# 2008 and 2009 Annual Reports
# 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

# 2008 and 2009 Annual Reports
# Alternative Energy Portfolio Standards Act of 2004

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## Executive Summary

The Alternative Energy Portfolio Standards (AEPS) Act of 2004 requires electric distribution companies (EDCs) and electric generation suppliers (EGSs) to supply 18 percent of electricity using alternative energy resources by 2021. The percentage of Tier I and Tier II resources that must be included in sales to retail customers gradually increases over this period.[1] The solar photovoltaic (PV) requirement is a component of the Tier I obligation. Act 35 of 2007 subsequently adjusted the photovoltaic percentages to smooth out the yearly increments needed to obtain the 2021 goal. EDCs and EGSs meet their AEPS requirements through the purchase of alternative energy credits (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 the electricity.

The EDCs and EGSs subject to compliance standards under the AEPS met their obligations for reporting years 2008 and 2009 through the purchase of AECs and/or by making alternative compliance payments (ACPs).[2] Compliance for the 2009 reporting year for two entities is under review by the Commission to determine if the credits reserved were eligible for compliance.

This report covers the two reporting periods of June 1, 2007 to May 31, 2008 (reporting year 2008) and June 1, 2008 to May 31, 2009 (reporting year 2009). The Commission recognizes that information contained in this report is valuable to many interests and plans to issue subsequent reports annually to provide timely information to interested stakeholders.

Pennsylvania Power Company (Penn Power) and UGI Utilities, Inc. - Electric were required to comply with the law beginning in 2007. Citizens' Electric of Lewisburg, Duquesne Light Company, Pike County Light and Power, and Wellsboro Electric Company were required to comply with the law beginning Jan. 1, 2008. In addition, seventeen EGSs recorded sales during one or both of the two reporting periods and therefore had compliance obligations for one or both periods. The EGSs include Constellation New Energy, ConEdison Solutions, Direct Energy Business, Dominion Retail, Duquesne Light Energy, Duquesne Light Company HPS, FirstEnergy Solutions, GDF Suez Energy Resources, Hess Corporation, Integrys Energy Services, Linde Energy Services, Pepco Energy Services, Reliant Energy Services, Sempra Energy Solutions, Strategic Energy, Suez Energy Resources and UGI Energy Services.

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[1] 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 such as 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, such as bark, wood chips, sawdust and lignin in spent pulping liquors and integrated combined coal gasification technology.

[2] 73 P.S. §1648.3(f)

For the reporting year 2008, the companies subjected to the compliance standards of the AEPS sold a total of 11,676,865 MWHs of electricity for the time they had an obligation. To meet their obligations, the companies purchased 665,516 AECs and made alternative compliance payments for the equivalent of 68 AECs.

For the reporting year 2009, the companies with an AEPS obligation sold a total of 19,412,310 MWHs of electricity. To meet their AEPS obligations, the companies purchased 1,203,518 AECs and made alternative compliance payments for the equivalent of 42 AECs.[3]

By Jan. 1, 2010, the alternative energy resource requirement was estimated to be 4,227,425 MWHs, representing approximately 2.6 percent of the Commonwealth's annual energy demand. By Jan. 1, 2021, the AEPS requirement will be an estimated 33,765,501 MWHs, or 18 percent of Pennsylvania's annual electric requirements.

AEPS compliance is verified and tracked through an alternative energy credits program, in which EDCs and EGSs meet their obligations by purchasing individual credits or by making alternative compliance payments. An alternative energy credit represents one megawatt hour of qualified alternative energy generation, whether self-generated, purchased along with the commodity or purchased separately through a tradable instrument.[4] Companies that fail to obtain the requisite number of AECs must make ACPs based on the number of AECs not retired during the AEPS compliance year true-up period.

During the 2008 reporting year, customers in the six utility service areas with an AEPS obligation were provided power for which AECs were retired and/or ACPs paid at an amount representing 5.7 percent of the electricity sold. Of that amount, AECs in an amount representing 1.5 percent of the electricity sold were derived from Tier I energy resources. AECs from solar photovoltaic energy and solar ACPs, representing and amounting to 0.003 percent of the total electricity sold, are included within the Tier I percentage. The amount of Tier II AECs and ACPs representing electricity generated from Tier II resources was 4.2 percent of the total electricity sold.

During the 2009 reporting year, customers in the six utility service areas with an AEPS obligation were provided power for which AECs were retired and/or ACPs paid at an amount representing 6.2 percent of the electricity sold. Of that amount, AECs representing 2.0 percent of the electricity sold were derived from Tier I resources with the solar PV share being 0.0063 percent. Tier II AECs were retired and/or ACPs paid in an amount representing 4.2 percent of the electricity sold.

AEPS compliance is monitored for successive 12-month reporting periods that begin on June 1 and conclude on May 31. The law provides for a three-month true-up period at the conclusion of each reporting period, during which EDCs and EGSs may acquire additional AECs needed for compliance. The true-up

[3] The number of alternative compliance payments may increase pending the Commission's review of credits reserved by one EDC and one EGS at Docket Nos. P-2010-2153577 and P-2010-2153657

[4] 73 P.S. §1648.3(e)(4)(ii)

period runs from June 1 until Sept. 1. At the conclusion of the true-up period, the Public Utility Commission (PUC or Commission) verifies compliance and imposes ACPs as appropriate.

The law also exempts utilities from complying with the schedules for Tier I and Tier II utilization until the companies have fully recovered their competitive or intangible transition charges, or until their generation rate caps have expired, whichever period is later. The Commission granted Duquesne Light Company an exemption to this general rule until Jan. 1, 2008, because Duquesne was subject to a Commission-approved default service plan and rates that existed prior to or within one year of the effective date of the AEPS Act. Penn Power and UGI Electric were required to obtain AECs for the full 2008 reporting year while Citizens' Electric of Lewisburg, Duquesne Light Holdings, Pike County Light and Power, and Wellsboro Electric Company were required to comply with the law beginning Jan. 1, 2008. Six EDCs (Citizens' Electric, Duquesne, Penn Power, Pike County Power, UGI Electric, and Wellsboro Electric) had AEPS obligations for the entire 2009 reporting year. The start dates of the compliance periods for the remaining EDCs range from Jan. 1, 2010, to Jan. 1, 2011.

The generation construction queues from PJM Interconnection[5] indicate that between 2009 and 2015, alternative energy resources could represent approximately 35 percent of the planned capacity additions within the Commonwealth. Of the total additions, wind will be responsible for about 10 percent. At this point, it is estimated that wind capacity could provide more than 2400 megawatts (MW) between 2009 and 2015. This is on top of the presently installed 750 MW of wind resources as of July 7, 2010, as per the PJM website.

Pennsylvania is among the early states which have implemented an alternative/renewable energy portfolio standard. During the 2008 and 2009 reporting years, the primary alternative energy sources in the state in terms of production have been waste coal, followed by conventional hydropower, landfill gas, wood and wind. As the marketplace for alternative energy continues to develop, it is expected that more energy will be generated from other Tier I and Tier II sources. At the same time, the growth in energy consumption may decrease on a per capita basis as energy efficiency programs and demand-side response programs are expanded and electricity prices increase.

On Oct. 15, 2008, Governor Rendell signed Act 129 of 2008 (Act 129) into law with an effective date of Nov. 14, 2008. In addition to the creation of Energy Efficiency and Conservation Programs, Act 129 amended the AEPS by expanding the definition of alternative energy sources in the AEPS that qualify as Tier I alternative energy resources.[6] Act 129 expanded the types of alternative energy sources qualifying as Tier I energy sources to include specific categories of Pennsylvania-located, low impact hydropower and generators utilizing by-products of pulping and wood manufacturing process. 66 Pa. C.S. § 2814(c) also requires the Commission to increase, at least quarterly, the percentage share of Tier I resources required of EDCs and

[5] PJM Interconnection (www.pjm.com) is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. Construction queues are found in the planning section of the pjm.com website.

[6] See Act 129 of 2008, Section 5, Codified in the Pennsylvania Consolidated Statutes at 66 Pa. C.S. § 2814.

EGSs to reflect the new Tier I resources added as a result of this amendment. The new Act 129 provisions for Tier I resource requirements impacted EDC and EGS obligations beginning in the 2010 reporting year. By Order adopted May 28, 2009, the Commission established qualifying procedures and guidelines for the new Tier I resources and established procedures that will be used to increase the non-solar Tier I percentage requirement on a quarterly basis to account for the newly eligible resources.

## 2008 & 2009 AEPS Compliance Summary

Table 1 provides a summary of compliance for EDCs and EGSs operating within service territories subject to AEPS compliance requirements during the 2008 and 2009 reporting periods. Included in Table 1 are the megawatt hours (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 payments made. The solar requirement is a percentage of retail sales and is included in the Tier I requirement. An ACP is required for each AEC for which an EDC and/or EGS was deficient in meeting its compliance obligation.

*Table 1 – 2008 & 2009 AEPS Compliance Report by Source*

| Reporting Period / 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 | | | | |
| 2008 / 11,676,865 | Solar | 0.0030percent | 349 * | $230.00 | $80,500 | 2 |
| | I | 1.5percent | 174,803 | $4.48 | $756,414 | |
| | II | 4.2percent | 490,364 | $0.66 | $316,244 | 66 |
| | All | 5.7percent | 665,516 | | $1,153,158 | |
| | | | | | | |
| 2009 / 19,412,310 | Solar | 0.0063percent | 1,221 | $260.19 | $317,690 | |
| | I | 2.0percent | 387,024 | $3.65 | $1,592,347 | ** |
| | II | 4.2percent | 815,273 | $0.36 | $294,576 | 42 |
| | All | 6.2percent | 1,203,518 | | $2,204,613 | ** |

**One EGS purchased and reserved a solar credit that was not necessary because it did not have an obligation. Therefore, the number of retired credits is 349 instead of 348.*

***The Tier I weighted average credit price, the cost of purchased Tier I credits and the number of ACPs may change for 2009. Staff review of compliance records indicated that a significant number of Tier I credits purchased and reserved by an EDC and an EGS may not be eligible for compliance. Compliance for these companies is under review by the Commission through proceedings at Docket Nos. P-2010-2153577 and P-2010-2153657.*

Table 2 presents 2008 reporting period data on the number of AECs reserved by tier in the territories of EDCs with AEPS obligations. The results show that the EDCs and EGSs are in compliance. Compliance was achieved through the purchase of AECs and/or the payment of ACPs. Suez Energy Resources providing services in the Duquesne territory paid an ACP to satisfy their solar obligation and another EGS purchased and retired a credit that was not necessary. All EDCs and EGSs were in compliance for their Tier I obligations through the purchase and retirement of AECs. Linde Energy Services, a supplier in the Duquesne service territory and Consolidated Edison Solutions, a supplier in the Pike County service territory were short on Tier II obligations and made the appropriate number of ACPs. Because EGS sales information is considered proprietary, their numbers have been combined and are shown with the appropriate EDC.

*Table 2 – 2008 AEPS Compliance Report by EDC Service Territory*

| Distribution Service Territory | Total Energy Sold (MWHs) | Alternative Energy Requirement (percent) | Credits Retired | Compliance Status |
|---|---|---|---|---|
| Citizens' Electric | 75,763 | | | |
| Solar | | 0.00percent | 2 | In Compliance |
| Tier I | | 1.50percent | 1,134 | In Compliance |
| Tier II | | 4.20percent | 3,182 | In Compliance |
| Duquesne Light & Suppliers* | 5,571,006 | | | |
| Solar | | 0.00percent | 167 | In Compliance after ACP paid |
| Tier I | | 1.50percent | 83,399 | In Compliance |
| Tier II | | 4.20percent | 233,978 | In Compliance after ACP paid |
| Penn Power & Suppliers | 4,944,622 | | | |
| Solar | | 0.00percent | 148 | In Compliance |
| Tier I | | 1.50percent | 74,021 | In Compliance |
| Tier II | | 4.20percent | 207,674 | In Compliance |
| Pike County & Suppliers* | 30,305 | | | |
| Solar | | 0.00percent | 1 | In Compliance |
| Tier I | | 1.50percent | 453 | In Compliance |
| Tier II | | 4.20percent | 1,213 | In Compliance after ACP paid |
| UGI | 1,007,334 | | | |
| Solar | | 0.00percent | 30 | In Compliance |
| Tier I | | 1.50percent | 15,080 | In Compliance |
| Tier II | | 4.20percent | 42,308 | In Compliance |
| Wellsboro Electric | 47,835 | | | |
| Solar | | 0.00percent | 1 | In Compliance |
| Tier I | | 1.50percent | 716 | In Compliance |
| Tier II | | 4.20percent | 2,009 | In Compliance |

**One supplier in the Duquesne Light service territory and one supplier in the Pike County Light & Power service territory paid ACPs to fulfill their obligations.*

***One of the suppliers in the Duquesne service territory and one supplier in the Pike County service territory were short on their Tier II obligations with a total shortage of 66 AECs. The suppliers paid alternative compliance payments to fulfill their obligations.*

Table 3 presents 2009 reporting period data on the number of AECs reserved for compliance by tier in the territories of EDCs with AEPS obligations. The results show that most of the EDCs and EGSs are in compliance. Compliance was achieved through the purchase of AECs and/or the payment of ACPs. An EGS providing services in the Duquesne territory paid an ACP to satisfy its Tier II obligation. One EDC and one EGS may have acquired Tier I AECs from an unqualified resource, and the matter is under review at the time this report was completed. All of the remaining EDCs and EGSs purchased and reserved the required number of AECs to fulfill their Tier I obligations. Because EGS sales information is considered proprietary, their data have been combined and are shown with the appropriate EDC.

