Department of Legislative Services

Maryland General Assembly
2011 Session

FISCAL AND POLICY NOTE

Senate Bill 964 (Senator Astle)
Finance

Renewable Energy - Poultry Litter - Net Energy Metering and Renewable Energy Portfolio Standard

This bill alters Maryland's renewable energy portfolio standards (RPS) by requiring 0.1% in 2013 and 2014, and 0.7% in 2015 and thereafter, of the electricity generated in the State to come from a poultry litter-to-energy (PLE) system. If the owner of a PLE system chooses to sell PLE renewable energy credits (RECs), the owner must first offer the credits for sale to an electricity supplier that must apply them toward compliance with Maryland's RPS. The bill also expands the sources of generation that are eligible for net energy metering to include a PLE generating facility. Finally, the bill establishes as a finding of the General Assembly that the benefits of converting poultry litter to renewable energy produced by viable commercially proven technology, rather than use as a land-applied fertilizer, may reduce the nitrogen and phosphorus runoff pollution to the Chesapeake Bay, its tributaries, and other waters of the State and further the State's progress toward achieving established State and federal nutrient reduction goals.

Fiscal Summary

State Effect: Special fund revenues to the Maryland Strategic Energy Investment Fund (SEIF) may increase by between $0.3 million and $2.6 million in FY 2014 and 2015. SEIF revenues may increase by between $1.8 million and $18.5 million in FY 2016 depending on the availability of PLE RECs and the amount of alternative compliance payments (ACP) paid by electricity suppliers. State expenditures (all funds) for electricity increase by a minimum of $15,400 in FY 2013 and by a maximum of $401,400 in FY 2016. To the extent the bill assists the State in achieving federal Chesapeake Bay restoration mandates, State expenditures (all funds) that would otherwise support these efforts may be reduced or redirected.

Local Effect: Potential increase in local government expenditures due to higher electricity prices. Local revenues may increase minimally to the extent PLE RPS is met

through ACP and local jurisdictions receive grants or loans for renewable energy projects through SEIF. Other potential indirect effects are described below.

Small Business Effect: Potential meaningful.

Analysis

Current Law: With respect to RPS requirements, PLE is considered a Tier 1 renewable source.

Maryland's RPS requires that renewable sources generate specified percentages of Maryland's electricity supply each year, increasing to 20%, including 2% from solar power, by 2022. Electricity suppliers must submit RECs equal to the percentage mandated by statute each year, or pay the alternative compliance payment (ACP) equivalent to the supplier's shortfall. RECs are classified as Tier 1, Tier 2, or solar RECs. Tier 1 sources include solar; wind; qualifying biomass; methane from anaerobic decomposition of organic materials in a landfill or wastewater treatment plant; geothermal; ocean, including energy from waves, tides, currents, and thermal differences; a fuel cell that produces electricity from a Tier 1 renewable source; a small hydroelectric plant of less than 30 megawatts (MW); and PLE. Tier 2 sources include hydroelectric and waste-to-energy. **Exhibit 1** shows RPS percentage requirements through 2022 and the proposed Tier 1 PLE requirement.

Exhibit 1
Renewable Energy Portfolio Standards

Year	Tier 1 Total	Tier 1 Solar	Proposed Tier 1 PLE	Tier 2
2011	5.0%	0.05%	-	2.5%
2012	6.5%	0.10%	-	2.5%
2013	8.2%	0.20%	0.1%	2.5%
2014	10.3%	0.30%	0.1%	2.5%
2015	10.5%	0.40%	0.7%	2.5%
2016	12.7%	0.50%	0.7%	2.5%
2017	13.1%	0.55%	0.7%	2.5%
2018	15.8%	0.90%	0.7%	2.5%
2019	17.4%	1.20%	0.7%	-
2020	18.0%	1.50%	0.7%	-
2021	18.7%	1.85%	0.7%	-
2022	20.0%	2.00%	0.7%	-

Source: Department of Legislative Services

The ACP for Tier 1 sources is $0.04 per kilowatt-hour (kWh). The ACP for the Tier 1 solar requirement is $0.40 per kWh through 2014 and decreases to $0.05 per kWh in 2023 and thereafter. Electricity used for an industrial process loads has a reduced ACP for Tier 1 and Tier 1 solar and no ACP for Tier 2 sources.

