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Coal's crash creates a wide swath of woes

By Calvin Kent, Ph.D., AAS

As the coal industry has collapsed, so has the property tax base supporting county governments and school districts in West Virginia.

From having the highest property tax bases per capita in the state, many coal counties now have the lowest. Unemployment has increased dramatically; many of those residents have moved; the retail base has diminished; and schools have laid off teachers and workers and eliminated extracurricular activities.

This article examines what occurs when the principal industry in an area fails and the loss of the property tax base has reverberating negative effects on the quality of life for those living in or dependent on the affected area.

Also included are suggestions based on the West Virginia experience that may be of value to assessors faced with a market decline in a major tax base.

West Virginia remains the sec-ond-largest producer of coal in the nation after Wyoming (see table 1). West Virginia coal constitutes 11 percent of the nation's supply. While there has been a slow, uneven decline in West Virginia coal production over the past few decades, the collapse began following the banner years of 2008–2011.

Background

Coal mining in West Virginia began in 1745, but production was first recorded in 1863 when 444,648 short tons (short ton = 2,000 pounds) was reported (West Virginia Office of Miners' Health, Safety and Training 2007–2016a).

For most of the period from 1860 until the turn of this century, West Virginia's coal activity mirrored the national economy. Coal production was tied to industrial activity. When the economy boomed, coal prices and production followed, only to fall during periods of recession. As the demand for electricity rose, so did the demand for coal-generated power (Netschert 1960).

Beginning in the 1840s, demand for coal was buoyed by the growth of railroads switching to coal from wood in steam locomotives. The railroad demand ended with the switch to diesel during the 1950s (Netschert 1960; King 2009; Park 2013). As manufacturing became less important in the U.S. economy, power plant efficiency increased, the use of natural gas and renewable fuels expanded, and the shift to a knowledge economy continued, coal and gross national product (GNP) became less tightly linked (EIA 2016a).

Coal production in West Virginia has varied dramatically, reaching peaks in 1924 (156,570,631 short tons), 1947 (173,653,816), 1990 (171,155,053), and 1997 (181,914,000) and then beginning a decline during the 21st century to 102,954,676 short tons in 2015 (West Virginia Office of Miners' Health, Safety and Training 2007–2016b).

Table 2 shows coal production and employment in West Virginia from 2002 to 2015. As late as 2008, production was 165,750,817 short tons.

Table 1. Coal production by state, rank, and year of highest production.

| State | 2014 Coal Production | | Historical High in Coal Production | |
	Thousand Short Tons	Percentage of U.S. Total	Thousand Short Tons	Year
Wyoming	395,665	39.6%	467,644	2008
West Virginia	112,187	11.2%	176,157	1947
Kentucky	77,335	7.7%	173,322	1990
Pennsylvania	60,910	6.1%	89,281	1918
Illinois	57,969	5.8%	77,377	1918
Montana	44,562	4.5%	44,732	2010
Texas	43,654	4.4%	55,755	1990
Indiana	39,267	3.9%	39,267	2014
North Dakota	29,157	2.9%	30,775	2003
Colorado	24,007	2.4%	39,870	2004
All other	113,710	11.4%	1,394,180	
Total United States	1,000,049	100%	1,171,809	2008

Source: U.S. Energy Information Administration, Annual Coal Report 2015
* Differences in coal production for 2014 comes from two agencies using different methodologies

Table 2. Employment and coal production in West Virginia, 2003-2016

Year	Estimated Total Employment[a]	Coal Production (short tons)
2003	22,421	145,899,599
2004	23,031	153,631,633
2005	26,648	159,498,069
2006	29,419	158,835,584
2007	26,321	160,043,930
2008	28,832	165,750,817
2009	28,196	144,017,758
2010	42,034	142,944,106
2011	44,865	139,424,080
2012	53,934	129,538,515
2013	52,213	120,342,846
2014	65,428	116,900,140
2015	48,327	102,954,676
2016	12,649[b]	88,350,456[c]

[a] Employment includes those directly associated with mining production, distribution, remediation, marketing, and finance.

[b] Underground and surface only.

[c] Preliminary as of March 27, 2017.
Source: West Virginia Office of Miners' Health, Safety and Training 2007–2016a,b.

The 2015 output was a reduction of 43 percent from the 1997 peak. The forecast for 2016 shows a further decline to 71–90 million short tons with a consensus of 80 (Lego and Deskins 2015; Risch, Shand, and Copley 2015).

The actual preliminary production figure was 88,350,456 (West Virginia Office of Miners' Health, Safety and Training 2017). Contract employment related to the closure of mines and mine remediation shows an increase for the past few years, but this is not expected to continue. In addition to the sharp fall in coal production, there has been a decline in coal prices The fall in average price for coal is even more notable than that for production.