*Table 3 – 2009 AEPS Compliance Report by EDC Service Territory*

| Distribution Service Territory | Total Energy Sold (MWHs) | Alternative Energy Requirement (percent) | Credits Retired | Compliance Status |
|---|---|---|---|---|
| Citizens' Electric | 167,325 | | | |
| Solar | | 0.01percent | 11 | In Compliance |
| Tier I | | 1.99percent | 3,336 | In Compliance |
| Tier II | | 4.20percent | 7,028 | In Compliance |
| Duquesne Light & Suppliers* | 13,603,711 | | | |
| Solar | | 0.01percent | 856 | In Compliance |
| Tier I | | 1.99percent | 271,217 | In Compliance or Under Review |
| Tier II | | 4.20percent | 571,312 | In Compliance after ACP paid |
| Penn Power & Suppliers | 4,468,612 | | | |
| Solar | | 0.01percent | 281 | In Compliance |
| Tier I | | 1.99percent | 89,091 | In Compliance or Under Review |
| Tier II | | 4.20percent | 187,681 | In Compliance |
| Pike County & Suppliers* | 73,293 | | | |
| Solar | | 0.01percent | 4 | In Compliance |
| Tier I | | 1.99percent | 1,462 | In Compliance |
| Tier II | | 4.20percent | 3,078 | In Compliance |
| UGI | 991,664 | | | |
| Solar | | 0.01percent | 62 | In Compliance |
| Tier I | | 1.99percent | 19,771 | In Compliance |
| Tier II | | 4.20percent | 41,650 | In Compliance |
| Wellsboro Electric | 107,705 | | | |
| Solar | | 0.01percent | 7 | In Compliance |
| Tier I | | 1.99percent | 2,147 | In Compliance |
| Tier II | | 4.20percent | 4,524 | In Compliance |

**One of the suppliers in Duquesne's service territory paid an ACP to cover a shortage of 42 credits needed to fulfill its Tier II obligation.*

## Future Compliance by Remaining Electric Distribution Companies

The compliance period began for PPL Electric Utilities, Inc. on Jan. 1, 2010. Pennsylvania Electric Company (Penelec), Metropolitan Edison Company (Met-Ed), West Penn Power and PECO Energy Company begin compliance on Jan. 1, 2011. As was the case with other EDCs, these companies will initially have partial year reporting requirements.

*Table 4 – Overview of EDC Compliance Year Requirements*

| Electric Distribution Companies | |
|---|---|
| Penn Power | 2007 |
| UGI Electric | 2007 |
| Duquesne | 2008 |
| Citizens' | 2008 |
| Pike County | 2008 |
| Wellsboro | 2008 |
| PPL | 2010 |
| Allegheny Power (West Penn Power) | 2011 |
| Met-Ed | 2011 |
| Penelec | 2011 |
| PECO | 2011 |

## Alternative Energy Credit

One alternative energy credit represents one megawatt hour 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 Alternative Energy Credit does not represent the purchase of renewable energy, only the confirmation of the generation of renewable energy. The generators are permitted to use generation on site or 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). Alternative Energy Credits for solar PV systems that are not based on meter recordings of the generation output will be 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 kilowatt hours 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.[7] 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. One credit or certificate represents one megawatt hour of energy produced. Each certificate is given a unique serial number for tracking purposes. Varying levels of information in the registry is available to electric distribution companies, electric generation suppliers, state regulators and the public.

GATS is not an online trading platform where potential buyers can bid for and purchase alternative energy credits. 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 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.

## AEPS Generators Certified

The Pennsylvania AEPS website (http://paaeps.com/credit/) maintains a summary of qualified generation facilities and qualified energy efficiency and demand-side management (EE/DSM) resources. There were 1,122 qualified generation facilities and 15 EE/DSM resources listed on Feb. 24, 2010.

The 1,122 qualified generation facilities include 570 facilities located in Pennsylvania and 552 facilities located outside of Pennsylvania. The 567 Pennsylvania generating facilities using only alternative energy sources represent 4,996 MW of capacity and the 545 non-Pennsylvania generating facilities represent 8,838 MW of capacity. Ten of the 1,122 listed qualified facilities use a mix of fuels that include non-alternative energy sources and were not included in the preceding capacity numbers. The aggregate

[7] www.pjm-eis.com

nameplate capacity of these ten facilities is 4,424 MW. The generators vary considerably in size, including hydro-pumped storage, waste coal and conventional hydro facilities that have capacities rated in the hundreds or thousands of megawatts to solar photovoltaic generators, whose facilities are rated as fractions of megawatts. Locations of generation facilities are not provided in this report for security reasons.

Appendix B includes summary information about the qualified generation facilities.

## AEPS Certificates/Credits Created

Table 5 shows the number of alternative energy credits (AECs) created in PJM-EIS by tier for calendar years 2005 through 2009 that were eligible for use in Pennsylvania. Over this time period, Pennsylvania solar AECs totaled 11,754, Tier I AECs totaled 22,531,654 and Tier II AECs totaled 154,376,258. The data in Table 5 reveals a trend whereby the number of AECs created is increasing each year.

When looking at the number of credits created thus far in relation to the estimated number of credits needed in 2021, Table 5 shows that there were more Tier II credits created in each of the years from 2005 through 2008 than will be needed in 2021. As a result, Tier II credits will continue to be over-subscribed in that there will likely be many more of these credits created in any given year than are needed to meet annual requirements during the 2010-2021 period.

It should be noted that AECs that are eligible for use in Pennsylvania may also be eligible to meet alternative energy requirements in other states. However, provisions are in place to ensure that credits used to meet compliance requirements in other states are retired and not available to be used to meet further Pennsylvania requirements. In addition, credits used for voluntary purchases in Pennsylvania or other states are retired and cannot be used again.

*Table 5 – Pennsylvania Eligible Credits and Estimated 2021 Requirements*

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2005-09 Total* | Est. 2021 Requirements |
|---|---|---|---|---|---|---|---|
| Solar | 60 | 345 | 561 | 2,247 | 8,541 | 11,754 | 937,931 |
| Tier I | 1,359,566 | 3,014,053 | 3,618,408 | 6,235,131 | 8,304,496 | 22,531,654 | 14,068,959 |
| Tier II | 27,350,981 | 32,695,189 | 31,986,326 | 31,542,227 | 30,801,535 | 154,376,258 | 18,758,612 |

**Source - PJM-EIS GATS as of June 9, 2010*

## Alternative Energy Credits Program Administrator

In April 2007, the PUC entered into a contract with Clean Power Markets (CPM), a subsidiary of Enerwise Global Technologies,[8] to be the Alternative Energy Credit Program Administrator in Pennsylvania. During the three-year contract, CPM has verified and will continue to verify that EGSs and EDCs are complying with requirements of the AEPS Act.

Clean Power Markets works with the Department of Environmental Protection (DEP) to administer the process of reviewing and qualifying alternative energy systems. CPM 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 Internet site at http://paaeps.com.

On Feb. 9, 2010, the Commission issued a new request for proposal for the services of an Alternative Energy Credits Program Administrator. At Public Meeting on June 3, 2010, the Commission approved CPM to continue as the Alternative Energy Credits Administrator and entered into a new contract until Dec. 31, 2013, with the option for two one-year contract extensions.

[8] www.cleanpowermarkets.com, www.enerwise.com

## Net Metering, Virtual Meter Aggregation and Interconnection Implementation

In accordance with Section 5 of the AEPS Act,[9] the PUC has established rules for how customer-generators who use technologies such as solar panels or fuel cells connect to the electric distribution system and how they are compensated by EDCs and EGSs for supplying surplus energy to the electric grid. The interconnection standards work in conjunction with the net metering rules to simplify and regulate the manner in which customer-generators work with utilities.

### Net Metering

The PUC formally commenced its rulemaking process to establish regulations governing net metering for customer-generators by issuing a proposed rulemaking order entered on Nov. 16, 2005. The PUC finalized the rulemaking on June 22, 2006, and the new regulations became effective when they were published on Dec. 16, 2006, in the Pennsylvania Bulletin.[10]

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."[11] The net metering requirements apply to EDCs which 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.[12]

[9] 73 P.S. §1648.5 Interconnection standards for customer-generator facilities
[10] See 36 Pa. Bull. 7562 (www.pabulletin.com) and 52 Pa. Code Ch. 75 (www.pacode.com)
[11] 73 P.S. §1648.2
[12] 52 Pa. Code § 75.13

On July 17, 2007, Gov. Rendell signed Act 35 of 2007 into law. Act 35 became effective immediately and amended a number of provisions of the AEPS Act, including revising the definition of net metering to include a restriction on virtual meter aggregation.

## 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 2 miles of the customer-generator's property and within a single EDCs territory.

## Interconnection Standards

On Nov. 10, 2005, the Commission adopted a proposed rulemaking order establishing interconnection standards for customer-generators. The regulations promote onsite generation by customer-generators using alternative energy systems and the regulations eliminate barriers which may have previously existed regarding interconnection. The PUC finalized the rulemaking on Aug. 17, 2006, and the new regulations became effective when they were published on Dec. 16, 2006 in the Pennsylvania Bulletin.[13]

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 for 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 who wish to interconnect to an electric distribution company's distribution network pursuant to 52 Pa. Code Sections

[13] See 36 Pa. Bull. 7574, (www.pabulletin.com) and 52 Pa. Code Ch. 75 (www.pacode.com)

75.21-75.5. The application forms cover Level 1 through Level 4 projects. The forms were adopted by Commission order on Feb. 26, 2009. The associated application fees were adopted by Policy Statement on Feb. 26, 2009.[14]

The Policy Statement establishes various fees by type of project. Simple Level 1 application reviews require a flat fee of $100 per application. Level 2 applications establish a base fee of $250 plus $1.00 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 $2.00 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 $2.00 per KW of nameplate capacity rating of the customer-generator's facility.

As discussed previously, 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 to 3 megawatts and from 2 to 5 megawatts for those projects that operate in parallel with the grid.

## Status of Customer-Generator Interconnections

The PUC's regulations for net metering and interconnection provide for annual reports to the PUC containing the number of customer-generators interconnected to the distribution system as well as the status of interconnection requests processed by the EDCs in the past year. As of May 31, 2010, as illustrated in Table 6, Pennsylvania EDCs reported that there were 1,515 Tier I and three Tier II net metering customer-generators interconnected to the distribution system. The source of this data comes from the EDCs' "Annual Net Metering/Interconnection Report, June 1, 2009 to May 31, 2010." These customer-generators represented approximately 17,739 kW of generation capacity. Solar PV accounted for 89 percent of the Tier I customer-generators and 81 percent of the Tier I generation capacity.

[14] See 52 Pa. Code §§69.2101-69.2104.

Of the 1,515 customer-generators, the EDCs processed 1,418 of these interconnection requests during the June 1, 2009 to May 31, 2010 period. There were no denials. The average number of days for EDCs to complete a Level 1 interconnection request/approval was approximately 10 days. Level 2 took an average of 12 days to complete. There were four Level 3 applications taking an average of five days to complete. Table 6 below provides a summary of the data.