Net energy metering is the measurement of the difference between the electricity that is supplied by an electric company and the electricity that is generated by an eligible customer-generator and fed back to the electric company over the eligible customer-generator's billing period. An "eligible customer-generator" is a customer that owns and operates, or leases and operates, a biomass, solar, fuel cell, wind, or micro combined heat and power (micro-CHP) electric generating facility located on the customer's premises or contiguous property; interconnected and operated in parallel with an electric company's transmission and distribution facilities; and intended primarily to offset all or part of the customer's own electricity requirements. The generating capacity of an eligible customer-generator for net metering may not exceed two megawatts (MW).

Background:

Poultry Litter on Maryland's Eastern Shore

The Maryland Department of Agriculture (MDA) estimates that there are approximately 900 poultry farms and 1,300 grain farms on Maryland's Eastern Shore. Approximately half of the poultry farms also raise crops. The Maryland poultry industry is the State's largest agriculture sector and accounted for nearly 40% of all farm income in 2009.

Poultry litter is a term that refers to the mixture of manure and bedding material removed periodically from poultry brooding houses. According to MDA, poultry litter is a fungible commodity commonly used as a crop fertilizer on Maryland's Eastern Shore and the Delmarva Peninsula. Poultry litter is also utilized by the Perdue Agri-recycle plant in Georgetown, Delaware for manufacturing of poultry litter pellets for specialty fertilizer applications. Smaller, but significant volumes of poultry litter are used in the production of mushrooms and compost products. The value of litter to the poultry farmer varies according to the proximity to an end user. Prices and services received by poultry farmers vary widely, ranging from giving away the litter in exchange for free removal services to $25 per ton delivered to the farm.

Poultry litter has high concentrations of phosphorus relative to the amount of nitrogen. If enough poultry litter is applied as fertilizer to meet the nitrogen needs of crops, the land can eventually become saturated with phosphorus, leading to reduced water quality. The excess application of phosphorus on the Eastern Shore is a concern with respect to the health of the Chesapeake Bay. Based on data provided by the U.S. Environmental Protection Agency's Chesapeake Bay Program, poultry litter use on Maryland's Eastern

Shore accounts for approximately 1.4% of the total nitrogen load and 1.9% of the total phosphorus load to the Chesapeake Bay. As a percentage of Maryland's nutrient load to the bay, poultry litter use on the Eastern Shore accounts for an estimated 6.6% of the nitrogen and 9.9% of the phosphorus.

MDA estimates that about 347,000 tons of poultry litter are generated annually on Maryland's Eastern Shore, and that about 765,000 tons are generated annually for the entire Delmarva peninsula.

Poultry Litter-to-energy

PLE is an established method of biomass electricity generation. Several plants have been constructed in Europe and a 55-MW PLE power plant began operation in Minnesota in 2007. The plant uses approximately 500,000 tons of turkey litter each year. PLE facilities have been proposed in several other states including: Arkansas, Georgia, Mississippi, Michigan, North Carolina, Pennsylvania, and Virginia. Three primary technologies are used in PLE facilities: direct combustion; fluidized bed combustion; and gasification.

The viability of poultry litter as a power plant fuel stock depends on several technical and market factors. These include the chemical composition of the poultry litter being fired, delivered poultry litter feedstock prices, and the net revenues that can be generated at an energy plant from poultry litter ash – a waste product that results from generating electricity from poultry litter. If the value of the poultry litter ash as a fertilizer can cover the associated transportation costs, the ash may be transferred away from the site for use as a fertilizer.

