Taxing West Virginia's Coal Reserves: A Primer

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

CSR	Code of State Rules
FY	Fiscal Year
GIS	geographic information system
RCVM	reserve coal valuation model
RTC	Resource Technologies Corporation
WVGES	West Virginia Geological and Economic Survey
WVTD	West Virginia State Tax Department

EXECUTIVE SUMMARY

West Virginia's coal reserves include coal that is mineable, but that is not part of an active mining property. Coal reserve owners—whether multinational coal companies, large landholding companies, or people who own small mineral parcels—deserve to be taxed fairly. The state's dramatic history of court cases and legislative actions has ultimately resulted in the current system for appraising coal reserves. This primer breaks down this process, called the Reserve Coal Valuation Model, into the three phases: (1) collecting basic statewide data, (2) calculating the total value of West Virginia's coal reserves, and (3) appraising each individual reserve coal property.

Key points

In 1999, the West Virginia State Tax Department switched to a new method for appraising coal reserve properties.

The previous approach was based on researching the sales prices of similar coal properties, but this method is problematic. The new discounted cash flow method is based on the expected revenues that will be generated when coal is mined and sold in the future. This system is data-intensive. Among other things, the West Virginia State Tax Department must characterize each seam and predict the sales price of the coal. In addition, appraisals calculated by this method depend considerably on discounting. Therefore, the discount rate and the number of years over which discounting occurs are critically important assumptions.

The new method for appraising coal reserve properties relies on accurate mapping of coal resources and coal reserve properties, but this mapping is not complete.

The coal itself must be mapped and characterized, and the coal properties must also be mapped and characterized. Forty-nine percent of the state's coal seam areas are completely mapped. An additional 37% are partially mapped, and many of these seams will be completed in Fiscal Year 2010 or 2011. Thirty-six percent of the more than 711,000 coal reserve properties have been mapped. The remaining properties are known to be located only within a specific tax index map, a portion of a quadrangle map, a tax district, or a county. Year by year, as more coal seams and reserve properties are mapped and characterized, appraisals will be improved.

West Virginia's coal reserves were appraised, in total, at about $1.4 billion in Tax Year 2008, or about 6¢ per ton.

While coal can sell for $50 per ton or more, the state's reserves are valued, on average, at only about 6¢ per ton and the property taxes paid on this reserve coal averages only a fraction of a cent per ton. This is due to several factors built into the Reserve Coal Valuation Model, as explained by this primer. There is little consensus about the state's true coal reserves. Estimates range from as low as 18 to as high as 52 billion tons, and the West Virginia State Tax Department raised its estimate of mineable reserves from 23 to 41 billion tons between Tax Year 2008 and 2009. For comparison, West Virginia coal mines produced 163 million tons in 2008.

Property taxes levied on coal reserves bring millions of dollars to county governments each year.

In Tax Year 2008, it is estimated that county assessors levied about $18 million in coal reserve property taxes to owners of coal reserves. Coal reserves are generally taxed as Class III properties, and tax rates vary from county to county. Boone, Logan, and Kanawha counties received more than $1 million in coal reserve taxes in Tax Year 2008. In Tax Years 2007 and 2008, property taxes in total—including coal and other properties—generated about $1.3 billion per year, with approximately $840-890 million spent on schools.

The price of West Virginia coal is a crucial component of the value of coal reserves, and coal prices can change significantly from year to year.

Each year, the West Virginia State Tax Department calculates new three-year running average coal prices for steam coal and metallurgical coal. The average coal prices used by the Department for Tax Year 2009 are $68.15 for metallurgical coal and $49.25 for steam coal. Coal prices are used to calculate the total value of all West Virginia coal reserves, and are also used to appraise individual coal reserve properties.

To appraise coal reserves, West Virginia uses royalty rates to approximate the value of these reserves to coal property owners.

The appraised value of a coal property is not the full projected sales price of the coal; instead, the value is the amount expected to be paid by a coal mining company to the coal owner as royalties. This is because the property tax is based on the value of the coal in place in the ground, before mining and processing takes place. For Tax Year 2009, the royalty rates are 5.84% for underground mines and 7.01% for surface mines. Therefore, even before applying a discount rate to account for the time value of money, the value of reserve coal that will be sold for $1 million in the future is reduced to $58,400 for underground mines or $78,100 for surface mines. In essence, this royalty method is based on the assumption that the royalty approximates the value of each coal reserve property to its owner.

West Virginia coal reserve values are heavily discounted.

Potential future revenues are “discounted” to account for the fact that money received in the future is worth less than the same amount received today. Waiting to receive future income has costs and risks; the longer the wait, the higher the cost and risk. A discount rate is estimated to account for the time to wait to realize potential income from the coal and to account for risk of waiting for coal income. The West Virginia State Tax Department set the discount rate to 12.2% for Tax Year 2009. The revenues expected from coal sales are discounted for either 20, 40, or 80 years, using the “t-factor,” or probable time of mining, calculated for each property. For example, if the coal is not expected to be mined until 40 years in the future, the present value of $1 million in future revenues is only about $11,000. The t-factor and discount rate are both very important because the higher they are, the lower the appraised value of the coal reserves.

The aggregate value of West Virginia coal reserves is not based on the estimated tons of coal reserves, but instead is based on other assumptions.

The equation used to calculate the aggregate value is based on the assumption that the current rate of coal production, price of coal, and royalty rate paid to landowners will continue into the future. The aggregate reserve value—the present value of all reserve coal properties in West Virginia—is therefore based on a simple statewide equation, without considering how much reserve coal is actually in the ground or information about any individual coal property.

The appraised value for each reserve property is based on site-specific data.

A variety of site-specific data are used to appraise every individual coal reserve property. These data include, among other things, the amount of coal on the property, the number of years in the future that the coal is expected to be mined, and the energy and sulfur content of the coal.

Individual appraisals are adjusted equally to ensure that they sum to the previously calculated aggregate value of all West Virginia coal reserves.

The total value of all coal reserves is calculated before considering any specific coal reserve properties. Final appraised values for all individual coal properties are adjusted equally to ensure that the sum of these individual values equals the aggregate value for West Virginia.

Coal seams less than 30 inches thick are not taxed as reserves.

The West Virginia State Tax Department maintains more than 711,000 individual reserve coal property ownership records totaling more than 49 million seam-acres. However, in Tax Year 2008 only 4.3 million seam-acres were considered potentially mineable and fully taxed as coal reserves. Based on an analysis of the market and the economic conditions affecting coal mining, this value was increased to 8.8 million acres in Tax Year 2009. Seams less than 30 inches thick are generally considered unmineable, even though these seams are frequently recovered by mountaintop removal mines.

INTRODUCTION

A portion of unmined coal in West Virginia is classified as reserves—this coal is not being actively mined, but promises to bring profits to its owners at some point in the future. This primer explains how property taxes are calculated for this reserve coal.

West Virginia's coal reserves are significant. In fact, as shown in Figure 1, the state's estimated recoverable reserves make up 7% of the nation's total (United States Energy Information Administration, 2008).

Over the years, West Virginia has refined its methods for appraising reserve coal. The current reserve coal valuation model (RCVM), used since 1999, values coal based on the income that it is projected to provide once it is developed. The RCVM relies on a complex effort to collect and analyze data on each coal seam and every one of the hundreds of thousands of coal properties across the state. The previous method, in contrast, appraised coal reserves based on representative sales across the state. This method was abandoned because it did not tax coal reserves fairly and accurately.

Reserve coal taxation in the news

Recent headlines demonstrate the importance of taxing coal reserves.

Taxes May Soar for Mineral Owners. *The Dominion Post,* Michelle Wolford, January 8, 2009.

Kanawha coal reserves miscalculated by $19 million. *The Charleston Gazette,* Rusty Marks, February 14, 2009.

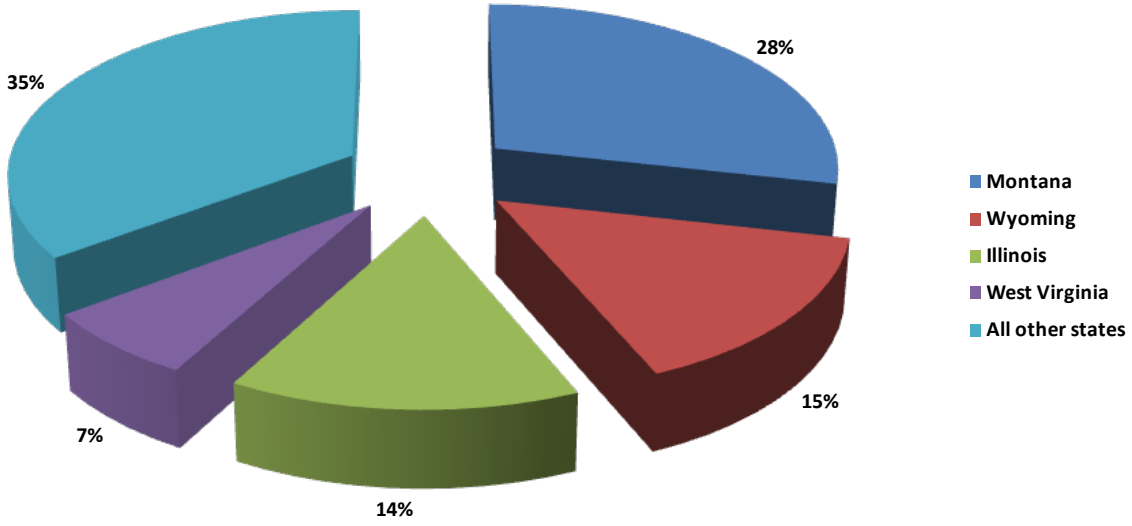
State Tax Officials Roll Back Some Coal Tax Values. *The State Journa*l, Cynthia McCloud, February 19, 2009.

A Taxing Year. *The State Journa*l, Pam Kasey, March 5, 2009.

Coal reserve owners—whether multinational coal companies, large landholding companies, or people who own small mineral parcels—deserve to be taxed fairly, and the West Virginia Constitution requires it. Recent newspaper articles on reserve coal taxation illustrate the outcry that can occur when small mineral owners with no intention of mining their coal see their tax bills rise significantly without explanation. Other cases before county boards of equalization review, which hear disputes on property appraisals, illustrate issues related to the fair taxation of companies that intend to mine their coal in the near future.

While fairness is very important from a taxpayer's perspective, accurate appraisals are also important because they impact how tax revenues are shared among counties. Simply put, if parcels in a county are appraised too low, then the county will collect fewer taxes. When individual coal reserve properties are appraised correctly, tax revenues are distributed fairly among counties.

Figure 1: Estimated recoverable reserves by state

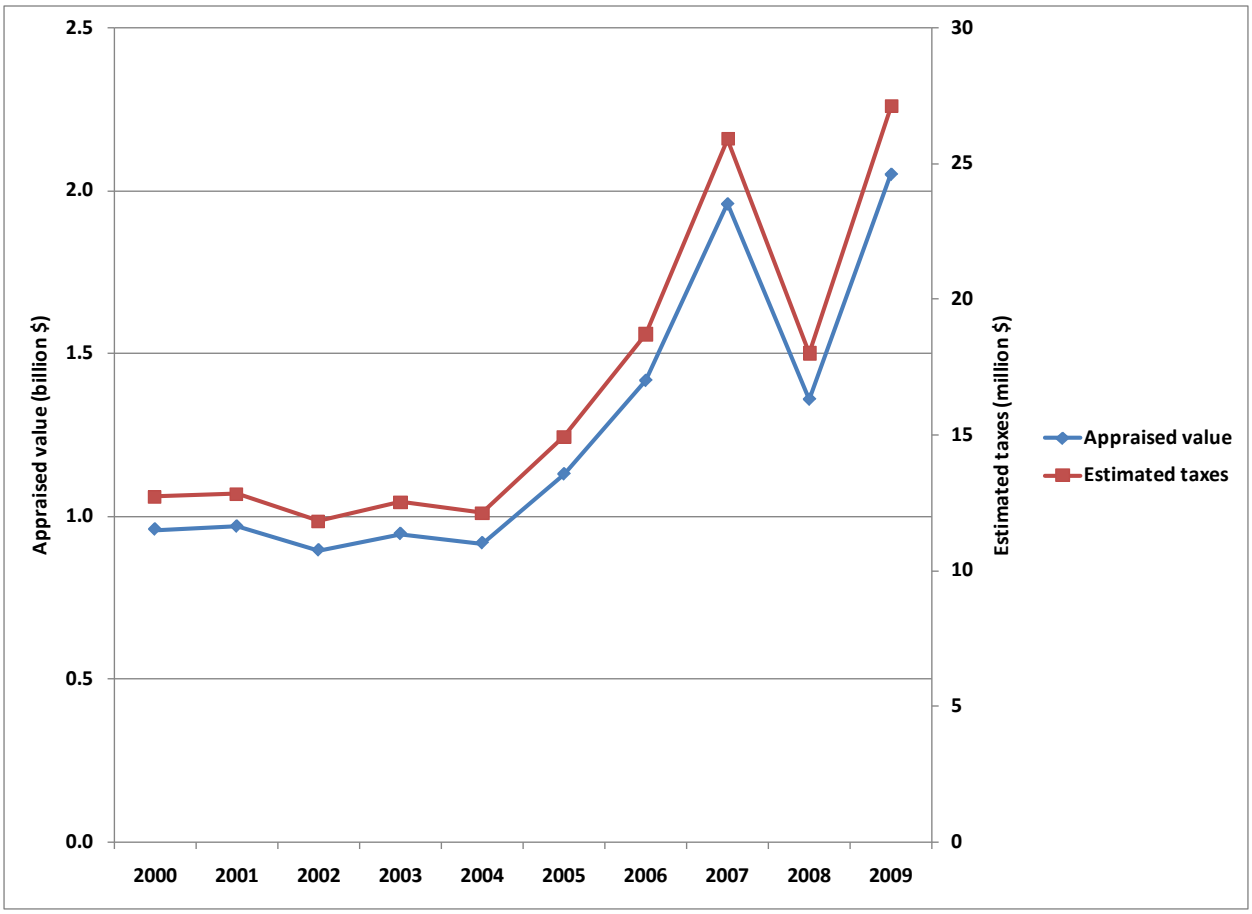


Source: United States Energy Information Administration (2008).

