate Tier I and Tier II supply exists through 2021. However, the Act requires the Commission to also work with DEP to "identify needed methods to maintain or increase the relative competitiveness of the alternative energy market within this Commonwealth."

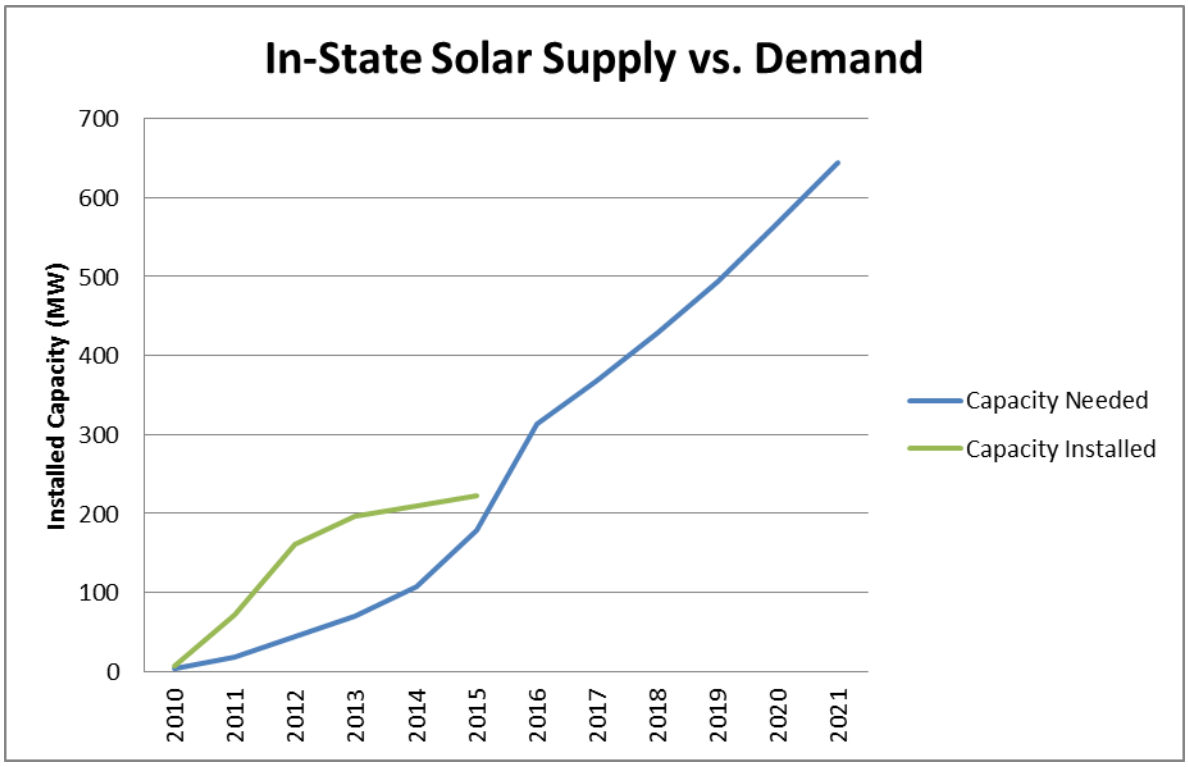
[18] PJM-EIS Public Reports, Renewable Generators Registered in GATS
[19] PJM queue. Includes "Active" and projects "Under Construction"

Current Pennsylvania REC/AEC prices are lower than adjacent states and others within PJM. This is a factor of two main design criteria, the annual percentage obligation for each tier and the geographic scope of eligibility. Compared to other PJM states with renewable portfolio standards, PA AEPS obligations may be characterized as modest and Pennsylvania's geographic scope from which credits can be obtained for compliance is larger. Holding all else equal, lower AEC prices may be viewed as an impediment to greater deployment of renewable and alternative energy systems and the economic development associated with that deployment. Although, it should not be forgotten that lower AEC prices help to keep end-use bills lower. Solar leasing programs, which are relatively new in the Commonwealth, are seemingly invalidating the argument that low AECs stymie deployment. However, conventional and large-scale solar development appears to still be challenged by these lower credit values. Aside of private-party leasing programs that offer attractive rates for customers, some examples of opportunities that could be used to bolster in-state development of AEPS resources include tax credits for qualifying installations; sales tax exemptions for the purchase of equipment and installation; establishment of green bank financing[20] to leverage private investments; limiting the geographic scope from which credits may be obtained for compliance; providing a credit value multiplier for Pennsylvania-sourced credits; increasing the AEPS requirements; and, allowing for community solar projects.

