

# **Final Report**

## **An Assessment of Biomass Feedstock Availability in Missouri**

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**Prepared for the:  
University of Missouri Office for Special Programs  
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Columbia, MO 65211-7300**

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Energy Center  
P.O. Box 176  
Jefferson City, MO 65102-0176**

**And the  
DOE/SSEB Southeast Biomass State and Regional  
Partnership**

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# An Assessment of Biomass Feedstock Availability in Missouri

By  
**Rodney J. Fink & Ross L. Fink**<sup>1</sup>

**Executive summary.** Biomass feedstocks offer an alternative to imported fuel supplies and can be used to produce power, liquid fuels and chemicals in the US. This study evaluates and inventories biomass feedstocks from the following sources: Crop residues, cotton gin and grass seed processing residues, alternative uses of Conservation Reserve Program acres, standing timber to include wood harvesting, stand thinning and processing residues, animal wastes, municipal solid waste (MSW) and used tires. While waste tires and some components of MSW are not technically biomass they are included in this assessment since they are often used in conjunction with biomass resources for energy production. Biomass sources are summarized and converted to Btu values for each of Missouri's counties.

Conservation Reserve Acreage converted to energy producing crops such as switchgrass represented the largest source of potential biomass energy (36% of total biomass available) followed by standing timber resources thinned as a practice of better timber management (30%). Crop residues (including cotton gin waste and fescue seed processing wastes) are another major source of biomass and constitute about 17% of the total. In addition to individual tables, by county, for each feedstock, summary tables (Appendix H, Tables 1 & 2) summarize the total biomass potential for each county.

## I. Introduction

The U.S. government wishes to foster new energy technologies to reduce dependence on foreign oil imports and to ensure a diversified energy supply.<sup>2</sup> Interest in biomass feedstocks exists to produce power, liquid fuels, and chemicals in the U.S.<sup>3</sup> This study will include the following categories of biomass feedstocks:

- Crop residues from corn, sorghum, wheat, rice, cotton and soybeans
- Cotton gin and grass seed residues
- Conservation Reserve Program acres, assuming production of short rotation woody crops such as hybrid poplar, hybrid willow and herbaceous crops such as switchgrass
- Timber harvesting residues and standing timber removed by thinning
- Primary wood processing wastes
- Landfill methane potential
- Animal manures from poultry, swine, dairy and cattle
- Municipal solid waste resources

Standing timber is an additional biomass resource in the state. Quantification of these resources is done periodically by the U.S. Forest Service in cooperation with state agencies. Due to the variety of competing uses for the standing timber resources, only those resources obtained from thinning, are included in this report. This report is intended to assist biomass technology developers and users in finding sources of biomass feedstocks. Users of this information need to consider the

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<sup>1</sup> Emeritus Dean, College of Applied Sciences at Western Illinois University and Professor of Business, Bradley University, respectively

<sup>2</sup> Biomass Initiative Newsletter. December, 2004. <http://www.bioproducts-bioenergy.gov/news/Newsletter.asp>

<sup>3</sup> Biomass Feedstock Availability in the United States: April 30, 1999 updated January, 2000. State Level Analysis. <http://bioenergy.ornl.gov//resourcedata/>.

equipment needs and labor required for harvesting these resources. Crop residues, for example, will need specialized equipment and storage facilities to provide proper handling. Conservation and yield factors will need to be considered when utilizing crop residues such as cornstalks which are generally thought to enhance and protect soil quality.<sup>4</sup>

## II. Feedstocks

### A. Crop Residues

The volume of crop residues was determined for corn, sorghum, rice, cotton and soybeans. The stover yield from a crop of corn is equal to the grain yield on a weight basis according to data by Wilhelm and coworkers.<sup>5</sup> The actual amount of feedstock (stover) that can be removed has been estimated to be from 20%<sup>6</sup> to about 30%<sup>7</sup> of the total based on the need for adequate soil cover to prevent soil erosion. Removal of residues can create erosion problems for many soils with high erosion indexes. The five bootheel counties of Southeast Missouri are not considered highly erodible so removing residue might not create a problem for water erosion; however, in this region wind erosion is a significant factor.<sup>8</sup> Regions along the Missouri River might be good regions for residue removal; however, wind erosion can be a factor on these lands as well. The amount of residue desired at planting time is generally considered to be 30% ground cover. All calculations were based on dry matter and available residue consisted of 30% of the residues produced.

Appendix A, tables 1 through 6, provides the amount of residue produced in each county for the selected crops. Yield data were acquired from the National Agricultural Statistics Service (NASS) using ten year averages from years 1994 through 2003. The average straw to grain ratios were multiplied by the average yield which was multiplied by the average number of acres. This provided an estimate of crop residue tonnage for each county in the state.

The estimated straw/stover to grain ratios used were selected based on data available and are good levels to use, however; crops yield differently and supply various amounts of residue.<sup>9</sup> Most estimates of residue production were developed in order to estimate residue production for soil conservation purposes.<sup>10</sup> The following ratios (straw/stover to grain) were used in this study.

**Table 1. Yield to Residue Ratios.**

<b>Crop</b>	<b>Ratio (straw/grain)</b>	<b>Pounds of grain/bushel</b>
Corn	1.0 to 1	56
Grain sorghum	1.0 to 1	56
Winter Wheat	1.7 to 1	60
Rice	1.7 to 1	60
Soybeans	1.0 to 1	60

<sup>4</sup> Crop Residue Removal for Biomass Energy Production: Effects on Soils and Recommendations. March 4, 2003. Soil Quality Institute, USDA NRCS

<sup>5</sup> Crop and Soil Productivity Response to Corn Residue Removal: A Literature Review. Jan.-Feb. 2004. Wilhelm, W.W., J.M.F. Johnson, J.L. Hatfield, W.B. Voorhees, and D.R. Linden. Agronomy Journal Volume 96, Number 1-17 (2004)

<sup>6</sup> Nelson, R.G. 2002. Resource assessment and removal analysis for corn stover and wheat straw in the Eastern and Midwestern United States –rainfall and wind-induced soil erosion methodology. Biomass Bioenergy 2:349-363

<sup>7</sup> McAloon, A.F., W. Yee, K. Ibsen, and R. Wooley. 2000. Determining the cost of producing ethanol from cornstarch and lignocellulosic feedstocks. Tech Rep. NREL/TP-580-28893. National Renewable Energy Lab., Golden, CO.

<sup>8</sup> Phone conversation with Ron Miller of the Missouri NRCS State office. Jan 31, 2005

<sup>9</sup> Best management practices, field crop production, understanding the basics. May, 2004. Government of Ontario, Canada. <http://www.gov.on.ca/OMAFRA/english/environment/field/basics.htm>.

<sup>10</sup> McCarthy, John R, D.L. Pfof and H. D. Currence. University of Missouri Extension. 1993. Conservation Tillage and Residue Management to Reduce Soil Erosion. <http://muextension.missouri.edu.xplor/agguides/agengin/g01650.htm>.



Cotton	1.5 to 1	*1,200 lb/bale
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\*Cotton yield per acre (estimate of seed, lint & waste taken from field to be ginned) was used as the base for determining pounds of residue.

The amount of residue may vary depending on yield level, weather conditions during the growing season and other factors such as variety. The ratios used provide a good average for determining the amount of residue produced per acre. The energy value of crop residues will vary between crops selected and the quality of the residue.<sup>11</sup> Corn stover when air dried is reported to produce 7,500 BTU per pound.<sup>12</sup> VanDyne and Blasé published a report in 1997 which used 6500 BTU per pound of crop residue.<sup>13</sup> Phil Badger prepared BTU values for biomass fuel stocks on a dry matter basis and these are used for this report. Corn stover, sorghum straw, and wheat straw are valued at 7,500 BTU/pound of dry matter and rice straw is valued at 6,811 BTU per bound of straw.<sup>14</sup> For soybeans and cotton field residues, values of 7,500 BTU per pound of residue were used.

Using crop residues to make valuable products such as fuels and chemicals has received a great deal of attention in recent years. In the US, there has been a search for methods of producing sugars and other chemical intermediates from lignocellulosic biomass such as corn stover. The unharvested stalks of biomass crops, such as corn stalks, have agronomic value and, when left on fields serve useful purposes such as reducing soil erosion, reducing water loss from evaporation and helping to maintain soil fertility. In some cases where the biomass (stover) would be removed from a cornfield, for example, the land would then be exposed to erosion and could be classified as highly erodible and unable to withstand continuous cropping without harmful environmental effects. Soils on rolling regions of Northwest Missouri when no-tilled with good residue management can be farmed intensively with acceptable soil-loss levels. If residue is removed, some of these soils, because of management practices, become highly erodible. Thus care must be utilized in selecting crop residues for biomass strategies. Use of cover crops in conjunction with residue removal can provide adequate soil erosion control in many instances. Also, it was beyond the scope of this study to look at the cost effectiveness of harvesting crop residues, which may make them unaffordable.

## B. Cotton Gin Trash

In addition to field residues cotton yields waste as a result of the ginning process. Getting rid of cotton gin waste has been a perennial problem for the ginning industry. In the past, gin waste or byproducts have not been considered to have monetary value and were actually considered a liability.<sup>15</sup> Practices have included burning to dumping on fields to enhance organic matter to turning it into compost/mulch. One ginner described the process of fermentation obtained by adding water to waste which raised the heat level high enough to make weed seeds sterile. The waste is then put on fields as a valuable additive without the contamination of weed seeds.<sup>16</sup> Researchers at the USDA Agricultural Research Service Cropping Systems Laboratory at Lubbock, Texas are using a hot, gelatinized starch

<sup>11</sup> Burning Shelled Corn as A Heating Fuel. Ontario Ministry of Agriculture and Food. Last reviewed March, 1997.

<sup>12</sup> Advanced Power generation Technologies for Renewables: Pyrolysis. Robert C. Brown, Iowa State University. The Future of Renewable Energy Generation in Iowa Symposium. Oct. 16., 2001

<sup>13</sup> VanDyne, Donald L. and Melvin Blase. Estimated Volume and Energy Content of Biomass and Municipal Solid Waste Resources in Missouri. Aewp- 1997-4. Dec. 1997

<sup>14</sup> Default Btu values/pound of Biomass Fuel-Stocks on a dry matter basis prepared by Phil Badger, P.E., President, General Bioenergy

<sup>15</sup> The Journal of Cotton science 7:205-216 (2003) Engineering Economic Analysis of a Cotton By-Produce Fuel Pellet Operation, Greg Holt et.al. <http://journal.cotton.org>.

<sup>16</sup> Phone conversation with David Blakemore on 17 Jan. 2005. Mr. Blakemore is of B. & B. Cotton Company in Campbell, Ky.

solution that acts as a glue to hold the cotton waste ingredients together in the form of pellets.<sup>17</sup> By adding cottonseed oil to the pellets, the heating value was increased to about 9,000 Btu per pound of pellets (more output than most wood pellets).<sup>18</sup> Successful use of pellets for feed and fuel could provide a good use for the nation's 2.5 to 3.0 million tons of cotton gin waste. For purposes of determining the Btu of energy available in cotton gin trash in Missouri, 7,000 Btu per pound of trash was used.<sup>19</sup>

The amount of cotton gin trash produced varies, depending on the type of harvest system used, pesticides used and ginning capability. Field picker cotton produced 150 to 200 pounds of cotton gin by-product but a stripper with a field cleaner produces twice this amount.<sup>20</sup> Within this range of values Missouri gin operators consider ginning trash to average two hundred pounds per bale of cotton.<sup>16</sup> This output will be used for estimating amounts of cotton ginning waste in Missouri. Cotton gin trash output and Btu produced are presented in Appendix A, Table 7. Appendix A, Table 8 lists the cotton gins located in Missouri. All cotton grown in Missouri is not processed in the state, however, the assumption is that the amount ginned out of state will approximately equal that brought into the state for ginning.<sup>21</sup>

### C. Seed Processing Waste.

Grain and grass seed processing facilities in Missouri are licensed and generate a significant amount of cleaning waste that is convertible to Btu values. The amount of seed trash produced depends on the facility processing the seed and the species being processed. Over 4,000 seed permits are issued each year which include about 300 wholesale brokers of seed. The Btu value of seed trash varies, so when considering the utilization of seed waste for processing the species being processed must be considered. Missouri fescue processors met at the Missouri Seedman's Association 2003 annual meeting and projected Missouri production of tall fescue seed to be between 70 and 150 million pounds of pure seed per year.<sup>22</sup> Assuming a screenings output of 25%, this would produce 17.5 to 37.5 million pounds of fescue screenings per year. Most seed wastes are put back on the soil as soil amendments or put in a landfill. One Missouri seed company is experimenting with an 8,600 BTU per pound pellet prepared from seed processing waste.<sup>23</sup> With some amendments, the Btu output per pound may be increased to 9,200 BTU. Wastes put on land without pretreatment (such as fermentation) may create a serious problem of weed seed dissemination. One processor stated that the waste was put on as mulch on poor soils and farmers were pleased with the ground cover and crop of fescue that followed.<sup>24</sup> He also suggested harvesting the stubble left after fescue was harvested to be used for an energy pellet or possible strawboard material.

The amount of waste produced varies, depending on the species of seed being processed. Soybeans, for example, have chips and cracks which are sold to processors and generally do not accumulate. Native grasses and crops like lespedeza and tall fescue, however, have large amounts of waste residue that could be used as a source of energy. Tall fescue generally will produce waste of

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<sup>17</sup> Phone conversation with Greg Holt, USDA-ARS Cotton Production and Processing Research Unit, Textile Center, Lubbock, TX.

<sup>18</sup> Fuel or feed, cotton waste may have a good value. Delta Farm Press, Nov 24, 2002.

[http://deltafarmpress.com/mag/farming\\_fuel\\_feed\\_cotton/](http://deltafarmpress.com/mag/farming_fuel_feed_cotton/)

<sup>19</sup> Cotton Fiber Processing Waste. Waste Production Fact Sheet. NC Department of Environment, Health and Natural Resources. <http://www.p2pays.org/ref/01/00013.htm>

<sup>20</sup> Crop Profile for Cotton Gin By-Product Use in Beef Cattle and Dairy Cow Diets in Texas. Dudley T. Smith. Soil and Crop Science Dept. Technical Report 01-08, Texas A & M University, College Station, Texas.

<http://pestdata.ncsu.edu/cropprofiles/docs/TXcotByprod.html>

<sup>21</sup> Gin data provided by the Missouri Department of Agriculture

<sup>22</sup> The Price of Impurity. Today's Farmer, October, 2003. <http://www.mfaincorporated.com/todaysfarmer/past/950816.asp>

<sup>23</sup> Phone interview with Steve Flick of Flick Seed Company, Kingsville, MO. WWW.Seedguys.com

<sup>24</sup> Phone conversation with David Danker of Bueheit Seed, Inc. of Perryville. Jan. 31, 2005

about 30 % of the gross amount processed.<sup>25</sup> Several companies with wholesale seed permits process over 10 million pounds of seed per year and will generate over 3 million pounds of waste per year. The waste is not dense, containing about 14 pounds per cubic foot of waste. Seed processing waste may be significant over the course of a year and to be utilized, in most instances, will require a continuous use of the material throughout the year. Processors indicated the waste would be provided to a user at no cost and in some cases, they might pay to have it removed. Current uses include bedding for animals, composting and applications as a soil amendment and mulching. One processor had mixed seed screenings with soybeans and by use of an extruder, produced a meal that was about 28% protein and 20% fiber. In addition, screenings were placed on city dump areas and around pond banks.<sup>26</sup> Appendix A, Table 9 identifies those counties where concentrated seed processing screenings could be available (data based on phone conversations with seed processors). Seed processors, previously cited, were contacted for their estimate of counties where significant levels of seed processing wastes would be available. Data for Table 9 were estimated based on these interviews. The amounts listed are estimated and 8,000 Btu per pound of dry matter is used to calculate the amount of energy available.<sup>23</sup> This is not a complete list but provides an example of resources that might be available. The 50,000 pound per year level of processing wastes was used as a cut-off level as this was assumed to be a minimum level of product necessary to be a viable fuel supply.

