

# Part 2: Monitoring Values

## »» Revenue

### I. Key Points:

- The pre-shale-gas period of oil and gas activity provided a total income to the commonwealth of approximately \$153,659,522. The shale-gas period (through 2012, for the purposes of this report) has provided \$582,250,644 in revenue. The combined total of all revenue from the oil and gas lease program from 1947 to the end of 2012 has been approximately \$735,910,166.
- The influx of shale-gas production revenue began in 2009 when most of the wells that had been first proposed in 2007, 2008, and early 2009 were drilled and connected to the pipeline system and gas was delivered to the market.
- Royalty income is just beginning to come to DCNR from the hundreds of new shale-gas wells on state forest land.
- Steady revenue growth from gas extraction is expected to continue for the next decade as the full development of the leases comes to a conclusion.

### II. Introduction

Since the first leases in 1947, the development of natural gas resources on state forest land has generated a steady and increasing revenue source for the commonwealth in the form of rents and royalties. This revenue can be examined by the pre-Marcellus period from 1947 to 2007 and the Marcellus period beginning in 2008. The pre-Marcellus period of oil and gas activity – during which the geologic targets were deep Oriskany sandstones and the shallow Upper Devonian low permeability gas sandstones – provided a total income to the commonwealth of approximately \$153,659,522. The Marcellus period (ending in 2012, for the purposes of this report) has provided \$582,250,644 in revenue, almost exclusively from the production of shale gas. The combined total of all revenue from the oil and gas lease program from 1947 to the end of 2012 has been approximately \$735,910,166.





### III. Monitoring Efforts/Results

The data presented in this chapter have been tracked and tabulated by the bureau since 1947. This is the first report of its kind of oil and gas revenue. Prior to the shale-gas boom, there was little interest in this information by the public and stakeholders. Reports of oil and gas income were largely for internal planning purposes.

The bureau maintains a database on all oil and gas revenue generated on state forest lands, which will be reported in this section. The purpose of this chapter is to report on current revenue resulting from shale-gas activity. It is beyond this report's scope to speculate what income future Marcellus activity may generate.

### IV. Discussion

Revenues generated from a lease sale on state forest lands, rents, and royalties generated from production are deposited into the Oil and Gas Lease Fund. The fund was created in 1955 to be used for conservation, recreation, and flood control programs at the direction of the secretary of what is now DCNR. Lease sale funds have been used to purchase state park lands; to acquire the mineral rights for state parks and forests; to make infrastructure and trail improvements; to conduct habitat protection and restoration; to provide for recreation and purchase other equipment; and to support the operations of the DCNR. The types of income that are deposited into the fund include all rentals, bonus payments (which are classed as rentals), royalties, and gas storage rental payments. Table 15.1 represents a compilation of all income from state forest gas development from 1947 to 2012. Note that after 1955 funds were placed in the Oil and Gas Lease Fund.