As shown in Figure 2, West Virginia's coal reserve appraisals have generally risen since 2000, and totaled about $1.4 billion in Tax Year 2008.[1] Taxes on these coal reserves provided about $18 million to county governments.[2] While mined and processed coal can sell for $50 per ton or more, the state's reserves are valued, on average, at only about 6¢ per ton and the property taxes paid on this reserve coal averages only a fraction of a cent per ton. This is due to several factors built into the RCVM, as explained by this primer.

[1] Tax Year 2008 corresponds with the fiscal year ending June 30, 2009.
[2] The West Virginia rule regarding valuation of coal reserves also includes a process for valuing active mining properties. This primer specifically focuses on reserves as described in 110 Code of State Rules (CSR) §1I-4.2 and not active mining properties as described in 110 CSR §1I-4.1.

Figure 2: Estimated reserve coal appraisals and taxes

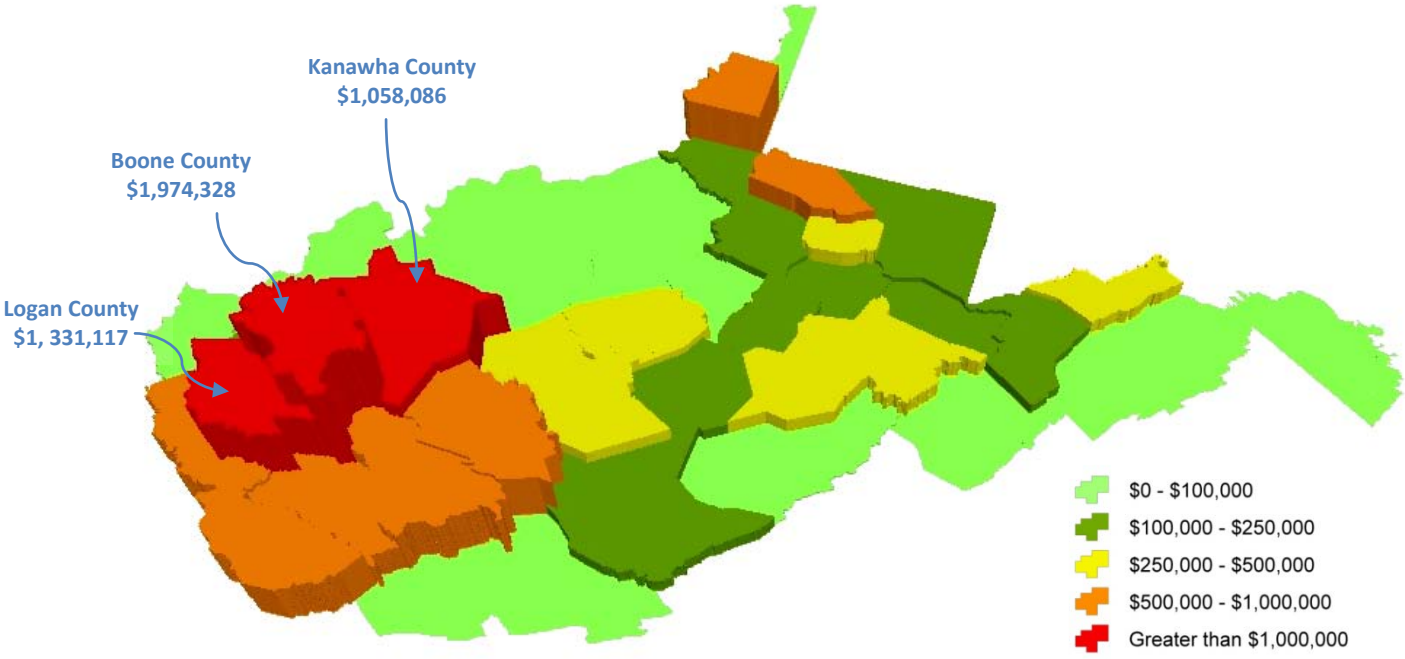


Source: RTC (2009b). Appraisals and estimated taxes do not include active coal properties.

As shown in Figure 3, Boone, Logan, and Kanawha counties each levied more than an estimated $1 million in coal reserve property taxes in Tax Year 2008. Other counties in the southern coalfields and in northern West Virginia generated between $500,000 and $1 million from coal reserve taxes. In Tax Years 2007 and 2008, property taxes in total—including coal and other properties—generated about $1.3 billion per year, with approximately $840-890 million spent on schools (WVTD, 2008b).

While other types of property taxes are handled at the county level, the West Virginia State Tax Department (WVTD) appraises reserve coal properties at the state level. Each year, WVTD notifies counties of the appraised values of each coal property, and county assessors then determine the assessed values and levy the taxes.

Figure 3: Estimated coal property taxes received by counties in Tax Year 2008



Source: WVTD (2008c).

As described below, this system uses a geographic information system (GIS) database that includes numerous types of data, many of which are updated annually or biannually.[3] The system is dependent on quality data to calculate the correct appraisal values for each property. Data are collected from a variety of sources, including the mineral owners and government entities.

This primer explains how the RCVM calculations are made. The goal is to help penetrate this complex collection of data and equations so that taxpayers, policy makers, and others can understand the system.

The following section provides background on West Virginia's coal reserves and the categories among which WVTD classifies coal properties. It then overviews the types of systems that can be used to appraise coal reserves and provides a brief summary of the history of West Virginia's systems. A more complete history is provided as an appendix.

Then, this primer steps through the process used to appraise coal reserves, by dividing the process into three phases. In Phase 1, WVTD collects basic statewide data. In Phase 2, the agency calculates the total value of all reserve coal in West Virginia. Finally, in Phase 3, WVTD appraises the hundreds of thousands of individual coal reserve properties across the state, and county assessors levy the taxes. These individual appraisals are adjusted to ensure that they sum to the total value of reserve coal calculated in Phase 2.

[3] 110 CSR §§1I-4.2.3.1.a-k.

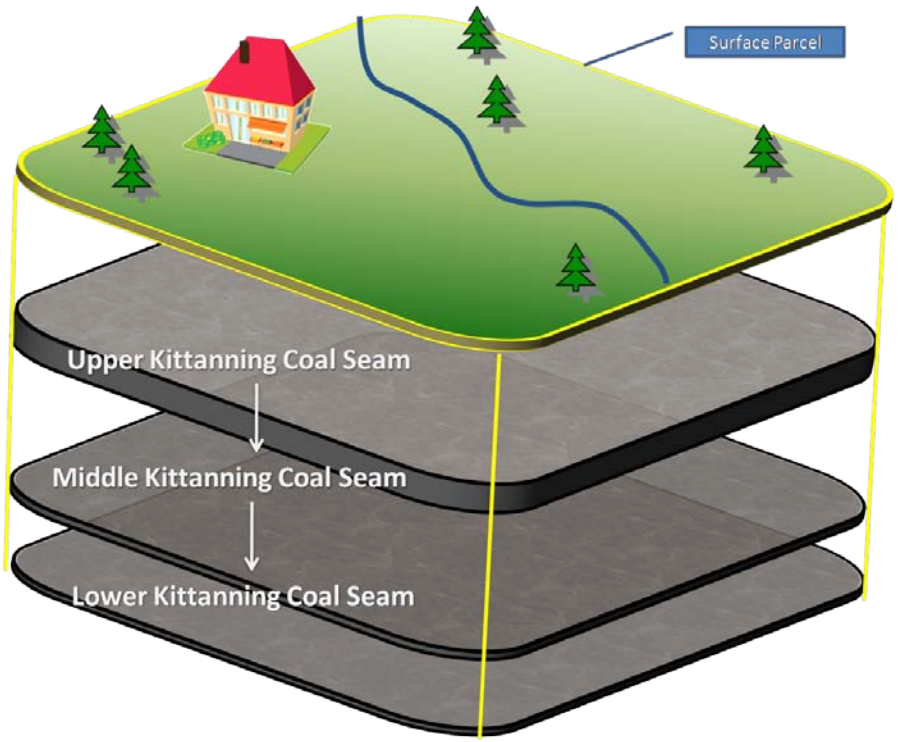
BACKGROUND

West Virginia coal reserves

Because coal is located underground, it takes considerable effort to estimate coal reserves. There is little consensus about the state's total coal reserves, and in fact, reserve estimates vary widely and will change year-to-year based on a number of factors. The West Virginia Coal Association (2008) estimates that 52 billion tons are recoverable.[4] In contrast, the federal government calculates 18 billion tons of recoverable reserves and a demonstrated reserve base of 32 billion tons (United States Energy Information Administration, 2008). In Tax Year 2008, West Virginia agencies estimated reserves at 23 billion tons. Based on market factors additional coal was reclassified as mineable in Tax Year 2009, increasing the estimated reserves to 41 billion tons (RTC, 2009a). For comparison, West Virginia coal mines produced 163 million tons in 2008 (West Virginia Office of Miners' Health Safety and Training, 2009).

These reserves are found in numerous coal seams that vary in thickness and other characteristics. As illustrated by Figure 4, multiple coal seams are often located beneath a single surface parcel. These parcel-seam combinations are taxed separately.

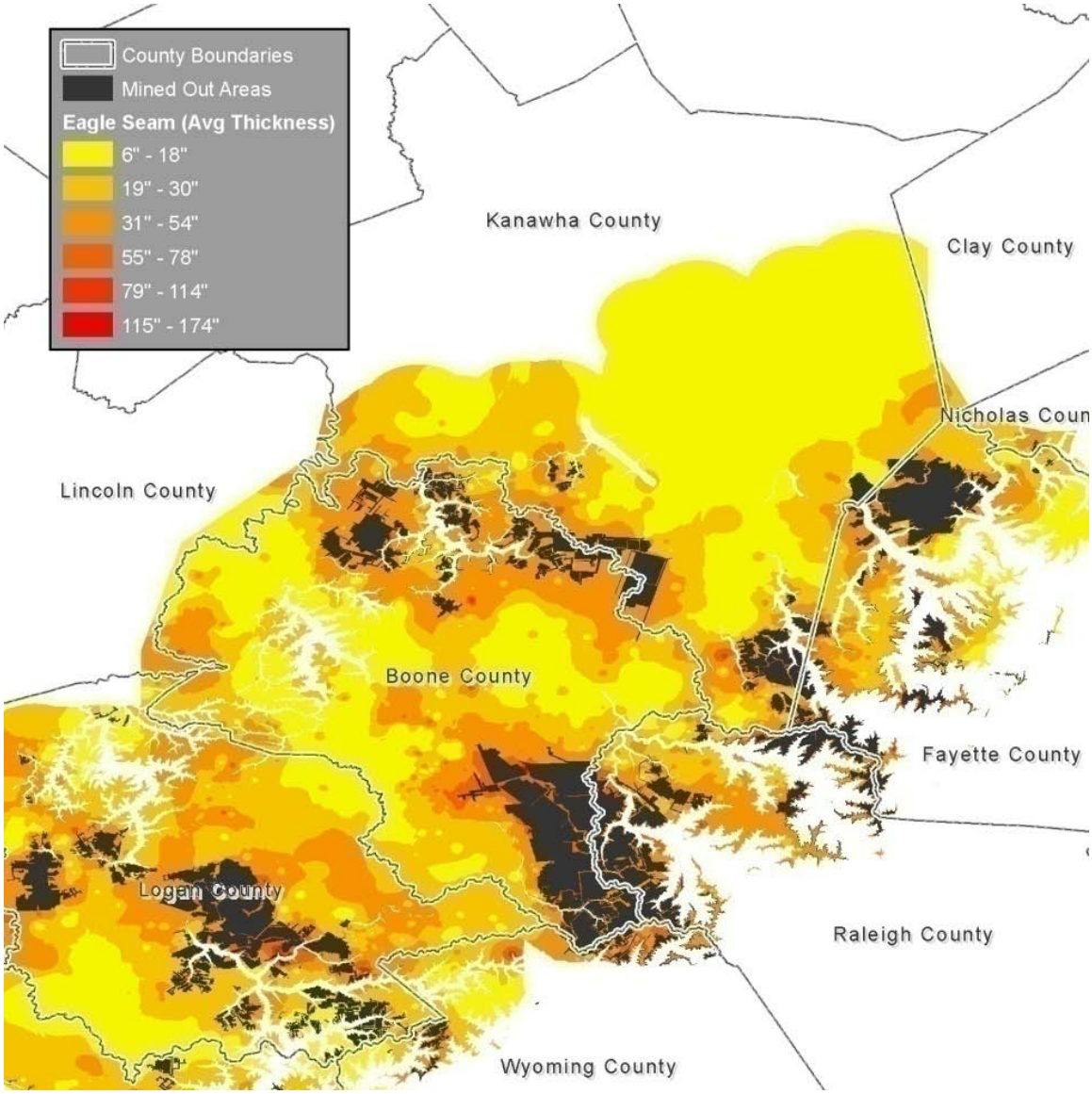
Figure 4: Illustration of multiple coal seams beneath a single surface parcel



[4] Goodell (2006) notes that the coal industry has an economic incentive to inflate reserve estimates in order to stay in business and encourage construction of new coal-fired power plants.

As illustrated in Figure 5, the Eagle Seam stretches across the coalfields of southern West Virginia. The seam varies significantly in thickness, as shown by the yellow, orange, and red colors. The mined-out areas, shown in black, generally correspond to the thicker portions of the coal seam.

Figure 5: The Eagle Seam in West Virginia



Source: WVGES (2008).

Active versus reserve coal

Before coal properties are appraised for tax purposes, they are divided into five categories: active, reserve, unmineable, mined-out, and barren.[5] This primer focuses on reserves.

Active. Coal to be mined by currently-permitted mines is generally taxed as active coal, with some exceptions.[6] Active coal valuation methods are similar to reserve coal valuation methods, but are described separately in West Virginia rules.[7] Compared with the other four categories of coal, WVTD can more easily calculate active coal appraisals because companies report their plans, past production, and coal characteristics each year using an Annual Appraisal Report for Production of Coal.