Fibrowatt, a developer of PLE power plants, has announced preliminary plans to construct a 55-MW facility on Maryland's Eastern Shore. Assuming an efficiency factor of 90%, the facility would generate RECs equal to about 434,000 megawatt-hours (MWh) of the 462,000 MWh of PLE generation required to meet the RPS specified under the bill. The facility is expected to use an average of 465,000 tons of poultry litter and 80,000 tons of yard waste each year.

Poultry litter has shown to be a viable renewable biomass fuel. The U.S. Energy Information Administration estimates its heat content is 6,187 British Thermal Units per pound and is usually quite dry when compared to other biomass fuels.

The Power Plant Research Project within the Department of Natural Resources completed an engineering and socioeconomic study of using poultry litter as a primary fuel at the Eastern Correctional Institution Cogeneration Facility in October 2000. The study confirmed the viability of poultry litter as a fuel, but determined that the

modifications that would have to be made to the existing wood-fired facility adversely affected the economics of the project.

Renewable Energy Portfolio Standards

Maryland's RPS was established in 2004 in order to recognize the economic, environmental, fuel diversity, and security benefits of renewable energy resources; establish a market for electricity from those resources in Maryland; and lower consumers' cost for electricity generated from renewable sources.

RPS works to encourage the development of renewable electric generation by providing the owners of renewable electric generating facilities with a payment for RECs associated with their facilities. RECs can be purchased and traded on an open exchange, allowing electricity suppliers to either purchase RECs directly from renewable generators or through a third-party reseller. RECs can also be purchased by an electricity supplier through a long-term contract. The price of a REC is effectively capped by the applicable ACP – what a supplier pays for an RPS shortfall. Based on RECs retired by electricity suppliers, for the 2009 compliance year, solar REC (SREC) prices averaged 86% of the ACP, while Tier 1 (nonsolar) RECs averaged only 2.5% of the ACP, and Tier 2 RECs averaged only 2.9% of the ACP.

Accordingly, the ACP for Tier 1 solar RPS was $400 per MWh, and Maryland SRECs were retired with an average cost of about $345. The ACP for Tier 1 nonsolar RPS was $40 per MWh and Tier 1 RECs averaged a cost of $0.96. The ACP for Tier 2 RPS was $15 per MWh and Tier 2 RECs averaged a cost of $0.43 in 2009.

To date, electricity suppliers generally have been able to meet their Tier 1 nonsolar RPS obligations through the submission of RECs, with little reliance on ACPs. By contrast, initial compliance with the solar RPS obligation has broadly been met with ACP payments, generating $1.2 million in 2008 and $1.1 million in 2009. This appears to be due, in part, to the timing of electricity supply contracts preventing some utilities from initially complying with the solar RPS obligation with SRECs and, in part, to the limited availability of SRECs. Based on preliminary data submitted by electricity suppliers, the Public Service Commission (PSC) expects suppliers to meet more of the solar RPS through SRECs than in prior years.

A two-tiered RPS system identifies the lowest cost technology or combination of technologies to meet the established renewable requirement for each tier. A two-tiered approach imposes constraints on the satisfaction of the RPS requirement by establishing that a portion of the generation used to meet the renewable requirement come from a particular group of technology types. In effect, a two-tiered approach can act to ensure that a wider variety of technologies is developed as a result of RPS, instead of the

lowest-cost option. Further sectioning the RPS into additional tiers or carve-outs can direct monetary incentives to specific types of renewable generation.

Changes in Maryland's RPS

Chapter 120 of 2007 revised Maryland's RPS to include a solar carve-out, requiring that at least 0.005% of electricity in 2008 be from solar generation increasing to at least 2.0% in 2022. The Act also increased total Tier 1 requirements as a result of the added solar component. Chapters 125 and 126 of 2008 amended Maryland's RPS by increasing the percentage requirements of the Tier 1 RPS to equal 20% in 2022 and beyond. Chapters 135 and 136 of 2008 included poultry-to-energy as a source eligible to meet the Tier 1 RPS.