Graph 8 provides a comparison of Pennsylvania's solar requirement to in-state installed capacity. The graph shows that Pennsylvania will not be able to meet its solar requirement without drawing from resources in other states, unless significant increases in our own installed capacity are realized in each of the next several years. Even if all the solar projects proposed for Pennsylvania in the PJM planning queue came to fruition it would still only add an additional 9 MW of installed capacity. The PJM queue however, is not a good indicator of solar development given that most solar development tends to be small, distributed and behind-the-meter projects that are not tracked by the queue. Despite this the graph illustrates that very likely, a significant and increasing percentage of out-of-state solar credits will be necessary to comply with the annual solar requirements of the AEPS.

[20] Green banks are financing authorities that use limited public funds to leverage greater private investments in clean energy and energy efficiency projects.

GRAPH 8: SOLAR MARKET PLACE IN PA ONLY



Note: Solar PV supply in Graph 1 includes existing supply and 25 percent of the new capacity in the PJM construction queues. It does not account for small, behind the meter systems.

Projected solar demand for Pennsylvania is summarized in Table 11. Please note that a capacity factor[21] of 13 percent was used for this table.

TABLE 11: SOLAR DEMAND FOR PENNSYLVANIA AND INSTALLED CAPACITY

Year	Generation Requirement (MWh)	Estimated Needed Capacity (MW)	Capacity Installed in Pennsylvania
2015	204,255	179	223
2016	356,049	313	
2017	419,460	368	
2018	488,333	429	
2019	562,615	494	
2020	647,152	568	
2021	734,469	645	

[21] The relative percentage of time a generator actually produces electricity

SECTION 5 RECOMMENDATIONS FOR PROGRAM IMPROVEMENTS

PROPOSED RULEMAKING

The Commission determined that it was necessary to update and revise its regulations to comply with Act 129 of 2008, and Act 35 of 2007, and to clarify certain issues of law, administrative procedure and policy. On Feb. 20, 2014, the Commission issued a Notice of Proposed Rulemaking (NoPR) for public comment. The Proposed Rulemaking Order and proposed rules were published in the *Pennsylvania Bulletin* on July 5, 2014, at 44 Pa.B. 4179. The initial comment period deadline was extended at the Request of the Pennsylvania Department of Agriculture. The deadline was extended to Sept. 3, 2014. The Commission received comments from numerous interested parties, as well as from the Independent Regulatory Review Commission (IRRC). On April 23, 2015, the Commission issued an Advance Notice of Final Rulemaking (ANoFR) which included changes to several proposed rules based on public comments received for the NoPR. The ANoFR and proposed rules were published in the *Pennsylvania Bulletin* on May 9, 2015, at 45 Pa.B. 2242. Comments were due within 20 days of the publication of the proposed rules in the *Pennsylvania Bulletin* or May 29, 2015.

The Commission continues to finalize the proposed rules, in consideration of the comments received. A summary of the proposed changes follows:

- The addition of definitions for aggregator, default service provider, grid emergencies, micro-grids and moving water impoundments.
- Revisions to the interconnection rules to reflect the increase in limits on customer-generator capacity contained in the Act 35 of 2007 amendments.
- Revisions to net metering rules and inclusion of a process for obtaining Commission approval to net meter alternative energy systems with a nameplate capacity of 500 kilowatts or greater.
- Clarification of the virtual meter aggregation language.
- Clarification of net metering compensation for customer-generators receiving generation service from EDCs, default service providers and EGSs.
- Revisions to the definitions for low-impact hydropower and biomass to conform with the Act 129 of 2008 amendment.
- Addition of provisions for adjusting Tier I compliance obligations on a quarterly basis to comply with the Act 129 of 2008 amendments.
- Addition of provisions for reporting requirements for new low-impact hydropower and biomass facilities in Pennsylvania to comply with the Act 129 of 2008 amendments.
- Clarification of Commission procedures and standards regarding generator certification and the use of estimated readings for solar photovoltaic facilities.
- Clarification of the authority given to the Program Administrator to suspend or revoke the qualification of an alternative energy system and to withhold or retire past, current or future alternative energy credits for violations.
- Clarification of the process for verification of compliance with the AEPS Act.