Reserve. Reserves include coal defined as mineable, but that is not part of an active mining property. The valuation of these coal reserves is the focus of this primer.

Unmineable. Unmineable coal cannot be economically mined using generally accepted mining practices. According to West Virginia rule, all coal beds less than 30 inches thick are considered to be unmineable unless there is evidence to the contrary.[8] Seams less than 30 inches thick are frequently recovered by mountaintop removal mining operations. Unmineable coal is generally valued at $5 per acre.[9] Between Tax Year 2008 and 2009, WVTD reclassified a significant amount of unmineable coal as reserve coal, raising the estimated mineable tons, which includes active and reserve coal, from 23 to 41 billion tons (RTC, 2009a). This reclassification was based on a review of current economic conditions, updated geologic data, company reports, and property records. With coal prices high, there was more coal likely to be mined, and therefore more coal classified as mineable.

Mined-out. If a coal bed has been depleted by prior operations and no additional coal is recoverable by generally accepted mining practices, it is considered to be mined-out unless there is evidence to the contrary.[10] Mined-out coal is generally valued at $1 per acre.[11]

Barren. Areas are considered to be barren when coal rights are owned but the coal was never deposited or has been eroded away. Barren coal is generally valued at $1 per acre.[12]

Methods for valuing coal reserves

Taxes are an integral part of our society and government; they pay for public goods such as police and fire service, schools, roads, libraries, and infrastructure. By state law, WVTD appraises coal reserves so that property taxes can be collected. A tax system should be fair, efficient, conveniently administered, and understandable to the taxpayer.

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[5] 110 CSR §1I-2.1.
[6] When active coal mines project that their operations will extend for more than 15 years for underground mines or five years for surface mines, the coal in the later years is taxed as reserves. 110 CSR §1I-3.30.1.
[7] 110 CSR §1I-4.1.
[8] 110 CSR §1I-3.36.
[9] 110 CSR §1I-4.3.
[10] 110 CSR §1I-3.37.
[11] 110 CSR §1I-4.4.
[12] 110 CSR §1I-4.5.

To tax reserve coal, an appraised value must be placed on every reserve coal property, and then a tax rate applied to that value. Therefore, the first step in taxing reserve coal is to calculate the true and accurate value of each property:

> "All property shall be assessed…at its true and actual value; that is to say, at the price for which such property would sell if voluntarily offered for sale by the owner thereof, upon such terms as such property, the value of which is sought to be ascertained, is usually sold"[13]

In addition to the WVTD, many others are interested in the fair market value of coal reserves, including landholding companies, coal companies, individual landowners, lending institutions, and others that are contemplating buying, selling, investing in, or developing coal properties. Over the years, these interested individuals have used three general methods to value mineral property investments, as summarized in Table 1.

Table 1: Methods for appraising mineral properties

Method	Description
Replacement cost	Based on a specific property's land, mineral rights, buildings, equipment, roads, and any other relevant costs
Comparable sales	Based on the sales prices of similar coal properties
Discounted cash flow analysis	Based on the net present value of a specific property, calculated by discounting future sales and expenses

Source: Stermole and Stermole (2006).

Replacement cost method. Using this method one would value a property based on the cost of the land, mineral rights, buildings, equipment, roads, and any other relevant costs. The main challenge in using the replacement cost method is to account for all relevant costs and to estimate them accurately. This approach to valuing mineral investments is most appropriate for existing mines, for which investments have already been made. The replacement cost method is not applicable to reserve coal properties and has not been used to appraise West Virginia coal reserves for property tax purposes.

Comparable sales approach. This method is based on researching the sales prices of similar properties. It is commonly used to appraise homes because many arm's length transactions occur in this market. However, for income-producing properties like coal reserves, this method is problematic. It may be difficult to find enough local transactions to calculate comparable values. Further complicating this method, local transactions may not be arm's length transactions, so the sales price may not reflect the true value of the reserves. Also, many site-specific characteristics affect the true value of a property, such as the size of the parcel and the expected timing of the development. Further, coal property sales often include existing mining infrastructure, existing permits, sales contracts, and other items that are difficult to back out of the sales price. In an academic textbook, Stermole and Stermole (2006) consider the comparable sales approach to often be a poor approach to the valuation of natural resource properties. As shown in the timeline in Figure 6, West Virginia used the comparable sales approach until implementation of the new RCVM method.

[13] W.Va. Code §11-3-1.

Discounted cash flow analysis. West Virginia switched to the discounted cash flow method in 1999. WVTD now appraises coal reserves in a manner similar to how a buyer would evaluate the property, by calculating the expected revenues based on coal sales. These revenues would then be combined into a net present value—the value of the reserve coal property today—based on a discount rate. The discount rate takes into account the delay between the tax year and the likely year that the coal might be mined, as well as the risks associated with the wait and the industry. One complication for this method is that future cash flows can only be calculated based on the projected sales price of coal. Coal prices vary considerably year to year based on a world market and vary seam to seam and county to county based on a number of factors. A data-intensive process is therefore required if WVTD is to characterize each seam and predict the sales price of the coal. In addition, the value calculated by this method depends considerably on discounting. Therefore, the discount rate and the number of years over which discounting occurs are critically important assumptions. These assumptions are perhaps the most important factors that determine the value of each coal reserve property in West Virginia.

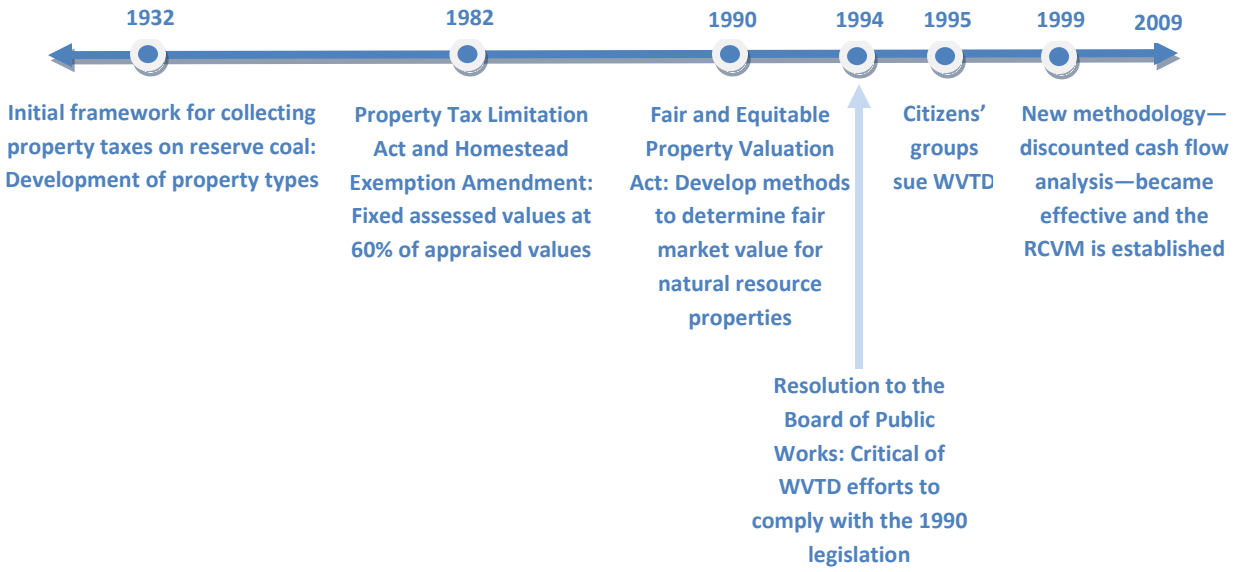
Arm's length transactions

When people buy and sell goods and services—including coal reserves—they agree on a price. Arm's length transactions are those where the buyer and seller are not related to each other and have no common interest. The sales price in arm's length transactions generally reflects the fair market value of the item that is sold.

In contrast, if a company sells a property to its subsidiary, for example, the sales price may not reflect the true market value.

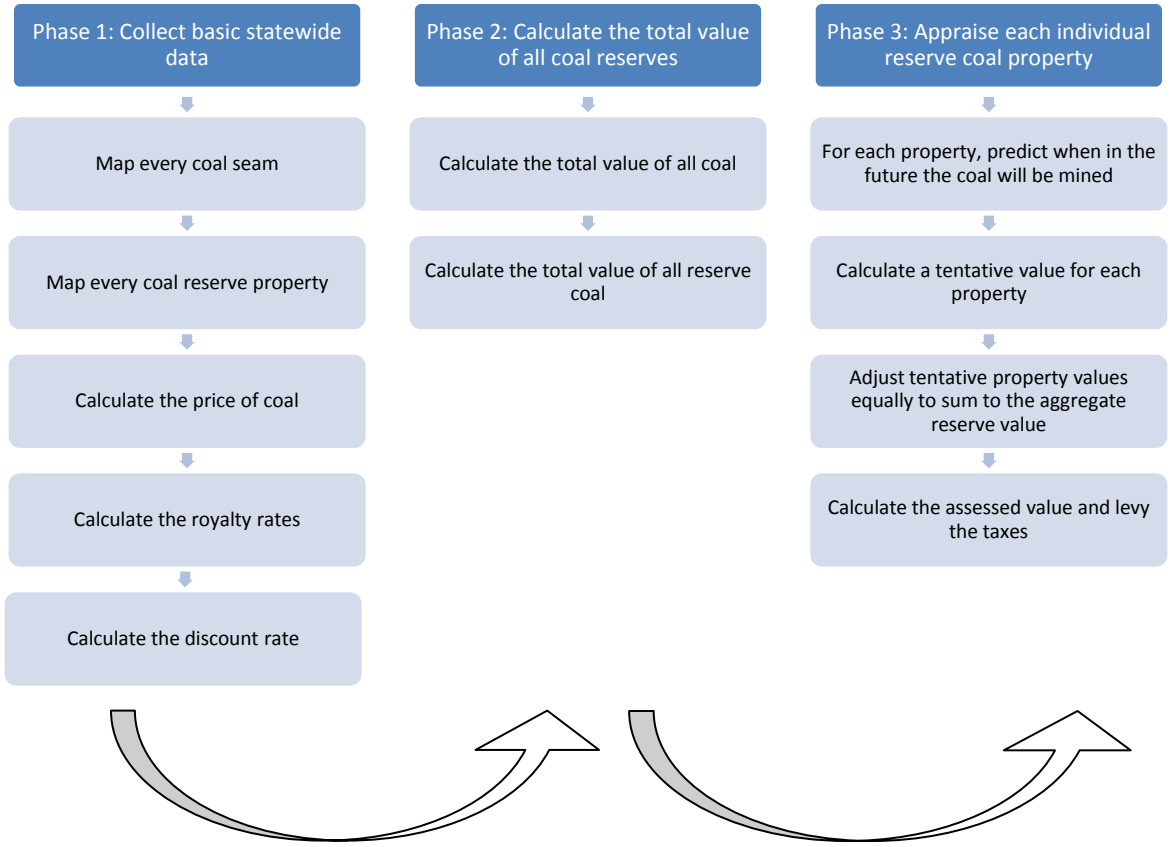
The framework for taxing coal reserves in West Virginia has evolved over the decades. A detailed description of this history is provided in an appendix. As shown in Figure 6, key recent milestones include a lawsuit by citizens' groups in 1995, which set the state on the path to using a discounted cash flow method for appraising coal reserves. This method was established in 1999.

Figure 6: Timeline of key coal reserve taxation milestones in West Virginia



The remainder of this primer divides the process for appraising coal reserves into three phases. Each phase involves a series of steps (Figure 7). The end products at the end of Phase 3 are appraisals for each of the more than 711,000 coal reserve properties across West Virginia. County assessors then levy taxes based on these appraised values.

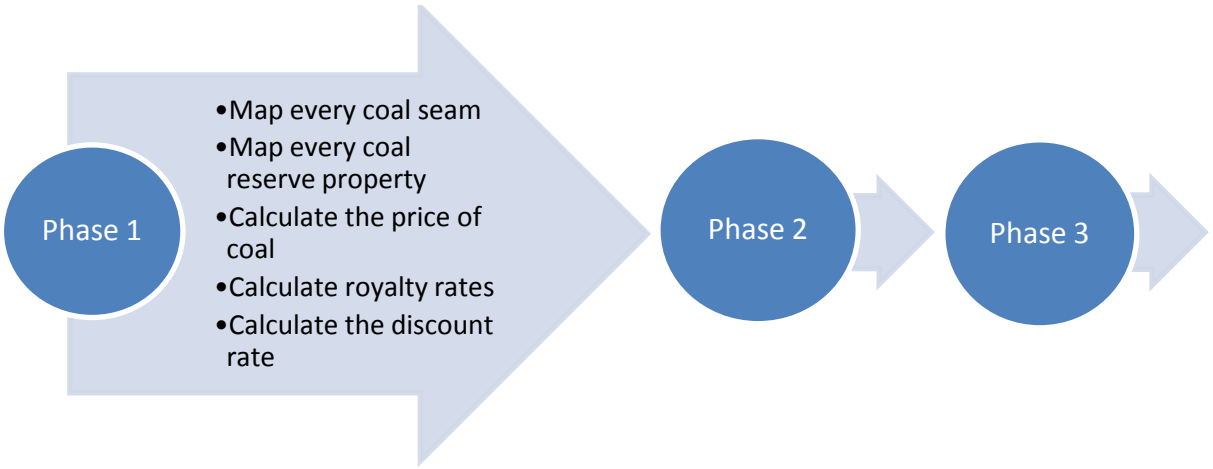
Figure 7: Phases for appraising reserve coal properties



PHASE 1: COLLECT BASIC STATEWIDE DATA

Certain basic information must be collected before West Virginia's RCVM can be properly implemented (Figure 8). For example, the location and characteristics of every coal seam must be identified, independent of who owns it. Ownership information is also crucial: Detailed information about every coal property—including its location—is required in order to match it up with the coal seams and characteristics.

Figure 8: Steps in Phase 1



These types of information, in addition to other data, are implemented using GIS. A GIS is a computer system and structured database that describes the world in geographic terms and that assembles, analyzes, models, stores, manipulates, and displays geographically referenced information. GIS is larger than just computer software and data; it also includes qualified operating personnel, management plans, defined procedures, and data quality assurance programs. Three separate but linked GIS systems have been developed by different entities in West Virginia to implement the RCVM: the West Virginia Geological and Economic Survey (WVGES), WVTD, and the West Virginia State GIS Technical Center at West Virginia University.