*Table 6 – Number of Customer-Generators Interconnected as of May 31, 2010*[15]

| | Tier I | Tier II | Solar PV* | Total |
|---|---|---|---|---|
| Number of Customer-Generators | 1,512 | 3 | 1,351 | 1,515 |
| Estimated Generation Capacity in kW | 17,274 | 465 | 14,076 | 17,739 |

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

## Pennsylvania's Alternative Energy Portfolio Standards Marketplace

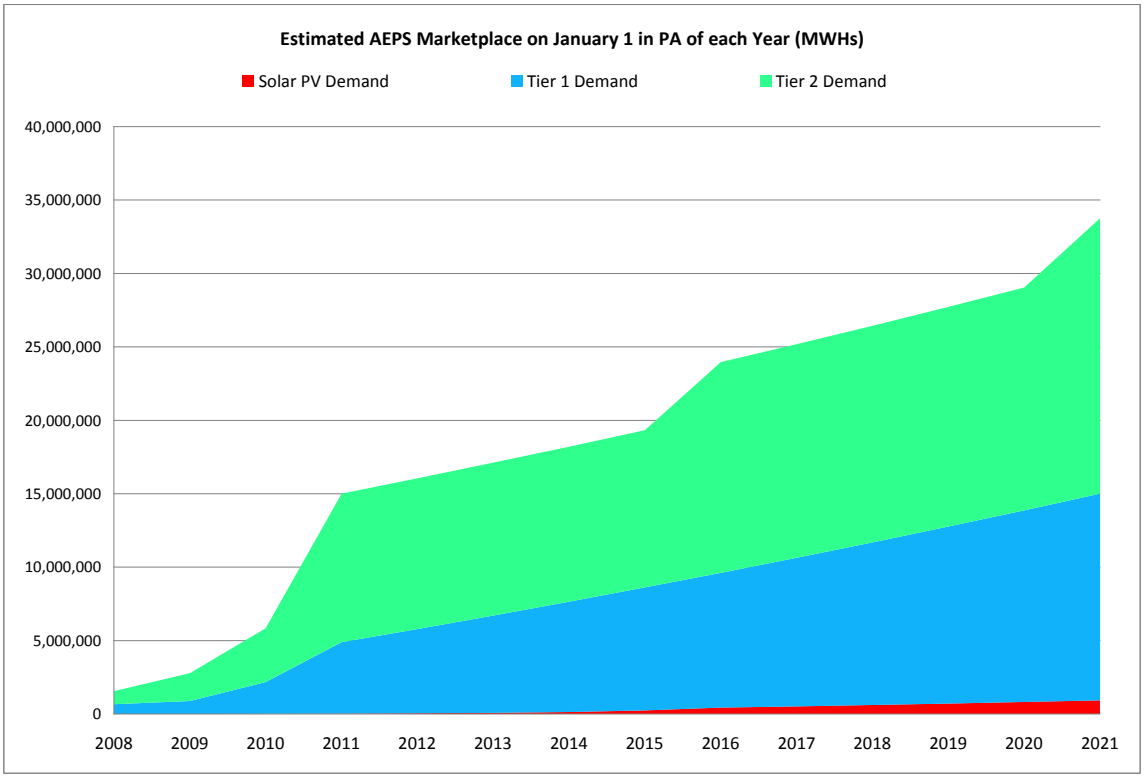
For Pennsylvania, the following graph represents the demand for AEPS energy on Jan. 1 of each year. As shown, on Jan. 1, 2008, the amount was very small at 1,215,183 MWHs. This represented approximately 0.81 percent of the Commonwealth's annual energy demand. However, by Jan. 1, 2016, demand for AEPS energy is expected to be 23,973,502 MWHs, or 13.70 percent of Pennsylvania's requirements. At the conclusion of the Act's requirements in 2021, renewable resources are estimated to provide 18.0 percent of Pennsylvania's total electric energy requirements, or an estimated 33,765,501 MWHs. The US Energy Information Administration (EIA) predicts in its Short Term Energy Outlook that total electricity consumption is expected to grow by 3.1 percent during 2010 from 2009 levels and by 0.9 percent in 2011, from 2010 levels. EIA also provides long-term forecasting in their Annual Energy Outlook. In this long-

[15] Electric Distribution Company "Annual Net Metering/Interconnection Report, June 1, 2008 to May 31, 2009"

term forecast, electricity demand is expected to increase 30 percent from 2008 to 2035, or by an average of 1.0 percent per year. Commercial usage is expected to increase by 42 percent as the service industries continue to expand. Residential usage increases by 24 percent due to increases in population and continued population shifts to regions with greater cooling needs. Industrial growth is expected at only 3 percent over the same time period as a result of slow growth in energy-intensive industries and energy efficiency gains.[16] Pennsylvania-specific forecast data was also used wherever possible. This data was submitted by the EDCs, which is filed annually with the Commission as a result of the regulations found at 52 Pa. Code §§ 57.141-57.154.

[16] U.S. EIA Short Term Energy Outlook, , June 8. 2010 release
U.S. EIA Annual Energy Outlook 2010, released May 10, 2010

*Graph 1 – Estimated AEPS Marketplace Jan. 1 in PA of Each Year (MWHs)*

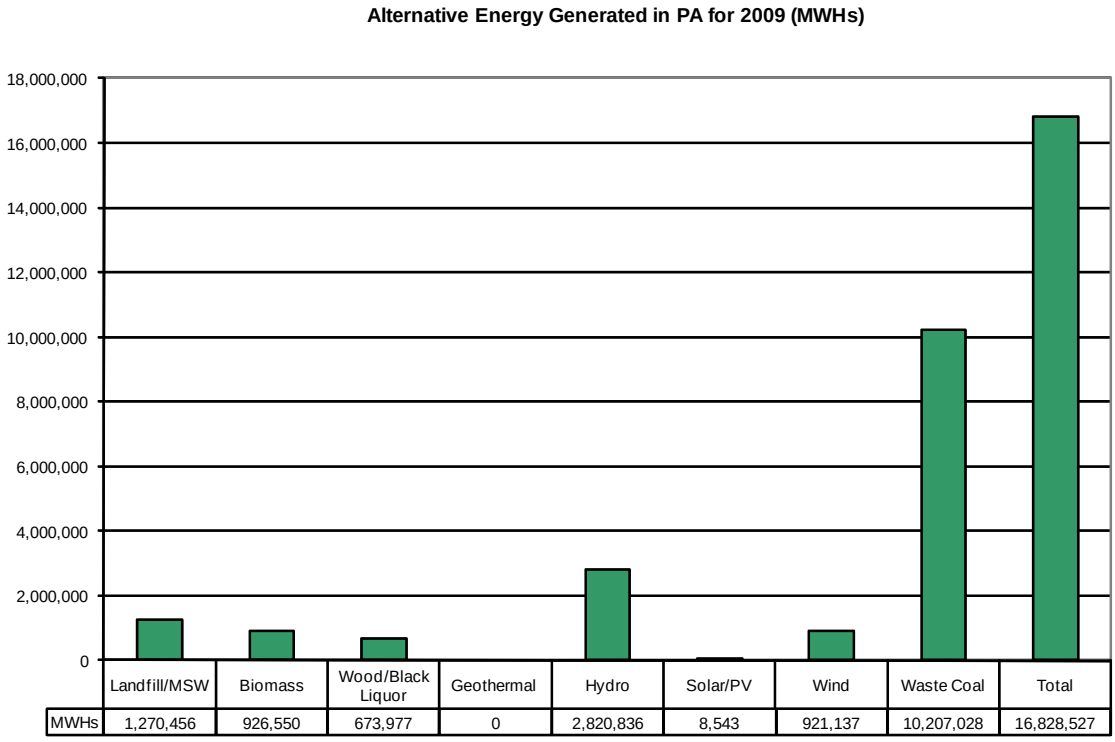



As a result of the Public Utility Regulatory Policies Act of 1978, Pennsylvania has 1,510 MW of Tier 2 alternative energy capacity in the form of waste coal.[17] As of June 2010, wind contributes about 748 MW and solar PV now provides more than 20 MW of capacity to the Commonwealth's total. Wind capacity is developing at a fast pace. Solar PV projects that are certified by the Alternative Energy Credits Program Administrator as of June 2010 total 16.31 MW in PA. There are an additional 5.75 MW pending certification in PA. Graph 2 details the megawatt hours of alternative energy generated in PA in 2009.[18]

[17] Electric Power Generation Association (EPGA) http://www.epga.org/GeneratingFacilities.html. Updated June 2009.

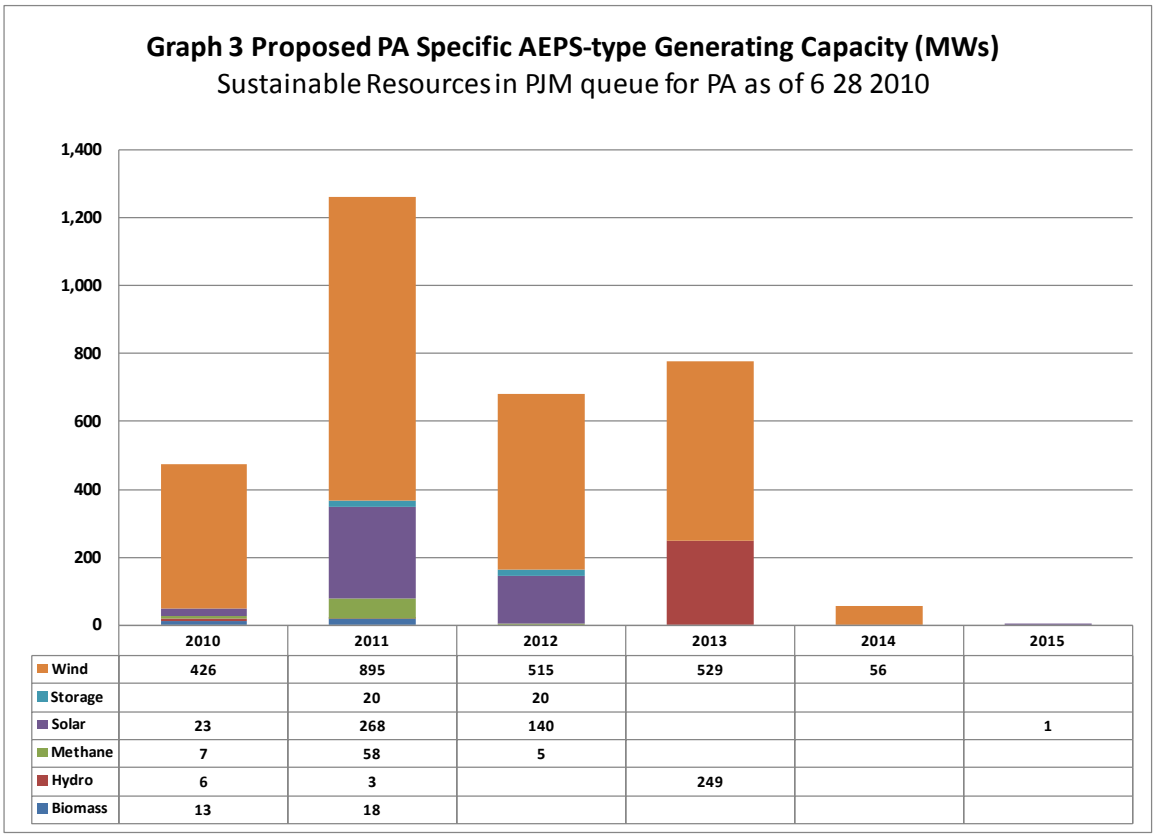
[18] U.S. EIA Form 923 Data and GATS EIS Eligible Certificates 2009

*Graph 2 – Alternative Energy Generated in PA for 2009 (MWHs)*




Looking forward, PJM maintains planning queues for proposed generating capacity. Graph 3 shows the planning queue for the PA portion of PJM as of June 2010. The graph shows proposed additions by fuel type by year. This graph represents renewable resources only. Much of the anticipated solar capacity does not show on the PJM planning queue because (a) individual projects are too small to qualify and (b) larger projects tend to be no larger than 3 MW, the limit for net metering, and may not require an interconnection agreement with PJM if the distribution grid is sufficiently robust to support interconnection and net metering.

*Graph 3 – Proposed PA Specific AEPS-type Generation Capacity*



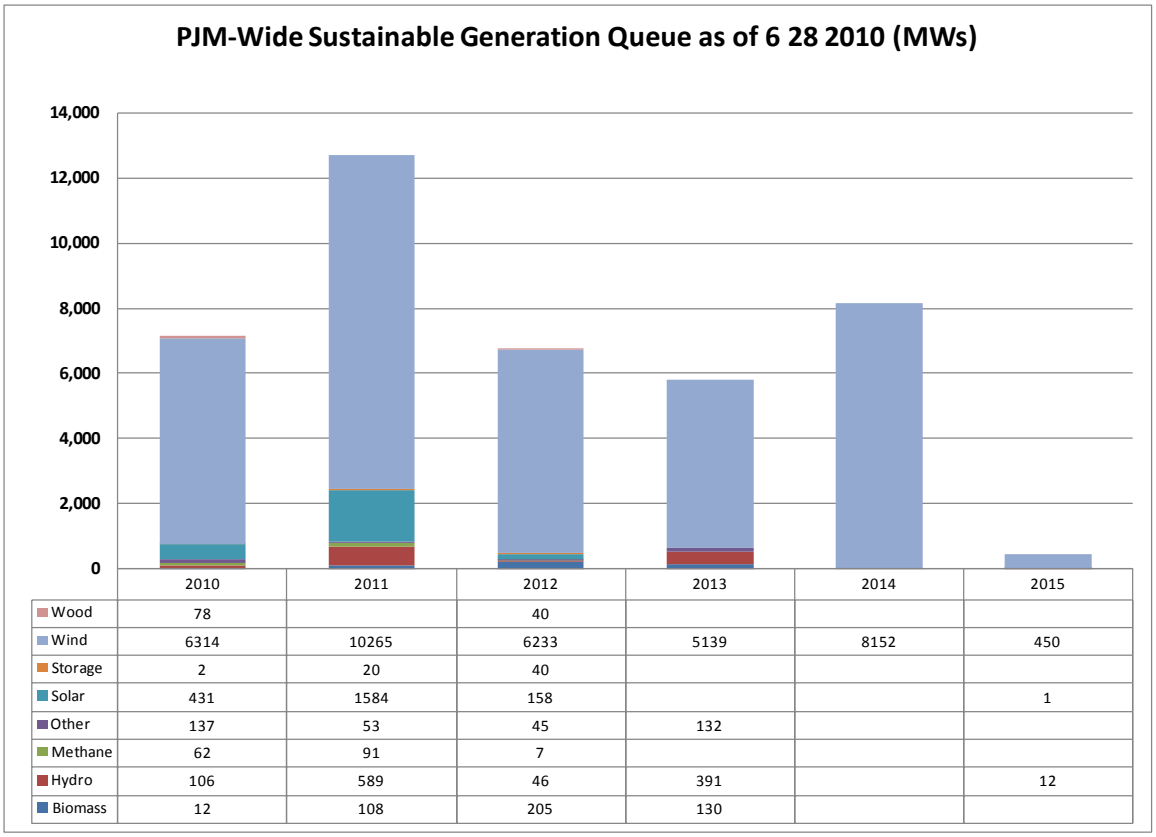

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Wind | 426 | 895 | 515 | 529 | 56 | |
| Storage | | 20 | 20 | | | |
| Solar | 23 | 268 | 140 | | | 1 |
| Methane | 7 | 58 | 5 | | | |
| Hydro | 6 | 3 | | 249 | | |
| Biomass | 13 | 18 | | | | |

As shown in Graph 3, Pennsylvania can expect 3,252 MW of sustainable generation from the presently effective PJM queue.[19] Historically, about 25 percent of the capacity that is in the generating queue on any given day gets built. Therefore, Pennsylvania could plan on about 813 MW of new, utility scale sustainable resources from now until 2015. DEP indicates that approximately 110 MW of solar PV projects have either been approved by the agency (PA Sunshine rebates) or have received Commonwealth funding and/or financing and are expected to be online within the next 12 to 24 months. Additional projects are expected to receive Commonwealth funding/financing in 2010.