Average short ton prices for Central Appalachian coal have declined from a high of $139.05/ton in January 2011 to an all-time low of $40.50/ton in May 2016 (EIA 2016b). This 71 percent drop in less than 5 years coupled with the decline in production has devastated many coal counties in West Virginia in terms of government finances, employment, and income.

Causes of the Crisis in Coal

There are many complicated and intertwined causes of what has transpired in the nation's and West Virginia's coal economy (Cunningham 2014; EIA 2016c; Higginbothan et al. 2010; Lego and Deskins 2015; Hodge 2016).

Environmental Regulations

More than 30 different federal laws cover all aspects of the production, distribution, and use of coal (Tribal Energy and Environmental Information Clearinghouse n.d.) Among the most discussed are the Environmental Policy Act, Clean Air Act, Clean Water Act, Surface Mining Control and Reclamation Act, Solid Waste Disposal Act, Safe Drinking Water Act, and the Mercury and Toxics Standards rule from the U.S. Environmental Protection Agency (EPA).

Electricity generation is included in the Clean Coal Plan (CCP). The goal of CCP is to substantially reduce carbon dioxide emissions from 2005–2015 levels by 2040. The 32 percent reduction in carbon emissions from the 2005 level called for by CCP

can be obtained by each state using different means (EPA n.d.). Although suspended due to Supreme Court action (EPA 2017), these regulations could further reduce the use of coal generation by electric utilities.

Closure of Coal-Fired Electricity-Generating Plants

Since 2012, six coal-fired electricity-generating electric plants in West Virginia have been shut down (EIA 2017). Some of these were smaller *peaker* plants used only during periods of high demand. All these plants were old and could not economically be retrofitted to meet regulations or to use less costly fuels.

Three of these plants were in major coal counties (Kanawha River Plant in Kanawha, Kramer in Marshall, Riverside in Marion); the other three were not (Phillip in Mason, Albright in Preston, Willow Island in Pleasants). The closures have not had a major im-

pact on the property taxes in the coal counties (Amburgey 2016). Utilities are assessed by the state on a *unit basis*. Individual power plants are not *isolated* for tax purposes (Amburgey 2016). Increases in the value of electric utilities due to upgrades and new construction have increased, maintaining the overall level of assessments for power plants.

However, the closures have led to unemployment of those who worked in those facilities and reduced the use of coal mined in West Virginia. Because 75 percent of West Virginia coal is *exported* to other states primarily for electricity generation (this figure also includes international exports of met coal, which is used primarily in steel production), the impact of closures of out-of-state plants also diminishes the demand for West Virginia coal (EIA 2016d).

Decrease in Productive Coal Seams

An additional problem is the decrease in the most productive, thicker coal seams (Boettner 2014). Southern West Virginia coal increasingly is found in relatively thin seams (less than 37 inches), which can be accessed only by costly underground mines (Mufson 2012). To an extent, this has been offset by the expansion of surface mining.

Currently 82 percent of West Virginia production is from underground mines.

Competition with Western Coal

Coal from the middle and western basins is less desirable in terms of heat capacity and emissions. Since western coal is often surface-mined, it is cheaper to mine and transport to eastern U.S. markets than the costlier West Virginia fuel. Powder River Basin (Wyoming) coal in 2015 was priced at only 23 percent of coal mined in Central Appalachian deposits (EIA 2015).

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Erosion of International Markets

Exporting of coal has been a major sustaining force to the West Virginia coal market. Between 2014 and 2015, total U.S. coal exports fell by 24 percent with exports to China dropping by 87 percent. West Virginia is this nation's largest exporter of coal. There has been a 40 percent decline in West Virginia exports since 2012 (EIA 2016e).

The primary reason for the slowdown in international coal exports is the decline in the growth rates of the economies of China, Japan, and Europe (Johnson 2016). As these economies recover, coal exports may as well.

Further depressing the West Virginia market is the expansion of coal exports to Far Eastern markets, mainly India and China, from Australia and Indonesia. Exports from these countries have begun to invade European markets traditionally served by U.S. producers. In addition, there has been an increase of imports from Colombia and other South American nations into the U.S. market (Johnson 2016).

Study Counties

For this study, the 10 West Virginia counties that produce more than 60

percent of all coal in the state were selected. Counties in the northern coal field are Ohio, Marion, Marshall, and Monongalia, and the southern coal field counties are Kanawha, Boone, Logan, Mingo, Raleigh, and Wyoming. These rankings will change dramatically due to the closure of mines, particularly in the south, and the surplus of coal now on the market (Risch, Shand, and Copley 2015).

All 10 counties have poverty rates well above the national average of 14.5 percent (see table 3). Job growth in all these counties has been negative over the past 13 years. With the exceptions of Raleigh, Kanawha, and Marshall counties, growth in county total output (GNP) has been negative over the same time span.