To provide an inventory of potential fescue screenings available in a county, the 2002 Census of agriculture provided acreage and yield values by county.<sup>27</sup> Appendix A, Table 10 shows the pounds of fescue seed produced per county, the pounds of seed screenings that could potentially be produced and an estimate of the Btu available assuming 8,000 Btu per pound.<sup>23</sup> The amount of screenings is calculated as 25% of the seed produced per county. Processors contacted suggested wide variability in the percentage of screenings per pound of fescue (generally between 15 and 30%) so the value of 25% was used as a representative value.

#### **D. Energy Crops on Conservation Reserve Program Land.**

There are 113 counties in Missouri with Conservation Reserve Program (CRP) contracts. This translates into acreage of 1,548,836 at the end of 2004.<sup>28</sup> Switchgrass and hybrid poplars are the most common types of energy crops that might be produced on Missouri CRP land. Switchgrass and hybrid poplars have energy values of 7,700 and 8,200 Btu/pound, respectively, on a dry matter basis.<sup>29</sup> These values compare with 7,500 Btu per pound for crop residues consisting of mixed grass hay. Btu values prepared by Phil Badger of 7,467 and 8,200 Btu per pound of dry matter are used in this report.<sup>14</sup> Since the value of hybrid willow is similar to switchgrass (7,478), a table is not included (but for reference, the switchgrass data are interchangeable with hybrid willow). Quality of land has a great influence on yields so calculations for 5, 7, and 10 dry tons of switchgrass per acre are presented in Appendix B, Table 1. Appendix B, Table 2 shows the same data for hybrid poplar.

The number of CRP acres in the state will change over time but the values presented for 2004 should be an approximate value that will be viable for several years unless major changes are legislated for the program. Adjustments in payments for CRP acres would be likely if this land were converted to short-rotation woody crops or herbaceous energy crops. In addition, soil preparation for planting such crops would present potential erosion problems for much of this highly erodible land. Producers would likely contend with reductions in the annual payment if CRP land is placed in such crops, thus

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<sup>25</sup> Phone interview with Mike Miller of Miller Seed Company, Clinton, Missouri. Jan 28, 2005

<sup>26</sup> Phone interview with Blackie Reed of Reed Seed Company in Chillicothe, MO. Jan. 31, 2005

<sup>27</sup> Census of Agriculture.2002 U.S. National Agricultural Statistics Service. Table 26, pages 518-519. 2004

<sup>28</sup> USDA – FSA Conservation Reserve Program. 2004

<http://www.fsa.usda.gov/crpstorpt/06Approved/r1sumyr/mo.htm>

<sup>29</sup> Electric Power Research Institute, Strategic Analysis of Biomass and Waste Fuels for Electric Power Generation, Palo Alto, CA. EPRI Report Number TR-102773s, 1993

increasing the risk to land owners. Conversely, if growers choose to keep these acres in existing forages, such as fescue and orchardgrass, a value of three tons per acre of biomass yield could be realized without investment in replanting or increased risk of soil erosion.

**E. Landfill Methane Potential.**

Landfill gas production estimates have been provided by a contractor for the Environmental Protection Agency through the Landfill Methane Outreach Program (LMOP). Landfill Gas (LFG) from three sites is currently being used in Missouri for industrial, greenhouse and school use. The energy equivalent from these three projects is provided in Table 2.

**Table 2. Estimated Annual Landfill Gas Production for Three Missouri Landfills.**

<u>Landfill Name and County</u>	<u>Recovery (cfm)</u>	<u>Recovery MMBtu/hr</u>	<u>Power generating potential (MW)*</u>	<u>Natural Gas Equivalent (Mcf)</u>
Fred Weber	2,441	74.1	6.7	641
Onyx Oak Ridge	1,600	48.6	4.4	420
Rumble 2	24	0.7	0.1	6
<b>TOTALS</b>	<b>4,065</b>	<b>123.4</b>	<b>11.2</b>	<b>1,068</b>

\*MW power generating potential assumes heat rate of 11,000 Btu/kWh<sup>30</sup>

- Source: EPA Landfill Methane Outreach Program

Data of the LMOP have been utilized by the MDNR to project landfill gas potential based on the 2004-2008 average annual gas flows.<sup>31</sup> Average recovery of landfill gas flow for the 5 year period was estimated from 22 landfill sites. EPA’s landfill gas generation model, LandGEM, was the model used for this purpose. Appendix C, Table 1 shows the average landfill recovery as potential in megawatts (MW) if the landfill gas were dedicated to power generation and the equivalent volume of natural gas (NG) in thousands of cubic feet (Mcf) and assumes the landfill gas has half the heat value of natural gas. In addition to average annual recovery, minimum annual recovery (Appendix C, Table 2) is estimated for the 2005 to 2014 period at constant landfill gas use. Minimum recovery is estimated because the investors in a landfill gas project may require a constant supply of landfill gas for at least 10 years to recover their investment.<sup>32</sup> The landfill average and projected data are based on EPA Landfill Methane Outreach Program (LMOP) modeling estimates, using LandGEM, EPA’s Landfill gas generation model. LandGEM is the most commonly used model for this purpose.<sup>33</sup> For purposes of estimating energy content of landfill gas, a factor of 506 cubic foot per cubic foot was used.<sup>30</sup>

**F. Animal Manures from Poultry, Swine, Dairy and Cattle**

The National Agriculture Statistics Service provides livestock numbers on a county basis, however, the utilization of animal biomass is most appropriately realized from Confined Animal Feeding Operations

<sup>30</sup> Presentation by John Noller, Energy Center MDNR. June 29, 2004

<sup>31</sup> US Environmental Protection Agency Landfill Methane Outreach Program Modeling Estimates, June, 2004

<sup>32</sup> Energy Center Initiatives – Missouri Landfill Gas (LFG). John Noller, Energy Center, Missouri Department of Natural Resources, Missouri Landfill Gas to Energy Workshop, Missouri Waste Control Coalition Conference. June 29, 2004

<sup>33</sup> U.S. Environmental Protection Agency Landfill Methane Outreach Program modeling estimates, June 2004

(CAFO) and it is assumed that all wastes reported can be collected and made available. The Missouri Department of Natural Resources (MDNR) has an inventory of 450 animal feeding operations in the state by species and county. Values for the total solids produced per day are the averages of total solids produced by the various stages of animal growth.<sup>34</sup> These values are an average of animals during all stages of production. For more precise values, users should identify the growth stages of livestock being grown and determine waste output based on these values. Values used for determining total solids (lb/day) are listed in Table 3.

The determination of values, to use in calculating Btu per pound of waste, were taken from a study by Vortex Combustion Company which gave energy content values from analyses conducted at Clemson University on samples of swine, dairy, layer, broiler and turkey litter. Samples were oven dried and ground in a hammer mill prior to the bomb calorimeter test. The average Btu values per pound are shown in Table 3.<sup>35</sup>

**Table 3. Animal Manure Dry Solids, Pounds per Day per Animal, and Energy Content per Dry Pound of Dry Solids (Btu/lb).**

<b>Animal Species</b>	<b>Solids produced, lb/day</b>	<b>Average Btu values/lb</b>
Beef Cattle	6.0 lb/day	7,000 Btu/lb
Dairy Cattle	7.2 lb/day	7,097 Btu/lb
Swine	1.0 lb/day	8,034 Btu/lb
Chicken	0.056 lb/day	4,627 Btu/lb
Turkey	0.225 lb/day	6,168 Btu/lb

The MDNR inventory of confined animal feeding operations classifies them as follows:

- Class IA 7,000 or more animal unit equivalents
- Class IB 3,000 to 6,999 animal unit equivalents
- Class IC 1,000 to 2,999 animal unit equivalents
- Class II 300 to 999 animal units

Examples of one animal unit equivalents include the following:

- 1 Beef feeder or slaughter animal
- 2.5 swine weighing over 55 lbs
- 15 swine weighing less than 55 lbs
- 30 laying hens
- 100 broiler chickens
- 0.7 dairy cows

The determination of animal waste values by species and county total for Missouri counties is presented in Appendix D, Table 1. Appendix D, Table 2 includes the pounds of waste dry matter per species and county and Btu for MDNR Class 1A, 1B and 1C confined feeding operations. Appendix D, Table 3 presents the same data for Class II facilities.

## **G. Wood Harvesting Residues and Standing Timber Resources Obtained by Thinning Stands<sup>41</sup>**

<sup>34</sup> Manure Characteristics. Midwest Plan Service, Iowa State University, Ames, Iowa. MWPS-18, Section 1. by Lorimor, Powers, & Sutton.. Copyright 2000

<sup>35</sup> VCC Combustion of Manure as a renewable Energy Source. Bob W. Young. BioEnergy 98: Expanding BioEnergy Partnerships. [http://vortexcombustion.com/vcc\\_of\\_manure.htm](http://vortexcombustion.com/vcc_of_manure.htm)

Harvesting residues are the limbs, branches, tops and other residues (except stumps) not recovered during logging. These materials have considerable energy content; however, they may not be economically recoverable.<sup>36</sup> These data are based on 2003 results published in 2005. Timber growth and mortality data are based on resources measured in 2002.<sup>37</sup> “The forest resource on Missouri’s timberland increased, on average, 629.4 million cubic feet per year, net of all harvests and mortality. Missouri’s forest resource is, statewide, being managed sustainably.”<sup>38</sup>

The distribution of timber removals for industrial roundwood shows that almost 60 percent of the total wood harvested was used for production of primary wood products and the remainder was left on the ground as harvest residues. The breakdown of timber removals follows:<sup>37</sup>

- **Sawtimber**                               **46%**
- **Poletimber**                               **2%**
- **Non-growing stock trees**   **11%**
- **Logging slash**                           **29%**
- **Logging residue**                       **12%**

Thus harvest residues composed 41% of the total timber removal potential. Harvest residues in 2000 were down 9 percent from 1997 and again in 2003, the harvest residues were reduced (from 89 million cubic feet to 87.7 million cubic feet). Red oak and white oak species account for the largest total volume of harvest residues and in 2000, 72% of the wood material left on the ground after the harvest of Missouri’s industrial roundwood came from non-growing stock sources such as cull trees, limb wood and dead trees.<sup>39</sup> Appendix E, Table 1 lists harvest residues based on resources measured in 2002. An estimated 87.7 million cubic feet of logging residues were available, the majority being of hardwoods, which have an energy value of 8,400 Btu/pound on a dry matter basis for coarse residues. Softwood coarse residues contain 8,700Btu/pound on a dry matter basis.<sup>14</sup> Hardwood and softwood volumes are combined in this table and a value of 8,550 Btu/pound of dry matter was used to calculate Btu available (logging residue dry weight values provided by Tom Treiman).<sup>40</sup>

**Standing timber resources** from Missouri’s 13+ million acres of commercial forestlands hold the largest single reserve of biomass materials in the state.<sup>41</sup> While the other feedstocks (except tires stored in unpermitted dumps) presented in this report are presented as annually available amounts, the standing timber resource represents a store of biomass that has accumulated over decades.

Forest management, and mismanagement, in Missouri has resulted in almost three-quarters of Missouri’s forest biomass being present in stands that are overstocked. Overstocked stands have too many trees per area of land and as a result experience stagnant growth and increased death rates of existing trees.

Some landowners prefer to maintain their land in an overstocked state for a variety of reasons including aesthetics and management for certain types of wildlife. But, for landowners that wish to

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<sup>36</sup> Treiman, Thomas B. Piva, Ronald J.; Missouri timber Industry—An Assessment of Timber Product Output and Use 2003. United States Forest Service, North Central Research Station Resource Bulletin. St. Paul, MN. (in press)

<sup>37</sup> W. Keith Moser, Gary J. Brand, Thomas Treiman, Bruce Moltzan, and Robert Lawrence; 2004. Missouri’s Forest Resources in 2002. United States Forest Service, North Central Research station Resource Bulletin NC-233. St. Paul, MN. 49 pp.

<sup>38</sup> Thomas Treiman, Natural Resource Economist, Missouri Department of Conservation. Personal communication, Jan. 2005 and June, 2005

<sup>39</sup> Piva, Ronald J and Tomas B. Treiman. Missouri Timber Industry—An Assessment of Timber Product Output and Use, 2000. Forest Service North Central Research Station resource Bulletin NC-223.

[http://www.ncrs.fs.fed.us/pubs/rb/rb\\_nc223.pdf](http://www.ncrs.fs.fed.us/pubs/rb/rb_nc223.pdf)

<sup>40</sup> E-mail communication from Tom Treiman, Natural Resource Economist, Missouri Department of Conservation

<sup>41</sup> Samuel J. Orr, Energy Planner for MDNR provided methodology and expertise for developing the biomass availability from thinning timber stands

manage their woodlands for optimal growth and quality timber production, responsible thinning of existing timber stands can provide environmental and economic benefits.

In the past a major obstacle to the thinning of forest stands has been a lack of markets for the removed biomass. A mix of new technology development, new government programs and increases in the price of fossil fuels is creating improved opportunity to conduct forest thinnings that are financially profitable and that could lead to development and expansion of rural industry in Missouri.

Appendix E, Table 2 presents “Tonnage Potentially Available from Thinning”. Data for Table 2 were provided by Patrick D. Miles.<sup>42</sup> Energy content and tonnage that can be realized from beneficial thinning of existing forestland acres are presented by county. Forestland that is considered in this table includes only commercial woodland and not protected woodlands such as wilderness areas. In upland oak forests, that comprise the majority of Missouri’s woodland, a linear relationship exists between volume and basal area (BA)(a value in square feet that describes how fully stocked a timber stand is).<sup>43</sup> Since tonnage and volume are essentially linear in their relationship one can use BA relationships to calculate changes in tonnage as a result of thinning activities that reduce BA. According to Gingrich, “About 40 percent of the basal area can be removed from stands that are 100 percent stocked without loss of total stand growth.”<sup>44</sup>

To be conservative in our projections of tonnage available from beneficial thinning the following assumptions were used.

- No tonnage was assumed for stands at a BA of 80 square feet per acre (square feet/acre) or less even though stands above 65 square feet/acre can in some cases be thinned with beneficial results
- For stands in the 81 to 120 square feet/acre BA class an average stocking of 100 square feet/acre was used
  - A 35 percent removal rate was assumed for these stands, rather than 40 percent, in order to avoid reducing BA to a less-than-fully-stocked level.
- For stands in the 120+ square feet/acre BA class an average stocking of 125 square feet/acre was assumed even though many of these stands will hold a much greater BA, and therefore will yield a greater tonnage than calculated.
  - A 40 percent removal rate was applied to these stands

Due to site conditions including soil type, slope, aspect, diameter class and species composition the time needed for different stands to again reach an overstocked condition can vary considerably. The rates of removal through managed thinning proposed herein should lead to an improved and sustainable management system in Missouri woodlands.

Removing poorly formed diseased and stunted trees through thinning can improve stand health and composition while increasing timber value. Landowners are encouraged to obtain the services of a registered professional forester to assure all pertinent environmental and economic issues are considered when such a project is undertaken.

Standing timber may be difficult to bring to market as it may be difficult to access, situated on protected land or managed by landowners with other goals.<sup>40</sup> Appendix E, Table 2 lists standing timber resources (from thinning) in dry tons and 8,550 Btu/dry lb was used to determine the energy availability by county.<sup>45</sup> A 20 year regeneration period was utilized to arrive at the annual availability of this resource.