Year	Gas Storage Rentals	O&G Lease Rentals	O&G Lease Royalties	O&G Lease Total	Total Income	Cumulative Income
1947	\$0	\$1,022	\$0	\$1,022	\$1,022	\$1,022
1948	\$0	\$2,016	\$119,328	\$121,344	\$121,344	\$122,366
1949	\$0	\$1,633	\$288,105	\$289,738	\$289,738	\$412,104
1950	\$0	\$143,561	\$237,969	\$381,530	\$381,530	\$793,634
1951	\$0	\$189,473	\$204,660	\$394,133	\$394,133	\$1,187,767
1952	\$0	\$723,225	\$1,143,385	\$1,866,610	\$1,866,610	\$3,054,377
1953	\$0	\$817,535	\$1,879,386	\$2,696,921	\$2,696,921	\$5,751,298
1954	\$0	\$469,023	\$5,887,370	\$6,356,393	\$6,356,393	\$12,107,691
1955	\$0	\$228,275	\$4,158,730	\$4,387,005	\$4,387,005	\$16,494,696
1956	\$39,700	\$208,928	\$4,427,055	\$4,635,983	\$4,675,683	\$21,170,379
1957	\$83,113	\$279,963	\$1,685,703	\$1,965,666	\$2,048,779	\$23,219,158
1958	\$84,966	\$360,604	\$1,356,979	\$1,717,583	\$1,802,549	\$25,021,707
1959	\$84,172	\$333,377	\$793,399	\$1,126,776	\$1,210,948	\$26,232,655
1960	\$100,202	\$219,191	\$651,082	\$870,273	\$970,475	\$27,203,130
1961	\$113,853	\$189,360	\$476,858	\$666,218	\$780,071	\$27,983,201
1962	\$114,861	\$230,360	\$1,672,554	\$1,902,914	\$2,017,775	\$30,000,976
1963	\$114,861	\$277,046	\$429,122	\$706,168	\$821,029	\$30,822,005
1964	\$114,861	\$230,546	\$377,151	\$607,697	\$722,558	\$31,544,563
1965	\$114,861	\$198,845	\$294,604	\$493,449	\$608,310	\$32,152,873
1966	\$114,861	\$25,035	\$224,740	\$249,775	\$364,636	\$32,517,509
1967	\$114,861	\$56,719	\$202,923	\$259,642	\$374,503	\$32,892,012
1968	\$115,192	\$213,121	\$195,644	\$408,765	\$523,957	\$33,415,969
1969	\$116,399	\$59,946	\$165,071	\$225,017	\$341,416	\$33,757,385
1970	\$116,383	\$65,108	\$155,570	\$220,678	\$337,061	\$34,094,446
1971	\$118,525	\$267,188	\$139,658	\$406,846	\$525,371	\$34,619,817
1972	\$118,646	\$751,659	\$129,224	\$880,883	\$999,529	\$35,619,346
1973	\$121,846	\$358,802	\$120,378	\$479,180	\$601,026	\$36,220,372
1974	\$230,293	\$355,160	\$357,150	\$712,310	\$942,603	\$37,162,975
1975	\$275,772	\$150,160	\$75,247	\$225,407	\$501,179	\$37,664,154
1976	\$360,763	\$96,783	\$246,426	\$343,209	\$703,972	\$38,368,126
1977	\$417,492	\$166,600	\$88,688	\$255,288	\$672,780	\$39,040,906
1978	\$489,157	\$2,912,824	\$37,628	\$2,950,452	\$3,439,609	\$42,480,515
1979	\$607,064	\$670,732	\$41,099	\$711,831	\$1,318,895	\$43,799,410
1980	\$668,212	\$3,259,679	\$53,596	\$3,313,275	\$3,981,487	\$47,780,897