The WVGES GIS generates the mineral-based data, which include coal seam location, thickness, quality, stratigraphy (the geological order of the seams), and mined out areas. The WVTD GIS houses the data used to assign ownership to the coal seams and to predict when mining will occur in the future. This GIS also integrates the mineral-based data originally generated by WVGES as well as additional coal and mine-based data gathered by WVTD (RTC, 2009c).

Other important basic data that are used to appraise reserve coal include the price of coal, the royalty rates paid to coal owners when coal is mined, and the discount rate.

Map every coal seam

To properly tax coal reserves, WVTD must know where coal seams are located and the characteristics of that coal. WVGES, through its Coal Bed Mapping Project, is compiling information about and modeling the known coal reserves across West Virginia.

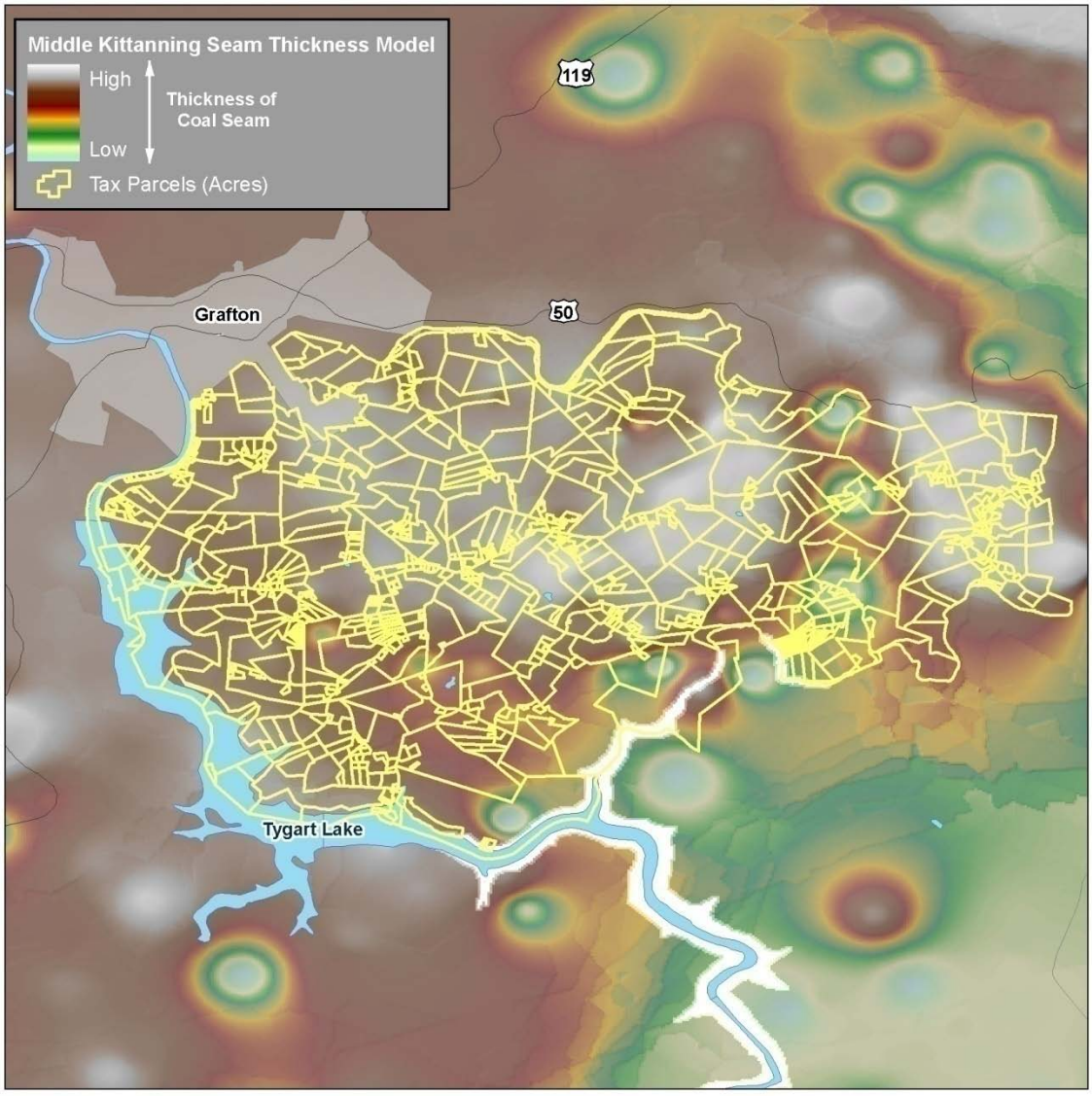
WVGES uses data from a variety of sources to generate the seam models. Coal seam control points include descriptions of surface exposures, logs of subsurface core borings, and observations made in underground mines. These control points are utilized to create a set of models or maps for each seam depicting its geographic location, variation in thickness, variation in the amount of non-coal material in the seam, and variation in elevation and depth. Very importantly, the mined areas are also compiled and differentiated by mining method. Figure 5, above, shows an example of this mapping effort for the Eagle Seam, while Figure 9, below, illustrates the thickness model for the Middle Kittanning Seam in Taylor County.

One important use of coal seam thickness data is to calculate the tons of coal in the ground. This is calculated as the area of the parcel multiplied by the coal seam thickness and the conversion factor of 1,800, as shown in Equation 1. In reality, the methods used to calculate reserve coal appraisals are much more complicated, as described throughout this primer.

Equation 1: Calculation of tons of coal

$$Tons = Area\ (acres) \times Thickness\ (feet) \times 1{,}800\ (tons\ per\ acre\ foot)$$

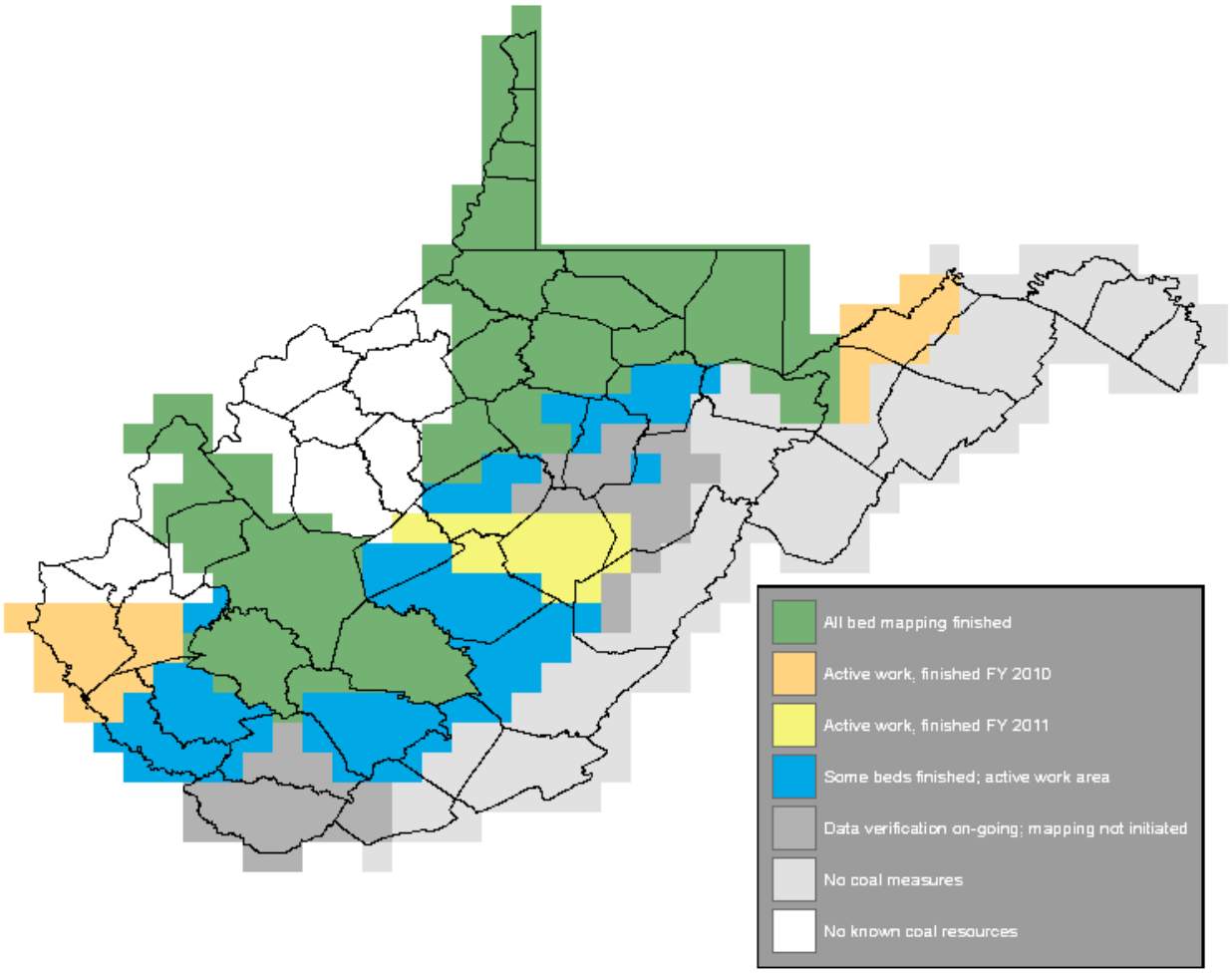
Figure 9: Coal seam thickness model: An example in Taylor County



Source: WVGES (2008).

As shown in Figure 10 and Table 2, WVGES has finished mapping a significant percentage of West Virginia's coal seams. Forty-nine percent of seam areas are completely mapped. An additional 37% are partially mapped. Many of these seams will be completed in Fiscal Year (FY) 2010 or 2011 (WVGES, 2009).

Figure 10: Status of coal bed mapping in West Virginia as of May 1, 2009



Source: WVGES (2009).

Table 2: WVGES coal mapping status

Status	Percent of coal seam areas
All bed mapping finished	49%
Active work, finished FY 2010	9%
Active work, finished FY 2011	5%
Some beds finished; active work area	23%
Data verification ongoing; mapping not initiated	13%

Source: WVGES (2009).

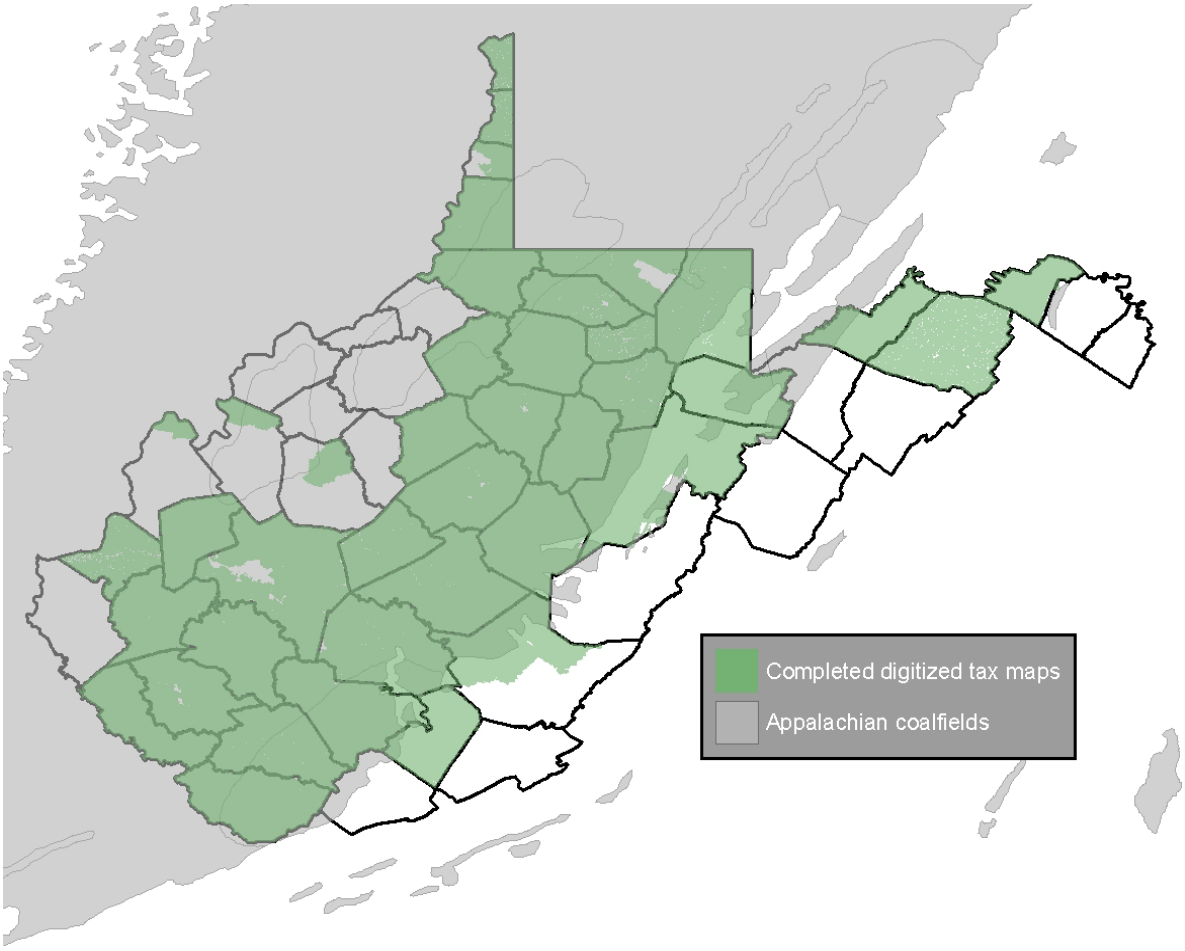
Map every coal reserve property

In addition to coal seams, all coal reserve properties must also be mapped. The Mineral Parcel Mapping Program was developed within WVTD to digitize surface parcel data, as shown in Figure 11. These data are used by WVTD to supply its field personnel with geo-referenced surface parcels, which in turn help them to locate underground mineral parcels.