[19] This data analysis is based on the PA PJM capacity as filed, not as the generation resources are paid for RPM capacity. For example, PJM would not pay for the entire amount of wind shown above, but some fraction based on historical performance data of wind on the system. See PJM Manual 11.

Graph 4 provides the proposed generation capacity queue for the entire PJM area.

*Graph 4 – Proposed AEPS Generation Capacity Across PJM*



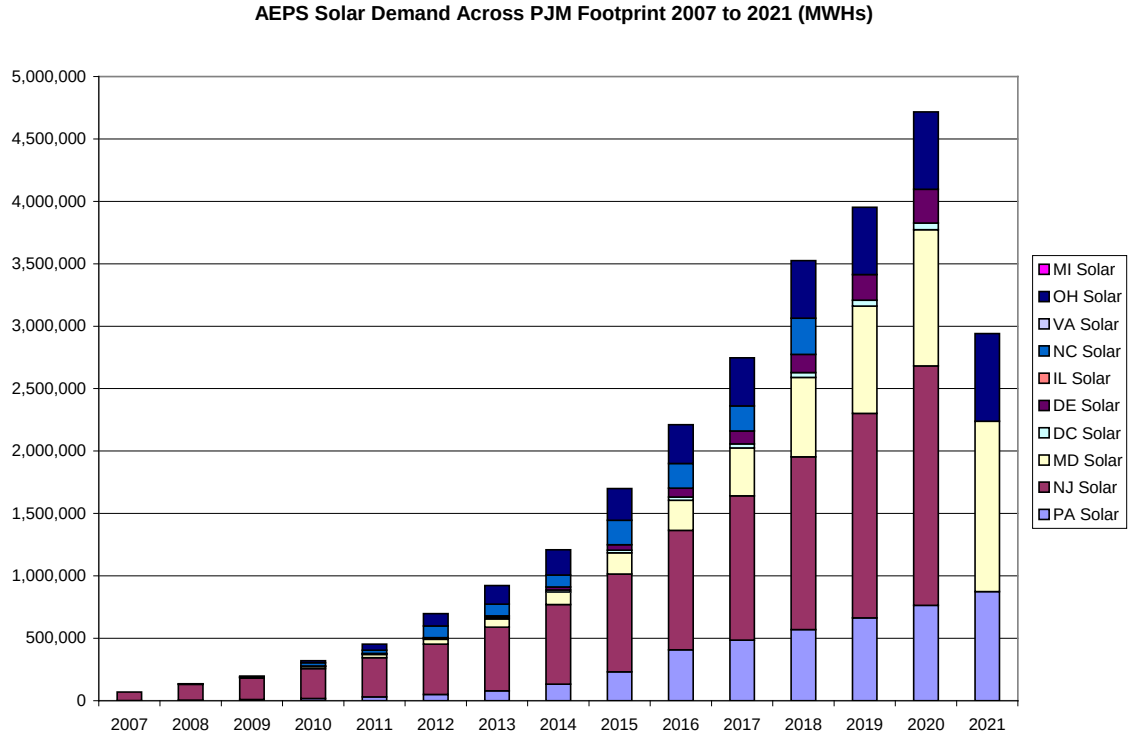

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Wood | 78 | | 40 | | | |
| Wind | 6314 | 10265 | 6233 | 5139 | 8152 | 450 |
| Storage | 2 | 20 | 40 | | | |
| Solar | 431 | 1584 | 158 | | | 1 |
| Other | 137 | 53 | 45 | 132 | | |
| Methane | 62 | 91 | 7 | | | |
| Hydro | 106 | 589 | 46 | 391 | | 12 |
| Biomass | 12 | 108 | 205 | 130 | | |

The Pennsylvania AEPS eligibility rules allow alternative energy projects within the PJM footprint to qualify for AEPS certification. An analysis of the renewable energy legislation for each state in the PJM queue has been completed.[20] Pennsylvania, Michigan, Ohio, Virginia, North Carolina, Illinois, Delaware, District of Columbia, Maryland, West Virginia and New Jersey currently have such legislation. For these states (excluding WV for which data was not yet available), the demand for renewable resources is presented in Graphs 5 through 7. Tennessee, Kentucky and Indiana do

[20] Comparison of Renewable Portfolio Standards (RPS) Programs in PJM States, http://www.pjm-eis.com/documents/downloads/20090326-rps-comparison.pdf, Jan. 16, 2009

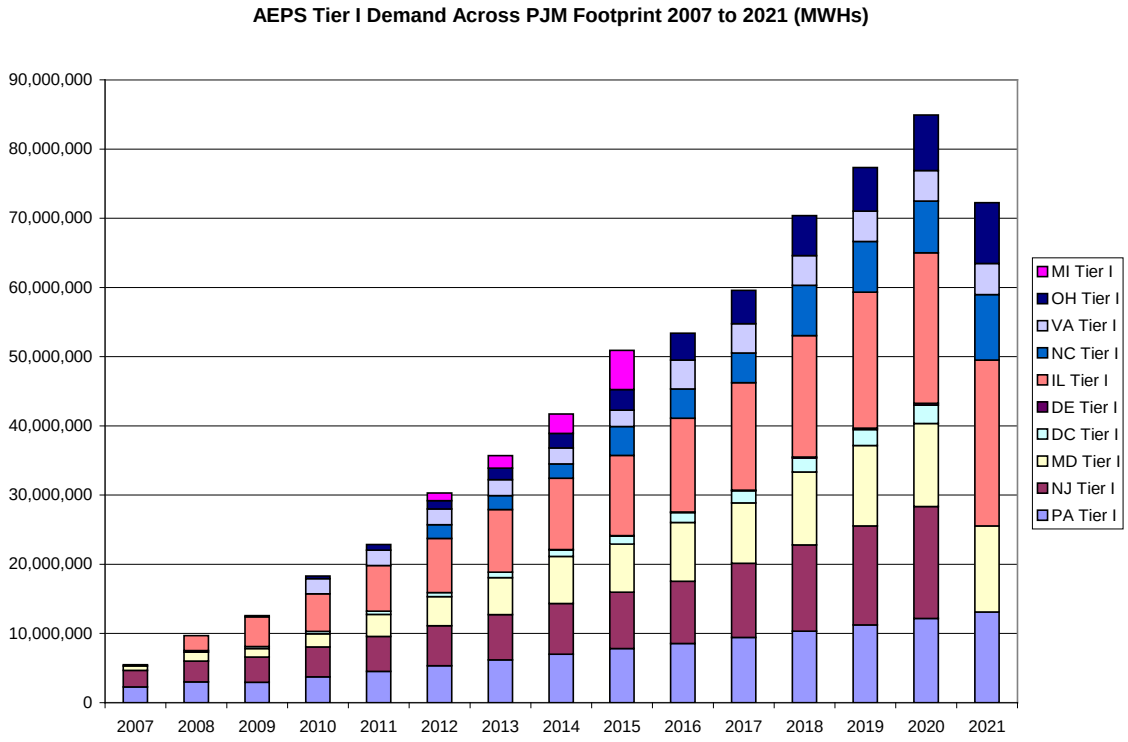
not yet have final renewable portfolio standards. Total retail sales data comes from EIA and the AEPS demand percentages come from PJM's summary of renewable requirements for PJM states.

*Graph 5 – AEPS Solar Demand Across PJM Footprint*

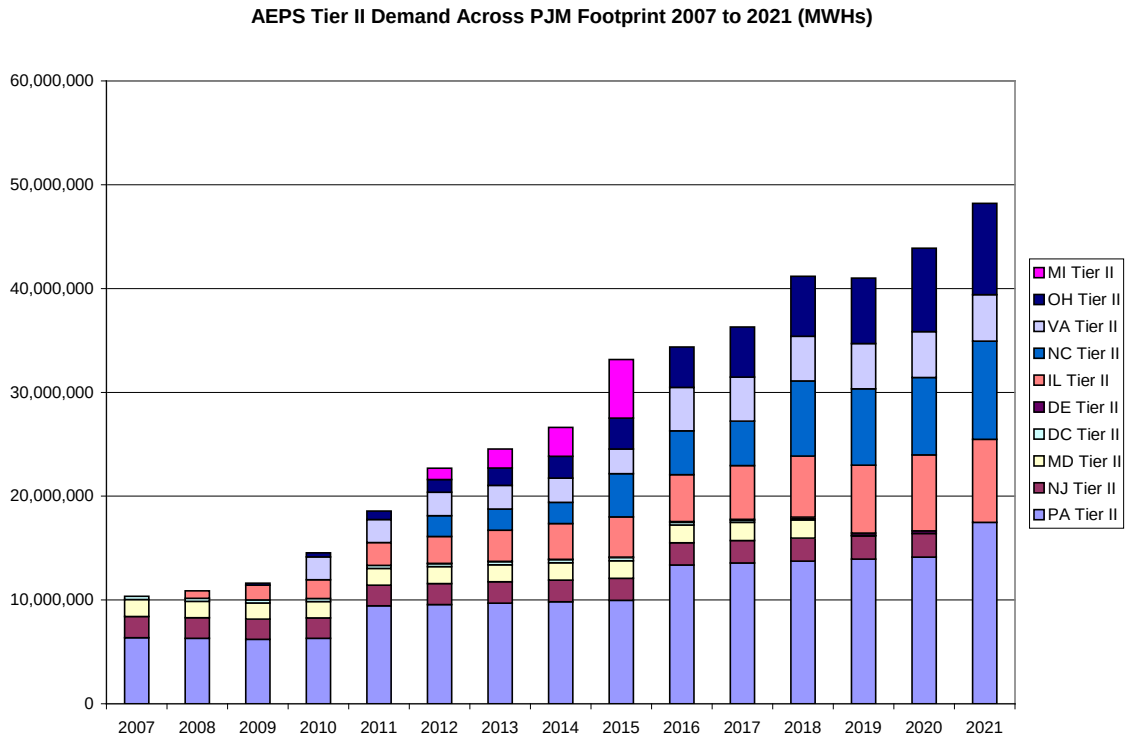



Graph 5 above details the solar demand in the PJM area for those states with renewable standards. Graphs 6 and 7 detail Tier I and Tier II demand respectively.

*Graph 6 – AEPS Tier I Demand Across PJM Footprint*



*Graph 7 – AEPS Tier II Demand Across PJM Footprint*




Assuming an increase of 1.0 percent[21] per year in electric energy consumption beginning in 2010, we see the following: there is presently enough Tier I capacity to meet supply, present and projected, until the year 2011 in PA alone. There is excess Tier II capacity in PA which will meet demand through the year 2021. There is approximately 20 MW of solar PV supply as of June 2010. Supply in PA by the end of 2010 is expected to reach 27.8 MW based on planned constructions in the PJM queue, while the demand for solar PV in 2010 is 5.8 MW. Solar PV demand in PA will outpace supply in 2015 if additional generation is not added. Construction costs for solar PV are estimated at $6,473,000/MW in 2010 dollars for a 5 MW commercial/industrial facility.

The PV market is changing rapidly with module costs falling as new technology is developed and markets mature. Capacity-weighted, average PV installation costs in the US were $7.5/W in 2008. Costs are also affected by economies of scale. The national average installed cost of systems <2kW were $9.2/W, dropping to $6.2/W for systems in the 500-750kW size. For systems >750kW, the average installed cost was

[21] U.S. EIA 2010 Annual Energy Outlook, p. 65. Release date May 11, 2010

$7.1/W.[22] New Jersey is one of the top four states in terms of the number of solar projects and has approximately 12 percent of the nation's total MW of solar installed. Installation costs (prior to any rebates or tax credits) of residential systems are less in New Jersey than Pennsylvania, indicating that a more robust market can reduce installation costs. Preliminary costs for residential projects for New Jersey for 2009 are estimated at $6.9/W. Pennsylvania was averaging $9.9/W in 2008, while New Jersey was at $7.6/W for installed costs.[23]

DEP's Office of Energy and Technology Development has provided more specific information for PA. Since 2009, the Commonwealth has funded and/or financed larger solar PV projects that have had average costs per Watt of about $5.80. Smaller residential and small business solar PV projects have received rebates for projects whose average costs were between $7.13 and $6.40 per Watt.