- Standards for the qualification of large distributed generation systems as customer-generators.

The Commission's initial proposal was to allow net metered customers to produce their own electricity to provide up to 100% their need, plus an amount equal to 10 percent in excess of their needs (proposed 110% rule). In doing so, the proposed rule would have limited the availability of net metering to AEPS-qualifying systems not capable of producing more than 110% of the previous five-year historical average load for the customer. In its ANoFR, and based on public commentary, the Commission subsequently adjusted this percentage upward to 200%, and included a proposed exemption, drafted with the Departments of Agriculture and Environmental Protection, to exclude all anaerobic digester systems that are linked to either nutrient management plans or Chesapeake Bay clean water regulations. The regulatory process continued beyond the 2015 reporting year with changes made to the initial proposals. The Commission anticipates finalizing changes to the AEPS regulations in 2016.

SECTION 6 RECENT DEVELOPMENTS SINCE CLOSE OF THE COMPLIANCE YEAR

PROPOSED RULEMAKING

The Commission's proposed rulemaking continued beyond the AEPS compliance year ending on May 31, 2015. Comments and reply comments were received in response to the previously referenced ANoFR that was published in the *Pennsylvania Bulletin* on May 9, 2015, at 45 Pa.B. 2242.

On Sept. 2, 2015, Commission Chairman Gladys M. Brown provided testimony on net metering before the Pennsylvania House of Representatives Consumer Affairs Committee. Chairman Brown testified on the history of net metering and prior actions of the Commission in support of net metering. The Chair further testified on the Commission's ongoing rulemaking process and the Commission's rationale for changing and clarifying the long-standing rules and policies regarding the AEPS.

At public meeting on Feb.11, 2016, the Commission issued a final Rulemaking Order regarding implementation of the AEPS at Docket No. L-2014-2404361. That Order adopted final-form regulations that revised Chapter 75 of the Commission's regulations. The Order was subsequently delivered to the IRRC and the Legislative oversight Committees on March 22, 2016.

On May 19, 2016, the IRRC held a public meeting during which it reviewed and subsequently disapproved the PUC's final-form regulations. In its Disapproval Order dated June 2, 2016, the IRRC found that the Commission did not have the statutory authority to impose the proposed limits on net metering. In response to the IRRC's findings the Commission issued an Amended Final Rulemaking Order on June 9, 2016, that removed the non-statutory limits, in reference to the previously proposed 200% cap, on a customer-generator's ability to net meter excess generation. The amended Final Rulemaking Order was delivered to the IRRC and the Legislative oversight Committees on June 13, 2016.

At a public meeting on June 30, 2016, the IRRC reviewed the modified final-form regulations and again disapproved the regulations. In its disapproval Order dated July 12, 2016, the IRRC found that the Commission's deletion of the non-statutory limits on net metering, coupled with the revised definition of "utility", created an unclear and ambiguous regulation. The IRRC further stated that they were not convinced of the need for all provisions of this rulemaking, noting that while the limit was deleted from the rulemaking, other unspecified provisions appear to limit a customer-generator's ability to net meter.

The Pennsylvania House Consumer Affairs Committee and the Senate Consumer Protection and Professional Licensure Committee had thirty days from July 12, 2016, to act on the IRRC's Disapproval Order. Since neither Committee issued a concurrent resolution to the IRRC order, the final form regulation package was deemed approved by the Committees. Subsequently,

on August 11, 2016, the Commission submitted to the Attorney General's office the modified final-form regulations for review as to form and legality and as required by the Regulatory Review Act.

As of the issuance of this report, the Commission is still considering next steps, pending the outcome of the Attorney General's Office review of the modified-final form regulations.