Figure 11: Surface parcel example

Figure 12 shows the status of this dataset: Over 70% of the state has been digitized, and a majority of these data are located in coal-producing counties.

Figure 12: Surface parcel status map



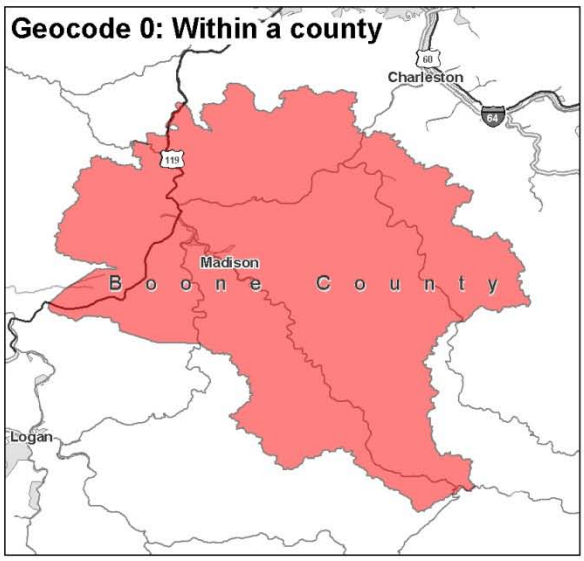
Source: Digitized tax maps from WVTD (2009b).

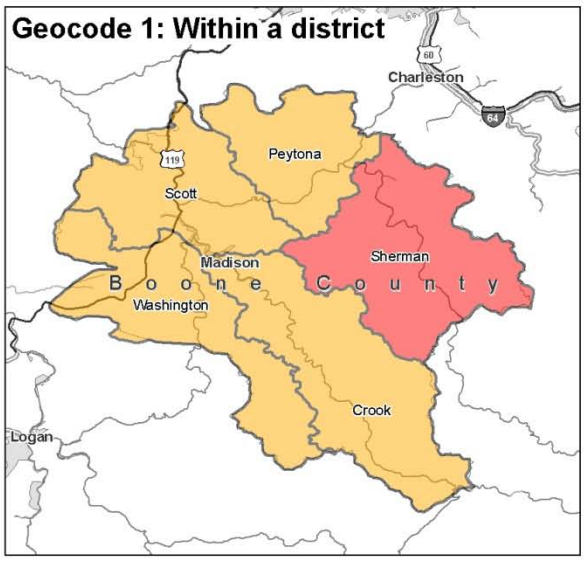
Across West Virginia, more than 240,000 unique parcels contain coal reserves. Some of these parcels have more than one coal seam; in total, more than 711,000 parcel-seam combinations are located across West Virginia (WVTD, 2009a). In this primer, these parcel-seam combinations are called "properties." These properties encompass more than 49 million seam-acres. However, in Tax Year 2008 only 4.3 million seam-acres were considered potentially mineable and fully taxed as coal reserves. Based on an analysis of the market and the economic conditions affecting coal mining, this value was increased to 8.8 million acres in Tax Year 2009. Seams less than 30 inches thick are generally considered unmineable, even though these seams are frequently recovered by mountaintop removal mines.

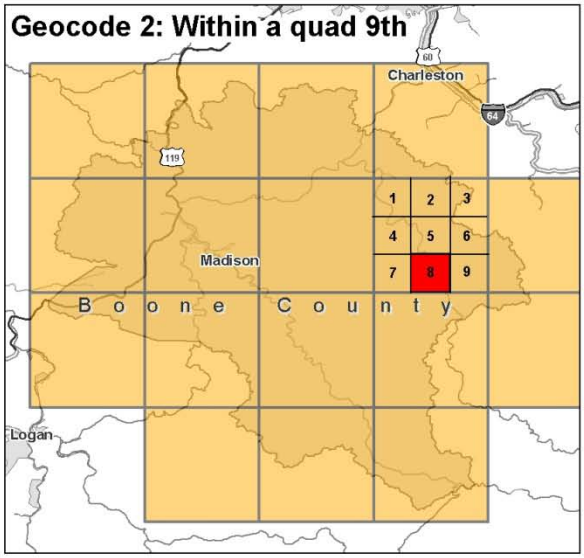
WVTD houses coal ownership data in a GIS and is making progress year by year in identifying the locations of these properties. However, as shown in Table 3, WVTD has only mapped 36% of these coal reserve properties. The remaining properties are known to be located only within a specific tax index map, a "quad 9th,"[14] a tax district, or a county (Figure 13).

[14] The United States Geologic Survey produces 7.5 minute, 1:24,000 scale quadrangle maps. By dividing these maps into nine equal rectangles, coal properties can be located within a "quad 9th."

Figure 13: Relationship between geocodes for coal reserve properties







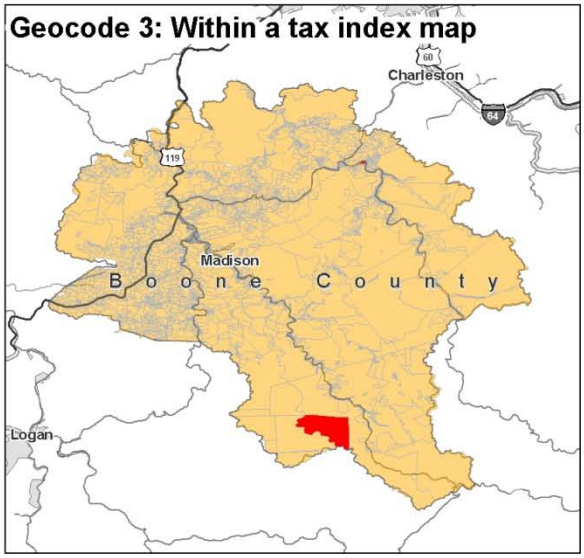


Table 3: Mapping status for coal reserve properties

Geocode	Description	Number	Percentage
4	Mapped	253,078	36%
3	Known to be in a tax index map	164,741	23%
2	Known to be in a quad 9th	81,354	11%
1	Known to be in a tax district	192,056	27%
0	Know to be in a county	20,251	3%
	Total	711,480	100%

Source: WVTD (2009a).

The goal, over time, is for every parcel to be mapped (Geocode 4), but until this is accomplished, parcels will continue to be taxed based on average values. For example, if a parcel has been located only within a specific county (Geocode 0), the characteristics of the coal on this parcel are estimated using the average information for the entire county. If the parcel has been located within a specific tax index map (Geocode 3), then it receives the average characteristics for that tax index map.

Calculate the price of coal

The price of West Virginia coal is a crucial component of the value of coal reserves. Coal prices can change significantly from year to year. Each year, WVTD calculates new three-year running average coal prices for steam coal and metallurgical coal. Steam coal is generally used in coal-fired power plants to generate electricity, and metallurgical coal—with its higher energy content—is more valuable and used to make steel. The average coal prices used by WVTD for Tax Year 2009 are $68.15 for metallurgical coal and $49.25 for steam coal (WVTD, 2008a). These selling prices are set by the market or by contracts, and include all the costs of production.

Calculate the royalty rates

To appraise coal reserves, West Virginia applies royalty rates. This means that the appraised value of a coal property is not the full projected sales price of the coal; instead, the value is the amount expected to be paid by a coal mining company to a coal owner as royalties.

WVTD sets the average royalty rates to be used in the RCVM. For Tax Year 2009, the royalty rates are 5.84% for underground mines and 7.01% for surface mines (WVTD, 2008a).

As illustrated in Figure 14, the value of a reserve coal property that will generate $1 million in coal sales is therefore reduced to $58,400 (underground) or $78,100 (surface), even before discounting (see a detailed discussion of discounting below). In essence, this royalty method is based on the assumption that the royalty approximates the stream of revenue that goes to the owner of the coal reserves over time. The use of a royalty rate is one

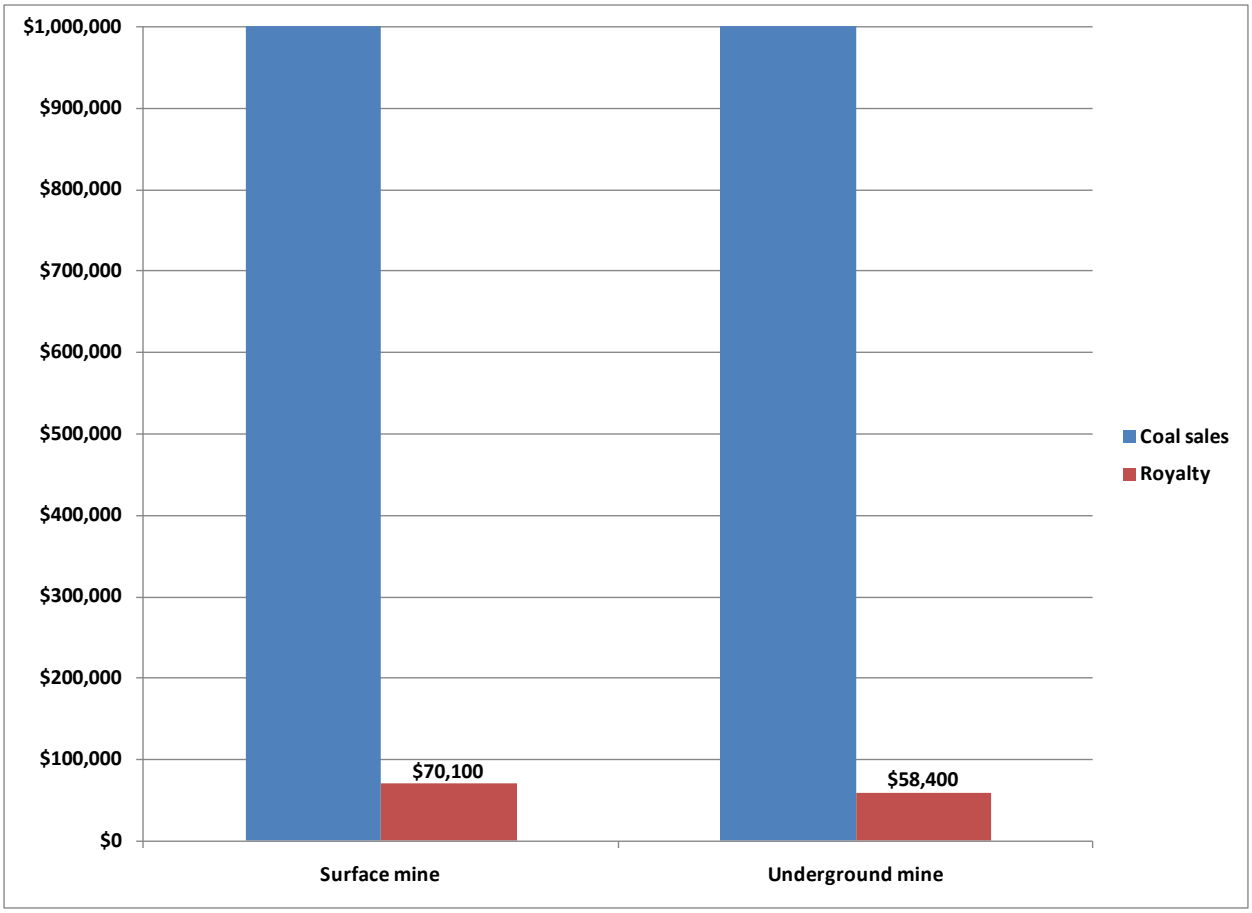
Royalties

In West Virginia, it is common for coal mining companies to lease the mineral rights. When the coal is mined, the mining companies pay the coal owners a royalty: a fixed percentage of coal sales. The royalty therefore represents the revenues that the mineral owners expect to generate once the coal is mined.

While royalty rates are negotiated for each lease, WVTD calculates average rates to appraise coal reserves.

major reason why the per-ton appraisals of West Virginia reserve coal is so much lower than the per-ton sales price. WVTD focuses its appraisal on the property value, not the value of the coal sales.

Figure 14: Relationship between coal sales and royalties



Note: Tax Year 2009 royalty rates from WVTD (2008a).

Calculate the discount rate

Reserve coal will be mined in the future, if it is mined at all. Because reserve coal appraisals are based on the present value of these future coal sales, these future revenues are "discounted" to account for the fact that money received in the future is worth less than the same amount received today. In a sense, discounting future revenues is the opposite of compounding interest on money in a bank.

To calculate the present value of future coal sales, a discount rate is required. WVTD adjusts this rate each year; for Tax Year 2009, it is set at 12.2%. While the term "discount rate" is a generic term used for this purpose, WVTD calls it the "capitalization rate" based on the state rules.[15] This rate is a three-year running average and is comprised of the sum of the safe rate, risk rate, non-liquidity rate, and management rate, minus the inflation rate.[16]

Figure 15 shows the effect of discounting $1 million of revenues that will be earned in the future. If these revenues were not discounted, then it would not matter when the revenues are realized; they would still be worth $1 million today.

However, using the 12.2% discount rate, the present value of future revenues is significantly reduced. For example, if the coal is not expected to be mined until 20 years in the future, the present value of $1 million in future revenues is only about $106,000. If the coal will not be mined for 40 or 80 years, the present value drops to about $11,000 or $106, respectively.

As this hypothetical example illustrates, discounting the value of coal reserves—based on the expected time that will pass before these reserves are actually developed— significantly reduces the value of reserve coal for taxation purposes. Reserve coal is discounted for either 20, 40, or 80 years. This method allows WVTD to approximate how buyers and sellers value coal properties in the open market.

Discounting and present value

Discounting is a technique used to account for the fact that money received in the future is worth less than the same amount received today.