The analysis presented in Graph 8 presupposes that only 25 percent of the projects proposed in the PJM planning queue will be built. Historically, this has been the case. From the PJM 2009 Regional Transmission Expansion Plan, approximately 25 percent of the interconnection requests from 2005 thru 2009 led to projects that were actually built. [24] The average capacity factor for wind projects in the PJM service territory is approximately 30 percent (historical average of approximately 27 percent for eastern wind farms and slightly more than 30 percent for wind farms in the Great Lakes region) and 13.5 percent for solar. [25] Capacity factor is the ratio of actual energy produced in a given period to the hypothetical maximum possible. For an example, a 100 MW wind farm in PA would reasonably be expected to produce approximately 27 percent or more of its actual nameplate MW rating or 27 MW each year. Graph 8 provides AEPS supply and demand in the PA Marketplace.

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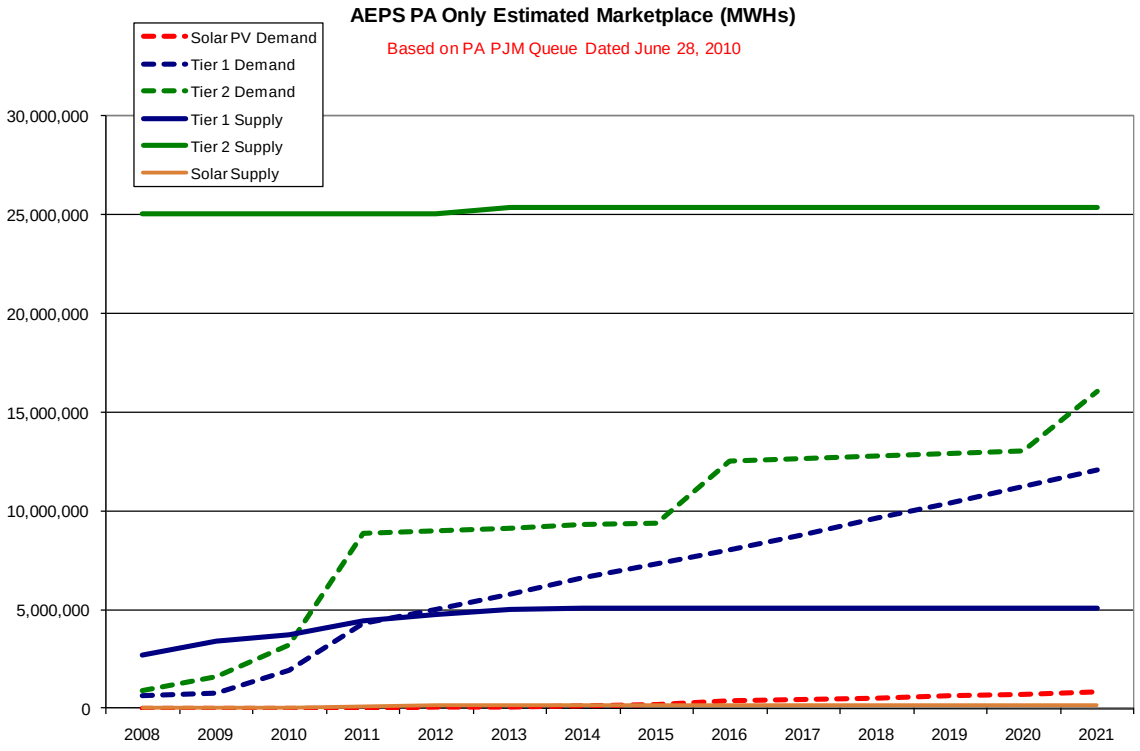
[22] *2008 Solar Technologies Market Report*, US DOE, http://www1.eere.energy.gov/solar/pdfs/46025.pdf, released January 2010.

[23] Wiser, R.; Barbose, G:Peterman, C. Darghouth, N.(2009) *Tracking the Sun II. The Installed Cost of Photovoltaics in the US from 1998-2008*. Berkeley, CA: Lawrence Berkeley National Laboratory, http://eetd.lbl.gov/ea/EMS/re-pubs.html. Accessed February 2010

[24] PJM Regional Transmission Expansion Plan, Section 2, Table 2.7.

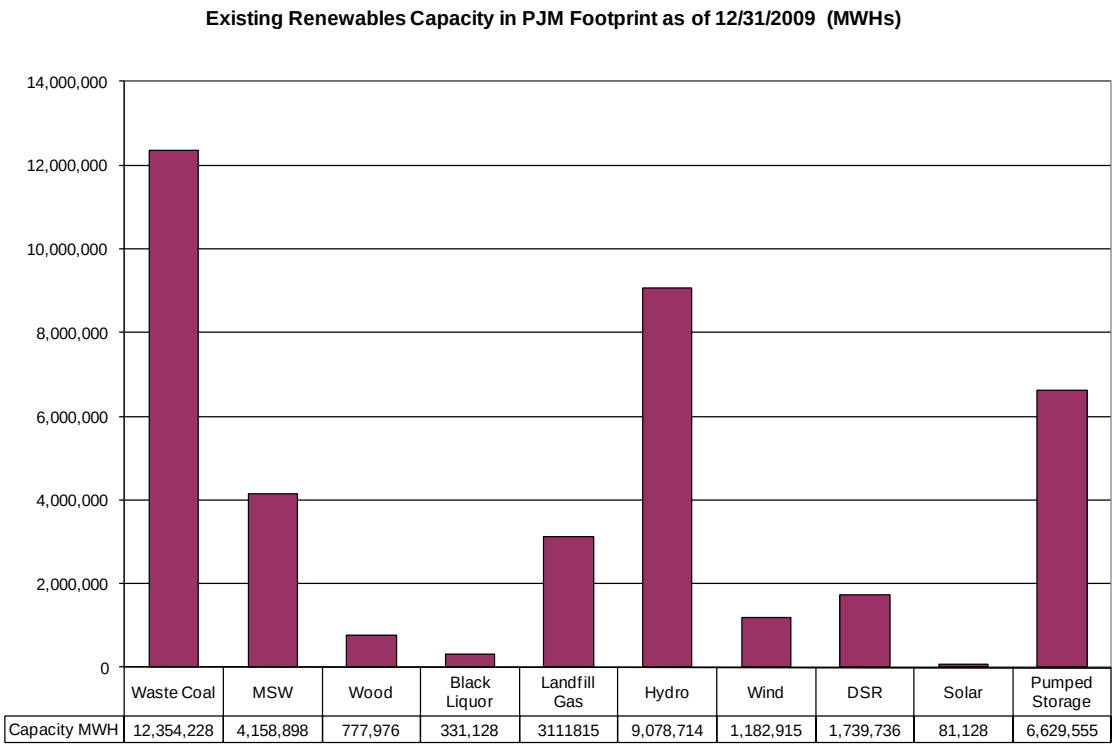
[25] Table 7 of DOE 2008 Wind Technologies Market Report, Released July 2009, and DEP's Pennsylvania's Solar Share Mandated Solar PV Installations in the Commonwealth of PA.

*Graph 8 – AEPS PA Only Estimated Marketplace (MWHs)*



Graph 9 is a summary of the existing alternative energy capacity in operation in the PJM service area.[26]

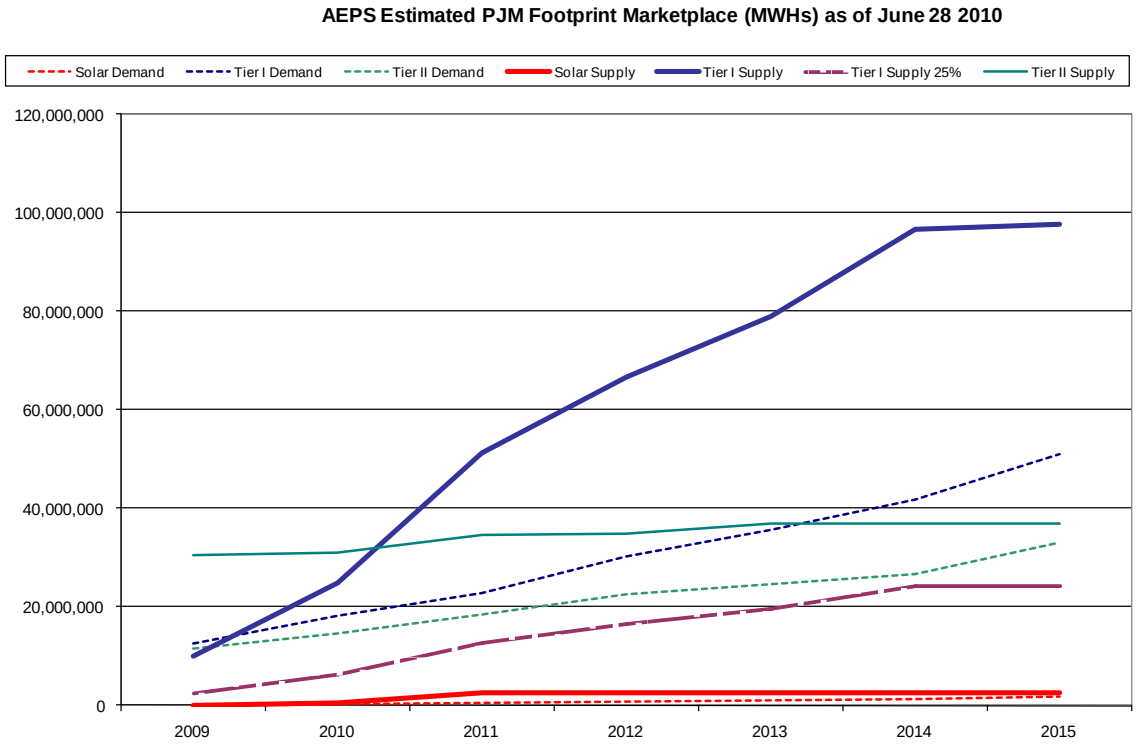
*Graph 9 – Existing Renewables in PJM*




When the entire PJM footprint is studied as in Graph 10, we see that there is adequate Tier I supply indefinitely. Not all states in the PJM service area currently have renewable requirements, so this excess Tier I capacity may be diminished if more PJM member states adopt renewable requirements. As shown in Graph 10, Tier II demand for the entire PJM area is met through 2015.

[26] PJM Renewable Dashboard http://www.pjm.com/about-pjm/newsroom/renewable-dashboard.aspx?p=1
PJM Capacity Info http://www.pjm.com/~/media/markets-ops/ops-analysis/capacity-by-fuel-type-2009.ashx

*Graph 10 – AEPS Estimated PJM Marketplace*




If only 25 percent of the Tier I resources planned in the PJM queue are built, Tier I demand for the entire PJM region will not be met beginning in 2009.

## Estimated Statewide AEPS Cost of Compliance

For purposes of comparison, the Commission provides the following analysis which estimates the total expected cost of EDC and EGS compliance with the AEPS legislation for the year 2011. This is the first year that all EDCs will be out from under rate caps and required to fully comply with AEPS. As shown in the following table, the total estimated cost for compliance for all load serving entities in Pennsylvania is just over $30 million. (by way of comparison, the usual cost of electric service is between $12 billion and $15 billion on an annual basis). In addition, a breakdown of needs by solar, Tier 1 and Tier 2 is given for each EDC. The AEC costs follow after 2009 values. These calculations do not consider the impact long-term contract purchases may have on compliance costs. The 2009 weighted average AEC values for solar, Tier I and Tier II were used in estimating costs for 2011.

## AEPS Estimated Cost of Compliance by EDC for 2011

| | | Total Needed MWHs | Price With RECs @ $260.19/MWH |
|---|---|---|---|
| **Solar** | | | |
| Duquesne | | 3,144 | 817,982 |
| Met Ed | | 3,220 | 837,862 |
| Penelec | | 3,231 | 840,615 |
| Penn Power | | 1,027 | 267,191 |
| PECO | | 8,890 | 2,313,083 |
| PPL | | 8,853 | 2,303,446 |
| UGI | | 224 | 58,207 |
| West Penn | | 4,729 | 1,230,443 |
| | **Total MWHs** | **33,317** | **$8,668,829** |

| | | Total Needed MWHs | Price With RECs @ $3.65/MWH |
|---|---|---|---|
| **Tier 1** | | | |
| Duquesne | | 461,497 | 1,684,465 |
| Met Ed | | 472,713 | 1,725,403 |
| Penelec | | 474,267 | 1,731,073 |
| Penn Power | | 150,746 | 550,224 |
| PECO | | 1,305,018 | 4,763,315 |
| PPL | | 1,299,581 | 4,743,469 |
| UGI | | 32,840 | 119,865 |
| West Penn | | 694,203 | 2,533,842 |
| | **Total MWHs** | **4,890,865** | **$17,851,657** |

| | | Total Needed MWHs | Price With RECs @ $0.36/MWH |
|---|---|---|---|
| **Tier 2** | | | |
| Duquesne | | 960,172 | 345,662 |
| Met Ed | | 983,507 | 354,063 |
| Penelec | | 986,739 | 355,226 |
| Penn Power | | 313,636 | 112,909 |
| PECO | | 2,715,165 | 977,459 |
| PPL | | 2,703,853 | 973,387 |
| UGI | | 68,325 | 24,597 |
| West Penn | | 1,444,330 | 519,959 |
| | **Total MWHs** | **10,175,727** | **$3,663,262** |

| | |
|---|---|
| **Total AEPS Cost** | |
| Duquesne | 2,848,109 |
| Met Ed | 2,917,328 |
| Penelec | 2,926,915 |
| Penn Power | 930,324 |
| PECO | 8,053,857 |
| PPL | 8,020,302 |
| UGI | 202,669 |
| West Penn | 4,284,244 |

| | |
|---|---|
| **Total Solar, Tier 1 and Tier 2** | **$30,183,747** |

Looking forward in time to the mid-2015's period, the market will likely change. All market prices, theoretically, are based on the relationship between supply and demand. In markets with an over-supply, prices should be lower and dropping. In undersupplied markets, prices would be higher and increasing.