QUARTERLY ADJUSTMENT

Act 129 of 2008, P.L. 1592, (Act 129) was signed into law on Oct. 15, 2008, and which took effect 30 days thereafter on Nov. 14, 2008. Section 5 of Act 129 adds Section 2814 to the Pennsylvania Public Utility Code. Section 2814 expands the types of alternative energy sources that qualify as Tier I alternative energy sources under the AEPS Act to include specific categories of low impact hydropower and biomass energy. Specifically, Section 2814 added to Tier I, Pennsylvania municipality-owned and Pennsylvania electric cooperative-owned hydropower facilities that held a Federal Energy Regulatory Commission (FERC) hydropower license on July 1, 2007 and which was issued on or before Jan. 1, 1984, whose nameplate capacity was 21 megawatts or less. Section 2814 also added generation of electricity from Pennsylvania facilities that utilize byproducts of the pulping process and wood manufacturing process, including bark, wood chips, sawdust and lignins in spent pulping liquors to the Tier I Biomass definition. Section 2814 further requires the Commission to increase, at least quarterly, the percentage share of Tier I resources to be sold by EDCs and EGSs to reflect any new Tier I resources added as a result of this amendment.[22]

On May 28, 2009, the Commission adopted a Final Order[23] at Docket Number M-2009-2093383 that established the procedures and guidelines to follow for low-impact hydropower facilities and generators utilizing by-products of pulping and wood manufacturing processes to follow in order to qualify as a Tier I resource. The Final Order also established reporting requirements and related procedures that the Commission uses to adjust the AEPS Act Tier I requirements that EDCs and EGSs must meet to account for the newly qualified Tier I resources.

On July 8, 2016, the Commission notified all EGSs and EDCs by Secretarial Letter that it discovered an error in how the non-solar Tier I quarterly adjustments had previously been calculated. The July 8, 2016 Secretarial Letter explained that the Commission has corrected this error for the 2016 compliance year. Although the Secretarial Letter referenced an increase of approximately 7%, when in reality it was an increase of approximately 7% of the 5.25%

[22] See 66 Pa. C.S. § 2814

[23] *See Implementation of Act 129 of 2008 Phase 4 – Relating to the Alternative Energy Portfolio Standards Act*, Final Order at Docket No. M-2009-2093383, entered on May 28, 2009.

unadjusted, non-solar requirement. The actual result was an absolute increase of about 0.37% to the unadjusted, non-solar Tier I requirement for a final adjusted Tier I obligation of 5.62%. In light of the miscalculation, the Commission requested comments on the impact of the quarterly adjustment obligation increase, on possible remedies to mitigate any impact, and on any other appropriate action to be taken by the Commission. As of the release of this report, the Commission is considering those comments and reply comments that have been received.

COMBINED HEAT AND POWER

Combined heat and power (CHP) CHP, sometimes referred to as cogeneration, is a type of distributed energy that takes the form of an integrated system located at or near a building or facility that provides at least a portion of the building's electrical load and uses thermal energy for space heating or cooling, process heating or cooling, refrigeration, or dehumidification. CHP represents a more efficient use of total energy consumption, reduces overall emissions, including greenhouse emissions, as compared to business-as-usual, and provides increased reliability to host facilities.

The Commission believes that there are several areas where EDCs and natural gas distribution companies (NGDCs) may be able to implement policies and practices that reduce barriers to the deployment of CHP projects. On Feb. 25, 2016 the Commission issued a Proposed Policy Statement[24] that establishes a biennial reporting requirement for EDCs and NGDCs regarding their efforts to eliminate obstacles to the deployment of CHP technologies and projects in the Commonwealth. The Commission sought and is reviewing comments and reply comments regarding the proposed policy statement and associated reporting requirements.

[24] See Proposed Policy Statement on Combined Heat and Power at Docket M-2016-2530484

APPENDIX A BACKGROUND

ALTERNATIVE ENERGY CREDIT

One AEC represents one megawatt hour (MWh) of qualified alternative electric generation from within the PJM footprint, whether self-generated, purchased along with the electric commodity, or purchased separately through a tradable instrument. The AEC does not represent the purchase of renewable energy, only the confirmation of the generation of renewable energy. Generators are permitted to use generation on site, sell the energy by contract, or participate in net metering if the facility is a customer-generator.