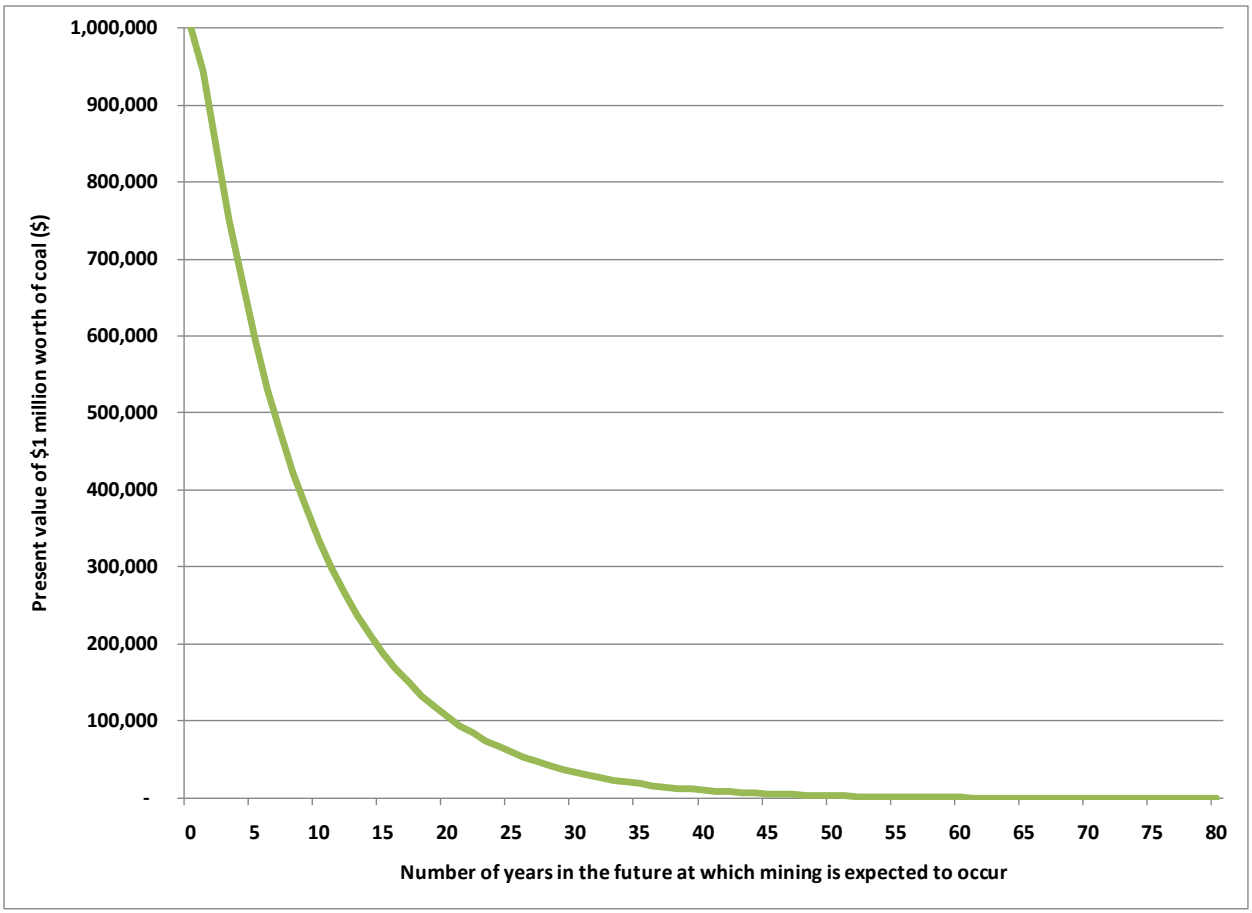
For example, if a company buys a coal reserve property that will generate $1 million in revenues, those revenues will not be seen for many years because the company must perform geological investigations, receive permits, hire workers, and prepare the site. When deciding how much to pay for the property, the company would discount the $1 million to account for the fact that the revenues will be generated in the future.

By discounting future revenues to the current year, a "present value" is calculated.

In a sense, discounting future revenues (with a discount rate) is the opposite of generating interest on money in a bank (with an interest rate).

[15] 110 CSR §1I-3.18.
[16] 110 CSR §1I-4.1.7. WVTD (Various dates) describes the specific calculations for each tax year.

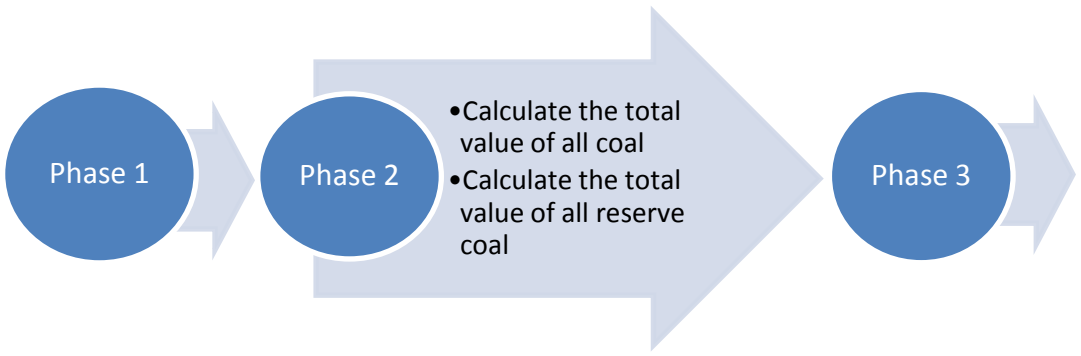
Figure 15: Discounting example



PHASE 2: CALCULATE THE TOTAL VALUE OF ALL COAL RESERVES

In Phase 1, basic data are collected that describe the coal seams, coal reserve property locations, coal prices, coal royalties, and discount rate. In Phase 2, described here, the total value of all reserve coal in West Virginia is calculated (Figure 16).

Figure 16: Steps in Phase 2



Calculate the total value of all coal

The total value of all coal is called the "aggregate value" and includes all active and reserve coal across the state. For Tax Year 2008, WVTD calculated the aggregate value as $2.7 billion, and for Tax Year 2009, the aggregate value increased to $3.9 billion (RTC, 2009b).

The equation used to calculate the aggregate value is set by West Virginia rule, and is based on the assumption that the current rate of coal production, price of coal, and royalty rate paid to landowners will continue into the future (Equation 2). Further, it discounts the value of coal that will be produced in the future.[17]

Equation 2: Calculation of aggregate value

$$Aggregate\ value = (Avg.coal\ price \times Avg.royalty\ rate \times Annual\ production) \div Discount\ rate$$

For example, if the average coal price were $50/ton, average royalty rate were 5%, annual production were 150 million tons, and discount rate were 10%, the aggregate value would be $3.75 billion. These values are round numbers that are close to the real numbers used to calculate the aggregate value of West Virginia coal.

[17] This equation is a reasonable approximation of the discounted value of coal, so long as annual production is small compared with reserves and mining will continue for many years. Annual coal production in West Virginia is well below even the lower bound of the range of reserve estimates.

It is important to note that this calculation does not depend on an accurate estimate of the total coal reserves in West Virginia. Instead, it assumes that the current annual production rate continues far into the future. Because future revenues are discounted, coal sales far in the future only marginally impact the aggregate value.

Calculate the total value of all reserve coal

Once the total value of all active and reserve coal is known, the total value of all reserve coal is calculated by subtracting the "aggregate active value" from the aggregate value (Equation 3). The calculation of aggregate active value is based on West Virginia rules and is not the subject of this primer.[18]

Equation 3: Calculation of aggregate reserve value

$$Aggregate\ reserve\ value = Aggregate\ value - Aggregate\ active\ value$$

The aggregate reserve value—the present value of all reserve coal properties in West Virginia—is therefore based on a simple statewide equation, without considering how much reserve coal is actually in the ground or information about any individual coal property.

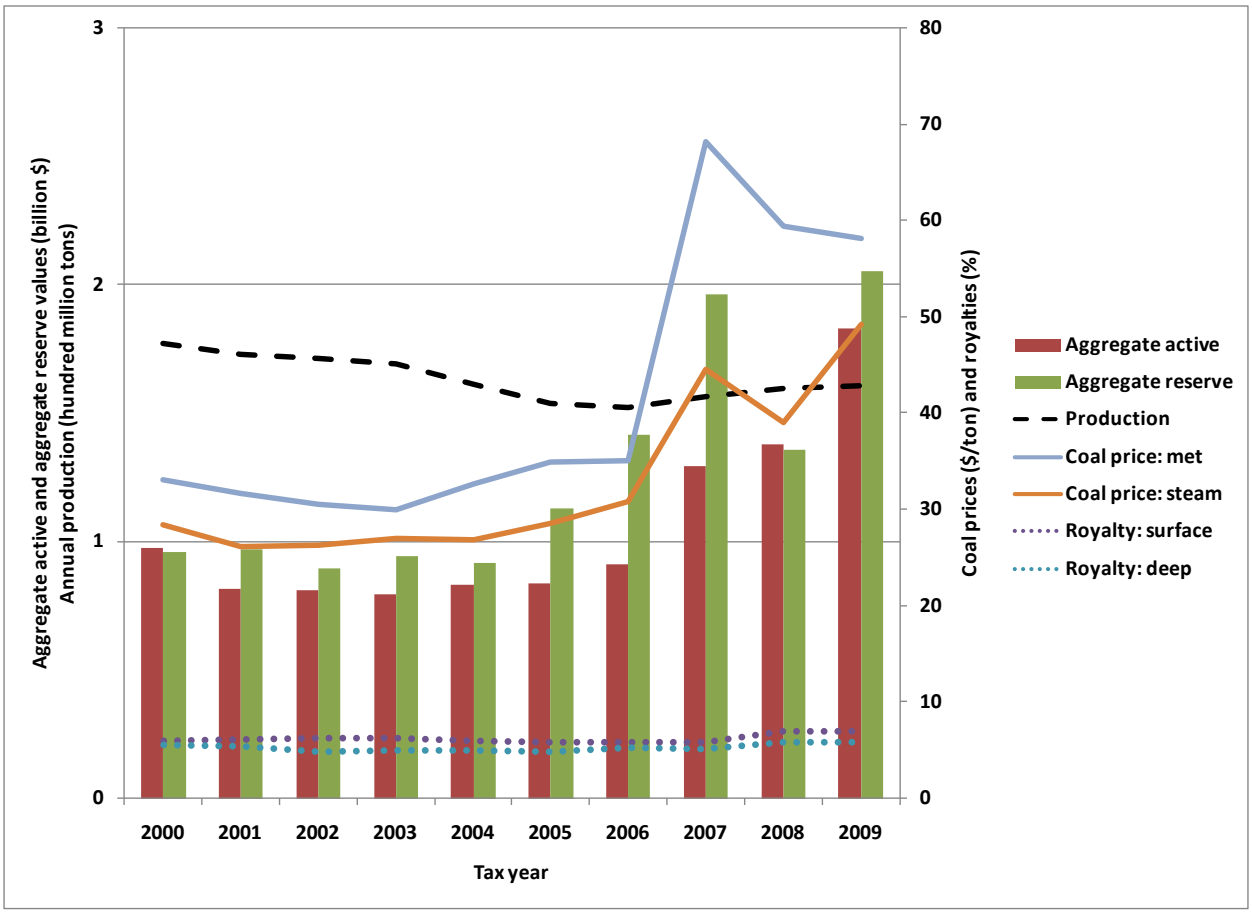
In addition, the aggregate reserve value does not depend on whether particular properties are appraised correctly. Instead, it is set even before WVTD calculates each individual parcel values as described in Phase 3.

WVTD recalculates the aggregate values every year. As shown in Figure 17, the aggregate active value and the aggregate reserve value have both increased year-by-year between 2005 and 2009, with one exception. While coal reserves were valued at below $1 billion from Tax Year 2000 through Tax Year 2002, the value rose to over $2 billion in Tax Year 2009.

Changes in the price of coal—shown in Figure 17 as the top two solid lines—help explain the changes in the aggregate values. Changes in coal production and royalty rates, which are less volatile than coal prices, appear to affect the aggregate values less significantly.

[18] 110 CSR §1I-4.1.

Figure 17: Aggregate active and aggregate reserve values, 2000-2009

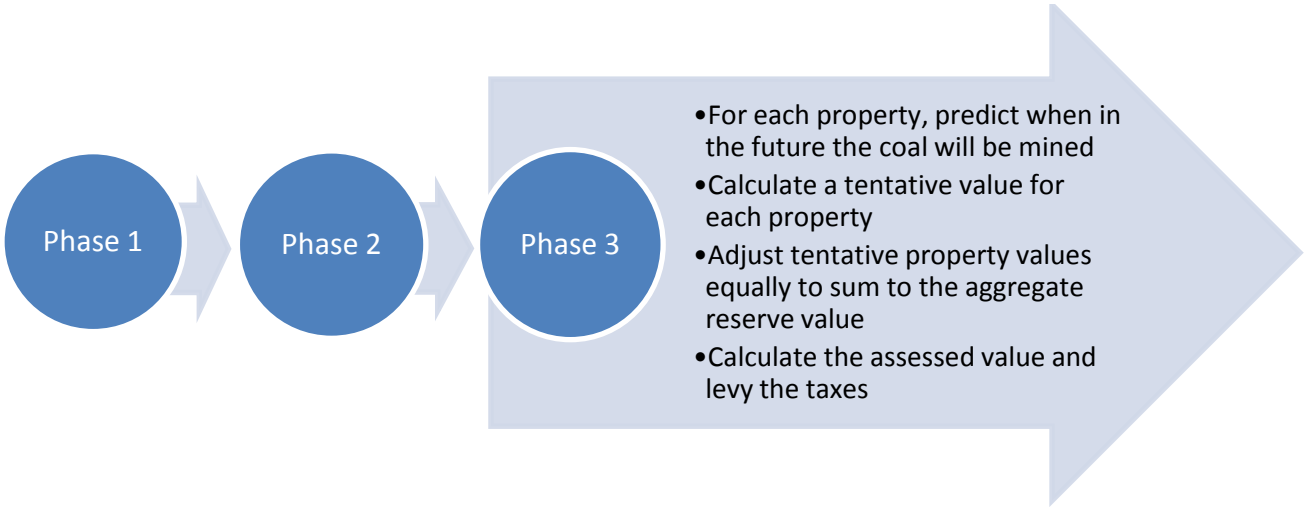


Source: Aggregate values from RTC (2009b).Coal prices and royalty rates from WVTD (Various dates). Production from West Virginia Office of Miners' Health Safety and Training (2009). Production data are three-year running averages.