Chapter 494 of 2010 increased the solar RPS percentages and the ACP payment amounts for the solar RPS from 2011 through 2016, accelerating the ramp up of the solar RPS obligation and increasing the incentive for the installation of solar capacity. To meet the 2% solar obligation in 2022 with SRECs, the installed solar capacity in the State will need to increase from roughly 27 MW or less at the end of 2010 to an estimated 1,300 MW in 2022.

Direct Impact of Creating a Tier 1 PLE Carve-Out

Under current law, the value of a Tier 1 REC from a PLE facility is worth the same as a REC as any other Tier 1 facility (excluding solar). Since there are currently enough RECs available for Maryland electricity suppliers to meet RPS, the value of Tier 1 RECs is depressed to a small portion of the applicable ACP, which acts as a price cap. Establishing a carve-out for Tier 1 PLE will significantly increase the value of RECs for these facilities, since PLE is the only source that can satisfy the new RPS carve-out under the bill. Additionally, since there are currently no facilities eligible to meet this requirement, RECs for PLE will likely be, at least initially, valued at or near the ACP.

Federal Chesapeake Bay Restoration Requirements

The federal Clean Water Act requires states to designate intended uses for their water bodies, such as swimming and fishing, and to set water quality standards to achieve these uses. Water bodies that do not meet the water quality standards are designated as *impaired* and are assigned a Total Maximum Daily Load (TMDL) or "pollution diet," which (1) sets the maximum amount of pollution that the water body can receive and still attain water quality standards; and (2) identifies specific pollution reduction requirements among the various contributing sources.

EPA has been working with watershed states and the District of Columbia to develop a Chesapeake Bay TMDL since 2000 in order to prepare for a federal court-ordered deadline established by several consent decrees. The effort was also significantly reinvigorated by the signing of Executive Order 13508 by President Obama in May 2009. In May 2010, EPA committed to establishing a final bay TMDL, which it released on December 29, 2010.

Working with EPA, each watershed state and the District of Columbia completed a final Phase I watershed implementation plan (WIP). The WIPs, which were released in December 2010 after a public comment period, are intended to provide a roadmap for how each jurisdiction will achieve and maintain its share of the bay TMDL. Maryland's WIP builds on existing restoration efforts and identifies strategy options to reduce nitrogen and phosphorous from all major sources, such as wastewater, stormwater runoff, septic systems, agriculture, and air pollution.

The total cost to implement the State's final Phase I WIP submitted to EPA on December 3, 2010, covering calendar 2010 to 2017, is approximately $10.9 billion. However, there are a number of current State programs that provide funding for actions identified in the plan. Existing State funding sources are projected to provide approximately $2.7 billion between fiscal 2010 and 2017. The major costs in calendar 2010 to 2017 are primarily related to regulated entities such as wastewater treatment plants, urban stormwater, and utilities, which account for approximately 94% of the total cost for calendar 2010 to 2017.

Phase I plans to reduce nitrogen and phosphorus pollution from Maryland's poultry farms are expected to cost $11.6 million through fiscal 2017. This cost estimate includes $6.8 million to transport poultry litter away from farms with high phosphorus levels to other farms or locations that can use manure safely. Half of the cost of manure transportation is available through MDA's Maryland Agricultural Water Quality Cost Share Program and the other half is paid by poultry companies. An additional $3.3 million cost is projected for surface application of an acidifier to poultry litter to acidify the litter and maintain ammonia in the nonvolatile ionized form (ammonium) in the poultry house. Other poultry farm-related actions identified in the WIP include building vegetation buffers around poultry houses; constructing structures to protect poultry waste from rain; and incorporating poultry litter into the soil at the time of application as fertilizer using minimum disturbance technology.

A county-scale Phase II WIP currently under development will require reductions of nutrient and sediment loads for each county in the State, as well as Baltimore City.

State Revenues: To the extent that establishing a Tier 1 carve-out for PLE results in additional compliance fees being paid by electricity suppliers, revenues to SEIF increase.