Generation output is confirmed by the PJM market settlement process or by metering of the generation system except for some small solar PV (<15 kW). AECs for solar PV systems that are not based on meter recordings of the generation output are calculated via the use of the National Renewable Energy Laboratory's (NREL's) PVWatts™ software to determine the energy production from the system. The PVWatts™ calculator works by creating hour-by-hour performance simulations that provide estimated monthly and annual energy production in kWh and energy value. Users can select a location and choose to use default values or their own system parameters for size, electric cost, array type, tilt angle and azimuth angle. In addition, the PVWatts™ calculator can provide hourly performance data for the selected location. There are two versions of PVWatts™ available. Pennsylvania uses Version 1 for the purposes of calculating estimates for solar generators participating in the PA AEPS program.

ALTERNATIVE ENERGY CREDITS REGISTRY

On Jan. 27, 2006, the PUC designated PJM Environmental Information Services Inc.'s (PJM-EIS) Generation Attribute Tracking System (GATS) as the alternative energy credits registry.[25] GATS provides an unbundled, certificate-based tracking system for use by electricity suppliers and other energy market participants to comply with state policies and regulatory programs. The GATS database contains information about each megawatt hour of electricity generated, including megawatt hours produced, emissions data, fuel source, location, state program qualification and ownership of attributes. Each certificate is given a unique serial number for tracking purposes. Varying levels of information in the registry are available to EDCs, EGSs, state regulators and the public.

GATS is not an online trading platform where potential buyers can bid for and purchase AECs. The actual sale of alternative energy certificates or credits, and any of its associated attributes, such as the emissions' attributes associated with carbon dioxide, nitrogen oxides and sulfur

[25] www.pjm-eis.com

dioxides, takes place outside of GATS between a buyer and seller. GATS simply records, after the fact, the ownership transfer of certificates representing certain attributes between two GATS subscribers.

In November 2015, the PUC contracted with InClime[26] to be the AEC Program Administrator for Pennsylvania until Dec.31,2018, with the option of a one-year extension from Jan. 1, 2019 until Dec. 31, 2019 and then another one-year extension from Jan.1, 2020 until Dec. 31, 2020. InClime was determined to be the successful bidder of the Alternative Energy Credits Administrator Request for Proposal issued May 2015 and the Commission approved the selection at Public Meeting Sept. 3, 2015. The previous AEC Program administrator from April 2007 through Dec. 31, 2015 was Clean Power Markets (CPM), a subsidiary of Enerwise Global Technologies.[27]

InClime verifies EGS and EDC compliance with requirements of the AEPS Act and works with DEP to administer the process of reviewing and qualifying alternative energy systems. InClime also tracks alternative energy credit prices, calculates ACP amounts, verifies data from behind–the-meter and energy efficiency/demand-side management, and confirms that the same alternative energy is not being claimed for compliance with another state's portfolio requirements. The company provides regular reports to the PUC and maintains a public website at http://www.pennaeps.com.

NET METERING

The PUC regulations governing net metering for customer-generators became effective Dec. 16, 2006, upon publication in the *Pennsylvania Bulletin*.[28] Net metering is defined as "the means of measuring the difference between the electricity supplied by an electric utility and the electricity generated by a customer-generator when any portion of the electricity generated by the alternative energy generating system is used to offset part or all of the customer-generator's requirements for electricity."[29] The net-metering requirements apply to EDCs that have customer-generators intending to pursue net-metering opportunities in accordance with the AEPS Act. EGSs may offer net metering to customer-generators under terms established in agreements between the EGS and the customer-generator taking service from the EGS.[30]

On July 17, 2007, Act 35 of 2007 was signed into law and amended a number of provisions of the AEPS Act, including the definition of net metering to include a restriction on virtual meter aggregation, described below as being within two miles.

---

[26] http://inclimesolutions.com/
[27] www.cleanpowermarkets.com, www.enerwise.com
[28] *See* 36 Pa.B. 7562 and 52 Pa. Code Ch. 75
[29] 73 P.S. §1648.2
[30] 52 Pa. Code § 75.13

VIRTUAL METER AGGREGATION

Virtual meter aggregation involves the combination of readings and billings for all meters, regardless of rate class, on properties owned or leased and operated by a single customer-generator, by means of the EDC's billing process, rather than through physical rewiring of the customer-generator's property for a physical, single point of contact. Virtual meter aggregation on properties owned or leased, and operated by a customer-generator, shall be allowed for purposes of net metering. Virtual meter aggregation shall be limited to meters located within two miles of the customer-generator's property and within a single EDC's territory.