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<sup>42</sup> Miles, Patrick D. July 12, 2005. Forest inventory mapmaker web application version 2.1. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station {Available only on internet: [www.ncrs2.fs.fed.us/4801/fiadb/index.htm](http://www.ncrs2.fs.fed.us/4801/fiadb/index.htm)}

<sup>43</sup> Personal Communication with Dr. David Larsen, Associate Professor of Forestry, University of Missouri-Columbia

<sup>44</sup> Gingrich (sic), Samuel F., Forest Science, Volume 13, Number 1, 1967, page 52

<sup>45</sup> Communication from Phil Badger, Technical Director. DOE/SSEB Southeastern State/Regional Partnership

## H. Primary Wood Processing

In 2003 Missouri's primary wood-using industry generated 1.8 million green tons of wood and bark residues. These residues generally occur at sawmills and include slabs, log ends, and fine residues such as sawdust. The estimated production of green tons of hardwood in 2003 was 228.5 thousand tons and green weight of softwoods was 12.3 thousand tons. Charcoal plants consumed 39 % of the total residues produced by Missouri's primary wood-using mills in 2000. In 2000, the following distribution of residues by wood using mills existed.<sup>39</sup>

- **Charcoal** 39%
- **Industrial fuel** 9%
- **Domestic fuel** 4%
- **Miscellaneous uses** 22%
- **Not used** 12%
- **Fiber products** 14%

Appendix E, Table 3 shows the distribution of primary mill residues on a county basis and includes disposition and residue type of both softwoods and hardwoods in Missouri, 2003. Table 3 also shows the total Btu for both softwoods and hardwoods and provides the grand total. Since the waste data were green weight, a conversion of 58% of the Btu value, to account for the moisture content, was used to reach the final values.<sup>40</sup> The estimated energy contents used follow:<sup>14</sup>

- Coarse and fine residues— **4,872 Btu/lb for hardwoods and 4,046 Btu/lb for softwoods**

## I. Solid Waste

Waste tonnage used in this report is for calendar year 2003 and includes tonnage disposed in Missouri landfills, or that passed out-of-state through transfer stations.<sup>46</sup> The composition of Missouri solid waste was split into the following categories:<sup>47</sup>

- **Municipal Solid Waste** 59.6%
- **Construction Waste** 5.5%
- **Demolition Waste** 13.0%
- **Industrial Waste** 11.8%
- **Special Wastes** 10.1%

The Environmental Protection Agency recommends that solid waste be managed using what is called the solid waste hierarchy. Use of solid waste for energy production is recommended after all possible waste reduction, reuse and recycling has taken place. As a result of ongoing efforts to increase the amount of waste reduction, reuse and recycling in Missouri the amounts and components of the state's waste stream could well change over time. The value of energy produced from solid waste depends to a large degree on what energy conversion technology is used. Paper and organics, through fermentation, could be converted into ethanol or other chemical products. In addition, products such as paper, organics and plastics could be used as fuel sources through combustion. The energy value for solid waste used in these analyses is 6,000 Btu per pound. The Biomass Handbook, Edited by Osamu Kitani and Carl Hall (p.881, Gordon and Breach Science Publishers, 1989) shows MSW ranges from 5,200 to 8,100 Btu/dry lb.<sup>48</sup>

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<sup>46</sup> Calendar year 2003 waste tonnage disposed in Missouri landfills, or that passed out-of-state through transfer stations. Personal communication from Dennis Hansen, Planning Unit Chief, MDNR

<sup>47</sup> Missouri Waste Composition Study. Midwest Assistance Program. 1999

<sup>48</sup> Biomass Handbook, Edited by Osamu Kitani and Carl Hall (P 881, Gordon and Breach Science Publisher, 1989)



The Missouri Solid Waste Composition Study was a three-year project designed to understand the characteristics and composition of solid waste entering transfer stations and landfills in Missouri. Phase I examined Municipal Solid Waste over a two year period and recorded results by weight and volume. Phase II examined the non-MSW waste and recorded into one of 5 solid waste categories listed in the preceding paragraph. The percentage of total waste falling into each of the five categories varies between large metro, small metro and rural areas. The Missouri Waste Composition Study provided guidance for the factors used to determine tonnage of the MSW components.<sup>49</sup> The 2003 waste tonnage disposal report for landfills utilized the following designations identified in the Missouri Waste Composition Study: Large Metropolitan, Small Metropolitan or Rural. The tonnage of each component was determined for each county by using the following average composition based on landfill size.

**Table 4. Municipal Solid Waste Components (MSW %)**

<b>Material</b>	<b>Large Metro</b>	<b>Small Metro</b>	<b>Rural</b>	<b>All landfills</b>
Paper	18.5%	15.1%	30.0%	22.1%
Glass	2.9%	1.8%	4.5%	3.4%
Metals	3.4%	2.3%	5.8%	4.1%
Plastics	7.2%	4.7%	12.0%	8.6%
Organics	15.3%	10.6%	25.7%	18.5%
Inorganics	2.4%	2.5%	3.6%	2.8%
<b>Total MSW</b>	<b>49.8%</b>	<b>36.9%</b>	<b>81.6%</b>	<b>59.6%*</b>

\*Other components are Demolition Waste – 13.0%, Construction Waste – 5.5%, Industrial Waste 11.8% and Special Wastes – 10.1%

The Missouri landfills/transfer stations noted in Table 5 were considered as potential sources of biomass feedstocks. In 2003, the grand total tonnage delivered to these facilities was 5,583,229 tons.

**Table 5. Missouri Landfills and Transfer Stations by Type, Volume and County Location**

<b><i>LANDFILL FACILITY</i></b>	<b><i>Facility Type</i></b>	<b><i>County</i></b>	<b><i>Tons/year</i></b>
American Recycling & Sanitation, Inc.	Rural	Atchison	8,506
Black Oak Recycling & Disposal Facility	Rural	Wright	269,575
Bridgeton Sanitary Landfill	Large Metropolitan	St. Louis	171,837
Burke Sanitation	Rural	Caldwell	2,141
Butler County Sanitary Landfill	Rural	Butler	160,741
Central Missouri Landfill, Inc.	Rural	Pettis	94,727
City of Columbia Sanitary Landfill	Small Metropolitan	Boone	157,971
City of Fulton Sanitary Landfill	Rural	Callaway	15,613
City of Maryville Solid Waste Transfer Station	Rural	Nodaway	11,119
City of Washington Sanitary Landfill	Rural	Franklin	10,881

<sup>49</sup> The Missouri Waste Composition Study. Phase I, 1996 and Phase II, 1997. Published 1999 and conducted by Midwest Assistance Program, Inc. and funded by a grant from The Missouri Department of Natural Resources.

<b><i>LANDFILL FACILITY</i></b>	<b><i>Facility Type</i></b>	<b><i>County</i></b>	<b><i>Tons/year</i></b>
Courtney Ridge Recycling & Disposal Facility	Large Metropolitan	Jackson	402,467
CWI of Missouri, Inc. Transfer Station	Rural	Washington	25,029
CWI-Jackson Regional Transfer Station	Rural	Cape Girardeau	34,876
East Ridge Landfill	Rural	Pike	87,375
El-Dorado Springs SW Transfer Station	Rural	Cedar	8,995
Fred Weber, Inc. Sanitary Landfill	Large Metropolitan	St. Louis	559,885
Gilliam Transfer Station	Rural	Washington	36,575
Heritage Environmental Services, LLC	Large Metropolitan	Clay	18
IESI Timber Ridge Landfill	Rural	Washington	19,556
Jefferson City Sanitary Landfill	Rural	Cole	198,021
Jefferson County Transfer Station	Rural	Jefferson	53,224
Joplin Transfer Station, Sunray Services	Rural	Jasper	50,178
Kraemer Hauling Transfer Station	Rural	Jefferson	7,559
Lee's Summit Sanitary Landfill	Large Metropolitan	Jackson	81,797
Lemons Landfill	Rural	Stoddard	199,503
Meremac Transfer Station	Rural	Jefferson	46,716
Moberly Municipal Sanitary Landfill	Rural	Randolph	21,050
Neosho Transfer Station	Rural	Newton	16,872
Northside Sanitary Landfill	Rural	Franklin	42,342
O'Fallon Regional Waste Transfer Station	Rural	St. Charles	12,215
Onyx Maple Hill Landfill	Rural	Macon	154,955
Only Oak Ridge Landfill	Large Metropolitan	St. Louis	483,308
Peerless Land Co. Demolition Landfill	Large Metropolitan	St. Louis	129,107
Perry County Transfer Station	Rural	Perry	13,804
Prairie Valley Sanitary Landfill	Rural	Crawford	40,119
Prairie View Regional Waste Facility	Rural	Barton	500,609
Rock Hill Demolition Landfill	Large Metropolitan	St. Louis	73,233
Roll-Off Service Transfer Station	Rural	Cass	204
Rye Creek Demolition	Rural	Cass	5,940

<b><i>LANDFILL FACILITY</i></b>	<b><i>Facility Type</i></b>	<b><i>County</i></b>	<b><i>Tons/year</i></b>
Landfill			
Schroder DBA Backridge Sanitary Landfill	Rural	Lewis	100,181
Scotland County Transfer Station	Rural	Scotland	489
Show Me Regional Sanitary Landfill	Rural	Scotland	119,420
Springfield Sanitary Landfill	Small Metropolitan	Greene	116,871
St. Joseph City Sanitary Landfill	Small Metropolitan	Buchanan	106,379
St. Louis Solid Waste Processing Facility	Large Metropolitan	St. Louis City	277,848
St. Louis Waste Transfer Station	Large Metropolitan	St. Louis	410,292
Waste Mgmt. of MO, Inc. South City Transfer Facility	Large Metropolitan	St. Louis	131,815
Waste Mgmt. of St. Louis Recycling and Transfer Facility	Large Metropolitan	St. Charles	111,291
	<b>TOTAL</b>		<b>5,583,229</b>

When determining the Btu available from Municipal Solid Waste, the percentage of MSW is multiplied times the tonnage per landfill or transfer station to determine the landfill average tonnage of MSW. Btu are then determined by using 6,000 Btu per pound of MSW components which can be used for energy (paper, plastics and organics) for each landfill category (large metro, small metro, rural and all landfill averages (see Appendix F, Table 1).<sup>48</sup>

## **J. Old Tires**

Old tires from automobiles, trucks and other vehicles present a unique opportunity to capture energy, mainly because of their high-energy. The categories of used and disposed tires identified in this database include the following:

1. Those already disposed of in unpermitted dumps
2. Those processed at permitted facilities
3. Those that are expected to be disposed of annually

Tires dumped in unpermitted sites throughout Missouri totaled about 2.3 million as of January 12, 2005. An estimated 5.5 million tires are generated each year (one per person as an average)<sup>50</sup> and these generally go to one of the approved Waste Tire Processors in Missouri.<sup>51</sup> According to one processor, the numbers of tires in inventory (processed or unprocessed) is generally small.<sup>52</sup> Because of the financial assurance required by MDNR, the waste tire processors in Missouri normally have a revolving inventory with tires going into the facility, being processed and then moving to a customer. Fourteen Waste Tire Processors are approved for operation in Missouri.<sup>51</sup> In a given year one could

<sup>50</sup> Britton, Bob, 2002, "Southeast States Struggle with Solid Waste Issues-Among Them, Used Tires," Georgia and Southeast Environmental News, Winter Park, Florida, May/June, p. 10

<sup>51</sup> Missouri Department of Natural Resources. List of processors updated July 9, 2004.  
<http://www.dnr.state.mo.us/alpd/swmp/tires/tireprocessors.htm>

<sup>52</sup> Phone conversation on 26 Jan. 2005 with Peggy Gordon of Alternative Fuel Sources, Inc. Odessa, MO.

add the number of tires in unpermitted dumps (2.3 million in 2005) to the 5.5 million generated annually and have a good idea of the total source of tires available in the state.

The volume of tires disposed of annually for each county in Missouri is assumed to equal the number of residents in that county. Population data for determining numbers of tires generated is from the U.S. Census Bureau 2002 data set.<sup>53</sup>

While some waste tires are converted into garden hoses and running track surfaces, energy recovery is currently the single largest use for scrap tires. Tire-derived fuel (TDF – whole or shredded tires) is utilized as a supplemental or dedicated fuel by some cement kilns, pulp and paper mills, electric utilities and dedicated tire-to-energy facilities.<sup>54</sup> TDF contains 14,000 to 16,000 British thermal units (Btu) per pound, which is a higher energy content than most types of coal. Facilities using TDF have not reported any adverse effects on environmental performance or product quality.

There is a wide range of sizes and weights of waste tires, however, analysts generally estimate that there are about 100 automobile tires per ton, or about 20 pounds per tire. In this report a passenger tire equivalent (PTE) of 20 pounds is used and some of the weight of a tire is the steel used for reinforcement. According to a representative of Dash Recycled Rubber, Inc., the rubber content per tire is about 12 pounds.<sup>55</sup> The numbers of tires per county (those generated based on population plus those already in unpermitted dumps) and the available energy potential in Btu are presented in Appendix G, Table 1. Appendix G, Table 2 presents the estimated Btu value of tires present in unpermitted dumps (2.3 million tires).

A per passenger tire equivalent (PTE) energy value of 182,000 Btu per tire has been used in this report based on average values received from processors. A calculation was run to check the validity of this value. Using a Btu/pound value of 15,500, which is within the range of values in several references, and a rubber content of 12 pounds per PTE one arrives at a value of 186,000 Btu/PTE. Given the usual amount of dirt and contaminants within a load of used tires the 4,000 Btu/PTE difference (only 2% of 182,000) seems a realistic value, and thus 182,000 Btu seems a reasonable per tire energy value.

Interestingly, the numbers of tires handled by end-users matches the population of the state, thus supporting the “one waste tire generated annually per person” rationale used in this report. End users and the numbers of tires used are presented in Table 6.<sup>56</sup>

**Table 6. Waste Tire End Users in Missouri**

<b>Tire Derived Fuel User</b>	<b>Location City/County</b>	<b>Tons/numbers of tires used in 2003</b>
Holcim, (Holnam) US, Inc.	Clarksville, MO/Pike County	7,200/720,000
Ameren UE, Inc.	Portage Des Sioux Power Plant/Saint Charles County	21,000/2,100,000
Univ. of MO.	Columbia, MO/Boone County.	2,500/250,000
Aquila, Inc.	Kansas City, MO/Jackson County	10,800/1,080,000
Buzzi Unicem USA	Cape Girardeau, MO/Cape	3,300/330,000

<sup>53</sup> U.S.Census Bureau Population 2000. [http://factfinder.census.gov/servlet/GCTTable?\\_bm=y&-geo\\_id=4..](http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=4..)

<sup>54</sup> Energy Recovery from Scrap Tires. Rubber manufacturers association. 1400 K Street, NW. Washington, D.C. 20005. [www.rma.org](http://www.rma.org).