PHASE 3: APPRAISE EACH INDIVIDUAL RESERVE COAL PROPERTY

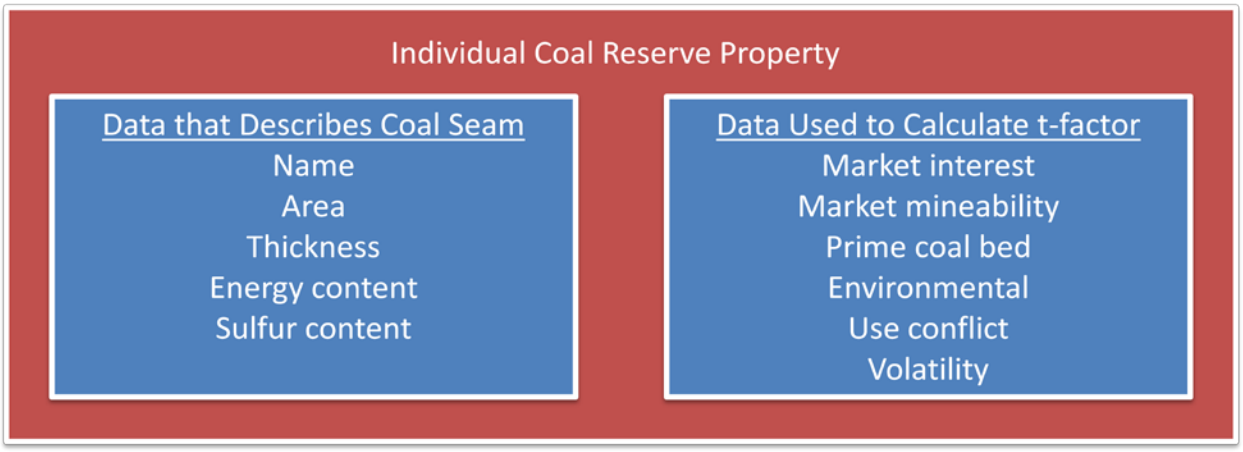
While the previous section describes how the total value of all West Virginia reserve coal is valued, this section describes how each individual coal reserve property is appraised. Phase 3 involves a series of steps that ultimately result in appraised values that are used by county assessors to calculate assessed values and levy taxes (Figure 18).

Figure 18: Steps in Phase 3



As described above, WVGES maps coal seams across the state, and WVTD maintains more than 711,000 individual reserve coal property ownership records (RTC, 2008). As shown in Figure 19, many types of data are required to apply the RCVM method to appraise each parcel. For example, a coal seam's area and thickness are required to calculate the number of tons in the ground. Other characteristics—including its energy content, sulfur content, and location with respect to environmental factors or use conflicts—will also affect the value of this coal and the projected timing of future mining. The RCVM blends these factors, plus several others, to appraise reserve coal properties.

Figure 19: Site-specific factors that impact the value of individual coal reserve properties



For each property, predict when in the future the coal will be mined

West Virginia discounts the expected revenues from future coal sales to appraise reserves. In order to discount future revenues, two pieces of information are required: (1) a discount rate, and (2) the number of years in the future when mining will occur.

The predicted timing of mining is calculated separately for each reserve coal property. While the state rules name it the "coal bed index factor,"[19] the predicted number of years until a certain coal property will be mined is commonly referred to as a "t-factor."[20] The t-factor is one of the most critical factors in the appraisal of coal reserves, because if future revenues are discounted over many years, the present value becomes very small. Appraisals are based upon this present value.

T-factors are calculated by combining the six factors in Table 4. Each individual factor is assigned a value according to certain criteria. Then, according to the state rule, these six factors are combined into the t-factor by summing and dividing by three.[21] This result is then rounded to 20, 40, or 80. It is common to refer to t-factors assigned to reserve coal properties as t-20, t-40, or t-80. The future coal sales are then discounted using this number of years.

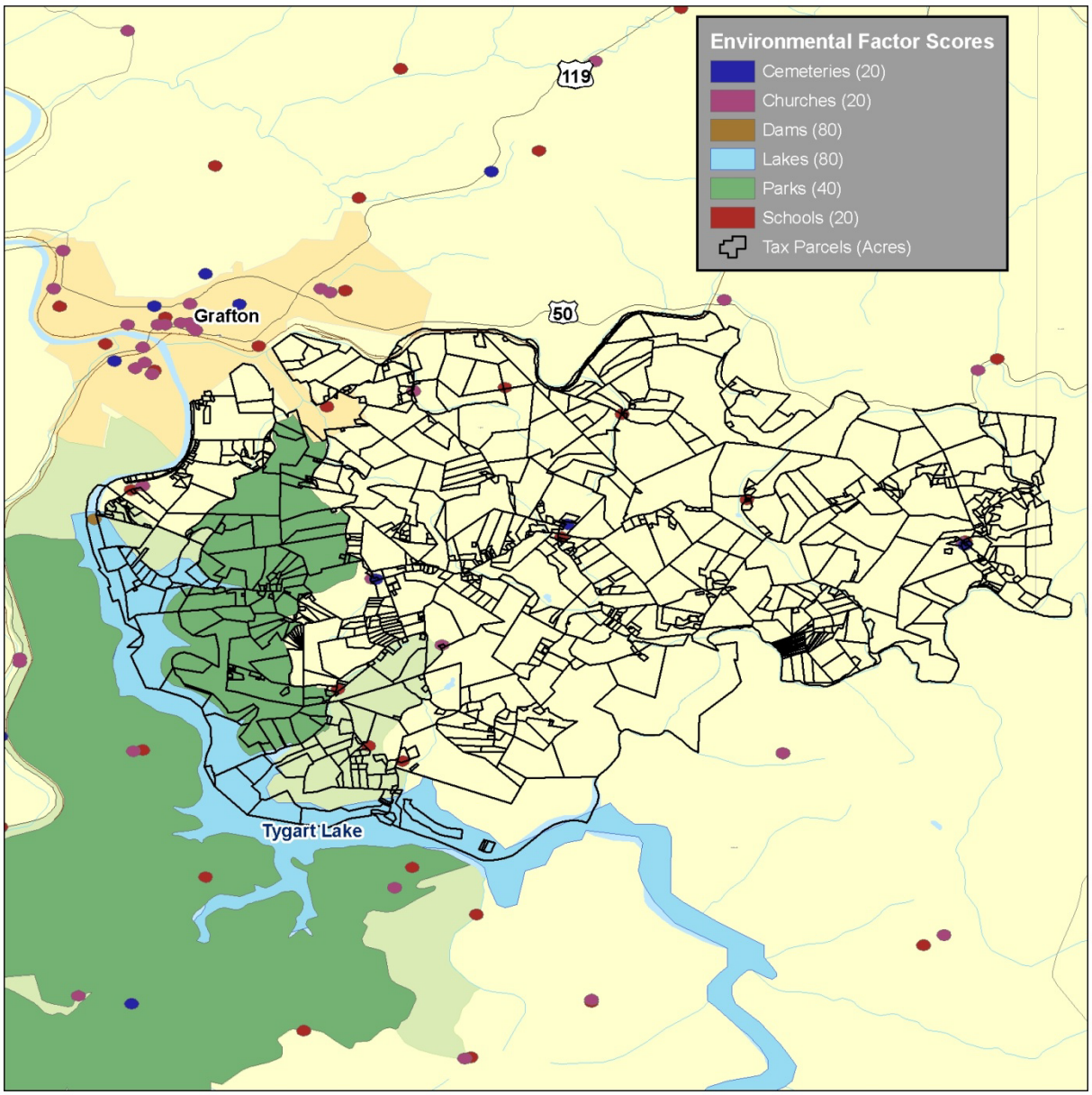
Table 4: Factors combined into the t-factor for each coal reserve property

Factor	Description	Value
Market interest	Indicates the relative coal market activity in a specified area	20, 40, or 80
Market mineability	Indicates the relative cost of mining in a specified area	20, 40, or 80
Prime coal bed	Indicates the seam most likely to be mined on a property	20 or 80
Environmental	Reflects the environmental impediments to mining, such as wild and scenic rivers, severe acid mine drainage problems, areas designated unsuitable for mining as identified by the Department of Environmental Protection, and other identified impediments	0, 20, 40, or 80
Use conflict	Indicates the degree that use conflicts are likely to arise with other land uses such as oil and gas wells	0, 20, 40, or 80
Volatility	Identifies coal with a volatility content sufficiently low to render it unsuitable for steam coal markets	0 or 80

WVTD's GIS houses these six factors, plus the combined t-factor, for all coal reserve properties in the state. Figure 20 illustrates several data points that are used to calculate the environmental factor. As shown in this figure, the location of properties with respect to lakes, parks, cemeteries, and churches all impact the value assigned to the environmental factor.

[19] 110 CSR §1I-3.21.
[20] These factors are called "t-factors" because they are used for the variable "t" or time in the RCVM equations.
[21] 110 CSR §1I-4.2.3.17.g.

Figure 20: GIS data that contribute to the environmental factor: An example in Taylor County



Calculate a tentative value for each property

Once the t-factor is calculated, a tentative value is calculated for each property. These values are tentative because they will then be adjusted as described in the following section.

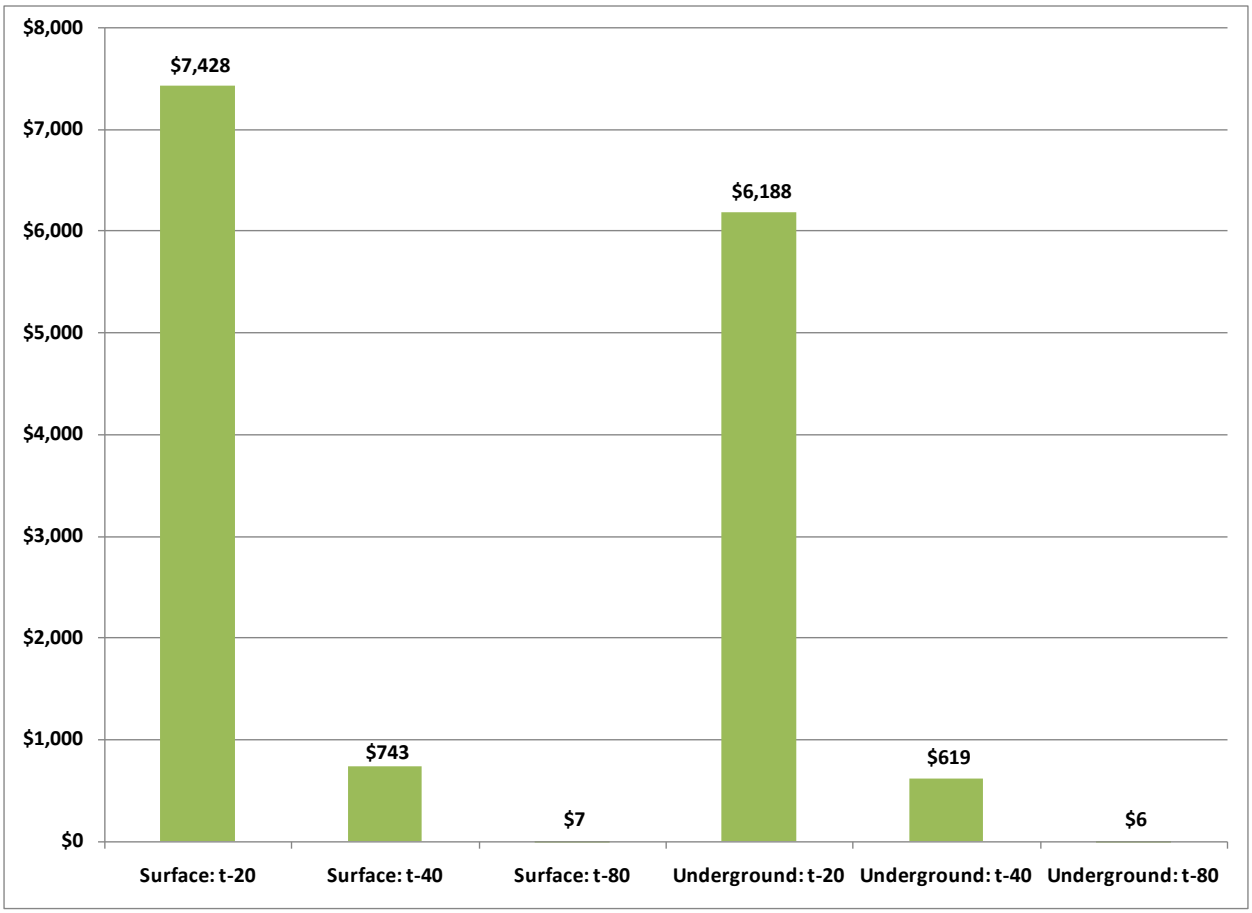
The example in Figure 21 shows how tentative values are calculated for hypothetical surface and underground mines that would each be expected to bring in $1 million in revenues in some future year. The appraised value is based on the potential royalties generated by the future coal sales. Applying the appropriate royalty rates set by WVTD, the $1 million in potential revenues corresponds to $70,100 in royalties for the surface mine and $58,400 for the underground mine.

Then these royalties are discounted by applying the discount rate over the number of years represented by the t-factor for that property. Figure 21 shows the dramatic difference between discounting for 20, 40, or 80 years for these two reserve properties. If the surface mine is classified as t-20, it will be valued at $7,428. If it is classified as t-40, however, the tentative value drops to $743. If it is classified as t-80, the value drops even farther, to $7. Values for the underground mine are less, due to the lower royalty rate.

Although it is not illustrated in Figure 21, one further adjustment is made at this stage. Based on the energy and sulfur content, a "Btu and sulfur adjustment factor" is used to adjust for the price of each property's coal based on these key market variables.[22]

[22] 110 CSR §§1I-3.17 and 3.54.