**Table 15.1** State forest land oil and gas income by year.

Year	Gas Storage Rentals	O&G Lease Rentals	O&G Lease Royalties	O&G Lease Total	Total Income	Cumulative Income
1981	\$720,040	\$5,782,264	\$55,207	\$5,837,471	\$6,557,511	\$54,338,408
1982	\$740,970	\$4,096,289	\$63,401	\$4,159,690	\$4,900,660	\$59,239,068
1983	\$733,494	\$1,770,915	\$409,421	\$2,180,336	\$2,913,830	\$62,152,898
1984	\$927,993	\$2,596,954	\$1,051,065	\$3,648,019	\$4,576,012	\$66,728,910
1985	\$935,426	\$2,780,875	\$1,282,461	\$4,063,336	\$4,998,762	\$71,727,672
1986	\$966,932	\$1,661,590	\$1,442,148	\$3,103,738	\$4,070,670	\$75,798,342
1987	\$970,508	\$1,733,042	\$1,360,171	\$3,093,213	\$4,063,721	\$79,862,063
1988	\$988,362	\$1,231,895	\$1,800,408	\$3,032,303	\$4,020,665	\$83,882,728
1989	\$1,041,656	\$1,005,234	\$2,707,610	\$3,712,844	\$4,754,500	\$88,637,228
1990	\$1,048,531	\$1,588,668	\$2,513,166	\$4,101,834	\$5,150,365	\$93,787,593
1991	\$1,100,705	\$1,325,086	\$2,187,643	\$3,512,729	\$4,613,434	\$98,401,027
1992	\$1,103,538	\$744,043	\$2,108,048	\$2,852,091	\$3,955,629	\$102,356,656
1993	\$1,124,917	\$481,886	\$1,619,350	\$2,101,236	\$3,226,153	\$105,582,809
1994	\$1,185,549	\$321,717	\$1,327,362	\$1,649,079	\$2,834,628	\$108,417,437
1995	\$1,197,003	\$295,306	\$976,654	\$1,271,960	\$2,468,963	\$110,886,400
1996	\$1,625,090	\$721,927	\$1,010,017	\$1,731,944	\$3,357,034	\$114,243,434
1997	\$1,628,117	\$189,629	\$1,003,610	\$1,193,239	\$2,821,356	\$117,064,790
1998	\$1,628,278	\$131,879	\$1,104,162	\$1,236,041	\$2,864,319	\$119,929,109
1999	\$1,557,019	\$170,891	\$975,496	\$1,146,387	\$2,703,406	\$122,632,515
2000	\$1,493,019	\$44,381	\$1,528,179	\$1,572,560	\$3,065,579	\$125,698,094
2001	\$1,910,493	\$183,905	\$1,540,417	\$1,724,322	\$3,634,815	\$129,332,909
2002	\$1,794,620	\$1,653,644	\$1,048,710	\$2,702,354	\$4,496,974	\$133,829,883
2003	\$1,838,959	\$112,409	\$1,519,285	\$1,631,694	\$3,470,653	\$137,300,536
2004	\$1,785,640	\$141,247	\$1,545,974	\$1,687,221	\$3,472,861	\$140,773,397
2005	\$1,828,472	\$90,494	\$1,783,592	\$1,874,086	\$3,702,558	\$144,475,955
2006	\$2,238,026	\$173,434	\$2,402,583	\$2,576,017	\$4,814,043	\$149,289,998
2007	\$2,224,935	\$75,426	\$2,069,163	\$2,144,589	\$4,369,524	\$153,659,522
2008	\$2,245,823	\$6,064,636	\$3,128,586	\$9,193,222	\$11,439,045	\$165,098,567
2009	\$2,331,670	\$163,303,356	\$1,596,962	\$164,900,318	\$167,231,988	\$332,330,555
2010	\$2,288,064	\$262,796,706	\$11,821,463	\$274,618,169	\$276,906,233	\$609,236,788
2011	\$2,749,056	\$3,703,849	\$42,786,628	\$46,490,477	\$49,239,533	\$658,476,321
2012	\$2,731,718	\$2,967,309	\$71,734,818	\$74,702,127	\$77,433,845	\$735,910,166
<b>TOTALS</b>	<b>\$53,635,539</b>	<b>\$484,454,385</b>	<b>\$197,820,242</b>	<b>\$682,274,627</b>	<b>-----</b>	<b>\$735,910,166</b>

Table 15.1 *Continued* State forest land oil and gas income by year.

### Pre-Shale Gas Revenue

Figure 15.1 is a graphical representation of the numerical tabulation in Table 15.1, color coded for ease of viewing, from 1947 to 2007, which represents the annual income up to the first shale-gas lease sale in 2008. Different classes of income ebb and flow through the charted years. The initial income increase in each income boom cycle is caused by large bonus payments and rentals for new acreage under lease. Over time, as the acreage is developed, rentals decrease and royalties increase.

The first income boom cycle occurred in 1952, with several lease sales. As the acreage was tested, gas production was established in the Oriskany sandstone. This led to the large royalty income from 1952 to 1958. Also, in 1957 some small gas storage income began to show as the first large Oriskany sandstone gas fields were converted to gas storage and primary production ceased. The characteristics of the Oriskany sandstone are such that it has very favorable reservoir properties for gas storage.

The second prominent cycle began around 1978 with industry interest in the shallow Upper Devonian gas play in Centre and Clinton counties, now known as the Council Run Gas Field. The large rental numbers from 1978 to 1985 represent the large bonus paid for the lease sales. Beginning in 1981, the amount of royalty increased and then peaked in 1990 and flattened until 2007. This is a reflection of changing gas prices and markets. Gas prices generally increased during this period and peaked in 2007. So even though well production declined, the higher gas prices maintained a steady income stream.