Table 4 shows the change in coal production in many counties has been dramatic; these are the 10 counties with the highest tonnage in 2015. Kanawha, home of the state capital, and Monongalia, home of West Virginia University, are outliers.

There are stark geographical differences in production over the 2011–2015 period. The southern counties (Boone, Logan, Mingo, Raleigh) have

Table 3. Economic indicators in selected West Virginia counties, 2002–2015

County	Average Unemployment Rate 2015	Average Job Growth 2002– 2015	Average GDP 2002–2015	Poverty Rate 2015[a]
Southern Coal Fields				
Boone	9.1%	−2.8%	−12.5%	20.7%
Logan	11.3%	−2.3%	−4.1%	19.8%
Mingo	12.9%	−2.8%	−12.2%	22.9%
Raleigh	7.6%	−2.0%	3.6%	17.1%
Kanawha	6.3%	−1.9%	1.8%	16.3%
Northern Coal Fields				
Monongalia	5.1%	−1.5%	−0.4%	22.8%
Marshall	7.7%	−0.5%	1.5%	16.4%
Ohio	5.6%	−0.4%	−1.3%	15.9%
Marion	6.5%	−1.2%	0.1%	15.2%

[a] National average was 14.5%.
Source: National Association of Counties 2016.

Table 4. Coal production and percentage change for selected West Virginia counties, 2011–2015

County	Coal Production (short tons)					Percentage Change
	2011	2012	2013	2014	2015	
Boone	20,903	15,752	11,386	11,485	7,012	−67%
Kanawha	9,624	8,769	9,715	10,314	8,219	−15%
Logan	14,211	13,060	10,932	9,915	7,250	−50%
Marion	11,640	11,180	11,256	13,244	13,180	12%
Marshall	17,085	17,154	17,293	16,891	16,364	−4%
Mingo	9,803	8,909	7,481	7,092	6,054	−39%
Monongalia	10,457	8,693	8,118	9,327	5,937	−43%
Ohio	571	4,392	7,658	11,130	10,654	97%
Raleigh	9,104	8,989	7,361	7,305	6,520	−28%
Wyoming	4,666	5,394	6,081	4,635	4,179	−10%

Source: West Virginia Office of Miners' Health, Safety and Training 2007–2016a,b.

seen the most substantial decreases. Counties in the northern coal field (Marion, Marshall, Ohio) have been stable or seen increases. This is due to the installation of scrubbers on electricity-generating plants allowing those plants to use the higher sulfur coal mined in the northern fields. The opening of a new deep mine explains the Ohio County increase (Powell 2016–2017).

Until 2012, Boone County was the major coal-producing county in the state. Now only a few small mines are producing there. In Mingo County,

also a top producer as late as 2012, only one major mine continues production (Herholdt 2016). The result is further deterioration of local government finances (Brown 2016–2017; Maher and Frosch 2015; Johnson 2016–2017).

The disparity in production between the northern and southern counties has increased because of the production of natural gas. With the horizontal drilling into the Marcelles shale, the counties of Ohio, Marshall, and Marion experienced natural gas booms until the decline in gas prices.

While there is gas and oil production in southern West Virginia coal counties, extraction often comes from shallow wells with limited production.

Impact on County Income

There are many ways to measure the impact of the decline of coal on a county's economy. One of the most easily understood is the percentage of total personal income (TPI) in a county that can be attributed to coal personal income (CPI).

Personal income (PI) is usually defined as all compensation received from any source (salaries, wages, bonuses, income from self-employment, dividends, income from investments, rents, profit-sharing, and distributions from investments). TPI for a county is the sum of all income received by individuals and entities in that jurisdiction during a given year. CPI is the sum of all income received by individual and entities in the jurisdiction from coal-related activities (Bureau of Economic Analysis 2016). Table 5 shows the TPI and CPI for 11 counties in West Virginia for the period 2011–2014. The economic dependency on coal varies not only by county but also by year.

Boone, the most coal-dependent county, receives up to 60 percent of its TPI from coal. Corresponding figures for other counties are Logan, up to 32 percent; Mingo, up to 45 percent; and Wyoming, 47 percent. Even in the northern county of Marshall, coal dependency reaches 25 percent.

Indirect Impacts

In determining the economic consequences of the collapse of coal on West Virginia county governments, consideration must be given to the indirect or multiplier effects of the lost income and employment from coal's demise. While not evaluated in this article, these additional effects are not inconsequential. The following

Table 5. Total personal income and coal personal income in 10 West Virginia counties, 2011–2014