<sup>55</sup> Dash Recycled Rubber rep. David Coleman. Phone conversation on Jan. 28, 2005

<sup>56</sup> Waste Tire End Users in Missouri. MDNR site updated Feb. 18, 2004. <http://www.dnr.mo.gov/alpd/swmp/tires/tireend.htm>

<b>Tire Derived Fuel User</b>	<b>Location City/County</b>	<b>Tons/numbers of tires used in 2003</b>
	Girardeau County	
Empire District Electric Co.	Asbury Power Plant, Joplin, MO/Jasper County	11,000/1,100,000
<b>CRUMB RUBBER USERS</b>		
EnTire Recycling, Inc	Rockport, MO/Atchison County	Started operation in June, 2004
Welch Products, Inc.	Macon, MO/Macon County	921/91,200
	<b>TOTAL waste tires used in 2003</b>	<b>56,721 tons or 5,672,100 tires</b>

While some overlap occurs, waste tire processors are not the same group as waste tire end users. The tons of waste tires processed in 2004 by waste tire processors in Missouri showed the ability to dispose of a major portion of the tires produced in Missouri.<sup>57</sup> By assuming each tire weighs 20 pounds, the total reported numbers of tires processed by waste tire processors in Missouri was 5,052,600 tires. This differs slightly from the end use number in Table 6 which shows numbers of tires used as contrasted to the numbers of tires processed. Some Missouri waste tires are shipped out of state and some from other states come to Missouri – The assumption is that the numbers leaving and entering are approximately equal. Waste tire processing information is presented in Table 7.

**Table 7. Tons of Waste Tires Processed in Missouri, 2004**

<b>Processor Name</b>	<b>County/city where located</b>	<b>Tons of tires processed</b>
Alternative Fuel Source, Inc.	Lafayette/Odessa	21,619.99
Beck's Tire Service	Jackson/Kansas City	771.49
City of St. Joseph SLF	Buchanan/St. Joseph	69.71
City of Rolla Sanitation Dept.	Phelps/Rolla	0.2
City of West Plains Solid Waste Transfer Station	Howell/West Plains	5.94
Dash Recycled Rubber, Inc.	Macon/Macon	4,951.57
Don's Welding & Waste Tire Removal	Polk/Halfway	272.78
EnTire Recycling (1 June through 31 Dec. 2004)	Atchison/Rock Port	2,426.58
Missouri Vocational Enterprises	Jefferson/Jefferson City	7,499.117
Plaza Tire Service	Cape Girardeau/Cape Girardeau	45.214
Pemiscot County Transfer Station	Pemiscot/West Hayti	179.22
Tire Shredders Unlimited	Jefferson/High Ridge	12,363.44
TRI-Rinse, Inc.	St. Louis/St. Louis	0.0
Waste Tire Transportation Services, LLC	Clay/Claycomo	593.78
	<b>TOTAL</b>	<b>50,799.031 Tons</b>

#### **A Note About Waste Tire Handling At Landfills**

<sup>57</sup> Data received from Kirk Mitchell of MDNR listing tires processed in 2004

Twenty-three sanitary landfills in the state were determined as potential sources of tires that accumulated in landfills. By state regulation (10 CSR 80-8.020 (1) (B) 4) waste tires must be cut either circumferentially or into thirds or smaller before they can be taken by Missouri waste transfer stations or buried in Missouri landfills. Some landfills accept tires for a charge and later send them to a waste tire processor (often via a listed tire hauler). Most landfills that take small numbers of quartered or shredded tires don't keep an inventory of these tires. The St. Joseph Sanitary Landfill (Buchanan County) accepts and buries tires that are cut up. The following numbers and types of tires were accepted in 2004:<sup>58</sup>

**Table 8. Number of Tires Received at St. Joseph Sanitary Landfill, 2004**

Type of tire received	Numbers of tires/tons
Passenger tires on rims	781/7.81
Passenger tires off rim	3,555/35.55
Truck tires	269/2.69
Chopped tires (delivered to landfill)	271.84 tons
Motor grader tires	11/0.11
Small tractor tires	16/0.16
Off road construction tires	6.33 tons

The processing of tires by the St. Joseph landfill is a service to customers and could be considered as a potential source of tires for commercial uses.

### III. Summary and Conclusions

Biomass feedstocks were evaluated for their potential to be energy resources for each Missouri County. These feedstock sources are presented in individual tables (Appendix A through G) and in a summary form in Appendix H, Tables 1 and 2.

The largest source of potential biomass energy is from Conservation Reserve Acreage represented by switchgrass (36%). This is followed by timber harvest residues (30%). Crop residues (including cotton gin waste and fescue seed processing wastes) are another major source of biomass and constitute about 17% of the total. Figure 1 presents the percentages of individual crop residues and Figure 2 presents the combined total of crop residues and all other biomass energy sources available and considered in this report.

Corn provides the largest potential feedstock of crop residues (46%) followed by soybeans (28%). Both corn and soybean residues would require major equipment investments to harvest the residues and such residue removal could sometimes run counter to good agronomic practices which encourage utilization of residue for soil conservation, moisture management and soil fertility management.

Dedicated energy crop production on Conservation Reserve Program land could provide a significant contribution of the total biomass energy available to Missouri. This resource could have some deterrents if the land would need to be tilled to establish the alternative crops and if Federal laws or regulations would need to be changed in order to allow removal of energy crops from CRP lands.

Estimates of potential energy presented in this report should be expected to change over time as cropping patterns change or as changes in waste management practices evolve.

<sup>58</sup> Phone conversation with City of St. Joseph Sanitary Landfill on Feb. 2, 2005 Numbers for year 2004

Figure 1. Btu Percentages by Crop Type (chart values presented clockwise in order listed in insert)

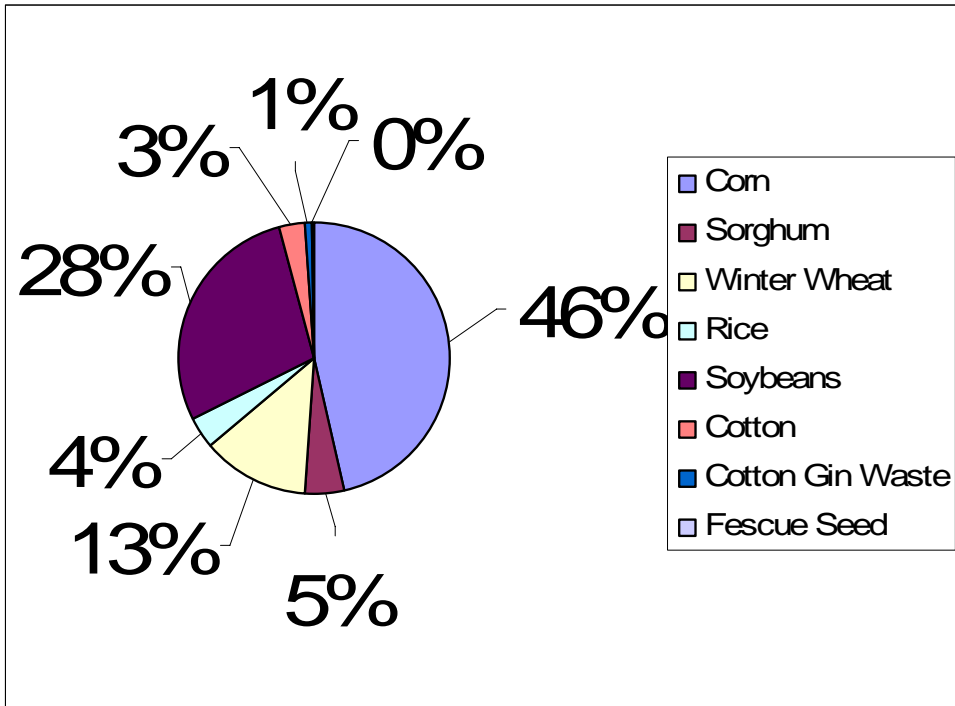
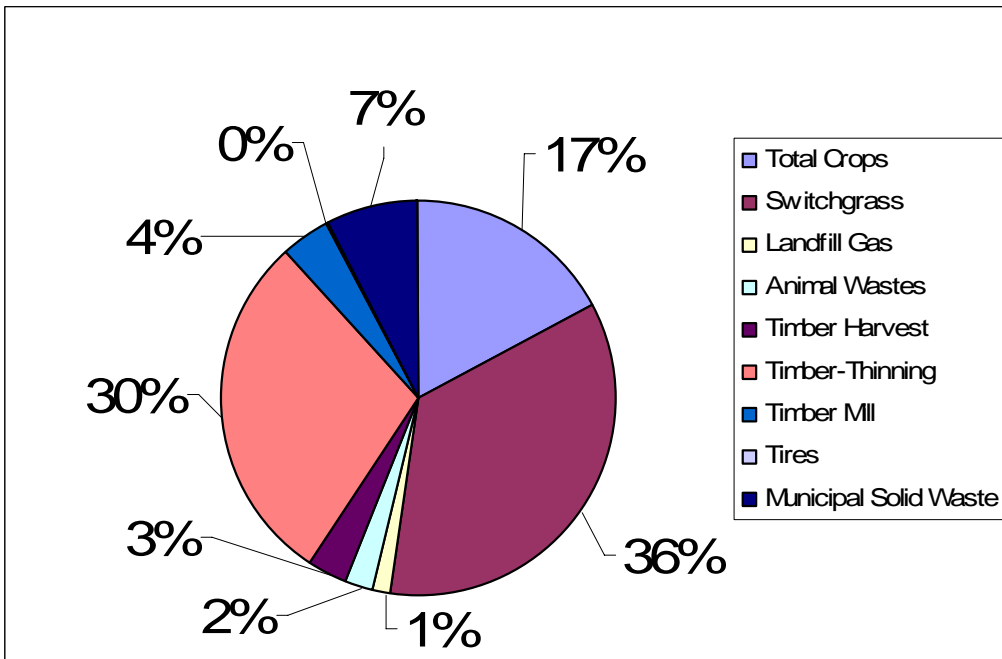


Figure 2. Btu Percentages by Source (chart values presented clockwise in order listed in insert).



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## Appendix A, Table 1. Estimated production of corn residues and Btu available using 7,500 Btu per pound of dry matter.<sup>59</sup>

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>60</sup>	Available production Btu (million Btu) <sup>61</sup>
Adair	11,840	1,351,300	114.13	3.20	37,836	567,546	170,264
Andrew	44,150	5,054,400	114.48	3.21	141,523	2,122,848	636,854
Atchison	117,870	14,284,600	121.19	3.39	399,969	5,999,532	1,799,860
Audrain	58,820	6,141,900	104.42	2.92	171,973	2,579,598	773,879
Barry	890	90,050	101.18	2.83	2,521	37,821	11,346
Barton	18,020	2,271,400	126.05	3.53	63,599	953,988	286,196
Bates	35,580	3,652,000	102.64	2.87	102,256	1,533,840	460,152
Benton	5,980	565,200	94.52	2.65	15,826	237,384	71,215
Bollinger	12,160	1,308,300	107.59	3.01	36,632	549,486	164,846
Boone	16,810	1,759,600	104.68	2.93	49,269	739,032	221,710
Buchanan	39,090	4,726,600	120.92	3.39	132,345	1,985,172	595,552
Butler	15,310	1,940,000	126.71	3.55	54,320	814,800	244,440
Caldwell	19,190	1,936,600	100.92	2.83	54,225	813,372	244,012
Callaway	19,380	2,054,400	106.01	2.97	57,523	862,848	258,854
Cape Girardeau	32,860	4,019,600	122.33	3.43	112,549	1,688,232	506,470
Carroll	61,070	7,709,500	126.24	3.53	215,866	3,237,990	971,397
Cass	23,150	2,360,600	101.97	2.86	66,097	991,452	297,436
Cedar	1,480	159,700	107.91	3.02	4,472	67,074	20,122
Chariton	59,240	7,011,900	118.36	3.31	196,333	2,944,998	883,499
Christian	215	19,670	91.49	2.56	551	8,261	2,478
Clark	44,400	5,383,000	121.24	3.39	150,724	2,260,860	678,258
Clay	8,000	930,100	116.26	3.26	26,043	390,642	117,193
Clinton	27,080	2,982,700	110.14	3.08	83,516	1,252,734	375,820
Cole	5,410	570,100	105.38	2.95	15,963	239,442	71,833
Cooper	36,310	3,748,500	103.24	2.89	104,958	1,574,370	472,311
Dade	4,230	483,700	114.35	3.20	13,544	203,154	60,946
Dallas	40	3,200	80.00	2.24	90	1,344	403
Daviess	26,030	2,611,300	100.32	2.81	73,116	1,096,746	329,024
De Kalb	23,520	2,428,500	103.25	2.89	67,998	1,019,970	305,991
Dunklin	14,350	2,013,100	140.29	3.93	56,367	845,502	253,651
Franklin	15,410	1,721,800	111.73	3.13	48,210	723,156	216,947
Gasconade	5,900	600,000	101.69	2.85	16,800	252,000	75,600
Gentry	27,370	2,910,000	106.32	2.98	81,480	1,222,200	366,660
Greene	645	52,310	81.10	2.27	1,465	21,970	6,591
Grundy	17,920	1,949,900	108.81	3.05	54,597	818,958	245,687
Harrison	38,760	4,278,500	110.38	3.09	119,798	1,796,970	539,091
Henry	16,250	1,359,400	83.66	2.34	38,063	570,948	171,284

<sup>59</sup> Table may not sum due to rounding.

<sup>60</sup> Btu is found by taking bushels of grain times 56 pounds of grain per bushel of corn times 1.0 pounds of stover per pound of grain times 7,500 Btu per dry pound of residue.

<sup>61</sup> Assumes 30% of total biomass production is available for usage.

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>60</sup>	Available production Btu (million Btu) <sup>61</sup>
Hickory	610	52,640	86.30	2.42	1,474	22,109	6,633
Holt	89,720	11,658,100	129.94	3.64	326,427	4,896,402	1,468,921
Howard	28,840	3,399,100	117.86	3.30	95,175	1,427,622	428,287
Jackson	14,830	1,697,000	114.43	3.20	47,516	712,740	213,822
Jasper	8,120	962,600	118.55	3.32	26,953	404,292	121,288
Jefferson	3,050	292,800	96.00	2.69	8,198	122,976	36,893
Johnson	28,680	2,691,000	93.83	2.63	75,348	1,130,220	339,066
Knox	27,700	3,124,700	112.81	3.16	87,492	1,312,374	393,712
Laclede	530	49,950	94.25	2.64	1,399	20,979	6,294
Lafayette	84,830	10,434,400	123.00	3.44	292,163	4,382,448	1,314,734
Lawrence	3,070	334,000	108.79	3.05	9,352	140,280	42,084
Lewis	43,350	4,987,100	115.04	3.22	139,639	2,094,582	628,375
Lincoln	43,000	4,632,200	107.73	3.02	129,702	1,945,524	583,657
Linn	17,800	1,812,400	101.82	2.85	50,747	761,208	228,362
Livingston	19,760	2,122,200	107.40	3.01	59,422	891,324	267,397
Macon	19,280	2,068,300	107.28	3.00	57,912	868,686	260,606
Maries	1,265	110,640	87.46	2.45	3,098	46,469	13,941
Marion	42,260	5,120,300	121.16	3.39	143,368	2,150,526	645,158
Mercer	13,010	1,514,900	116.44	3.26	42,417	636,258	190,877
Miller	1,840	189,500	102.99	2.88	5,306	79,590	23,877
Mississippi	64,860	9,564,600	147.47	4.13	267,809	4,017,132	1,205,140
Moniteau	12,080	1,155,000	95.61	2.68	32,340	485,100	145,530
Monroe	34,170	3,414,900	99.94	2.80	95,617	1,434,258	430,277
Montgomery	40,650	4,262,400	104.86	2.94	119,347	1,790,208	537,062
Morgan	6,180	565,300	91.47	2.56	15,828	237,426	71,228
New Madrid	67,960	10,032,600	147.63	4.13	280,913	4,213,692	1,264,108
Newton	1,250	118,000	94.40	2.64	3,304	49,560	14,868
Nodaway	104,080	11,354,500	109.09	3.05	317,926	4,768,890	1,430,667
Osage	7,870	892,200	113.37	3.17	24,982	374,724	112,417
Pemiscot	20,420	2,760,300	135.18	3.78	77,288	1,159,326	347,798
Perry	24,080	2,826,200	117.37	3.29	79,134	1,187,004	356,101
Pettis	38,790	3,622,600	93.39	2.61	101,433	1,521,492	456,448
Phelps	400	37,750	94.38	2.64	1,057	15,855	4,757
Pike	47,090	5,312,200	112.81	3.16	148,742	2,231,124	669,337
Platte	32,390	3,774,900	116.55	3.26	105,697	1,585,458	475,637
Polk	1,400	130,360	93.11	2.61	3,650	54,751	16,425
Pulaski	320	27,980	87.44	2.45	783	11,752	3,525
Putnam	9,540	1,027,000	107.65	3.01	28,756	431,340	129,402
Ralls	34,060	3,664,300	107.58	3.01	102,600	1,539,006	461,702
Randolph	13,250	1,284,900	96.97	2.72	35,977	539,658	161,897
Ray	30,620	3,724,600	121.64	3.41	104,289	1,564,332	469,300
Ripley	1,670	192,210	115.10	3.22	5,382	80,728	24,218
St. Charles	40,330	5,171,000	128.22	3.59	144,788	2,171,820	651,546
St. Clair	7,030	638,800	90.87	2.54	17,886	268,296	80,489
Ste. Genevieve	12,570	1,489,600	118.50	3.32	41,709	625,632	187,690