The price of natural gas has a large effect on the income stream from gas sales and royalty to the commonwealth, but the number of wells drilled and placed in production also has a large effect. This can be seen in the early days of a development boom in Figure 15.1. Figure 15.2 is a graph of crude oil and natural gas prices from 1988 to 2012. There is a gradual increase in gas prices to the spikes in 2006 and 2008. These price spikes, along with arrival of the hydraulic fracturing and horizontal

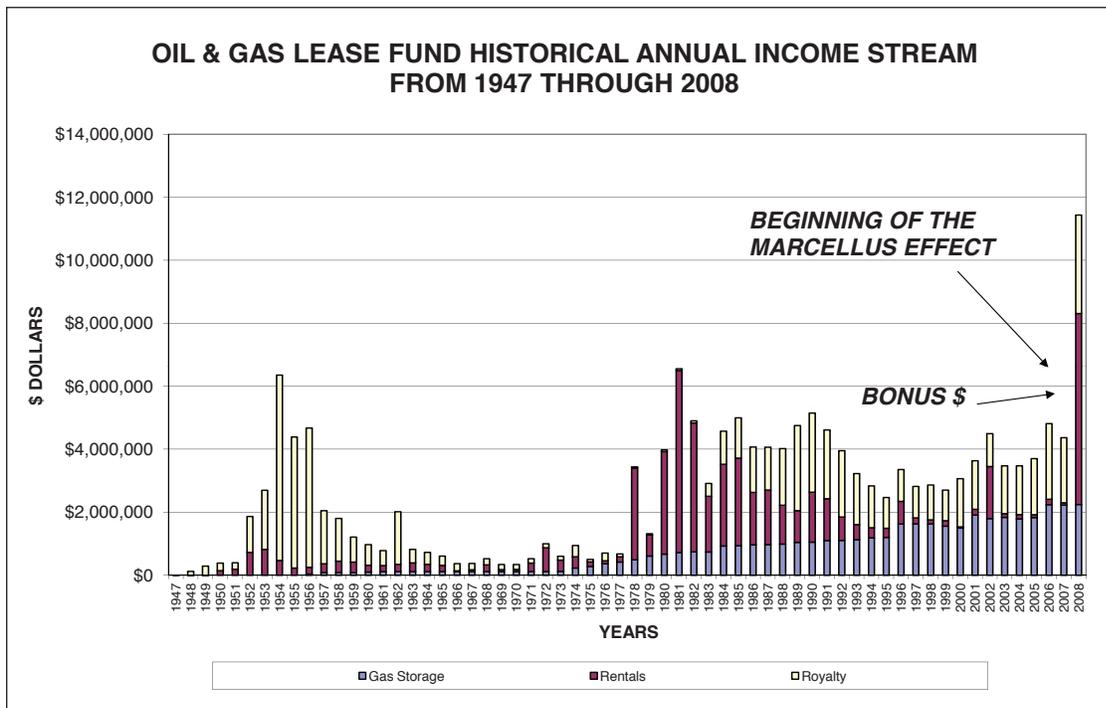


Figure 15.1

drilling technology, are three of the main drivers of the Marcellus boom in Pennsylvania from 2007.

### Shale-Gas Revenue

The influx of shale-gas production revenue began in 2009, when most of the wells that had been first proposed in 2007, 2008, and early 2009 were drilled and connected to the pipeline system and gas delivered to the market. Figure 15.3 is a graphical representation of the numerical tabulation above from 1947 to 2012, which represents the annual income up to the end of 2012. This graph shows how the historic oil and gas income is dwarfed by the shale-gas income stream, largely due to bonus payments from the