County	2011		2012		2013		2014		Percentage Change		CPI as a Percentage of TPI)
	TPI	CPI	TPI	CPI	TPI	CPI	TPI	CPI	TPI	CPI	
Boone	$603,472	$357,146	$524,415	$306,247	$443,732	$241,016	$391,488	$178,125	64.%	49.9%	60–45%
Kanawha	$5,741,960	$235,473	$5,903796	$225,882	$5,781,329	$168,575	$5,869,889	$178,558	102.1%	75.8%	4–5%
Logan	$592,916	$188,619	$599,087	$193,295	$551,179	$159,726	$509,196	$135,629	85.9%	71.9%	32–27%
Marion	$1,043,143	(D)	$1,072,795	(D)	$1,051,844	(D)	$1,042,422	$186,251	99.9%	NA	24%
Marshall	$765,816	(D)	$847,823	$202,835	$858,010	$220,222	$879,007	$219,038	114.8%	NA	25%
Mingo	$539,758	$244,493	$517,367	$239,941	$441,089	$199,083	$32,869	$158,897	67.2%	65.0%	45–43%
Monongalia	$2,445,670	$87,778	$2,542,076	$79,952	$2,634,517	$54,764	$2,749,652	$56,584	112.4%	64.5%	4–2%
Ohio	$1,152,662	(D)	$1,233,517	(D)	$1,285,779	(D)	$1,319,444	(D)	114.5%	NA	NA
Raleigh	$1,162,936	$280,174	$1,732,709	$318,023	$1,625,014	$264,238	$1,584,955	$240,453	98.3%	85.8%	17–15%
Wyoming	$243,010	$114,013	$250,807	$126,549	$257,334	$133,140	$245,945	$113,752	101.2%	99.8%	47%

Note: Dollars are in thousands; (D) = deleted due to confidentiality; and NA = not applicable.

are the most frequently cited indirect results (Moore 2016; Higginbothan et al. 2010; Thompson et al. 2001):

- Reduced railroad shipments of coal, leading to reduced employment, track closures, and idling of terminals, particularly in West Virginia and nearby states (Burton 2017). (Coal is the greatest source of railroad revenue in the United States, and 92 percent of all West Virginia coal is moved by rail. Coal shipments and railroad revenue declined by 27.4 percent from 2008 to 2014 (Association of American Railroads 2016].)

- Closure of retail outlets and smaller sales at remaining stores, forcing layoffs and abandonments

- Increased bankruptcies and mortgage foreclosures for homes and commercial firms

- Decreases in employment in coal service industries such as trucking, contracting, construction, and finance

- Expanded demand for governmental services and transfer payments

- Reduced property values for residential and commercial properties.

While there are no statistical data, reports from the field and in the press (Cunningham 2014; Rich 2016) indicate that decreased coal valuations have caused a reduction in values for other types of property. Residential values are affected as bankruptcies increase and departing residents

abandon their homes to foreclosure. Because there are fewer people with lower incomes, retail sales and commercial valuations are also affected— empty buildings are common in coal communities (Adkins 2016–2017; Brown 2016–2017; Cook 2016–2017). A 2008 study of the economic impact of coal on the West Virginia economy measuring both direct and indirect effects found the following (Higginbothan et al. 2010):

- Each direct job induced the employment of one additional person in West Virginia.

- Indirect taxes (workers' compensation, corporate net income, special reclamation, sales and use, Coal Resource Transportation Road Fund, personal income taxes) related to coal production and employment totaled $174 million.

- The industries in which the greatest induced effects occurred were services, retail trade utilities (including transportation and warehousing), finance (including insurance and real estate), and wholesale trade.

- Business volume and value added totaled more than $2 billion.

- West Virginia coal-fired electric power plants generated almost $1 billion in business volume and value added.

These impacts are not confined to the coal-producing counties. Because of the trade flows between counties into other adjacent states, the impact is

much broader.

Coal Real Property Assessment

Unlike some other mineral-producing states, West Virginia levies its ad valorem tax on coal reserves rather than on extraction (Kent 2015). Coal is assessed for all counties by the State Property Tax Division using the Reserve Coal Valuation Model (RVCM). The model employs a discounted cash flow income approach to value both active coal mines and coal reserves (Kent 2010). Although the RVCM is complex, it closely parallels the model used by private appraisers to establish the expected market value of a coal property (Rudenno 2012).

The RCVM puts coal reserves in five property categories: active mining, reserve coal, unmineable coal, mined-out coal, and barren coal. Only the first two produce any significant amounts of property tax revenue. For active coal deposits permitted and under active development, the present value is calculated by taking the weighted average of the previous three years' production and converting those figures into estimated income using average coal prices over the previous year. That result is discounted using a rate established by the state.