INTERCONNECTION STANDARDS

The PUC's regulations establishing interconnection standards for customer-generators became effective Dec. 16, 2006.[31] The regulations promote onsite generation by customer-generators using alternative energy systems and eliminate barriers which may have previously existed regarding interconnection.

The interconnection regulations govern the process by which a customer-generator may interconnect onsite generation equipment to an electric utility's distribution lines. The regulations set forth specific levels of, and criteria for, review depending on the rated generation capacity of the generation equipment. The regulations also provide a dispute resolution process to manage disputes which may arise during the interconnection process. The application forms and associated fees were not included in the regulations, but were developed through a stakeholder process. The Commission's Interconnection Standards Working Group developed a set of standard application forms for use by customer-generators that wish to interconnect to an EDC's distribution network.[32] The application forms cover Level 2 through Level 4 projects.[33]

Level 1 application reviews require a flat fee of $100 per application. Level 2 applications establish a base fee of $250 plus $1 per kW of nameplate capacity rating of the customer-generator's facility, plus other review costs that may not exceed $100 per hour. Level 3 applications specify a base fee of $350 plus $2 per kW of the nameplate capacity rating of the customer-generator's facility, plus other review costs that may not exceed $100 per hour. For a Level 4 application, when the Level 4 application is processed using the Level 1, Level 2 or Level 3 review process, the fees set forth for those particular review levels should apply. No fee shall be assessed for an area network impact study conducted under Section 75.40. A Level 4 application reviewed under Section 75.40(d) is subject to a base fee of $350 plus $2 per KW of nameplate capacity rating of the customer-generator's facility.

---

[31] *See* 36 Pa.B. 7574, and 52 Pa. Code Ch. 75

[32] 52 Pa. Code Sections 75.21-75.5

[33] On Feb. 26, 2009, the forms were adopted by Commission Order and the associated application fees were adopted by Policy Statement. *See* 52 Pa. Code §§69.2101-69.2104.

Act 35 amended a number of provisions of the AEPS Act, including revising the definition of "customer-generator" to increase the capacity limit on non-residential projects from 1 MW to 3 MW and from 2 MW to 5 MW for those projects that operate in parallel with the grid during emergencies or where a micro grid is in place for maintaining critical infrastructure.

CHRONOLOGY OF EVENTS

Table 12 provides a snapshot of the key chronology of events to date.

TABLE 12 CHRONOLOGY OF EVENTS

Event	Date
Act 213 of 2004	Nov. 30, 2004
Act 213 of 2004 Effective Date	Feb.28, 2005
PUC Adopts Implementation Order I (M-00051865)	March 23, 2005
PUC Adopts Implementation Order II (M-00051865)	July 14, 2005
PUC Adopts Order: Standards for DSM Resources (M-00051865)	Sept. 25, 2005
PUC Adopts Order: Designates PJM GATS Registry (M-00051865)	Jan. 27, 2006
Final Net Metering/Interconnection Regulations in the *Pennsylvania Bulletin*	Dec. 16, 2006
PUC Contracts with Clean Power Markets as Program Administrator	March 28, 2007
Compliance Required for Pennsylvania Power Co. & UGI Utilities Inc.	May 31, 2007
Act 35 of 2007	July 19, 2007
Compliance Required for Citizens' Electric Co., Duquesne Light Co., Pike County Light & Power, and Wellsboro Electric Co.	Jan. 1, 2008
PUC Adopts Final Rulemaking Implementation Order (L-00060180)	Sept. 25, 2008
Act 129 of 2008	Oct. 15, 2008
Final Omitted Rulemaking Order (Net Metering) – Published in *PA Bulletin* (L-00050174)	Nov. 29, 2008
PUC Adopts Act 129 Implementation Order – Relating to AEPS	May 28, 2009
Compliance Required for PPL Electric Utilities	Jan.1, 2010
PUC Adopts Solar Policy Statement	Sept. 16, 2010

Event	Date
Compliance Required for PECO Energy Co., Pennsylvania Electric Co., Metropolitan Edison Co., and West Penn Power Co.	Jan. 1, 2011
PUC Adopts Policy Statement, Net Metering – Use of Third Party Operators	March 29, 2012
PUC Approves Selection of InClime as Program Administrator	Sept. 3, 2015

APPENDIX B PUC ORDERS

Orders are available on the PUC Web site at www.puc.pa.gov, click Electricity, Alternative Energy. Information is also available at http://www.pennaeps.com/.