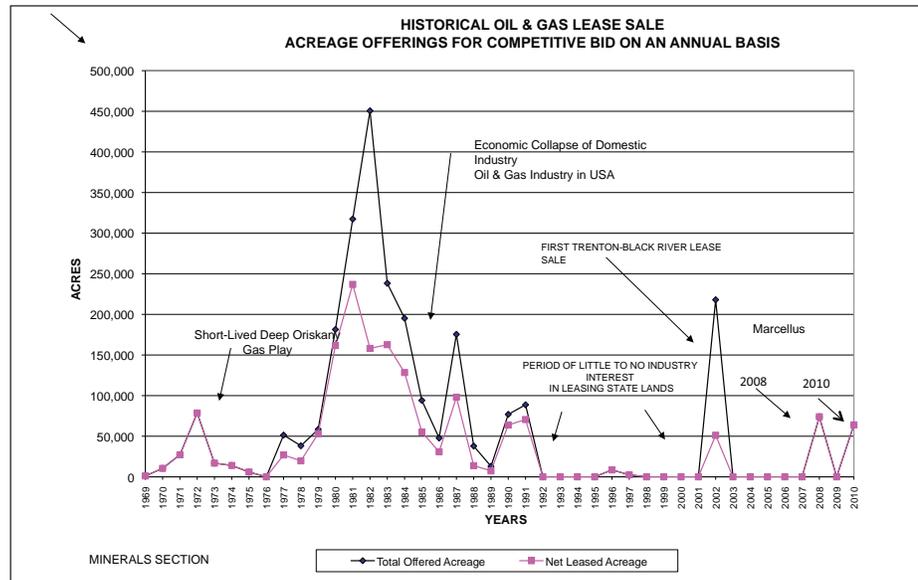


Figure 15.2 From EIA 2012 Energy Report.

2008 and 2010 lease sales. In addition, royalty income is just beginning to come to DCNR from the hundreds of new shale-gas wells on state forest land.

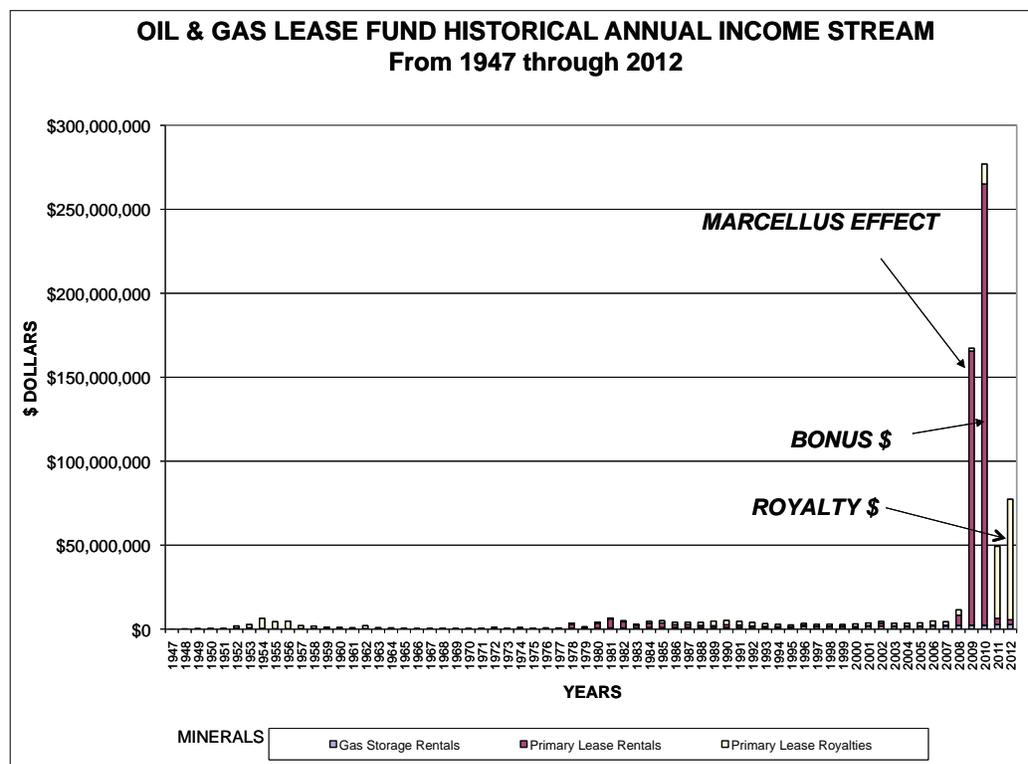


Figure 15.3