The calculation for reserve coal property is more complex. It is applied to coal deposits not under mining permit or being actively mined but capable of being mined. Factors considered in valuing each acre in the seam

Table 6. Coal mineral real property valuation and percentage change in selected West Virginia counties, 2011–201

County	Mineral Real Property Valuation					Four-Year Percentage Change
	2011	2012	2013	2014	2015	
Marshall	$169,185,676	$187,167,931	$207,714,631	$233,877,041	$268,221,31	59%
Marion	$115,138,745	$6,866,386	$101,240,302	$99,311,194	$118,968,980	3%
Ohio	$8,949,419	$8,624,065	$4,011,268	$14,852,989	$32,396,616	262%
Kanawha	$137,636,002	$56,598,225	$167,114,565	$136,987,602	$134,295,92	−2%
Logan	$198,375,412	$240,263,055	$279,655,226	$231,087,865	$250,205,732	26%
Boone	$319,886,677	$385,255,086	$400,974,862	$311,296,919	$264,978,926	−17%
Raleigh	$134,887,292	$132,431,562	$187,893,865	$161,550,360	$153,607,299	14%
Mingo	$106,342,748	$110,375,416	$133,163,879	$83,147,944	$74,453,972	−30%
Monongalia	$62,366,306	$67,410,586	$72,595,909	$71,080,770	$67,158,277	7%
Wyoming	$108,649,060	$117,853,091	$136,750,484	$146,365,423	$125,167,737	15%
All Other	$704,312,757	$696,637,142	$95,921,601	$713,184,456	$623,520,729	−11%
Total	**$2,065,730,094**	**$2,229,482,545**	**$2,587,036,592**	**$2,202,742,563**	**$2,112,975,515**	**2%**

Source: West Virginia Property Tax Division n.d.

include the average coal price per million BTU, the average royalty rate, the sulfur adjustment factor, clean coal recovery rate, and the BTU content of the coal seam. The result is discounted over the estimated life of the coal bed, 20, 40, or 80 years, that is, the number of years remaining in which the seam is to be mined. Unmineable coal beds have seams of less than 30 inches in width and are valued at a flat $5/acre, while mined-out coal and barren coal are valued at $1/acre.

Table 6 shows the assessed values and percentage changes for real coal property for the 10 West Virginia counties since 2011. As shown, not all coal counties have suffered decreases in real property coal valuations; the northern counties (Marshall, Marion, Ohio) have experienced increases. At the same time, southern coal counties (Kanawha, Boone, Mingo) have realized decreases. While Boone County has seen an erosion of 17 percent in valuations of coal real property. Mongo has experienced a 30 percent decline. In all other counties, increases have ranged from 256 percent in Ohio County, due to the opening of a new deep mine, to 3 percent in Marion. For all West Virginia counties, real property valuations are up 2 percent

despite an 11 percent decrease for the counties not included in this study.

Coal real property valuations have not declined as fast as coal prices and production because of the averaging of prices and production for active coal. Coal valuations *look back* for three years' output and prices. The full impact of the recent dramatic fall in prices and output has yet to be fully recognized in these valuations.

Coal Personal Property Assessment

West Virginia also levies a property tax on coal-related personal property including machinery and equipment used to access, extract, and process coal as well as furniture, fixtures, inventory, materials, and supplies. This property is usually valued using replacement cost less depreciation. Machinery and equipment are extremely valuable components of the property tax base in coal counties.

Both surface- and underground-mining equipment is expensive, often running into millions of dollars or more for a single piece (CostMine 2016). Most underground mining equipment and machinery cannot be moved out of state to avoid taxation; surface-mining equipment can be moved but only at significant expense.

This, plus the overall national market for coal, has kept substantial amounts of personal property in-state.

To blunt the impact of declining income, the values of commercial and industrial coal property have been reduced by action of the State Tax Department (Brennen 2016–2017; Johnson 2016–2017). The level of assessment was lowered to a *salvage value* of 30 percent (Amburgey 2016).

From a high in 2014, property taxes collected on machinery and equipment, which is mostly coal related, have experienced a swift and significant decline in most coal counties (see table 7) (West Virginia Property Tax Division n.d.). In tax year 2015, machinery and equipment tax collection in Boone County was only 39 percent of what it was three years earlier.

Responses of Local Governments

It is difficult for the most severely affected counties to maintain basic services. Wyoming, Boone, Logan, and Mingo counties are all considered *distressed counties* by the Appalachian Regional Commission; the other study counties are classified as *transitional* (Appalachian Regional Commission n.d.). Falling revenues at a time of high demand for social services have

further strained county budgets.

Government—local, state, health, federal, and public education—is the major employer in the southern counties (Bureau of Economic Analysis 2016). In the southern coal field counties (except Kanawha), transfer payments constitute 35–50 percent of personal income (transfer payments include Social Security, Medicare, Medicaid, unemployment insurance, and other public assistance) (Bureau of Economic Analysis 2017).

All the southern counties have been victimized by the bankruptcies of the major coal companies, Alpha Natural Resources and Patriot Coal Corporation, as well as smaller firms. These companies have outstanding tax liabilities in the millions of dollars.

It is anticipated that some of the loss will be paid as these firms emerge from bankruptcy (Alpha Natural Resources came out of bankruptcy on July 27, 2016). County officials in the southern counties report that, because of unemployment related to coal, there has been a spike in foreclosures and tax delinquencies on owner-occupied homes.