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>60</sup>	Available production Btu (million Btu) <sup>61</sup>
St. Francois	1,285	128,510	100.01	2.80	3,598	53,974	16,192
St. Louis	5,050	621,200	123.01	3.44	17,394	260,904	78,271
Saline	117,720	15,185,100	128.99	3.61	425,183	6,377,742	1,913,323
Schuyler	7,450	832,500	111.74	3.13	23,310	349,650	104,895
Scotland	31,480	3,727,900	118.42	3.32	104,381	1,565,718	469,715
Scott	61,320	8,970,800	146.29	4.10	251,182	3,767,736	1,130,321
Shelby	33,680	3,727,300	110.67	3.10	104,364	1,565,466	469,640
Stoddard	106,400	15,163,100	142.51	3.99	424,567	6,368,502	1,910,551
Sullivan	8,370	871,600	104.13	2.92	24,405	366,072	109,822
Texas	515	40,020	77.71	2.18	1,121	16,808	5,043
Vernon	24,990	2,547,900	101.96	2.85	71,341	1,070,118	321,035
Warren	18,720	2,036,500	108.79	3.05	57,022	855,330	256,599
Wayne	1,840	189,900	103.21	2.89	5,317	79,758	23,927
Webster	325	28,990	89.20	2.50	812	12,176	3,653
Worth	12,070	1,291,400	106.99	3.00	36,159	542,388	162,716
Totals	2,480,550	292,104,180			8,178,917	122,683,756	36,805,127

Counties not reporting are Camden, Carter, Crawford, Dent, Douglas, Howell, Iron, McDonald, Madison, Oregon, Ozark, Reynolds, Shannon, Stone, Taney, Washington, Wright, and St. Louis City

**Appendix A, Table 2. Estimated production of grain sorghum residues and Btu available using 7,500 Btu per pound of dry matter.<sup>62</sup>**

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>63</sup>	Available production Btu (million Btu) <sup>64</sup>
Andrew	600	43,400	72.33	2.03	1,215	18,228	5,468
Audrain	27,370	2,657,400	97.09	2.72	74,407	1,116,108	334,832
Barton	28,580	2,526,700	88.41	2.48	70,748	1,061,214	318,364
Bates	7,990	681,300	85.27	2.39	19,076	286,146	85,844
Benton	3,590	316,800	88.25	2.47	8,870	133,056	39,917
Bollinger	2,920	216,700	74.21	2.08	6,068	91,014	27,304
Boone	2,410	214,000	88.80	2.49	5,992	89,880	26,964
Buchanan	710	57,400	80.85	2.26	1,607	24,108	7,232
Butler	13,980	1,006,100	71.97	2.02	28,171	422,562	126,769
Caldwell	530	36,740	69.32	1.94	1,029	15,431	4,629
Callaway	6,810	647,600	95.10	2.66	18,133	271,992	81,598
Cape Girardeau	3,880	328,000	84.54	2.37	9,184	137,760	41,328
Carroll	1,665	138,830	83.38	2.33	3,887	58,309	17,493
Cass	3,720	297,500	79.97	2.24	8,330	124,950	37,485
Cedar	585	46,500	79.49	2.23	1,302	19,530	5,859
Chariton	950	74,700	78.63	2.20	2,092	31,374	9,412
Clay	65	5,320	81.85	2.29	149	2,234	670
Clinton	450	34,170	75.93	2.13	957	14,351	4,305
Cole	485	39,780	82.02	2.30	1,114	16,708	5,012
Cooper	1,340	107,080	79.91	2.24	2,998	44,974	13,492
Dade	7,050	636,900	90.34	2.53	17,833	267,498	80,249
Daviess	1,600	133,500	83.44	2.34	3,738	56,070	16,821
De Kalb	980	75,980	77.53	2.17	2,127	31,912	9,573
Dunklin	10,940	824,400	75.36	2.11	23,083	346,248	103,874
Franklin	880	67,500	76.70	2.15	1,890	28,350	8,505
Gasconade	925	69,700	75.35	2.11	1,952	29,274	8,782
Gentry	560	45,550	81.34	2.28	1,275	19,131	5,739
Grundy	2,670	224,900	84.23	2.36	6,297	94,458	28,337
Harrison	175	13,110	74.91	2.10	367	5,506	1,652
Henry	10,350	825,900	79.80	2.23	23,125	346,878	104,063
Hickory	435	34,100	78.39	2.19	955	14,322	4,297
Holt	755	58,350	77.28	2.16	1,634	24,507	7,352
Howard	55	4,650	84.55	2.37	130	1,953	586
Jackson	460	41,380	89.96	2.52	1,159	17,380	5,214
Jasper	9,420	770,600	81.80	2.29	21,577	323,652	97,096

<sup>62</sup> Table may not sum due to rounding

<sup>63</sup> Btu is found by taking bushels of grain times 56 pounds of grain per bushel times 1.0 pound of stover per pound of grain times 7,500 Btu per pound of residue.

<sup>64</sup> Assumes 30% of total biomass production is available for usage.

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>63</sup>	Available production Btu (million Btu) <sup>64</sup>
Johnson	5,630	432,600	76.84	2.15	12,113	181,692	54,508
Knox	210	15,490	73.76	2.07	434	6,506	1,952
Lafayette	450	31,800	70.67	1.98	890	13,356	4,007
Lawrence	1,490	96,260	64.60	1.81	2,695	40,429	12,129
Lincoln	1,450	127,220	87.74	2.46	3,562	53,432	16,030
Linn	1,440	113,670	78.94	2.21	3,183	47,741	14,322
Livingston	6,090	510,300	83.79	2.35	14,288	214,326	64,298
Macon	1,710	146,100	85.44	2.39	4,091	61,362	18,409
Marion	1,265	107,230	84.77	2.37	3,002	45,037	13,511
Mercer	195	15,090	77.38	2.17	423	6,338	1,901
Mississippi	15,340	1,448,100	94.40	2.64	40,547	608,202	182,461
Moniteau	1,470	109,250	74.32	2.08	3,059	45,885	13,766
Monroe	13,140	1,171,400	89.15	2.50	32,799	491,988	147,596
Montgomery	3,880	334,300	86.16	2.41	9,360	140,406	42,122
Morgan	490	38,030	77.61	2.17	1,065	15,973	4,792
New Madrid	24,210	2,105,100	86.95	2.43	58,943	884,142	265,243
Newton	1,170	74,410	63.60	1.78	2,083	31,252	9,376
Nodaway	390	27,810	71.31	2.00	779	11,680	3,504
Osage	1,085	91,590	84.41	2.36	2,565	38,468	11,540
Pemiscot	14,620	1,193,100	81.61	2.29	33,407	501,102	150,331
Perry	920	71,020	77.20	2.16	1,989	29,828	8,949
Pettis	7,525	623,200	82.82	2.32	17,450	261,744	78,523
Pike	4,740	432,000	91.14	2.55	12,096	181,440	54,432
Platte	740	61,400	82.97	2.32	1,719	25,788	7,736
Polk	225	18,740	83.29	2.33	525	7,871	2,361
Ralls	8,460	804,700	95.12	2.66	22,532	337,974	101,392
Randolph	1,620	133,960	82.69	2.32	3,751	56,263	16,879
Ray	840	60,300	71.79	2.01	1,688	25,326	7,598
Ripley	1,635	117,580	71.91	2.01	3,292	49,384	14,815
Saline	830	61,460	74.05	2.07	1,721	25,813	7,744
Scotland	125	7,240	57.92	1.62	203	3,041	912
Scott	9,530	782,000	82.06	2.30	21,896	328,440	98,532
Shelby	6,380	617,900	96.85	2.71	17,301	259,518	77,855
St. Charles	335	26,130	78.00	2.18	732	10,975	3,292
St. Clair	6,130	511,300	83.41	2.34	14,316	214,746	64,424
St. Louis	110	7,150	65.00	1.82	200	3,003	901
Ste. Genevieve	290	19,690	67.90	1.90	551	8,270	2,481
Stoddard	16,220	1,357,000	83.66	2.34	37,996	569,940	170,982
Vernon	18,780	1,602,500	85.33	2.39	44,870	673,050	201,915
Warren	1,090	79,030	72.50	2.03	2,213	33,193	9,958
Wayne	305	19,560	64.13	1.80	548	8,215	2,465
Worth	60	3,670	61.17	1.71	103	1,541	462
Totals	338,500	28,908,920			809,450	12,141,746	3,642,524

Counties not reporting are Adair, Atchison, Barry, Camden, Carter, Christian, Clark, Crawford, Dallas, Dent, Douglas, Greene, Howell, Iron, Jefferson, Laclede, Lewis, McDonald, Madison, Maries, Miller, Oregon, Ozark, Phelps, Pulaski, Putnam, Reynolds, St. Francois, Schuyler, Shannon, Stone, Taney, Washington, Wright, and St. Louis City.

### Appendix A, Table 3. Estimated production of winter wheat residues and Btu available using 7,500 Btu per pound of dry matter.<sup>65</sup>

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>66</sup>	Available production Btu million Btu) <sup>67</sup>
Adair	2,618	121,782	46.51	2.37	6,211	93,163	27,949
Andrew	2,018	86,527	42.87	2.19	4,413	66,193	19,858
Atchison	345	13,709	39.68	2.02	699	10,487	3,146
Audrain	23,627	1,187,727	50.27	2.56	60,574	908,611	272,583
Barry	577	23,236	40.25	2.05	1,185	17,776	5,333
Barton	38,727	1,792,364	46.28	2.36	91,411	1,371,158	411,347
Bates	28,118	1,350,636	48.03	2.45	68,882	1,033,237	309,971
Benton	5,927	277,000	46.73	2.38	14,127	211,905	63,572
Bollinger	3,295	134,955	40.95	2.09	6,883	103,240	30,972
Boone	9,591	466,273	48.62	2.48	23,780	356,699	107,010
Buchanan	4,100	167,664	40.89	2.09	8,551	128,263	38,479
Butler	17,945	821,909	45.80	2.34	41,917	628,760	188,628
Caldwell	4,055	171,118	42.20	2.15	8,727	130,905	39,272
Callaway	9,973	460,273	46.15	2.35	23,474	352,109	105,633
Cape Girardeau	16,455	755,727	45.93	2.34	38,542	578,131	173,439
Carroll	19,918	877,727	44.07	2.25	44,764	671,461	201,438
Cass	10,964	516,727	47.13	2.40	26,353	395,296	118,589
Cedar	1,055	44,727	42.41	2.16	2,281	34,216	10,265
Chariton	20,300	985,636	48.55	2.48	50,267	754,012	226,204
Christian	227	10,200	44.88	2.29	520	7,803	2,341
Clark	4,891	238,364	48.74	2.49	12,157	182,348	54,704
Clay	2,464	105,145	42.68	2.18	5,362	80,436	24,131
Clinton	2,055	89,555	43.59	2.22	4,567	68,509	20,553
Cole	1,991	85,927	43.16	2.20	4,382	65,734	19,720
Cooper	18,955	923,818	48.74	2.49	47,115	706,721	212,016
Crawford	27	1,036	38.00	1.94	53	793	238
Dade	16,636	756,364	45.46	2.32	38,575	578,618	173,585
Dallas	118	4,409	37.31	1.90	225	3,373	1,012
Daviess	5,373	227,291	42.30	2.16	11,592	173,878	52,163

<sup>65</sup> Table may not sum due to rounding

<sup>66</sup> Btu found by taking bushels of grain times 60 pounds of grain per bushel times 1.7 pounds of straw per pound of grain times 7,500 Btu per pound of residue.

<sup>67</sup> Assumes 30% of total biomass production is available for usage.

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>66</sup>	Available production Btu million Btu) <sup>67</sup>
De Kalb	2,468	109,536	44.38	2.26	5,586	83,795	25,139
Dunklin	27,018	1,301,818	48.18	2.46	66,393	995,891	298,767
Franklin	5,464	226,182	41.40	2.11	11,535	173,029	51,909
Gasconade	2,173	89,364	41.13	2.10	4,558	68,363	20,509
Gentry	2,873	120,445	41.93	2.14	6,143	92,141	27,642
Greene	1,095	48,218	44.02	2.24	2,459	36,887	11,066
Grundy	5,155	235,909	45.77	2.33	12,031	180,470	54,141
Harrison	2,564	106,336	41.48	2.12	5,423	81,347	24,404
Henry	15,391	694,455	45.12	2.30	35,417	531,258	159,377
Hickory	282	10,473	37.16	1.90	534	8,012	2,403
Holt	1,500	58,945	39.30	2.00	3,006	45,093	13,528
Howard	9,000	419,364	46.60	2.38	21,388	320,813	96,244
Howell	105	3,791	36.26	1.85	193	2,900	870
Jackson	8,600	417,909	48.59	2.48	21,313	319,700	95,910
Jasper	21,473	902,455	42.03	2.14	46,025	690,378	207,113
Jefferson	1,409	56,509	40.10	2.05	2,882	43,229	12,969
Johnson	8,836	411,636	46.58	2.38	20,993	314,902	94,471
Knox	6,764	318,182	47.04	2.40	16,227	243,409	73,023
Laclede	236	9,164	38.77	1.98	467	7,010	2,103
Lafayette	12,855	634,091	49.33	2.52	32,339	485,080	145,524
Lawrence	5,918	245,091	41.41	2.11	12,500	187,495	56,248
Lewis	8,582	425,182	49.54	2.53	21,684	325,264	97,579
Lincoln	15,045	696,091	46.27	2.36	35,501	532,510	159,753
Linn	6,455	302,091	46.80	2.39	15,407	231,100	69,330
Livingston	12,682	586,273	46.23	2.36	29,900	448,499	134,550
McDonald	27	955	35.00	1.79	49	730	219
Macon	7,800	386,727	49.58	2.53	19,723	295,846	88,754
Maries	473	19,627	41.52	2.12	1,001	15,015	4,504
Marion	12,809	644,091	50.28	2.56	32,849	492,730	147,819
Mercer	664	26,091	39.32	2.01	1,331	19,960	5,988
Miller	382	14,736	38.60	1.97	752	11,273	3,382
Mississippi	47,582	2,631,455	55.30	2.82	134,204	2,013,063	603,919
Moniteau	5,018	224,636	44.76	2.28	11,456	171,847	51,554
Monroe	14,564	719,455	49.40	2.52	36,692	550,383	165,115
Montgomery	15,482	712,182	46.00	2.35	36,321	544,819	163,446
Morgan	2,091	87,100	41.66	2.12	4,442	66,632	19,989
New Madrid	36,973	1,902,000	51.44	2.62	97,002	1,455,030	436,509
Newton	3,445	137,309	39.85	2.03	7,003	105,041	31,512
Nodaway	2,373	97,455	41.07	2.09	4,970	74,553	22,366
Oregon	95	3,500	36.67	1.87	179	2,678	803
Osage	1,336	54,191	40.55	2.07	2,764	41,456	12,437
Pemiscot	40,436	1,845,818	45.65	2.33	94,137	1,412,051	423,615
Perry	12,509	564,182	45.10	2.30	28,773	431,599	129,480
Pettis	22,855	1,076,636	47.11	2.40	54,908	823,627	247,088
Phelps	27	1,091	40.00	2.04	56	835	250
Pike	14,164	700,364	49.45	2.52	35,719	535,778	160,733