Referring back to Graph 8, if AEPS compliance was limited to resources from within the Commonwealth, there would be enough AECs to meet Tier 1 demand through mid-2011. Then, either more facilities would need to be built or force majeure[27] would need to be declared. Tier 2 demand can be met through 2021.

With the entire PJM pool as the eligible marketplace, which the AEPS Act allows for, there is sufficient Tier 1 and Tier 2 capacity through 2015 even if only 25 percent of the PJM queued capacity is constructed.

There is approximately 27.8 MW of Solar PV supply expected to be available in 2010. The demand for Solar PV in 2010 is 5.8 MW. Solar PV demand will outpace supply in 2015 if additional generation is not added and only 25 percent of the PJM queue projects are built. Without the 25 percent qualifier, solar PV demand will exceed supply by 11 MW in 2015. This could cause increased prices, induce the non-compliance penalties called for in the Act and create the possibility that force majeure will need to be declared. As the economy appears to be slowly rebounding, the PJM queues are changing rapidly with large increases in both solar and wind projects and it is difficult to predict what will happen in 2015. The solar projects funded by federal stimulus and Commonwealth programs may be more likely to be built than the 25 percent qualifier used for the PJM queue. This could positively affect the supply and demand balance for solar PV even before 2015.

[27] Upon its own initiative or upon a request of an electric distribution company or an electric generator supplier, the Pennsylvania Public Utility Commission, within 60 days, shall determine if alternative energy resources are reasonably available in the marketplace in sufficient quantities for the electric distribution companies and electric generation suppliers to meet their obligations for that reporting period under this act. If the commission determines that alternative energy resources are not reasonably available in sufficient quantities in the marketplace for the electric distribution companies and electric generation suppliers to meet their obligations under this act, then the commission shall modify the underlying obligation of the electric distribution company or electric generation supplier or recommend to the General Assembly that the underlying obligation be eliminated. 73 P.S. §1648.2

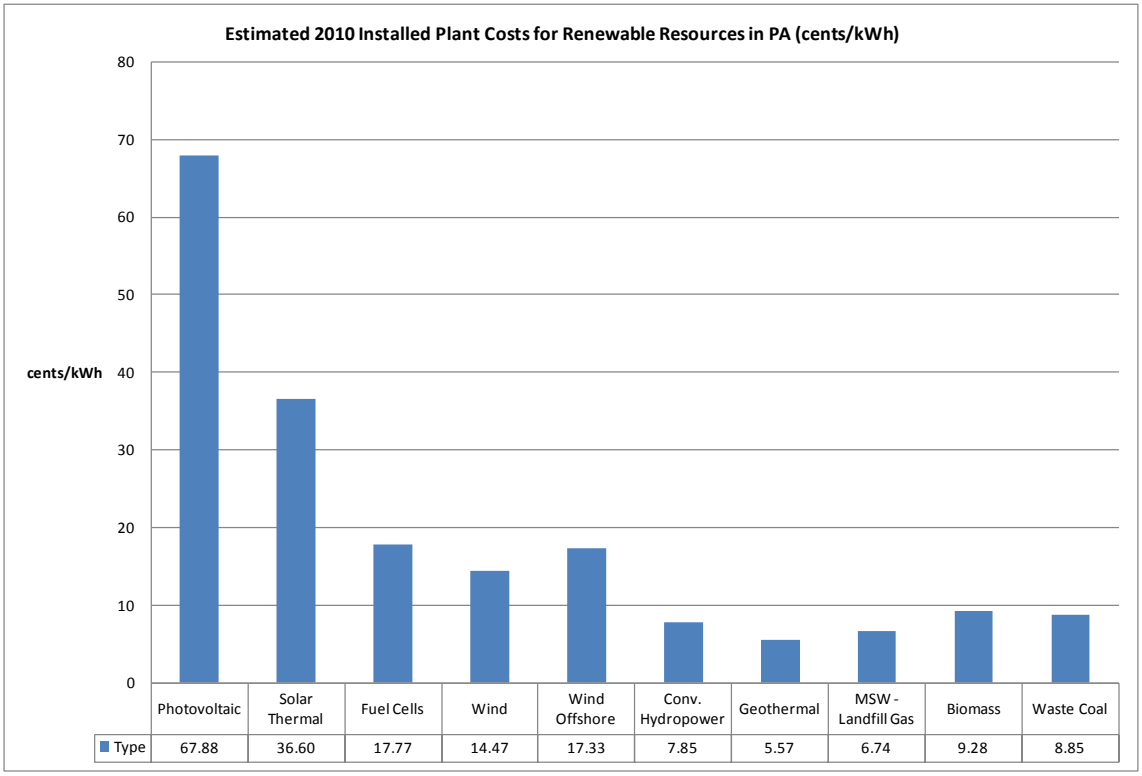
## Estimated Costs of Renewable Resources in Pennsylvania

Presently, very limited data is available regarding the costs of renewable resources. Historically, the Electric Power Research Institute (EPRI) provided such data, or the data was made available during rate cases. However, generation has been deregulated. As such, plant construction costs, as well as most distributed generation prices, are considered to be proprietary business information and are not normally made available.

Given the foregoing, data is available from the Energy Information Administration (EIA). This data is related to the generation cost data subset required by EIA to develop its "Annual Energy Outlook 2010."[28] The EIA data was manipulated to produce the following graph showing estimated installed generating costs for Pennsylvania in 2010.

[28] EIA Annual Energy Outlook, 2010 http://www.eia.doe.gov/oiaf/aeo/index.html

*Graph 11– Estimated 2010 Installed Plant Costs for Renewable Resources in PA*




The graph is meant to depict actual annual costs of ownership per kWh produced. By way of analogy, if we were to use a car, annual costs of ownership would include the following: monthly car payment, registration, gasoline, miscellaneous operation and maintenance (wiper blades, tires), regular operation and maintenance (oil changes, tire rotations), etc. The graph shows all of these expenses on a power plant, including taxes and insurance costs, on a per kWh of output basis. Federal tax credits or the sale of alternative energy credits would reduce the cost of installed plant costs, but are not included in the costs in Graph 11.

# Appendix A

## Background of the Alternative Energy Portfolio Standards

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

The PUC is responsible for carrying out and enforcing the provisions of the law. The Department of Environmental Protection has been charged with ensuring compliance with all environmental, health and safety laws and standards relevant to the law's implementation. The PUC and DEP are to jointly monitor compliance with the Act, the development of the alternative energy market and the costs of alternative energy, and to conduct 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 on a regular basis.

The law establishes a 15-year schedule for complying with its mandates. The percentage of Tier I, Tier II and solar 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 periods that begin on June 1 and conclude on 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 period. This three-month true-up period runs from the conclusion of each reporting period until Sept. 1 of the same calendar year. After the conclusion of the true-up period, the PUC will verify compliance and impose ACPs as appropriate after providing notice and opportunities for hearings to affected parties.

On July 19, 2007, the Governor signed Act 35 of 2007, which amended Act 213 by changing the compliance schedule related to solar PV (photovoltaic) energy. Act 35 also amended other provisions of the original law, including definitions for customer-generator and net metering. As a result, the PUC on Sept.13, 2007, reopened the

public comment period to provide interested parties the opportunity to advise the Commission on how these amendments should be reflected in the final form rulemaking at Docket No. L-00060180. Comments were due October 11, 2007. The Commission completed its review of the comments and issued a final rulemaking at the Public Meeting on Sept. 25, 2008; the rules became effective when published in the Pennsylvania Bulletin on Dec. 20, 2008.

The final rule, published Dec. 20, 2008, provides a 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 7 provides an overview of the AEPS percentage sales requirements with the revised solar PV schedule.

*Table 7 – Overview of AEPS Percentage Sales Requirements*

| Year* | Tier I | Tier II | Solar PV |
|---|---|---|---|
| Year 01- 2007 | 1.50 percent | 4.20 percent | 0.0013 percent |
| Year 02- 2008 | 1.50 percent | 4.20 percent | 0.0030 percent |
| Year 03- 2009 | 2.00 percent | 4.20 percent | 0.0063 percent |
| Year 04- 2010 | 2.50 percent | 4.20 percent | 0.0120 percent |
| Year 05- 2011 | 3.00 percent | 6.20 percent | 0.0203 percent |
| Year 06- 2012 | 3.50 percent | 6.20 percent | 0.0325 percent |
| Year 07- 2013 | 4.00 percent | 6.20 percent | 0.0510 percent |
| Year 08- 2014 | 4.50 percent | 6.20 percent | 0.0840 percent |
| Year 09- 2015 | 5.00 percent | 6.20 percent | 0.1440 percent |
| Year 10- 2016 | 5.50 percent | 8.20 percent | 0.2500 percent |
| Year 11- 2017 | 6.00 percent | 8.20 percent | 0.2933 percent |
| Year 12- 2018 | 6.50 percent | 8.20 percent | 0.3400 percent |
| Year 13- 2019 | 7.00 percent | 8.20 percent | 0.3900 percent |
| Year 14- 2020 | 7.50 percent | 8.20 percent | 0.4433 percent |
| Year 15- 2021 | 8.00 percent | 10.00 percent | 0.5000 percent |

**Years reflect the AEPS year, from June 1 through May 31. For example, Year 1 represents the 12 months of June 1, 2006 through May 31, 2007.*

On Oct. 15, 2008, the Governor signed Act 129 of 2008, which, among other things, included additional energy sources to the definition of Tier 1 alternative energy sources. 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. At Public Meeting on May 28, 2009, the Commission issued a Final Order that established procedures to increase the AEPS Act non-solar PV Tier I percentage requirement on a quarterly basis to account for the new resources.

## Chronology of Events

Table 8 provides a snapshot of the key chronology of events to date.

*Table 8 – Chronology of Events: 2004-09*

| Event | Date |
|---|---|
| Governor Rendell Signs Act 213 of 2004 | November 30, 2004 |
| Act 213 of 2004 Effective Date | February 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) | September 25, 2005 |
| PUC Adopts Order: Designates PJM GATS Registry (M-00051865) | January 27, 2006 |
| Final Net Metering/Interconnection Regs in PA Bulletin | December 16, 2006 |
| PUC Contracts with CPM as Program Administrator | March 28, 2007 |
| Compliance Required for PennPower & UGI | May 31, 2007 |
| Governor Rendell Signs Act 35 of 2007 | July 19, 2007 |
| Compliance Required for Citizens, Duquesne, Pike County & Wellsboro | January 1, 2008 |
| PUC Adopts Final Rulemaking Implementation Order (L-00060180) | September 25, 2008 |
| Governor Rendell Signs Act 129 of 2008 | October 15, 2008 |
| Final Omitted rulemaking Order (Net Metering) – Published in PA Bulletin (L-00050174) | November 29, 2008 |
| PUC Adopts Act 129 Implementation Order – Relating to AEPS | May 28, 2009 |

## Appendix B - AEPS Registered Generators

Alternative Energy Portfolio Standards Generators Registered for PA Certification Summary Information as of February 24, 2010:

- 1,122 qualified generator facilities
- 570 qualified facilities located in Pennsylvania
- 552 qualified facilities located outside Pennsylvania
- 10 qualified facilities use a mix of fuels that include some non-alternative energy resources. Three of these facilities are located in Pennsylvania and seven are located outside Pennsylvania.
- 834 qualified facilities have been certified since June 1, 2007

Table 9 summarizes the Alternative Energy Resources by type and the capacity of each type in and out of Pennsylvania. Though the table does not include biomass as an alternative energy resource type, generator facilities using biomass are included within the Tier I Wood/Wood Wastes Solids resource type.