Specific responses given by county governments and school districts in the study are listed below. Although school districts follow county boundaries, they are independent and do not rely on county government for financial support. School finance comes from local property taxes and state aid. State aid is allocated using a complex minimum foundation formula. A minimum level of funding for each student is set by the state. That minimum depends on seven factors, primarily the number and types of students. As enrollment declines, as is the case in most coal counties, state aid decreases. What of that minimum per-student amount cannot be filled by local property taxes is allocated to the district by the state (Kent and Sowards 2009). Although state aid partially offsets the loss in property

tax revenue, this assumes state aid is fully funded. State aid accounts for 60–75 percent of school budgets in the selected counties. This year, because of decreases in the severance tax at the state level, state aid to local school districts was cut by $16 million (Quinn 2017).

Some of the data for each county was obtained from the National Association of Counties (NACo) (National Association of Counties 2016).

Southern Counties

Boone County (Brown 2016–2017)

The situation in Boone county was summed up by the *Wall Street Journal* as follows:

Boone County has lost 2,700 coal mining jobs since 2011, the most of any county in the U.S. The county took in $5.5 million in coal-severance tax money in 2010. That fell to $2 million last year [2015] and officials expect about $1.5 million this year. The county's budget for this fiscal year totals $13 million. The county plans to end free trash removal in January and a private contractor will begin charging residents $15 a month. These services cost the county $1.2 million a year and was funded entirely by coal taxes. (Maher and Frosch 2015)

Boone County must close three of its 10 elementary schools (part of the reason for the closures is declining enrollment, which in part reflects the out-migration of those who lost their jobs). For teachers to receive their pay until the end of the 2015–2016 school year, the state legislature had to appropriate more than $2 million as an emergency grant. Faced with a $6.9-million drop in revenue related to coal, the school district was forced to also cut teachers' and other employees' pay by an average of $4,000.

In June 2016, the unemployment rate was 8.8 percent, compared to a state average of 6.4 percent and a national rate of 5.6 percent. Of the county's top five employers in 2013, four were coal

companies that have ceased or almost ceased production. The bankruptcies of the major coal producers have left the county with $8 million in uncollected property taxes.

Mingo County (Mahon 2016–2017; Johnson 2016–2017)

Mingo County shows depressing statistics with an unemployment rate of 12.5 percent. For the 2016–2017 school year, the Mingo county school district saw its property tax base fall from $22.6 million to $13.6 million. This drop has necessitated either the laying off of 48 teachers or the elimination of almost all extracurricular activities.

County government saw dramatic drops in both coal property taxes and severance tax receipts of more than $2 million, forcing elimination of support for fairs, the library, fire departments, parks, and ambulance services and cuts to county departments ranging from 9 to 28 percent.

Logan County (Adkins 2016–2017; Brennen 2016–2017)

The unemployment rate in Logan County is 10.7 percent. Logan has lost more than $200 million in coal property valuations. During the *good times*, the county commission built a sizable contingency fund, which to date has not had to be used. County services have not had to be cut, and no cuts are anticipated. Property tax revenues have been supported by the construction of three new coal-processing plants.

Because the Logan County School District has a reserve fund, this year it did not cut any staff or programs. But the district anticipates having to do so next year. Coal company bankruptcies have cost the district $2.6 million in unpaid property taxes.

Wyoming County (Cook 2016–2017)

The unemployment rate in Wyoming County was 10 percent in June 2016.

Table 7. Coal industrial personal property valuation and percentage change in West Virginia counties, 2011–2015

County	Industrial Personal Property Valuation					Four-Year Percentage Change
	2011	2012	2013	2014	2015	
Marshall	$169,237,640	$233,173,669	$303,996,904	$374,770,568	$424,220,402	150%
Marion	$147,951,090	$178,068,293	$198,259,028	$211,476,224	$166,373,948	12%
Ohio	$63,887,072	$60,869,089	$116,474,609	$140,929,395	$140,199,756	119%
Kanawha	$232,786,131	$297,486,389	$314,940,386	$295,675,472	$304,538,098	31%
Logan	$410,417,779	$491,312,839	$533,913,353	$523,071,589	$444,129,991	8%
Boone	$579,421,729	$742,003,386	$745,629,442	$489,446,547	$574,645,090	1%
Raleigh	$265,480,366	$282,467,644	$347,561,825	$292,606,063	$282,440,971	6%
Mingo	$262,813,375	$317,032,308	$357,266,390	$333,353,936	$293,952,960	12%
Monongalia	$105,072,505	$141,168,288	$148,497,779	$108,289,208	$131,332,124	25%
Wyoming	$162,664,532	$245,325,308	$287,299,237	$234,367,657	$260,505,585	60%
All Other	$979,217,395	$1,133,558,722	$1,405,125,680	$1,417,733,341	$1,142,427,096	17%
Total	**$3,378,949,614**	**$4,122,465,935**	**$4,758,964,633**	**$4,421,720,000**	**$4,164,766,021**	**23%**

Source: West Virginia Property Tax Division n.d.