County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total dry tons of residue per yr.	Total biomass production Btu (million Btu) <sup>66</sup>	Available production Btu million Btu) <sup>67</sup>
Platte	4,636	195,027	42.06	2.15	9,946	149,196	44,759
Polk	964	41,427	42.99	2.19	2,113	31,692	9,508
Putnam	491	21,673	44.15	2.25	1,105	16,580	4,974
Ralls	14,773	729,545	49.38	2.52	37,207	558,102	167,431
Randolph	8,045	370,091	46.00	2.35	18,875	283,120	84,936
Ray	9,282	403,636	43.49	2.22	20,585	308,782	92,635
Ripley	1,373	58,309	42.48	2.17	2,974	44,606	13,382
St. Charles	10,027	477,273	47.60	2.43	24,341	365,114	109,534
St. Clair	11,782	518,818	44.04	2.25	26,460	396,896	119,069
Ste. Genevieve	4,709	214,636	45.58	2.32	10,946	164,197	49,259
St. Francois	291	12,273	42.19	2.15	626	9,389	2,817
St. Louis	2,636	114,800	43.54	2.22	5,855	87,822	26,347
Saline	15,964	765,182	47.93	2.44	39,024	585,364	175,609
Schuyler	859	38,573	44.90	2.29	1,967	29,508	8,852
Scotland	3,927	180,182	45.88	2.34	9,189	137,839	41,352
Scott	38,982	1,940,909	49.79	2.54	98,986	1,484,795	445,439
Shelby	15,064	774,182	51.39	2.62	39,483	592,249	177,675
Stoddard	48,600	2,557,636	52.63	2.68	130,439	1,956,592	586,978
Sullivan	823	36,236	44.04	2.25	1,848	27,721	8,316
Vernon	25,573	1,141,909	44.65	2.28	58,237	873,560	262,068
Warren	5,773	256,636	44.46	2.27	13,088	196,327	58,898
Wayne	586	22,773	38.84	1.98	1,161	17,421	5,226
Webster	309	13,318	43.09	2.20	679	10,188	3,057
Worth	264	8,782	33.31	1.70	448	6,718	2,015
Wright	41	1,373	33.56	1.71	70	1,050	315
<b>Totals</b>	<b>923,164</b>	<b>43,872,136</b>			<b>2,237,479</b>	<b>33,562,184</b>	<b>10,068,655</b>

Counties not reporting are Camden, Carter, Dent, Douglas, Iron, Madison, Ozark, Pulaski, Reynolds, Shannon, Stone, Taney, Texas, Washington, and St. Louis City.

**Appendix A, Table 4. Estimated production of rice residues and Btu available using 6,811 Btu per pound of dry matter.<sup>68</sup>**

County	Harvested Acres per yr.	Production—hundred weight (100 pounds) (CWT) per yr.	Yield (lbs/Acre)	Tons of residue per acre	Total tons of dry residue per yr.	Total bio mass production Btu (million Btu) <sup>69</sup>	Available biomass Btu (million Btu) <sup>70</sup>
Butler	60,870	3,417,600	5614.59	4.77	290,496	3,957,137	1,187,141
Dunklin	6,520	373,200	5723.93	4.87	31,722	432,117	129,635
New Madrid	16,760	936,820	5589.62	4.75	79,630	1,084,716	325,415
Pemiscot	8,960	518,400	5785.71	4.92	44,064	600,240	180,072
Ripley	4,150	225,900	5443.37	4.63	19,202	261,563	78,469
Stoddard	51,240	2,902,000	5663.54	4.81	246,670	3,360,139	1,008,042
Totals	148,500	8,373,920			711,783	9,695,911	2,908,773

Counties not reporting are Adair, Andrew, Atchison, Audrain, Barry, Barton, Bates, Benton, Bollinger, Boone, Buchanan, Caldwell, Callaway, Camden, Cape Girardeau, Carroll, Carter, Cass, Cedar, Chariton, Christian, Clark, Clay, Clinton, Cole, Cooper, Crawford, Dade, Dallas, Daviess, DeKalb, Dent, Douglas, Franklin, Gasconade, Gentry, Greene, Grundy, Harrison, Henry, Hickory, Holt, Howard, Howell, Iron, Jackson, Jasper, Jefferson, Johnson, Knox, Laclede, Lafayette, Lawrence, Lewis, Lincoln, Linn, Livingston, McDonald, Macon, Madison, Maries, Marion, Mercer, Miller, Mississippi, Moniteau, Monroe, Montgomery, Morgan, Newton, Nodaway, Oregon, Osage, Ozark, Perry, Pettis, Phelps, Pike, Platte, Polk, Pulaski, Putnam, Ralls, Randolph, Ray, Reynolds, St. Charles, St. Clair, Ste. Genevieve, St. Francois, St. Louis, Saline, Schuyler, Scotland, Scott, Shannon, Shelby, Stone, Sullivan, Taney, Texas, Vernon, Warren, Washington, Wayne, Webster, Worth, Wright, and St Louis City.

<sup>68</sup> Table may not sum due to rounding

<sup>69</sup> Btu found by taking 1.7 pounds of straw per pound of grain times 6,811Btu per pound of residue.

<sup>70</sup> Assumes 30% of total biomass production is available for usage.

**Appendix A, Table 5. Estimated production of soybean crop residues and Btu available using 7,500 Btu per pound of dry matter.<sup>71</sup>**

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total tons of dry residue per yr.	Total biomass production Btu (million Btu) <sup>72</sup>	Available biomass Btu (million Btu) <sup>73</sup>
Adair	41,530	1,332,900	32.09	0.96	39,987	599,805	179,942
Andrew	69,730	2,558,600	36.69	1.10	76,758	1,151,370	345,411
Atchison	94,420	3,795,700	40.20	1.21	113,871	1,708,065	512,420
Audrain	119,890	4,100,700	34.20	1.03	123,021	1,845,315	553,595
Barry	53,550	1,735,160	32.40	0.97	52,055	780,822	234,247
Barton	63,460	1,786,800	28.16	0.84	53,604	804,060	241,218
Bates	90,930	2,700,900	29.70	0.89	81,027	1,215,405	364,622
Benton	21,690	688,800	31.76	0.95	20,664	309,960	92,988
Bollinger	19,890	620,800	31.21	0.94	18,624	279,360	83,808
Boone	46,600	1,593,600	34.20	1.03	47,808	717,120	215,136
Buchanan	51,810	1,899,900	36.67	1.10	56,997	854,955	256,487
Butler	94,790	3,041,200	32.08	0.96	91,236	1,368,540	410,562
Caldwell	55,070	1,785,700	32.43	0.97	53,571	803,565	241,070
Callaway	70,900	2,499,700	35.26	1.06	74,991	1,124,865	337,460
Cape Girardeau	49,756	1,643,111	33.02	0.99	49,293	739,400	221,820
Carroll	104,020	3,641,900	35.01	1.05	109,257	1,638,855	491,657
Cass	74,010	2,289,000	30.93	0.93	68,670	1,030,050	309,015
Cedar	12,570	410,300	32.64	0.98	12,309	184,635	55,391
Chariton	100,320	3,550,100	35.39	1.06	106,503	1,597,545	479,264
Christian	62,770	2,194,600	34.96	1.05	65,838	987,570	296,271
Clark	23,960	831,800	34.72	1.04	24,954	374,310	112,293
Clay	48,540	1,836,700	37.84	1.14	55,101	826,515	247,955
Clinton	11,867	327,667	27.61	0.83	9,830	147,450	44,235
Cole	56,560	1,847,300	32.66	0.98	55,419	831,285	249,386
Cooper	31,275	1,030,650	32.95	0.99	30,920	463,793	139,138
Dade	34,520	904,300	26.20	0.79	27,129	406,935	122,081
Dallas	73,480	2,322,800	31.61	0.95	69,684	1,045,260	313,578
Daviess	35,360	1,242,100	35.13	1.05	37,263	558,945	167,684
De Kalb	76,460	1,951,900	25.53	0.77	58,557	878,355	263,507
Dunklin	29,580	1,056,200	35.71	1.07	31,686	475,290	142,587
Franklin	8,070	257,400	31.90	0.96	7,722	115,830	34,749
Gasconade	51,160	1,757,300	34.35	1.03	52,719	790,785	237,236
Gentry	8,428	282,467	33.52	1.01	8,474	127,110	38,133
Greene	62,890	1,995,500	31.73	0.95	59,865	897,975	269,393
Grundy	54,111	1,906,778	35.24	1.06	57,203	858,050	257,415
Harrison	48,710	1,445,800	29.68	0.89	43,374	650,610	195,183

<sup>71</sup> Table may not sum due to rounding

<sup>72</sup> Btu is found by taking bushels of grain times 60 pounds of grain per bushel times 1.0 pounds of straw per pound of grain times 7,500 Btu per pound of residue.

<sup>73</sup> Assumes 30% of total biomass production is available for usage.

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total tons of dry residue per yr.	Total biomass production Btu (million Btu) <sup>72</sup>	Available biomass Btu (million Btu) <sup>73</sup>
Henry	12,610	324,700	25.75	0.77	9,741	146,115	43,835
Hickory	89,110	3,357,200	37.67	1.13	100,716	1,510,740	453,222
Holt	40,570	1,452,600	35.80	1.07	43,578	653,670	196,101
Howard	37,770	1,263,000	33.44	1.00	37,890	568,350	170,505
Jackson	35,880	979,500	27.30	0.82	29,385	440,775	132,233
Jasper	16,470	502,030	30.48	0.91	15,061	225,914	67,774
Jefferson	61,322	2,109,556	34.40	1.03	63,287	949,300	284,790
Johnson	60,390	2,020,500	33.46	1.00	60,615	909,225	272,768
Knox	96,930	3,754,100	38.73	1.16	112,623	1,689,345	506,804
Laclede	18,290	501,500	27.42	0.82	15,045	225,675	67,703
Lafayette	55,050	1,975,000	35.88	1.08	59,250	888,750	266,625
Lawrence	64,980	2,265,900	34.87	1.05	67,977	1,019,655	305,897
Lewis	54,930	1,829,600	33.31	1.00	54,888	823,320	246,996
Lincoln	88,640	2,885,600	32.55	0.98	86,568	1,298,520	389,556
Linn	63,980	2,096,500	32.77	0.98	62,895	943,425	283,028
Livingston	2,210	68,320	30.91	0.93	2,050	30,744	9,223
Macon	54,040	1,838,400	34.02	1.02	55,152	827,280	248,184
Maries	19,750	664,925	33.67	1.01	19,948	299,216	89,765
Marion	46,680	1,551,700	33.24	1.00	46,551	698,265	209,480
Mercer	4,510	149,210	33.08	0.99	4,476	67,145	20,143
Miller	141,970	5,056,800	35.62	1.07	151,704	2,275,560	682,668
Mississippi	26,360	889,800	33.76	1.01	26,694	400,410	120,123
Moniteau	68,580	2,167,800	31.61	0.95	65,034	975,510	292,653
Monroe	74,310	2,372,000	31.92	0.96	71,160	1,067,400	320,220
Montgomery	14,410	429,600	29.81	0.89	12,888	193,320	57,996
Morgan	142,170	4,498,000	31.64	0.95	134,940	2,024,100	607,230
New Madrid	9,750	317,930	32.61	0.98	9,538	143,069	42,921
Newton	129,922	4,724,000	36.36	1.09	141,720	2,125,800	637,740
Nodaway	13,830	496,600	35.91	1.08	14,898	223,470	67,041
Osage	135,110	3,801,200	28.13	0.84	114,036	1,710,540	513,162
Pemiscot	41,878	1,613,444	38.53	1.16	48,403	726,050	217,815
Perry	68,370	2,295,300	33.57	1.01	68,859	1,032,885	309,866
Pettis	46,283	1,322,900	28.58	0.86	39,687	595,305	178,592
Phelps	60,550	2,182,000	36.04	1.08	65,460	981,900	294,570
Pike	46,010	1,760,500	38.26	1.15	52,815	792,225	237,668
Platte	23,860	933,980	39.14	1.17	28,019	420,291	126,087
Polk	16,840	601,000	35.69	1.07	18,030	270,450	81,135
Pulaski	79,930	2,745,500	34.35	1.03	82,365	1,235,475	370,643
Putnam	31,060	996,800	32.09	0.96	29,904	448,560	134,568
Ralls	86,220	3,208,100	37.21	1.12	96,243	1,443,645	433,094
Randolph	14,590	450,100	30.85	0.93	13,503	202,545	60,764
Ray	122,290	4,693,500	38.38	1.15	140,805	2,112,075	633,623
Ripley	25,922	898,333	34.65	1.04	26,950	404,250	121,275
St. Charles	57,380	2,056,300	35.84	1.08	61,689	925,335	277,601
St. Clair	85,700	2,791,200	32.57	0.98	83,736	1,256,040	376,812
Ste.	74,370	2,579,400	34.68	1.04	77,382	1,160,730	348,219

County	Harvested Acres per yr.	Production (Bu)/yr.	Yield (Bu/Acre)	Tons of residue per acre	Total tons of dry residue per yr.	Total biomass production Btu (million Btu) <sup>72</sup>	Available biomass Btu (million Btu) <sup>73</sup>
Genevieve							
St. Francois	46,070	1,812,700	39.35	1.18	54,381	815,715	244,715
St. Louis	27,950	856,400	30.64	0.92	25,692	385,380	115,614
Saline	7,317	220,600	30.15	0.90	6,618	99,270	29,781
Schuyler	31,640	1,100,700	34.79	1.04	33,021	495,315	148,595
Scotland	15,730	578,400	36.77	1.10	17,352	260,280	78,084
Scott	138,630	4,540,800	32.75	0.98	136,224	2,043,360	613,008
Shelby	23,830	770,100	32.32	0.97	23,103	346,545	103,964
Stoddard	61,640	1,770,900	28.73	0.86	53,127	796,905	239,072
Sullivan	31,260	1,119,300	35.81	1.07	33,579	503,685	151,106
Texas	16,010	502,750	31.40	0.94	15,083	226,238	67,871
Vernon	29,060	984,800	33.89	1.02	29,544	443,160	132,948
Totals	4,943,591	166,595,511			4,997,86	74,967,980	22,490,394

Counties not reporting are Camden, Carter, Crawford, Dent, Douglas, Howell, Iron, McDonald, Madison, Oregon, Ozark, Reynolds, Shannon, Stone, Taney, Warren, Washington, Wayne, Webster, Worth, Wright, and St Louis City.