*Table 9 – AEPS Resource Summary*

| AEPS Tier | Alternative Energy Resource Types (s) | Nameplate Capacity of Facilities in PA (MW) | Nameplate Capacity of Facilities Outside of PA (MW) | Total Nameplate Capacity (MW) |
|---|---|---|---|---|
| I | Black Liquor | 54.00 | 0.00 | 54.00 |
| 1 | Fuel Cell | 0.00 | 0.50 | 0.50 |
| I | Hydro | 42.18 | 0.00 | 42.18 |
| I | Landfill Gas | 159.74 | 266.92 | 426.66 |
| I | Other Biomass Gas | 1.01 | 1.53 | 2.54 |
| I | Solar | 7.69 | 3.69 | 11.38 |
| I | Wind | 751.60 | 1,794.42 | 2,546.03 |
| I | Wood/Wood Waste Solids | 18.00 | 223.10 | 241.10 |
| I | Wood/Wood Waste Solids & Black Liquor | 109.50 | 0.00 | 109.50 |
| II | Blast Furnace Gas | 0.00 | 556.64 | 556.64 |
| II | Blast Furnace & Other Gases | 52.50 | 485.80 | 538.30 |
| II | Hydro | 1,911.70 | 4,292.90 | 6,204.60 |
| II | Municipal Solid Waste | 252.42 | 434.24 | 686.66 |
| II | Other Gases | 31.00 | 0.00 | 31.00 |
| II | Waste Coal | 1,591.90 | 244.60 | 1,836.50 |
| II | Waste Heat | 0.00 | 94.60 | 94.60 |
| II | Wood/Wood Waste Solids | 12.50 | 0.00 | 12.50 |
| II | Wood/Wood Waste Solids & Black Liquor* | 0.00 | 438.9 | 438.9 |

** Several facilities have the capability of generating electricity utilizing multiple fuel sources that include both Tier I and Tier II resource types, those facilities are accounted for as Tier II Wood/Wood Waste Solids & Black Liquor within the summary table.*

## Appendix C- Discussion of Estimating Costs of Renewable Resources Methodology

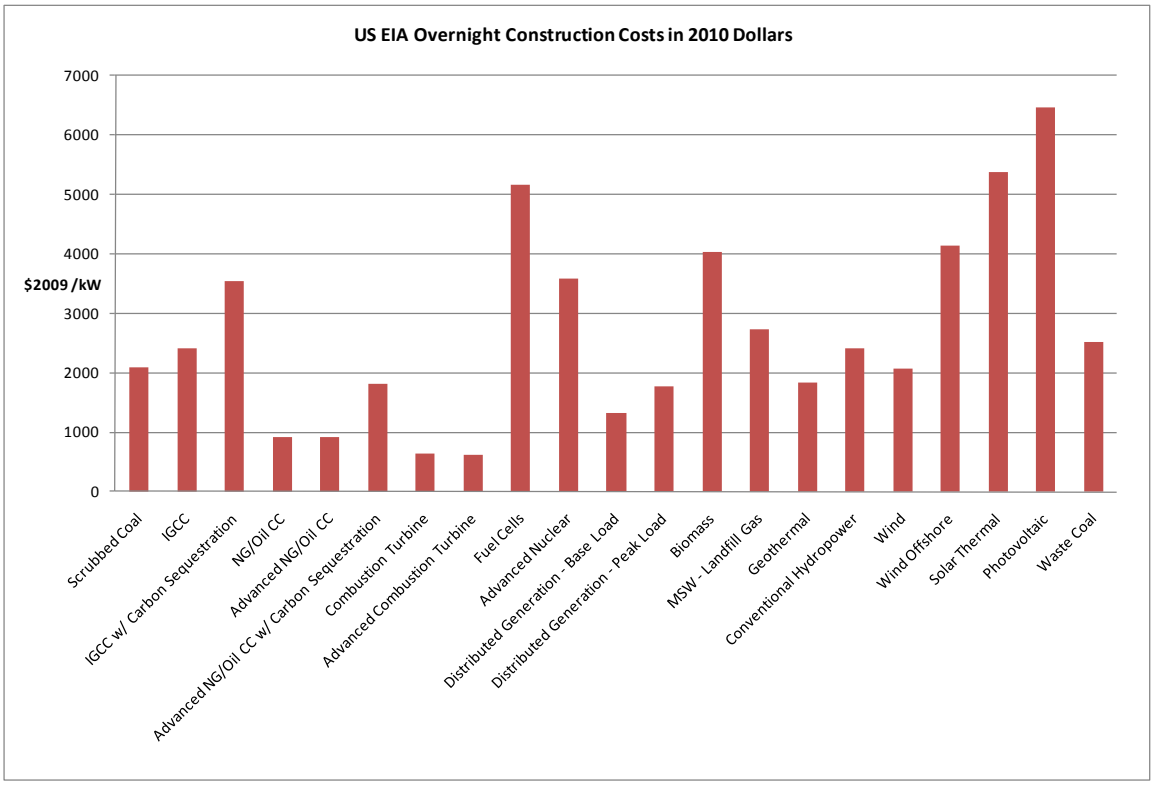
Graph 11 provided earlier in this report (page 33) shows the estimated 2010 installed plant costs for renewable resources in cents per kWh. The graph is meant to depict actual annual costs of ownership per kWh produced. This appendix provides a more detailed discussion of the methodology.

Capital costs associated with various generating units can be found in the U.S. EIA's Table 39, Assumptions to the Annual Energy Outlook 2010.[29] EIA provided the costs in 2008 dollars. The costs as shown in the following graph were updated from 2008 dollars to 2010 dollars using the U.S. Bureau of Labor and Statistics Producer Price Index (PPI) for Electric Utility Distribution costs.[30] The 2008 capital costs were decreased by a factor of 0.941 for 2010.

[29] EIA Assumptions to the Annual Energy Outlook 2010, Table 8.2
http://www.eia.doe.gov/oiaf/aeo/assumption/index.html

[30] Bureau of Labor Statistics Producer Price Index Industry Data Electric Power Generation
http://data.bls.gov/cgi-bin/dsrv

*Graph 12 – U.S. EIA Overnight Construction Costs*




The term "overnight construction costs" is meant to represent the idea that there was no interest accumulated on funds used during construction. No consideration in this report was given to the length of construction duration, nor to the degree of construction difficulty.

Capital costs were annualized to allow comparison of different technologies to one another. For the purposes of this report, a fixed-charge rate was used. Fixed-charge rates for all plant types were provided by EIA.[31] The fixed-charge rate is composed of the capital costs, debt and equity, taxes, and insurance. No benefit was given to any plant-type for existing or expected future tax benefits. When an investment in utility plant is made and placed into service, the owning cost to the utility includes the following:

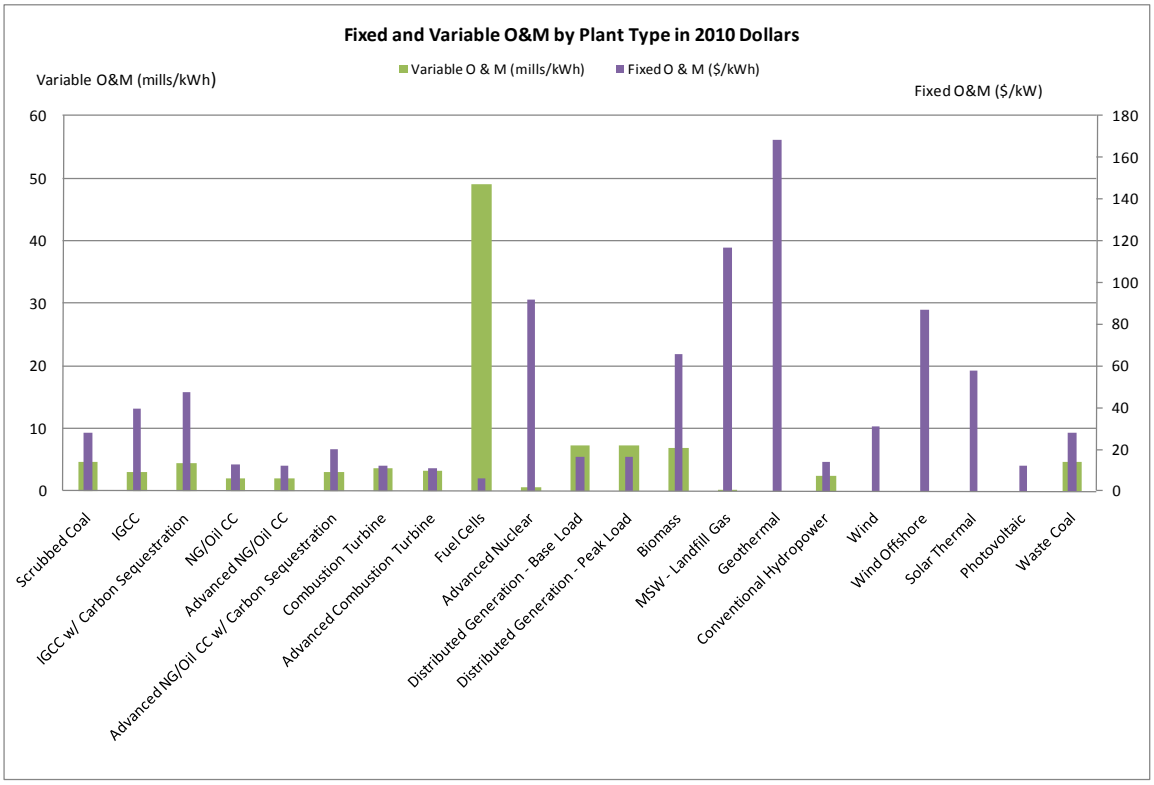
[31] FCRs for 2009 USEIA AEO.xls provided by email from Laura Martin, EIA

- Interest on bonds used to partially finance the project;
- Equity return requirements of the stockholders who helped to finance the project;
- Income taxes to be paid to state and local government;
- Ad valorem (property) taxes and insurances to be paid; and
- Depreciation charge on this investment.

The fixed-charge rate has a yearly variation. The fixed-charge rate might begin at a value of 28 percent per year and decrease to a value of 14 percent per year at 30 years. Levelized or average value over the 30- or 40-year plant life is also used. This can range from 18 percent to 22 percent on a levelized basis for a typical investor-owned utility, depending on the specific utility. Fixed-charge rates for all plant types were provided by EIA. Then, fixed and variable operation and maintenance (O&M) expenses were added in. Most of these O&M numbers were based on the EIA data.[32] The O&M data was for 2008, and like the capital costs, had to be decreased to 2010 dollars. The same PPI factor was used. The data is shown in the following graph.

[32] EIA Assumptions to the Annual Energy Outlook 2010, Table 8.2
http://www.eia.doe.gov/oiaf/aeo/assumption/index.html

*Graph 13– Fixed and Variable O&M by Plant Type*




Capacity factors were either given by the EIA or came from other sources. Base load facilities were assumed at 80 percent, fuel cell capacity factors came from US Army research, distributed generation from U.S. DOE, waste coal from ICF (a consultant for ARIPPA[33]), and nuclear cost information from the World Nuclear Association as provided in the notes with the following calculations:[34]

[33] ARIPPA is the trade association of PA waste coal electric generating waste plants.
[34] DODFuelCell ERC-CERL Projects http://dodfuelcell.cecer.army.mil/res/fleet_performance.php http://www.eere.energy.gov/de/pdfs/dg_economics.pdf, http://www.world-nuclear.org/info/info, ICF's Technical Support Document: Waste Coal-Fired Units in the CAIR and CAIR FIP, p. 9

**Summary of Cost and Performance Characteristics of New Central Station Technologies**

(Following after: US EIA, Table 8.2, Assumptions to the Annual Energy Outlook 2010)

| Plant Type | Size (MW) | Total Overnight Construction Costs ($2008/kW) | Variable O&M ($2008 - mills/kWh) | Fixed O&M ($2008/kW) | Early/Poor Heat Rates (BTU/kWh) |
|---|---|---|---|---|---|
| Scrubbed Coal | 600 | 2223 | 4.69 | 28.15 | 9200 |
| IGCC | 550 | 2569 | 2.99 | 39.53 | 8765 |
| IGCC w/ Carbon Sequestration | 380 | 3776 | 4.54 | 47.15 | 10781 |
| NG/Oil CC | 250 | 984 | 2.11 | 12.76 | 7196 |
| Advanced NG/Oil CC | 400 | 968 | 2.04 | 11.96 | 6752 |
| Advanced NG/Oil CC w/ Carbon Sequestration | 400 | 1932 | 3.01 | 20.35 | 8613 |
| Combustion Turbine | 160 | 685 | 3.65 | 12.38 | 10788 |
| Advanced Combustion Turbine | 230 | 648 | 3.24 | 10.77 | 9289 |
| Fuel Cells | 10 | 5478 | 49 | 5.78 | 7930 |
| Advanced Nuclear | 1350 | 3820 | 0.51 | 92.04 | 10488 |
| Distributed Generation - Base Load | 2 | 1400 | 7.28 | 16.39 | 9050 |
| Distributed Generation - Peak Load | 1 | 1681 | 7.28 | 16.39 | 10069 |
| Biomass | 80 | 3849 | 6.86 | 65.89 | 9451 |
| MSW - Landfill Gas | 30 | 2599 | 0.01 | 116.8 | 13648 |
| Geothermal | 50 | 1749 | 0 | 168.33 | 32969 |
| Conventional Hydropower | 500 | 2291 | 2.49 | 13.93 | 9884 |
| Wind | 50 | 1966 | 0 | 30.98 | 9884 |
| Wind Offshore | 100 | 3937 | 0 | 86.92 | 9884 |
| Solar Thermal | 100 | 5132 | 0 | 58.05 | 9884 |
| Photovoltaic | 5 | 6171 | 0 | 11.94 | 9884 |
| Waste Coal | 600 | 2600.91 | 4.69 | 28.15 | 4846 |