Of the 34 mines that were open in 2011, only 4 remain active. Wyoming County has seen its severance tax revenue drop by $300,000 and its property tax revenue fall by more than $1.2 million. In addition, the bankruptcies of Alpha Natural Resources and Patriot Coal Corporation have left unpaid property taxes of more than $1.7 million.

Among the county services that are being cut are answering nuisance dog complaints, landfill employment (from eight to three workers), cardboard pickup from businesses, and hours for the transfer/compactor stations to be open. As county positions become open, they are not planned to be filled. The school district cut 18 positions.

Raleigh County (Bias-Evans 2016–2017)

Raleigh County has an unemployment rate of 6.7 percent, which is the lowest among the southern coal counties. Being a tourism and transportation hub, the county has a more diversified economy than the other southern counties. West Virginia University is establishing a campus there.

Although coal property taxes have dropped, with the county government receiving $500,000 less, this decrease has been offset by increases in other property values. To date there have not been any layoffs or reductions in services. The schools lost $2.4 million in tax dollars from coal property, but this decrease has been offset by increases in other valuations, primarily new construction.

It is not expected that these offsets will continue into next year. There is almost $2 million in unpaid property taxes because of coal company bankruptcies. Residential foreclosures and listings are at an all-time high. The effects of the coal economy collapse are being felt in retail and commercial values as well.

Kanawha County (Robinson 2016–2017)

Because of a 25 percent decrease in coal severance receipts, the Kanawha County Commission reduced the county budget by almost $580,000. Most of the coal severance money supported services for the coal-producing parts of the county. The decrease in revenue necessitated cuts to outside agencies and a 3 percent cut in pay for county elected officials. Services experiencing cuts included fire departments and police officers.

The school district experienced a "very tight budget" because of cuts in

state aid tied to enrollment and a drop in property tax revenue. It was reported that 25 positions were to be eliminated, 21 of them teacher aides.

Northern Counties

Marion County (Cinalli 2016-2017)

Marion County has an unemployment rate of 6.5 percent. Marion has been less negatively affected than other southern counties. Extraction is from deep mines that produce higher sulfur coal, which can be used in electric generators with scrubbers.

Coal mines in the county have been idled or put on reduced shifts because of the decrease in demand. County government has seen a decrease in severance tax revenue of almost 50 percent from its 2011 high. The decrease has been offset by the use of reserve funds and taxes on oil and natural gas production. While there is a hiring freeze, no jobs have been lost or services cut.

Marshall County (Kessler 2016-2017)

Marshall County has an unemployment rate of 7.7 percent. Marshall County has not seen decreases in

property valuations for either coal real or personal property. For the current year, valuations have increased. But for the coming year, this "good fortune" is not expected to continue. The Marshall County School District has also not seen a decrease in property tax revenues.

Monongalia County (Music 2016-2017)

Monongalia County has a comparatively low unemployment rate of 5.6 percent. Monongalia County has severance tax money in a separate fund to support outside entities. It was not being used for general county government expenses.

As a result of the decline in severance tax money, various organizations placed special levies on the May 2016 ballot. Four of the six proposals passed by more than the required 60 percent. The result was an average 4.5 percent increase in property taxes. The services supported by the new excess levies include volunteer fire departments, the county library, parks and recreation activities, and public transportation.

A construction boom has largely replaced the loss in property taxes including taxes for school support. Much of this has been tied to the expansion of West Virginia University.

Ohio County (Powell 2016-2017)

The unemployment rate in Ohio County is 5.6 percent. Because of the opening of the Tunnel Ridge Mine, Ohio County has seen increases in both coal-related property valuations and severance taxes. As a result, Ohio County has not experienced the problems found in the other counties.

The Future for West Virginia Coal-Dependent Governments

There should be no expectation that coal will return as a significant source

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of West Virginia county income or boost property taxes in the predictable future. All the major forecasts for coal (Lego and Deskins 2015; EIA 2016a; Risch, Shand, and Copley 2015), while differing slightly, see a small uptick in West Virginia coal production and then a steady, slow decline over the forecast period 2015–2040.

Estimated coal output in West Virginia for 2035 ranges from a high of 114.0 to 81.4 million short tons with a consensus of 97.3. (All these projections consider only the environmental regulations in effect in October 2014. Adoption of CPP and MATS would significantly alter these [Lego and Deskins 2015; Risch, Shand, and Copley 2015]. For 2016, coal production was 84,840,384 short tons [West Virginia Coal Association 2017].)

The impact of the forecast decline among West Virginia coal counties will continue to be uneven (Pollard and Jacobsen 2017).