Implementation of the Alternative Energy Portfolio Standards Act of 2004 (Implementation Order I), PUC Docket No. M-00051865, PUC Public Meeting on March 23, 2005, entered March 25, 2005

Implementation of the Alternative Energy Portfolio Standards Act of 2004 (Implementation Order II), PUC Docket No. M-00051865, PUC Public Meeting on July 14, 2005, entered July 18, 2005

Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources, PUC Docket No. M-00051865, PUC Public Meeting on Sept. 29, 2005, entered Oct. 3, 2005.

Implementation of the Alternative Energy Portfolio Standards Act of 2004: Designation of the Alternative Energy Credits Registry, PUC Docket No. M-00051865, PUC Public Meeting on Jan. 27, 2006, entered Jan. 31, 2006.

Final Rulemaking regarding Net Metering for Customer-generators pursuant to Section 5 of the Alternative Energy Portfolio Standards Act, 73 P.S. §1648.5, Docket No. L-00050174, and Implementation of the Alternative Energy Portfolio Standards Act of 2004: Net Metering, Docket No. L-00050175, PUC Public Meeting on June 22, 2006, entered June 23, 2006.

Implementation of the Alternative Energy Portfolio Standards Act of 2004, Docket No. L-00060180, PUC Public Meeting on July 20, 2006, entered July 25, 2006.

Final Rulemaking regarding Interconnection Standards for Customer-generators pursuant to Section 5 of the Alternative Energy Portfolio Standards Act, 73 P.S. §1648.5, Docket No. L-00050175, and Implementation of the Alternative Energy Portfolio Standards Act of 2004: Interconnection Standards, Docket No. M-00051865, PUC Public Meeting on Sept. 15, 2006, entered Sept. 19, 2006.

Implementation of the Alternative Energy Portfolio Standards Act of 2004, Docket No. M-00051865, PUC Public Meeting on Nov. 30, 2006, entered Dec. 5, 2006.

Petition for Declaratory Order Regarding Ownership of Alternative Energy Credits Associated with Non-Utility Generating Facilities Under Contract to Pennsylvania Electric Company and Metropolitan Edison Company, Docket No. P-00052149, PUC Public Meeting on Dec. 21, 2006, entered Feb. 12, 2007.

Petition for Declaratory Order Regarding Ownership of Alternative Energy Credits Associated with Non-Utility Generating Facilities Under Contract to Pennsylvania Electric Company and Metropolitan Edison Company, Petition for Reconsideration of Viking Energy of Northumberland, Docket No. P-00052149, PUC Public Meeting on May 30, 2007, entered May 31, 2007.

Implementation of Act 35 of 2007; Net Metering and Interconnection, Docket No. L-00050174, PUC Public Meeting on May 22, 2008, entered July 2, 2008.

Implementation of the Alternative Energy Portfolio Standards Act of 2004, Docket No. L-00060180, PUC Public Meeting on Sept. 25, 2008, entered Sept. 29, 2008.

Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standard Interconnection Application Forms, Docket No. M-00051865, PUC Public Meeting on Feb. 26, 2009, entered Feb. 27, 2009.

Implementation of Act 129 of 2008 Phase 4 – Relating to the Alternative Energy Portfolio Standards Act, Docket No. M-2009-2093383, PUC Public Meeting on May 28, 2009, entered on May 28, 2009.

Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual Update, Docket No. M-00051865, PUC Public Meeting on May 28, 2009, entered on June 1, 2009.

Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual Update, Docket No. M-00051865, PUC Public Meeting on June 3, 2010, entered on June 8, 2010.

Policy Statement in Support of Pennsylvania Solar Projects, Docket No. M-2009-2140263, entered Sept. 16, 2010.

Policy Statement regarding Net Metering – Use of Third Party Operators, Docket No. M-2011-2249441 entered March 29, 2012.

PA Public Utility Commission
P.O. B ox 3265
Harrisburg, PA 17105-3265
www.puc.pa.gov

PA Department of Environmental Protection
P.O. Box 2063
Harrisburg, PA 17105-2063
www.dep.pa.gov