Figure 21: Tentative appraised values for hypothetical $1 million reserve coal properties

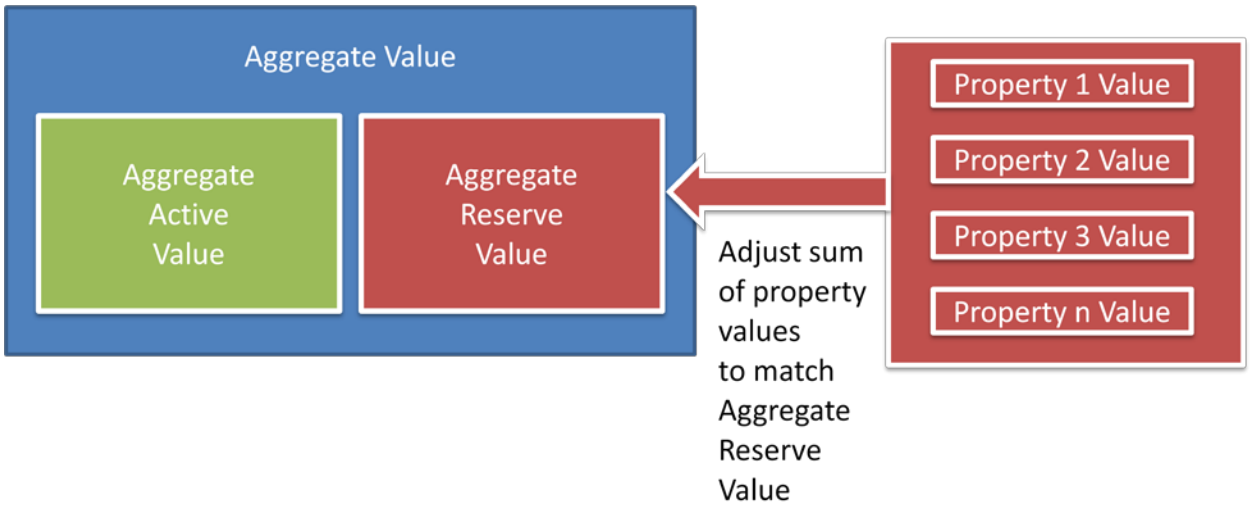


Adjust tentative property values equally to sum to the aggregate reserve value

As illustrated in Figure 22, the sum of the values for every reserve property will not necessarily equal the aggregate reserve value that was already set in Phase 2: It may be higher or lower.[23] Therefore, after all individual appraised values are calculated, they are adjusted equally to ensure that the total value of all reserve properties equals the previously-calculated aggregate reserve value.[24]

[23] This sum is called the "aggregate reserve index" in the West Virginia rule (110 CSR §1I-4.2.3.22.a).
[24] In the rules, this adjustment factor is called the "aggregate ratio" (110 CSR §1I-4.2.3.22.b).

Figure 22: Relationship between the aggregate reserve value and individual reserve properties



For example, if the aggregate reserve value is $2 billion and the sum of the tentative property values is $2.5 billion, then the individual values are too high and must be lowered. All tentative property values would then be reduced by multiplying by 0.8.[25] This final step results in the final appraised value for each property.

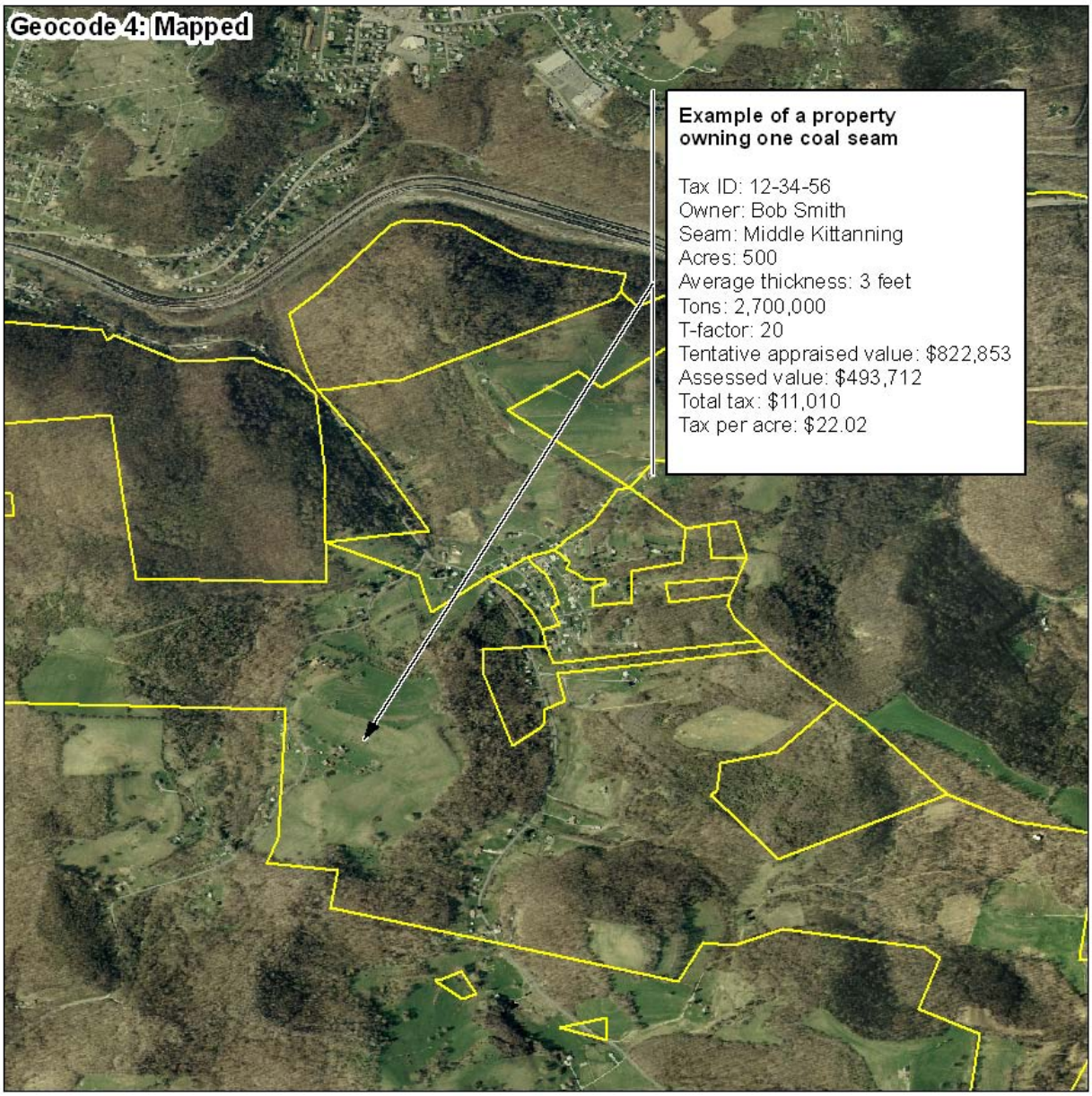
Calculate the assessed value and levy the taxes

The discussion so far has focused on appraising coal reserve properties. The next step is to calculate assessed values, which are always 60% of appraised values. Then the Class III property tax rate is applied to the assessed value. These tax rates differ by county. In Tax Year 2008, for example, the tax rate averaged $2.16 per $100 of assessed value (WVTD, 2008b).

[25] This factor of 0.8 is called the aggregate ratio and is calculated by dividing $2 billion by $2.5 billion.

Figure 23 provides an example of the appraisal, assessment, and tax on one hypothetical coal reserve property.

Figure 23: Hypothetical calculation of appraised and assessed values and property taxes



Note: Calculations performed assuming coal price = $49.25/ton, royalty rate = 5.84%, Btu and sulfur adjustment factor = 1, recovery rate = 100%, and tax rate = $2.23/$100 assessed value.

CONCLUSIONS: ENSURING TAX FAIRNESS FOR WEST VIRGINIA'S COAL RESERVES

West Virginia has now been implementing its new system for appraising coal reserves, the RCVM, for about 10 years. This system is complicated: It relies on the accurate mapping of West Virginia's coal resources as well as the more than 711,000 coal reserve properties. Numerous characteristics of the coal and the properties are also required to appraise reserves fairly and accurately.

Implementation of the RCVM remains a work in progress. While WVGES has mapped a significant number of seams across the state, many are still not fully mapped. WVTD has mapped 36% of the reserve coal properties; the exact location of the other 458,000 properties is not known. Year by year, as more coal seams and reserve properties are mapped and characterized, appraisals will be improved.

The numerous appeals of coal reserve appraisals witnessed in 2009 and throughout the past several years emphasize the importance of accurately and fairly appraising these properties. Owners of coal reserves—whether large corporations that own thousands of acres or individuals who own just a few acres—deserve their tax bills to reflect the fair market value of the reserves and to accurately implement the RCVM. Counties—which rely on reserve coal taxes to fund important local services—also deserve to receive their fair share of taxes.

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APPENDIX: A HISTORY OF COAL RESERVE TAXATION IN WEST VIRGINIA

The framework for collecting property taxes on reserve coal in West Virginia was initially shaped in 1932, when the state legislature passed the Tax Limitation Amendment that established four types of property and set maximum levy rates for each (Morgan, 1997). Coal reserves are generally Class III properties, which, as described in Table 5, include all real and personal property outside of municipalities that are not Class I or II. Class III tax rates vary by county.

Table 5: Property tax classes

Class	Description
I	All tangible personal property employed exclusively in agriculture, including horticulture and grazing; all products of agriculture, including livestock, while owned by the producer; all notes, bonds, bills and accounts receivable, stocks and any other intangible personal property.
II	All property owned, used and occupied by the owner exclusively for residential purposes; all farms, including land used for horticulture and grazing, occupied and cultivated by their owners or bona fide tenants.
III	All real and personal property situated outside of municipalities, exclusive of Classes I and II.
IV	All real and personal property situated inside of municipalities, exclusive of Classes I and II.

Source: WVTD (2008b).

It is the tax commissioner's responsibility to appraise all industrial and natural resource property in the state.[26] County assessors then set assessed values and levy taxes on these assessed values.[27] Previously, assessors were required to assess property anywhere between 50% and 100% of appraised value. In 1982, the state Supreme Court ruled that this methodology was unconstitutional,[28] resulting in the Property Tax Limitation and Homestead Exemption Amendment of 1982, which fixed assessed values at 60% of appraised values.

In 1990, the legislature passed the Fair and Equitable Property Valuation Act, which directed the tax commissioner to develop methods to determine fair market value of all natural resource property in the state.[29] State regulations divided the state into five regions based on the rough valuation of the coal seams in these regions. Appraised values were then calculated based upon approximate equivalent of coal reserve sales in these respective regions during the preceding five years (Morgan, 1997).

In West Virginia, the use of the comparable sales approach generated increasing public concern in large part because there were simply too few coal transactions in the state to successfully achieve accurate appraisals. The system was also criticized because known transactions were not always arm's length transactions, and therefore the terms of these transactions did not necessarily match the value of the coal reserves.

[26] W.Va. Code §11-1C-10.
[27] W.Va. Constitution Article X, §§1, 1b. Voters must approve any additional levy.
[28] Killen vs. Logan County Commission (W.Va. 1982).
[29] W.Va. Code §§11-1C-10, 11-1C-5(b).

In 1994, the sentiment of unequitable taxation took the form of official action with the introduction of a resolution to the Board of Public Works that the WVTD prepare a report detailing the "necessary steps to achieve the goal that commencing in Tax Year 1995 all natural resources property be assessed on an equal and uniform basis statewide in the same proportion to fair market value as homeowner property, automobiles and public service business." (Morgan, 1997, p. 548). That resolution was unanimously passed by the Board (Morgan, 1997).

WVTD responded with a report defending its methodology, which was ultimately found unreliable (Morgan, 1997).[30] Subsequently, the Board of Public Works established the Natural Resource Property Valuations Task Force, which in 1995 made numerous findings critical of WVTD's efforts to comply with the 1990 legislation (Natural Resource Property Valuations Task Force, 1995). The report stated that WVTD had inadequate data and recommended creation of a GIS database of coal reserve property.

In 1995, several citizens' groups sued WVTD alleging that the tax commissioner had developed inaccurate lists of coal property values and that reserve coal property owners consequently did not pay their fair share of the taxes in violation of the state Constitution.[31] To help settle this case, WVTD hired two independent consultants: Resource Technologies Corporation (RTC), and Torries and Colyer.

These consultants studied WVTD's valuation methodology. Their first report said WVTD's data on coal reserves was "not statistically valid by any acceptable measure of confidence" (Morgan, 1997, p. 552 quoting RTC, 1995). Their second report found that the department's methodology "results in predicted values that differ from actual values on an average of plus or minus 50 percent, but can range up to 600 percent from actual values" (Morgan, 1997, p. 552, quoting Torries and Colyer, 1995).

In the case settlement, the state tax commissioner agreed to use an "arithmetic mean" and later a "median ratio" analysis for valuing regional coal sales. However, both methods were found to be unreliable, resulting in a second lawsuit, which challenged the 1996 valuations.[32] This case, too, was settled after the tax commissioner agreed to a new methodology for appraising coal reserves recommended by the two consultants.[33]

This new methodology—a discounted cash flow analysis—became effective in 1999 and corresponds to the third alternative for appraising mineral properties (Table 1). Called the RCVM, this method remains the basis for West Virginia's current system and is the focus of this primer.[34] WVTD subsequently hired RTC as a consultant to help administer the new system.

[30] The report was examined by the *Charleston Gazette*, which discovered multiple discrepancies (Nyden, 1996). Many large sales were missing from WVTD databases and in other instances, sales were between parent and subsidiary companies and not at arm's length (Morgan, 1997).
[31] Lawson et al. vs. Paige, Kanawha Civil Action 95 MISC 43.
[32] Adkins vs. Page, Kanawha Civil Action No. 96-C-742.
[33] This case was finalized by Kanawha Circuit Judge Andrew MacQueen in an order March 7, 1997, wherein he stated, among other things, that he would retain the case to monitor compliance. Plaintiffs appealed to the State Supreme Court, challenging the court's failure to declare WVTD's methods unconstitutional. The Court held that the trial court's decision was not "final" for appellate purposes, noting that the Tax Commissioner was proceeding in good faith to implement new methodology. *Adkins vs. Capehart,* 504 S.E.2d 923 (W.Va. 1998).
[34] 110 CSR §1I *et seq*.