All the forecasts see the greatest declines in the southern coal counties as the seams continue to play out. Coal production from the northern coal counties will either be stable or increase slightly as the remaining coal-fueled electricity-generation plants add scrubbers allowing use of higher sulfur coal. The movement from south to north has started. In

2011, the southern coal fields produced 69 percent of all West Virginia coal but now account for only half.

One positive for southern counties is that they are the source of the high-quality metallurgical coal essential to making steel. (Metallurgical coal [coking coal], usually called *coke*, is a porous hard black rock of concentrated carbon created by heating bituminous coal without air to extremely high temperatures [Baker 2013].) Met coal is in high demand in Europe and Asia (EIA 2016b) and does not produce the pollution that thermal (steam coal) does.

This demand will continue to support coal exports for some time. In spring 2017 coking coal's price rose from $75/ton in 2016 to $308/ton because of disruptions in the Australian supply and the economic recovery in Europe (Els 2017). Implementation of CPP and MATS will have a greater impact on the northern counties where met coal reserves are limited, but production in the northern counties will continue to exceed that of the south.

West Virginia as a Case Study

The West Virginia situation serves as a case study of what can happen to property taxes when a major tax base collapses.

While not covered in this articles, other major coal-producing states

have seen decreases in coal production (EIA 2016b). Compared to other property tax bases, coal taxes are less stable because of swings in prices and output (EIA 2016f).

These unanticipated and unfortunate events are due to the economic collapse of an important property tax base and place assessors in an awkward position.

Local governments are concerned about operating revenue, and taxpayers are concerned about values that no longer reflect the market.

Because property tax collections are usually delayed by one year after they are levied, taxpayers must pay taxes based on outdated valuations. The result is not only taxpayer hostility but also bankruptcy, eviction, and property abandonment along with falling tax revenues.

Drops in valuations for coal and other energy resources, however, are not the only reasons a jurisdiction may find its property tax base eroded.

Natural events, such as hurricanes, tornadoes, typhoons, earthquakes, floods, and wildfires can all reduce property values.

Economic events, as the 2007–2008 financial crises demonstrated, can also cause property values to decline rapidly, particularly when they come at the end of a building bubble.

But significant differences exist between assessment after a natural disaster and a collapse in the real estate market because in the latter instance the property is not physically destroyed or damaged.

There is considerable literature dealing with reappraisals after natural disasters (Wiley and Gaglione 2005; Gilbreth 2006, 2007), almost none of it applying to valuation changes caused by economic events.

There are quantitative techniques for trending values that can be used after a real estate bust (Gloudemans 1999,

163–168). Unfortunately drops in valuations due to changes in markets usually happen quickly, and the number of samples necessary for these techniques to be used is usually not available (IAAO 2013, 11–16).

Lessons for Assessors

The assessment process in all states is defined by state laws and regulations over which the assessor has little or no control. There is an extensive body of research and studies dealing with how property values should be adjusted after natural disasters. Economic disasters, on the other hand, receive scant coverage. Based on the West Virginia experience, there are steps the assessor can take, as follows:

• Keep assessment rolls current. To the extent allowed by law, jurisdictions on two-, three-, five-year, or more assessment cycles should annually update their rolls using sales ratio studies, trending studies, revised multipliers, or other appropriate means to lower all values.

• Use appeals and adjustments of property assessments where the values have declined due to external events. To avoid appeals on a one-for-one basis, results from early appeals can be used for the entire jurisdiction. This action could be in lieu of a total reappraisal.

• Validate all sales to determine whether sales are hardship sales (short sales), foreclosures, or government sales (IAAO 2010b). Any properties that meet these criteria should be removed from ratio studies (IAAO 2013, 19). If all properties in the jurisdiction are involved, then the use of a ratio study should be employed only with caution, recognizing its unreliability.

• Lending institutions and their regulators have concern about widespread declining property values. Properties may be *underwater*, that is, owing a mortgage greater than their market

value. Appraisers make determinations of the losses (often using mass appraisal techniques) so they can present correct balance sheets to the financial institution's boards and regulators. Coordination with these appraisers may ease the assessor's burden and reduce the possibility of an appeal.

• Assessors should follow economic trends, which may indicate significant decreases in value (Appraisal Institute 2008). The assessor is in an advantageous position to see movements in the entire market of the jurisdiction. This insight can allow an early warning system to governments when drafting budgets. One indicator of impending problems may be an increase in the sale of property to foreign investors. Another possible indicator is property values on residences increasing faster than personal income in the jurisdiction.

• Assessors should be actively involved with the public and with legislative and regulatory bodies (IAAO 2010a, 5–6; IAAO 2011, 9). The West Virginia experience demonstrates the importance of current, accurate information. State government officials must be kept aware of the situation. The public must have clear information on the causes of the problem and what steps might be taken to ease the situation.

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