The amount of additional ACP paid could vary greatly depending on the availability of RECs available from a PLE facility when compared to the amount of ACP paid by electricity suppliers under the current Tier 1 RPS. **Exhibit 2** shows the potential additional revenues to SEIF, depending on the amount of PLE RECs available to meet the PLE RPS carve-out. The low-cost scenario assumes 10% of the PLE RPS is met through ACP; the medium-cost scenario assumes 20% of the PLE PRS is met through ACP; and the high-cost scenario assumes an eligible PLE facility is not constructed and, thus, 100% of the PLE RPS is met through ACP. The estimates assume that electricity suppliers are able to meet current Tier 1 RPS through the retirement of RECs and are not liable for ACP. The estimates also assume that the value of regular Tier 1 RECs increases by 50% annually, as the demand for Tier 1 RECs under RPS is increased each year.

Exhibit 2
Potential Revenues to SEIF from ACP under PLE RPS

Fiscal Year	PLE RPS Annual %	ACP Low-cost	ACP Medium-cost	ACP High-cost
2014	0.1%	$260,076	$520,152	$2,600,760
2015	0.1%	262,452	524,904	2,624,520
2016	0.7%	1,848,056	3,696,112	18,480,560
2017	0.7%	1,874,712	3,749,424	18,747,120
2018	0.7%	1,897,364	3,794,728	18,973,640

Source: Department of Legislative Services

SEIF revenues from ACP are received during the fiscal year following the RPS calendar year compliance. For example, revenues from the 2013 compliance year are paid to SEIF during fiscal 2014. As shown in the exhibit, revenues in fiscal 2014 and 2015 may increase by between $260,000 to $2.6 million in both years. Estimated SEIF revenues in fiscal 2016, the first full fiscal year under the 0.7% PLE RPS, range from $1.8 million to $18.5 million. By fiscal 2018, estimated revenues range from $1.9 million to $19.0 million.

State Expenditures: As an electric customer, State agencies and the University System of Maryland used approximately 1.5 million MWh of electricity in fiscal 2010. Depending on the number of PLE RECs available to meet the PLS RPS, the cost of RPS compliance absorbed by electric suppliers and passed on to the State may vary greatly. **Exhibit 3** shows the potential increase in electricity costs under the three cost scenarios described above. In fiscal 2013, State expenditures for electricity (all funds) may

increase by a minimum of $15,400 or by a maximum of $29,400, which reflects the 0.1% PLE RPS in effect for half the fiscal year. In fiscal 2016, the first full fiscal year of the 0.7% PLE RPS carve-out, electricity costs may increase by a minimum of $192,200 or by a maximum of $401,400.

Exhibit 3
Potential Increase in State Electricity Expenses

Fiscal Year	Low-cost	Medium-cost	High-cost
2013	$15,427	$23,640	$29,403
2014	30,332	46,520	58,512
2015	114,365	175,989	230,834
2016	192,238	296,600	401,433
2017	176,184	273,534	397,419

Source: Department of Legislative Services

Establishing a separate carve-out in Maryland's RPS for PLE significantly increases financial incentives for private development of a PLE facility. A PLE facility sized to meet the PLE RPS is estimated to consume between 450,000 to 700,000 pounds of poultry litter each year. Although not a *direct* effect of the bill to the extent a PLE facility is constructed, State expenditures (all funds) that would otherwise support the State's efforts through the WIP to reduce nitrogen and phosphorus loading to the Chesapeake Bay may be reduced or redirected.

Local Fiscal Effect: Counties and municipalities use electricity for street lighting, wastewater treatment plants, office facilities, and recreational facilities. Local school systems are also large consumers of electricity. Thus, local government expenditures for electricity increase, based on the cost incurred by electricity suppliers to meet the PLE RPS. Local revenues may increase minimally to the extent PLE RPS is met through ACP and local jurisdictions receive grants or loans for renewable energy projects through SEIF.

In addition, local governments will likely incur a significant portion of the costs the State anticipates to meet the WIP. To the extent a PLE facility is constructed as a result of this bill, local expenditures that would otherwise support efforts to reduce nitrogen and phosphorus loading to the Chesapeake Bay may be reduced or redirected.