**Calculations and Assumptions**

| Plant Type | FCR (%) | Fuel Price ($/MM BTU,Ton) | Capacity Factor (%) | Annualized Capital Costs 2009 Dollars | Total Annual Cost $ 2009 Dollars | Average Annual Cost ($2009/MWH) |
|---|---|---|---|---|---|---|
| Scrubbed Coal | 23.4% | 46.75 | 80.0% | 293,694,757 | 398,859,037 | 94.86 |
| IGCC | 23.4% | 46.75 | 80.0% | 311,123,112 | 410,299,244 | 106.45 |
| IGCC w/ Carbon Sequestration | 18.8% | 46.75 | 80.0% | 253,841,751 | 337,537,006 | 126.75 |
| NG/Oil CC | 15.5% | 4.98 | 80.0% | 35,880,330 | 102,011,454 | 58.23 |
| Advanced NG/Oil CC | 15.5% | 4.98 | 80.0% | 56,475,056 | 155,750,962 | 55.56 |
| Advanced NG/Oil CC w/ Carbon Sequestration | 17.8% | 4.98 | 80.0% | 129,442,454 | 258,218,246 | 92.12 |
| Combustion Turbine | 17.5% | 4.98 | 80.0% | 18,048,380 | 80,366,159 | 71.67 |
| Advanced Combustion Turbine | 17.5% | 4.98 | 80.0% | 24,543,162 | 101,704,104 | 63.10 |
| Fuel Cells | 17.5% | 4.98 | 75.0% | 9,020,897 | 11,676,165 | 177.72 |
| Advanced Nuclear | 19.9% | 0.71 | 80.0% | 965,694,663 | 1,251,230,617 | 132.25 |
| Distributed Generation - Base Load | 15.0% | 4.98 | 60.0% | 395,220 | 903,379 | 85.94 |
| Distributed Generation - Peak Load | 15.0% | 4.98 | 60.0% | 264,505 | 545,261 | 103.74 |
| Biomass | 15.0% | 0 | 83.0% | 48,451,212 | 53,980,708 | 92.80 |
| MSW - Landfill Gas | 15.0% | 0 | 90.0% | 12,268,580 | 15,944,276 | 67.41 |
| Geothermal | 14.3% | 0 | 90.0% | 13,118,112 | 21,947,021 | 55.67 |
| Conventional Hydropower | 18.0% | 0 | 65.0% | 216,293,310 | 223,599,598 | 78.54 |
| Wind | 16.5% | 0 | 29.4% | 17,014,256 | 18,639,157 | 144.75 |
| Wind Offshore | 12.5% | 0 | 40.0% | 51,623,913 | 60,741,821 | 173.35 |
| Solar Thermal | 13.4% | 0 | 24.4% | 72,138,471 | 78,227,916 | 365.99 |
| Photovoltaic | 12.3% | 0 | 13.6% | 3,981,128 | 4,043,753 | 678.85 |
| Waste Coal | 23.40% | 0 | 85.00% | 354,654,612 | 372,372,227 | 83.35 |

**Notes:** Coal price based on US EIA, 3/2010 Table 4.2 Receipts cost for Elec. Util.

NG Price EIA NG Weekly Contract = $4.98/MM BTU 6/16/2010

Nuclear Fuel Price (cents/kWh) World Nuclear Assoc. 0.71c/kWh 4/2010

Base Load capacity factors = 80% Waste Coal = 85% from ICF's Technical Support Document

Renewable capacity factors from EIA Table 13.2 of Annual Energy Outlook 2009

CF Fuel Cell http://dodfuelcell.cecer.army.mil/res/fleet_performance.php

Distributed Generation CF http://www.eere.energy.gov/de/pdfs/dg_economics.pdf

Photovoltaic Capacity Factor from DEP Pennsylvania's Solar Share, Wind from DOE

2008 to 6/2010

| Plant Type | Adjusted Plant Price Change $/KW | Total 6/2009 Plant Cost 2009 Dollars | Expected Annual Plant Output MWH | Adusted F & V O & M 2009 Dollars | Expected Annual Fuel Cost 2009 Dollars | Total Annual Costs 2009 Dollars | Average Annual Costs ($2009/ MWH) |
|---|---|---|---|---|---|---|---|
| Scrubbed Coal | 2092 | 1,255,105,800 | 4,204,800 | 17,717,615 | 87,446,665 | 398,859,037 | 94.86 |
| IGCC | 2417 | 1,329,585,950 | 3,854,400 | 22,806,837 | 76,369,295 | 410,299,244 | 106.45 |
| IGCC w/ Carbon Sequestration | 3553 | 1,350,222,080 | 2,663,040 | 18,794,938 | 64,900,317 | 337,537,006 | 126.75 |
| NG/Oil CC | 926 | 231,486,000 | 1,752,000 | 3,346,312 | 62,784,812 | 102,011,454 | 58.23 |
| Advanced NG/Oil CC | 911 | 364,355,200 | 2,803,200 | 5,018,418 | 94,257,488 | 155,750,962 | 55.56 |
| Advanced NG/Oil CC w/ Carbon Sequestration | 1818 | 727,204,800 | 2,803,200 | 8,538,863 | 120,236,929 | 258,218,246 | 92.12 |
| Combustion Turbine | 645 | 103,133,600 | 1,121,280 | 2,077,863 | 60,239,916 | 80,366,159 | 71.67 |
| Advanced Combustion Turbine | 610 | 140,246,640 | 1,611,840 | 2,598,481 | 74,562,461 | 101,704,104 | 63.10 |
| Fuel Cells | 5155 | 51,547,980 | 65,700 | 60,684 | 2,594,585 | 11,676,165 | 177.72 |
| Advanced Nuclear | 3595 | 4,852,737,000 | 9,460,800 | 130,342,447 | 155,193,508 | 1,251,230,617 | 132.25 |
| Distributed Generation - Base Load | 1317 | 2,634,800 | 10,512 | 34,394 | 473,765 | 903,379 | 85.94 |
| Distributed Generation - Peak Load | 1763 | 1,763,369 | 5,256 | 17,201 | 263,555 | 545,261 | 103.74 |
| Biomass | 4038 | 323,008,080 | 581,664 | 5,529,496 | 0 | 53,980,708 | 92.80 |
| MSW - Landfill Gas | 2726 | 81,790,530 | 236,520 | 3,675,696 | 0 | 15,944,276 | 67.41 |
| Geothermal | 1835 | 91,735,050 | 394,200 | 8,828,909 | 0 | 21,947,021 | 55.67 |
| Conventional Hydropower | 2403 | 1,201,629,500 | 2,847,000 | 7,306,288 | 0 | 223,599,598 | 78.54 |
| Wind | 2062 | 103,116,700 | 128,772 | 1,624,901 | 0 | 18,639,157 | 144.75 |
| Wind Offshore | 4130 | 412,991,300 | 350,400 | 9,117,908 | 0 | 60,741,821 | 173.35 |
| Solar Thermal | 5383 | 538,346,800 | 213,744 | 6,089,445 | 0 | 78,227,916 | 365.99 |
| Photovoltaic | 6473 | 32,366,895 | 5,957 | 62,625 | 0 | 4,043,753 | 678.85 |
| Waste Coal | 2526 | 1,515,618,000 | 4,467,600 | 17,717,615 | 0 | 372,372,227 | 83.35 |

**Notes:** Installed Plant costs decreased by 0.941 for 2008 to 5/2010 based on Prod Price Index - Electric Power generation Http://data.bls.gov/cgi-bin/dsrv

Wind Offshore new for this report. Offshore wind projects planned for NJ and Lake Erie.

Waste Coal costs est. from conv. coal adding 17% for construction costs. Assume waste coal plant is CFB with controls.

## Key to Generating Capacity Types

| Capacity Type |
|---|
| Existing Coal Steam Plants |
| High Sulfur Pulverized Coal with Wet Flue Gas Desulfurization |
| Advanced Coal – Integrated Coal Gasification Combined Cycle |
| Advanced Coal with Carbon Sequestration |
| Oil/Gas Steam – Oil/Gas Steam Turbine |
| Combined Cycle – Conventional Gas/Oil Combined Cycle Combustion Turbine |
| Advanced Combined Cycle – Advanced Gas/Oil Combined Cycle Combustion Turbine |
| Advanced Combined Cycle with Carbon Sequestration |
| Combustion Turbine – Conventional Combustion Turbine |
| Advanced Combustion Turbine – Steam Injected Gas Turbine |
| Molten Carbonate Fuel Cell |
| Conventional Nuclear |
| Advanced Nuclear – Advanced Light Water Reactor |
| Generic Distributed Generation – Baseload |
| Generic Distributed Generation – Peak |
| Conventional Hydropower – Hydraulic Turbine |
| Pumped Storage – Hydraulic Turbine Reversible |
| Geothermal |
| Municipal Solid Waste |
| Biomass – Integrated Gasification Combined-Cycle |
| Solar Thermal – Central Receiver |
| Solar Photovoltaic – Single Axis Flat Plate |
| Wind |
| Wind Offshore |

*Source: Energy Information Administration, Assumptions to the Annual Energy Outlook 2009 Table 8.1*

# Appendix D

## PUC Orders

Orders are available on the PUC Web site at www.puc.state.pa.us under the tab Electricity, Alternative Energy. Information is also available at http://paaeps.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

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

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 September 29, 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 January 27, 2006

Final Rulemaking Re: 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

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

Final Rulemaking Re: 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 September 15, 2006

Implementation of the Alternative Energy Portfolio Standards Act of 2004, Docket No. M-00051865, PUC Public Meeting on November 30, 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 December 21, 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, Petition for Reconsideration of Viking Energy of Northumberland, Docket No. P-00052149, PUC Public Meeting on May 30, 2007

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

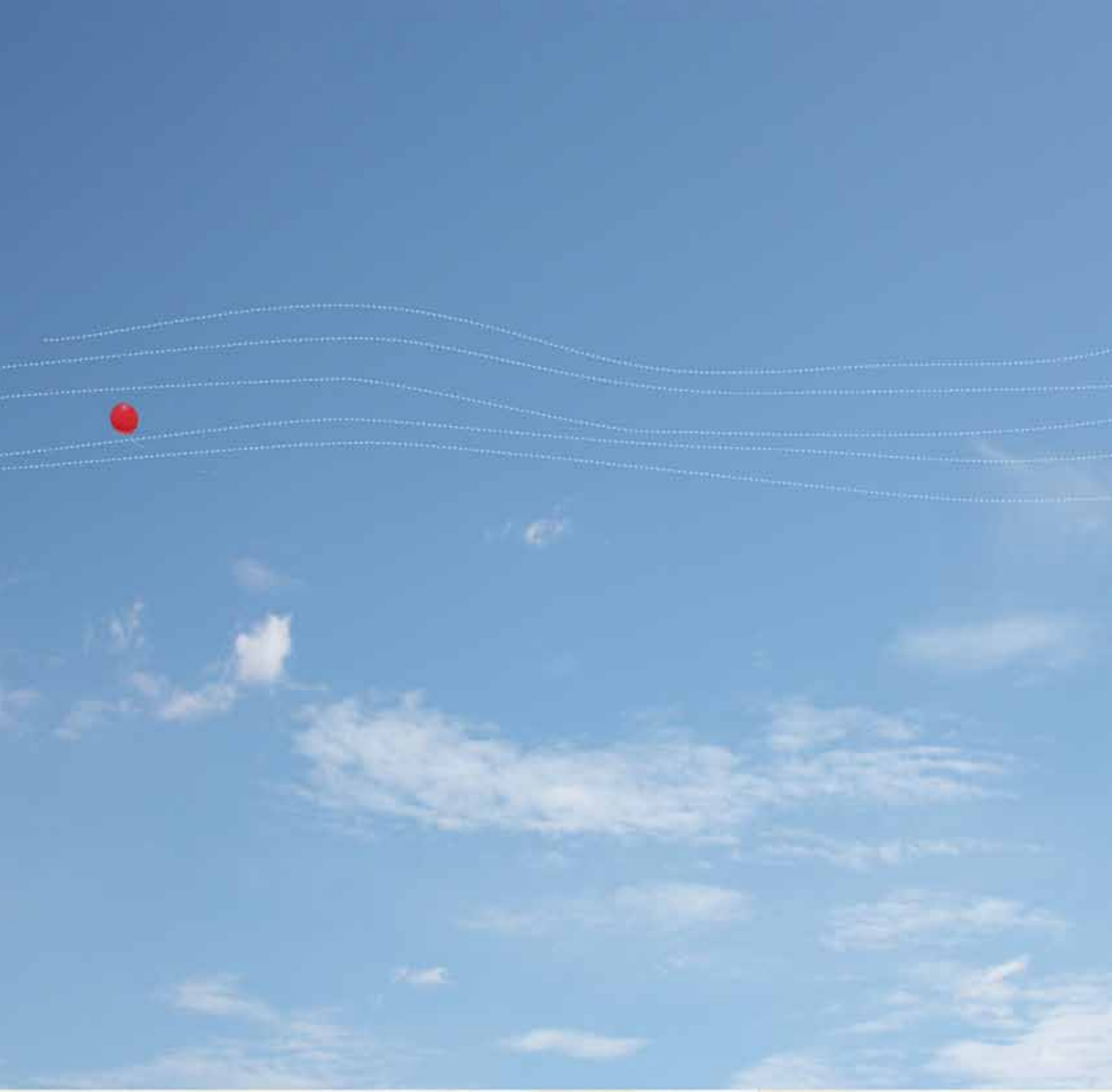
Implementation of the Alternative Energy Portfolio Standards Act of 2004, Docket No. L-00060180, PUC Public Meeting on September 25, 2008

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

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

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



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