**Appendix A, Table 6. Estimated production of cotton field waste residues and Btu available using 7,500 Btu per pound of dry matter.<sup>74</sup>**

County	Harvested Acres per yr.	Production (bales)/yr.	Yield (Bales/Acre)	Tons of residue per acre	Total tons dry residue per yr.	Total biomass production Btu (million Btu) <sup>75</sup>	Available production Btu (million Btu) <sup>76</sup>
Butler	495	550	1.11	1.00	495	7,425	2,228
Dade	130	125	0.96	0.87	113	1,688	506
Dunklin	151,270	215,550	1.42	1.28	193,995	2,909,925	872,978
Mississippi	1,300	1,610	1.24	1.11	1,449	21,735	6,521
New Madrid	99,000	149,880	1.51	1.36	134,892	2,023,380	607,014
Pemiscot	82,860	119,100	1.44	1.29	107,190	1,607,850	482,355
Scott	9,770	15,000	1.54	1.38	13,500	202,500	60,750
Stoddard	39,740	62,510	1.57	1.42	56,259	843,885	253,166
Totals	384,565	564,325			507,893	7,618,388	2,285,516

Counties not reporting are Adair, Andrew, Atchison, Audrain, Barry, Barton, Bates, Benton, Bollinger, Boone, Buchanan, Caldwell, Callaway, Camden, Cape Girardeau, Carroll, Carter, Cass, Cedar, Chariton, Christian, Clark, Clay, Clinton, Cole, Cooper, Crawford, Dallas, Daviess, DeKalb, Dent, Douglas, Franklin, Gasconade, Gentry, Greene, Grundy, Harrison, Henry, Hickory, Holt, Howard, Howell, Iron, Jackson, Jasper, Jefferson, Johnson, Knox, Laclede, Lafayette, Lawrence, Lewis, Lincoln, Linn, Livingston, McDonald, Macon, Madison, Maries, Marion, Mercer, Miller, Moniteau, Monroe, Montgomery, Morgan, Newton, Nodaway, Oregon, Osage, Ozark, Perry, Pettis, Phelps, Pike, Platte, Polk, Pulaski, Putnam, Ralls, Randolph, Ray, Reynolds, Ripley, St. Charles, St. Clair, Ste. Genevieve, St. Francois, St. Louis, Saline, Schuyler, Scotland, Shannon, Shelby, Stone, Sullivan, Taney, Texas, Vernon, Warren, Washington, Wayne, Webster, Worth, Wright, and St. Louis City.

<sup>74</sup> Table may not sum due to rounding

<sup>75</sup> Btu is found by taking bales times 1,200 pounds per bale (including gin waste, seed, and lent) times 1.5 pounds of residue per pound of gin waste, seed, and lent times 7,500 Btu per pound of residue.

<sup>76</sup> Assumes 30% of total biomass production is available for usage.

**Appendix A, Table 7. Estimated production of cotton gin waste residues Btu available using 7,000 Btu per pound of dry matter.<sup>77</sup>  
Btu of Energy Available From Cotton Gin Waste.<sup>78</sup>**

County	Harvested Acres per yr.	Production (bales)/yr.	Cotton Gin Waste (dry tons)	Btu available (million Btu) <sup>79</sup>
Butler	495	550	55	770
Dade	130	125	13	175
Dunklin	151,270	215,550	21,555	301,770
Mississippi	1,300	1,610	161	2,254
New Madrid	99,000	149,880	14,988	209,832
Pemiscot	82,860	119,100	11,910	166,740
Scott	9,770	15,000	1,500	21,000
Stoddard	39,740	62,510	6,251	87,514
Totals	384,565	564,325	56,433	790,055

Counties not reporting are Adair, Andrew, Atchison, Audrain, Barry, Barton, Bates, Benton, Bollinger, Boone, Buchanan, Caldwell, Callaway, Camden, Cape Girardeau, Carroll, Carter, Cass, Cedar, Chariton, Christian, Clark, Clay, Clinton, Cole, Cooper, Crawford, Dallas, Daviess, DeKalb, Dent, Douglas, Franklin, Gasconade, Gentry, Greene, Grundy, Harrison, Henry, Hickory, Holt, Howard, Howell, Iron, Jackson, Jasper, Jefferson, Johnson, Knox, Laclede, Lafayette, Lawrence, Lewis, Lincoln, Linn, Livingston, McDonald, Macon, Madison, Maries, Marion, Mercer, Miller, Moniteau, Monroe, Montgomery, Morgan, Newton, Nodaway, Oregon, Osage, Ozark, Perry, Pettis, Phelps, Pike, Platte, Polk, Pulaski, Putnam, Ralls, Randolph, Ray, Reynolds, Ripley, St. Charles, St. Clair, Ste. Genevieve, St. Francois, St. Louis, Saline, Schuyler, Scotland, Shannon, Shelby, Stone, Sullivan, Taney, Texas, Vernon, Warren, Washington, Wayne, Webster, Worth, Wright, and St. Louis City.

<sup>77</sup> Table may not sum due to rounding

<sup>78</sup> Assumes all cotton ginned in county where produced

<sup>79</sup> Btu is found by taking number of bales times 200 pounds of residue per bale times 8,000 Btu per pound of residue.

## Appendix A, Table 8. Cotton Gins located in Missouri.<sup>80</sup>

Name of Cotton Gin	City location	County location
D.G. & G. Cotton Gin Company	Sikeston	Scott
Matthews Cotton Company	Sikeston	Scott
Crowder Gin Company	Sikeston	Scott
Stoddard County Cotton Company	Bernie	Stoddard
Coppage Long Gin Co. Inc.	Braggadocio	Pemiscot
Cardwell COOP Gin # 1	Cardwell	Dunklin
Caruthersville Gin, Inc.	Caruthersville	Pemiscot
Hurley Cotton Company, LLC	Charleston	Mississippi
Cooter Cotton Gin, Inc.	Cooter	Pemiscot
J.P. Ross Cotton Co. Inc.	Essex	Stoddard
McCord Gin Company, Inc.	Gideon	New Madrid
Fletchers Gin, Inc.	Gideon	New Madrid
Peach Orchard Gin Company, Inc.	Gideon	New Madrid
R. M. Hart Gin & Elevator # 1	Holcomb	Dunklin
Edmonston Gin Co. Inc.	Hornersville	Dunklin
Stephens Gin Company	Kennett	Dunklin
Poe & Graves Gin, Inc.	Kennett	Dunklin
Stokes-Mayberry Gin Co. Inc.	Malden	Dunklin
Richardson Gin, Inc.	Marston	New Madrid
Big Prairie Cotton Co.	Matthews	New Madrid
A. C. Riley Cotton Company	New Madrid	New Madrid
Mahan Gin Company	Parma	New Madrid
Portageville Farmers Gin, Inc.	Portageville	New Madrid
Farmers Union Gin Company	Senath	Dunklin
Four Way Gin Company, Inc.	Senath	Dunklin
Dalton Cotton Company, Inc.	Senath	Dunklin
Still Gin Inc.	Steele	Pemiscot
Citizens Gin Inc.	Wardell	Pemiscot
Whiteoak Gin Company, Inc.	Whiteoak	Dunklin
B. & B. Cotton Company	Campbell	Dunklin

<sup>80</sup> All cotton grown in Missouri is not ginned in Missouri; however, the assumption is accepted that cotton leaving the state for ginning will be equaled by cotton entering the state. Data provided by the Missouri Department of Agriculture.



**Appendix A, Table 9. Counties where significant tall fescue seed processing screenings could be found (based on phone interviews with seed processors).<sup>81</sup>**

County of Production	Estimated pounds of dry screenings per year*	Btu produced per year (Million Btu) <sup>82</sup>
Phelps County	600,000	4,800
Henry County	3,200,000	25,600
Perry County	3,000,000	24,000
Cape Girardeau County	2,000,000	16,000
Dade County	8,000,000	64,000
Livingston County	50,000	400
Totals	16,850,000	134,800

\*primarily tall fescue screenings

**Appendix A, Table 10. Potential Tall Fescue processing screenings and projected energy content in Missouri of Tall Fescue grown for seed.<sup>83</sup>**

County	Farms	Acres	Pounds	Estimated lb of dry Screenings	Btu (Million Btu) <sup>84</sup>
Adair	4	9	1,315	329	3
Audrain	26	1,212	300,332	75,083	601
Barry	144	12,545	3,059,748	764,937	6,119
Barton	82	4,505	628,145	157,036	1,256
Bates	70	6,358	1,132,344	283,086	2,265
Benton	35	2,405	354,582	88,646	709
Bollinger	82	(D)	1,300,583	325,146	2,601
Buchanan	4	27	4,526	1,132	9
Callaway	13	558	94,668	23,667	189
Camden	25	1,998	344,486	86,122	689
Cape Girardeau	36	2,175	492,123	123,031	984
Carroll	6	206	22,712	5,678	45
Carter	3	61	4,300	1,075	9
Cass	13	651	101,690	25,423	203
Cedar	74	(D)	1,076,705	269,176	2,153

<sup>81</sup> Seed processors were interviewed and asked for their estimates of screenings available per county. The leading six producers were summarized (based on their input) in this table

<sup>82</sup> Btu found by taking pounds of screenings times 8,000 Btu per pound of screenings.

<sup>83</sup> Acreage from the 2002 Census of Agriculture.

<sup>84</sup> Btu found by taking pounds of seed times 25% (to find pounds of screenings) times 8,000 Btu per pound of screenings.

County	Farms	Acres	Pounds	Estimated lb of dry Screenings	Btu (Million Btu) <sup>84</sup>
Christian	58	(D)	759,276	189,819	1,519
Cole	52	2,252	370,955	92,739	742
Cooper	26	1,210	272,463	68,116	545
Crawford	3	(D)	110,623	27,656	221
Dade	88	10,532	2,051,267	512,817	4,103
Dallas	62	(D)	987,930	246,983	1,976
DeKalb	3	67	10,705	2,676	21
Dent	7	(D)	90,510	22,628	181
Douglas	29	(D)	422,135	105,534	844
Franklin	13	577	136,932	34,233	274
Gasconade	30	2,452	572,251	143,063	1,145
Greene	78	(D)	924,938	231,235	1,850
Henry	131	17,394	3,661,266	915,317	7,323
Hickory	77	7,838	1,098,807	274,702	2,198
Howard	6	333	47,750	11,938	96
Howell	108	8,931	1,866,477	466,619	3,733
Jasper	80	6,510	1,318,408	329,602	2,637
Jefferson	6	77	9,600	2,400	19
Johnson	72	7,617	1,176,678	294,170	2,353
Laclede	43	(D)	516,207	129,052	1,032
Lafayette	15	454	94,784	23,696	190
Lawrence	209	18,822	3,930,570	982,643	7,861
Livingston	3	(D)	594	149	1
McDonald	24	2,314	516,498	129,125	1,033
Maries	97	6,922	1,322,351	330,588	2,645
Marion	6	163	10,562	2,641	21
Miller	150	12,117	2,761,786	690,447	5,524
Moniteau	114	16,209	4,047,882	1,011,971	8,096
Monroe	5	(D)	8,856	2,214	18
Montgomery	10	480	44,640	11,160	89
Morgan	97	8,991	1,657,866	414,467	3,316
Newton	109	(D)	2,287,667	571,917	4,575
Nodaway	3	20	7,000	1,750	14
Oregon	98	10,757	2,228,490	557,123	4,457
Osage	70	(D)	975,606	243,902	1,951
Ozark	30	(D)	1,065,339	266,335	2,131
Perry	51	2,720	561,773	140,443	1,124
Pettis	61	6,833	1,296,683	324,171	2,593

County	Farms	Acres	Pounds	Estimated lb of dry Screenings	Btu (Million Btu) <sup>84</sup>
Phelps	15	723	128,587	32,147	257
Pike	4	502	202,320	50,580	405
Polk	214	20,365	3,958,211	989,553	7,916
Pulaski	29	(D)	461,257	115,314	923
Ralls	3	108	32,600	8,150	65
Ripley	9	920	160,693	40,173	321
St. Clair	137	18,038	3,774,845	943,711	7,550
Ste. Genevieve	10	3,150	741,500	185,375	1,483
Saline	6	399	50,052	12,513	100
Shannon	9	(D)	119,725	29,931	239
Shelby	15	558	106,620	26,655	213
Stone	10	(D)	59,993	14,998	120
Taney	4	350	94,400	23,600	189
Texas	106	12,664	2,429,747	607,437	4,859
Vernon	91	8,412	1,765,565	441,391	3,531
Webster	42	3,231	825,438	206,360	1,651
Wright	58	(D)	1,184,418	296,105	2,369
Misc. Counties			551,742	137,936	1,103
<b>Totals</b>			<b>64,790,097</b>	<b>16,197,524</b>	<b>129,580</b>

(D) Data withheld to avoid disclosing data for individual farms.

Counties not reporting are Andrew, Atchison, Boone, Butler, Caldwell, Chariton, Clark, Clay, Clinton, Daviess, DeKalb, Dunklin, Gentry, Grundy, Harrison, Henry, Hickory, Howard, Howell, Knox, Lewis, Lincoln, Linn, Macon, Madison, Mercer, Mississippi, Newton, Perry, Polk, Ralls, Ray, Reynolds, St. Charles, St. Francois, St. Louis, Schuyler, Scotland, Scott, Stoddard, Sullivan, Warren, Washington, Wayne, and Wright.

**Appendix B, Table 1. Potential energy production of switchgrass on CRP land in Missouri counties using 7,467 Btu per pound of dry matter<sup>85</sup>**

County	CRP Acreage as of Sept. 2004	Yield at 5 dry tons per acre	Yield at 7 dry tons per acre	Yield at 10 dry tons per acre	Btu at 5 Tons per acre (millions Btu)* <sup>86</sup>	Btu at 7 Tons per acre (millions Btu)*	Btu at 10 Tons per acre (millions Btu)*
Adair	32,041	160,205	224,287	320,410	2,392,501	3,349,502	4,785,003
Andrew	20,093	100,465	140,651	200,930	1,500,344	2,100,482	3,000,689
Atchison	9,040	45,200	63,280	90,400	675,017	945,024	1,350,034
Audrain	15,805	79,025	110,635	158,050	1,180,159	1,652,223	2,360,319
Barry	376	1,880	2,632	3,760	28,076	39,306	56,152
Barton	21,247	106,235	148,729	212,470	1,586,513	2,221,119	3,173,027
Bates	18,651	93,255	130,557	186,510	1,392,670	1,949,738	2,785,340
Benton	1,190	5,950	8,330	11,900	88,857	124,400	177,715
Bollinger	2,752	13,760	19,264	27,520	205,492	287,689	410,984
Boone	9,113	45,565	63,791	91,130	680,468	952,655	1,360,935
Buchanan	10,424	52,120	72,968	104,240	778,360	1,089,704	1,556,720
Butler	669	3,345	4,683	6,690	49,954	69,936	99,908
Caldwell	42,846	214,230	299,922	428,460	3,199,311	4,479,035	6,398,622
Callaway	12,586	62,930	88,102	125,860	939,797	1,315,715	1,879,593
Cape girardeau	13,718	68,590	96,026	137,180	1,024,323	1,434,052	2,048,646
Carroll	57,608	288,040	403,256	576,080	4,301,589	6,022,225	8,603,179
Carter	91	455	637	910	6,795	9,513	13,590
Cass	9,034	45,170	63,238	90,340	674,569	944,396	1,349,138
Cedar	3,462	17,310	24,234	34,620	258,508	361,911	517,015
Chariton	39,450	197,250	276,150	394,500	2,945,732	4,124,024	5,891,463
Christian	210	1,050	1,470	2,100	15,681	21,953	31,361
Clark	23,765	118,825	166,355	237,650	1,774,533	2,484,346	3,549,065
Clay	1,547	7,735	10,829	15,470	115,514	161,720	231,029
Clinton	22,224	111,120	155,568	222,240	1,659,466	2,323,253	3,318,932
Cole	1,371	6,855	9,597	13,710	102,373	143,322	204,745
Cooper	15,659	78,295	109,613	156,590	1,169,258	1,636,961	2,338,515
Crawford	342	1,710	2,394	3,420	25,537	35,752	51,074
Dade	5,059	25,295	35,413	50,590	377,756	528,858	755,511
Dallas	385	1,925	2,695	3,850	28,748	40,247	57,496
Daviess	57,126	285,630	399,882	571,260	4,265,598	5,971,838	8,531,197
Dekalb	43,188	215,940	302,316	431,880	3,224,848	4,514,787	6,449,696
Dent	165	825	1,155	1,650	12,321	17,249	24,641
Douglas	779	3,895	5,453	7,790	58,168	81,435	116,336
Dunklin	1,764	8,820	12,348	17,640	131,718	184,405	263,436
Franklin	5,023	25,115	35,161	50,230	375,067	525,094	750,135
Gasconade	1,101	5,505	7,707	11,010	82,212	115,096	164,423