Finally, some local jurisdictions could benefit from enhanced economic development to the extent the bill encourages the construction of a PLE facility in the State.

Small Business Effect: Increasing the value of RECs from a PLE facility may increase the likelihood that such a facility is constructed. If such a facility is constructed on Maryland's Eastern Shore, poultry farmers receive a meaningful benefit through an increase in the demand for poultry waste and potentially an increase in payments for poultry litter. Farmers who currently use poultry litter as a fertilizer source may experience an increase in fertilizer costs, as a PLE facility will significantly increase the demand for poultry litter and decrease the availability of poultry litter for fertilizer purposes.

All electric customers, including small businesses, incur additional costs for electricity as the additional expense in meeting the Tier 1 PLE RPS is paid by all electricity customers, as discussed below.

Additional Comments: The potential cost of complying with the PLE RPS carve-out is shown in **Exhibit 4**. The actual cost will vary greatly depending on the availability of RECs from PLE, especially when compared to the cost of nonsolar and nonPLE Tier 1 RECs.

Under a low-cost scenario, 90% of the PLE RPS is met through procurement of RECs, and the price of RECs equals 50% of the ACP. Under a medium-cost scenario, 80% of the PLE RPS is met through procurement of RECs valued at 80% of the ACP. The high-cost scenario assumes that a PLE facility is not constructed and PLE RECs are not available to meet the PLE RPS. Therefore, under the high-cost scenario, 100% of the PLE RPS is met through payment of ACP. Under each scenario, the cost of PLE RECs reflects the expected cost of regular Tier 1 RECs. The estimates assume the value of Tier 1 RECs increase by 50% annually, as the demand for Tier 1 RECs increases significantly each year under the existing RPS.

Exhibit 4
Total Estimated Increase in Cost of PLE RECs and ACP

Year	Demand (Gigawatt-hours	PLE RPS Annual %	PLE RPS Low-cost	PLE RPS Medium-cost	PLE RPS High-cost
2013	65,019	0.1%	$1,364,586	$2,091,011	$2,600,760
2014	65,613	0.1%	1,343,836	2,062,873	2,624,520
2015	66,002	0.7%	9,111,782	14,026,745	18,480,560
2016	66,954	0.7%	8,709,355	13,469,806	18,747,120

Source: Department of Legislative Services

The potential impact on ratepayers of establishing a PLE RPS carve-out is shown in **Exhibit 5.** The exhibit uses the same low-, medium-, and high-cost scenarios described above and allocates compliance costs on a per kWh basis. The estimates assume that the average residential customer uses 1,026 kWh of electricity each month and that the average commercial customer uses 12,500 kWh of electricity each month. As shown in the exhibit, annual electricity costs for residential customers may increase between $1.70 and $3.45 in 2015 the first year under the 0.7% RPS. Annual electricity costs for a typical commercial customer may increase between $20.71 and $42.00 in 2015.

Exhibit 5
Annual Impact on Average Customer Bills
($ per kWh)

	Low-cost Scenario		Medium-cost Scenario		High-cost Scenario	
Year	Residential	Commercial	Residential	Commercial	Residential	Commercial
2013	$0.26	$3.15	$0.40	$4.82	$0.49	$6.00
2014	0.25	3.07	0.39	4.72	0.49	6.00
2015	1.70	20.71	2.62	31.88	3.45	42.00
2016	1.60	19.51	2.48	30.18	3.45	42.00

Source: Department of Legislative Services

Additional Information

Prior Introductions: None.

Cross File: None.

Information Source(s): Maryland Department of Agriculture, Department of Natural Resources, Maryland Department of the Environment, Office of People's Counsel, Public Service Commission, U.S. Energy Information Administration, U.S. Environmental Protection Agency, Department of Legislative Services

Fiscal Note History: First Reader - March 23, 2011
ncs/lgc

Analysis by: Erik P. Timme

Direct Inquiries to:
(410) 946-5510
(301) 970-5510