<sup>85</sup> Counties with zero acres had no enrolled acres

<sup>86</sup> Btu found by taking dry tons times 7,467 Btu per dry pound

County	CRP Acreage as of Sept. 2004	Yield at 5 dry tons per acre	Yield at 7 dry tons per acre	Yield at 10 dry tons per acre	Btu at 5 Tons per acre (millions Btu)* <sup>86</sup>	Btu at 7 Tons per acre (millions Btu)*	Btu at 10 Tons per acre (millions Btu)*
Gentry	58,549	292,745	409,843	585,490	4,371,854	6,120,595	8,743,708
Greene	85	425	595	850	6,347	8,886	12,694
Grundy	46,707	233,535	326,949	467,070	3,487,612	4,882,656	6,975,223
Harrison	78,147	390,735	547,029	781,470	5,835,236	8,169,331	11,670,473
Henry	9,524	47,620	66,668	95,240	711,157	995,620	1,422,314
Hickory	484	2,420	3,388	4,840	36,140	50,596	72,281
Holt	5,956	29,780	41,692	59,560	444,735	622,628	889,469
Howard	17,217	86,085	120,519	172,170	1,285,593	1,799,831	2,571,187
Howell	237	1,185	1,659	2,370	17,697	24,776	35,394
Iron	51	255	357	510	3,808	5,331	7,616
Jackson	382	1,910	2,674	3,820	28,524	39,934	57,048
Jasper	9,739	48,695	68,173	97,390	727,211	1,018,096	1,454,422
Jefferson	375	1,875	2,625	3,750	28,001	39,202	56,003
Johnson	10,977	54,885	76,839	109,770	819,653	1,147,514	1,639,305
Knox	40,331	201,655	282,317	403,310	3,011,516	4,216,122	6,023,032
Laclede	361	1,805	2,527	3,610	26,956	37,738	53,912
Lafayette	7,120	35,600	49,840	71,200	531,650	744,311	1,063,301
Lawrence	6,080	30,400	42,560	60,800	453,994	635,591	907,987
Lewis	24,251	121,255	169,757	242,510	1,810,822	2,535,151	3,621,644
Lincoln	9,765	48,825	68,355	97,650	729,153	1,020,814	1,458,305
Linn	63,176	315,880	442,232	631,760	4,717,352	6,604,293	9,434,704
Livingston	39,950	199,750	279,650	399,500	2,983,067	4,176,293	5,966,133
Mcdonald	163	815	1,141	1,630	12,171	17,040	24,342
Macon	51,203	256,015	358,421	512,030	3,823,328	5,352,659	7,646,656
Madison	238	1,190	1,666	2,380	17,771	24,880	35,543
Maries	421	2,105	2,947	4,210	31,436	44,010	62,872
Marion	15,485	77,425	108,395	154,850	1,156,265	1,618,771	2,312,530
Mercer	43,957	219,785	307,699	439,570	3,282,269	4,595,177	6,564,538
Miller	27	135	189	270	2,016	2,823	4,032
Mississippi	1,676	8,380	11,732	16,760	125,147	175,206	250,294
Moniteau	10,152	50,760	71,064	101,520	758,050	1,061,270	1,516,100
Monroe	34,224	171,120	239,568	342,240	2,555,506	3,577,709	5,111,012
Montgomery	7,228	36,140	50,596	72,280	539,715	755,601	1,079,430
Morgan	512	2,560	3,584	5,120	38,231	53,523	76,462
New madrid	1,535	7,675	10,745	15,350	114,618	160,466	229,237
Newton	2,537	12,685	17,759	25,370	189,438	265,213	378,876
Nodaway	50,200	251,000	351,400	502,000	3,748,434	5,247,808	7,496,868
Oregon	124	620	868	1,240	9,259	12,963	18,518
Osage	605	3,025	4,235	6,050	45,175	63,245	90,351
Ozark	45	225	315	450	3,360	4,704	6,720
Pemiscot	1,023	5,115	7,161	10,230	76,387	106,942	152,775
Perry	7,058	35,290	49,406	70,580	527,021	737,829	1,054,042
Pettis	11,930	59,650	83,510	119,300	890,813	1,247,138	1,781,626
Phelps	201	1,005	1,407	2,010	15,009	21,012	30,017
Pike	10,783	53,915	75,481	107,830	805,167	1,127,233	1,610,333

County	CRP Acreage as of Sept. 2004	Yield at 5 dry tons per acre	Yield at 7 dry tons per acre	Yield at 10 dry tons per acre	Btu at 5 Tons per acre (millions Btu)* <sup>86</sup>	Btu at 7 Tons per acre (millions Btu)*	Btu at 10 Tons per acre (millions Btu)*
Platte	4,488	22,440	31,416	44,880	335,119	469,167	670,238
Polk	1,126	5,630	7,882	11,260	84,078	117,710	168,157
Putnam	34,417	172,085	240,919	344,170	2,569,917	3,597,884	5,139,835
Ralls	19,802	99,010	138,614	198,020	1,478,615	2,070,061	2,957,231
Randolph	33,894	169,470	237,258	338,940	2,530,865	3,543,211	5,061,730
Ray	25,169	125,845	176,183	251,690	1,879,369	2,631,117	3,758,738
Ripley	1,278	6,390	8,946	12,780	95,428	133,600	190,857
St charles	687	3,435	4,809	6,870	51,298	71,818	102,597
St clair	5,450	27,250	38,150	54,500	406,952	569,732	813,903
St francois	651	3,255	4,557	6,510	48,610	68,054	97,220
St louis	126	630	882	1,260	9,408	13,172	18,817
Ste genevieve	4,677	23,385	32,739	46,770	349,232	488,924	698,463
Saline	12,983	64,915	90,881	129,830	969,441	1,357,217	1,938,881
Schuyler	18,920	94,600	132,440	189,200	1,412,756	1,977,859	2,825,513
Scotland	42,789	213,945	299,523	427,890	3,195,055	4,473,076	6,390,109
Scott	3,236	16,180	22,652	32,360	241,632	338,285	483,264
Shelby	17,087	85,435	119,609	170,870	1,275,886	1,786,241	2,551,773
Stoddard	20,041	100,205	140,287	200,410	1,496,461	2,095,046	2,992,923
Stone	42	210	294	420	3,136	4,391	6,272
Sullivan	59,261	296,305	414,827	592,610	4,425,019	6,195,026	8,850,038
Vernon	35,606	178,030	249,242	356,060	2,658,700	3,722,180	5,317,400
Warren	3,962	19,810	27,734	39,620	295,843	414,180	591,685
Wayne	497	2,485	3,479	4,970	37,111	51,955	74,222
Webster	102	510	714	1,020	7,616	10,663	15,233
Worth	29,801	149,005	208,607	298,010	2,225,241	3,115,337	4,450,481
Total		7,783,935	10,897,509	15,567,870	116,245,285	162,743,399	232,490,571

\*rounding errors can result in differences

**Appendix B, Table 2. Potential energy production of hybrid poplars on CRP land in Missouri counties using 8,200 Btu per pound of dry matter.<sup>87</sup>**

County	Acreage as of Sept. 2004	Yield at 5 dry tons per acre	Yield at 7 dry tons per acre	Yield at 10 dry tons per acre	Btu at 5 Tons per acre (millions Btu) <sup>*88</sup>	Btu at 7 Tons per acre (millions Btu) <sup>*</sup>	Btu at 10 Tons per acre (millions Btu) <sup>*</sup>
Adair	32,041	160,205	224,287	320,410	2,627,362	3,678,307	5,254,724
Andrew	20,093	100,465	140,651	200,930	1,647,626	2,306,676	3,295,252
Atchison	9,040	45,200	63,280	90,400	741,280	1,037,792	1,482,560
Audrain	15,805	79,025	110,635	158,050	1,296,010	1,814,414	2,592,020
Barry	376	1,880	2,632	3,760	30,832	43,165	61,664
Barton	21,247	106,235	148,729	212,470	1,742,254	2,439,156	3,484,508
Bates	18,651	93,255	130,557	186,510	1,529,382	2,141,135	3,058,764
Benton	1,190	5,950	8,330	11,900	97,580	136,612	195,160
Bollinger	2,752	13,760	19,264	27,520	225,664	315,930	451,328
Boone	9,113	45,565	63,791	91,130	747,266	1,046,172	1,494,532
Buchanan	10,424	52,120	72,968	104,240	854,768	1,196,675	1,709,536
Butler	669	3,345	4,683	6,690	54,858	76,801	109,716
Caldwell	42,846	214,230	299,922	428,460	3,513,372	4,918,721	7,026,744
Callaway	12,586	62,930	88,102	125,860	1,032,052	1,444,873	2,064,104
Camden		0	0	0	0	0	0
Cape Girardeau	13,718	68,590	96,026	137,180	1,124,876	1,574,826	2,249,752
Carroll	57,608	288,040	403,256	576,080	4,723,856	6,613,398	9,447,712
Carter	91	455	637	910	7,462	10,447	14,924
Cass	9,034	45,170	63,238	90,340	740,788	1,037,103	1,481,576
Cedar	3,462	17,310	24,234	34,620	283,884	397,438	567,768
Chariton	39,450	197,250	276,150	394,500	3,234,900	4,528,860	6,469,800
Christian	210	1,050	1,470	2,100	17,220	24,108	34,440
Clark	23,765	118,825	166,355	237,650	1,948,730	2,728,222	3,897,460
Clay	1,547	7,735	10,829	15,470	126,854	177,596	253,708
Clinton	22,224	111,120	155,568	222,240	1,822,368	2,551,315	3,644,736
Cole	1,371	6,855	9,597	13,710	112,422	157,391	224,844
Cooper	15,659	78,295	109,613	156,590	1,284,038	1,797,653	2,568,076
Crawford	342	1,710	2,394	3,420	28,044	39,262	56,088
Dade	5,059	25,295	35,413	50,590	414,838	580,773	829,676
Dallas	385	1,925	2,695	3,850	31,570	44,198	63,140
Daviess	57,126	285,630	399,882	571,260	4,684,332	6,558,065	9,368,664
Dekalb	43,188	215,940	302,316	431,880	3,541,416	4,957,982	7,082,832
Dent	165	825	1,155	1,650	13,530	18,942	27,060
Douglas	779	3,895	5,453	7,790	63,878	89,429	127,756
Dunklin	1,764	8,820	12,348	17,640	144,648	202,507	289,296
Franklin	5,023	25,115	35,161	50,230	411,886	576,640	823,772
Gasconade	1,101	5,505	7,707	11,010	90,282	126,395	180,564

<sup>87</sup> Counties with zero acres had no enrolled acres

<sup>88</sup> Btu found by taking dry tons times 8,200 Btu per pound.

County	Acreege as of Sept. 2004	Yield at 5 dry tons per acre	Yield at 7 dry tons per acre	Yield at 10 dry tons per acre	Btu at 5 Tons per acre (millions Btu)* <sup>88</sup>	Btu at 7 Tons per acre (millions Btu)*	Btu at 10 Tons per acre (millions Btu)*
Gentry	58,549	292,745	409,843	585,490	4,801,018	6,721,425	9,602,036
Greene	85	425	595	850	6,970	9,758	13,940
Grundy	46,707	233,535	326,949	467,070	3,829,974	5,361,964	7,659,948
Harrison	78,147	390,735	547,029	781,470	6,408,054	8,971,276	12,816,108
Henry	9,524	47,620	66,668	95,240	780,968	1,093,355	1,561,936
Hickory	484	2,420	3,388	4,840	39,688	55,563	79,376
Holt	5,956	29,780	41,692	59,560	488,392	683,749	976,784
Howard	17,217	86,085	120,519	172,170	1,411,794	1,976,512	2,823,588
Howell	237	1,185	1,659	2,370	19,434	27,208	38,868
Iron	51	255	357	510	4,182	5,855	8,364
Jackson	382	1,910	2,674	3,820	31,324	43,854	62,648
Jasper	9,739	48,695	68,173	97,390	798,598	1,118,037	1,597,196
Jefferson	375	1,875	2,625	3,750	30,750	43,050	61,500
Johnson	10,977	54,885	76,839	109,770	900,114	1,260,160	1,800,228
Knox	40,331	201,655	282,317	403,310	3,307,142	4,629,999	6,614,284
Laclede	361	1,805	2,527	3,610	29,602	41,443	59,204
Lafayette	7,120	35,600	49,840	71,200	583,840	817,376	1,167,680
Lawrence	6,080	30,400	42,560	60,800	498,560	697,984	997,120
Lewis	24,251	121,255	169,757	242,510	1,988,582	2,784,015	3,977,164
Lincoln	9,765	48,825	68,355	97,650	800,730	1,121,022	1,601,460
Linn	63,176	315,880	442,232	631,760	5,180,432	7,252,605	10,360,864
Livingston	39,950	199,750	279,650	399,500	3,275,900	4,586,260	6,551,800
McDonald	163	815	1,141	1,630	13,366	18,712	26,732
Macon	51,203	256,015	358,421	512,030	4,198,646	5,878,104	8,397,292
Madison	238	1,190	1,666	2,380	19,516	27,322	39,032
Maries	421	2,105	2,947	4,210	34,522	48,331	69,044
Marion	15,485	77,425	108,395	154,850	1,269,770	1,777,678	2,539,540
Mercer	43,957	219,785	307,699	439,570	3,604,474	5,046,264	7,208,948
Miller	27	135	189	270	2,214	3,100	4,428
Mississippi	1,676	8,380	11,732	16,760	137,432	192,405	274,864
Moniteau	10,152	50,760	71,064	101,520	832,464	1,165,450	1,664,928
Monroe	34,224	171,120	239,568	342,240	2,806,368	3,928,915	5,612,736
Montgomery	7,228	36,140	50,596	72,280	592,696	829,774	1,185,392
Morgan	512	2,560	3,584	5,120	41,984	58,778	83,968
New Madrid	1,535	7,675	10,745	15,350	125,870	176,218	251,740
Newton	2,537	12,685	17,759	25,370	208,034	291,248	416,068
Nodaway	50,200	251,000	351,400	502,000	4,116,400	5,762,960	8,232,800
Oregon	124	620	868	1,240	10,168	14,235	20,336
Osage	605	3,025	4,235	6,050	49,610	69,454	99,220
Ozark	45	225	315	450	3,690	5,166	7,380
Pemiscot	1,023	5,115	7,161	10,230	83,886	117,440	167,772
Perry	7,058	35,290	49,406	70,580	578,756	810,258	1,157,512
Pettis	11,930	59,650	83,510	119,300	978,260	1,369,564	1,956,520
Phelps	201	1,005	1,407	2,010	16,482	23,075	32,964
Pike	10,783	53,915	75,481	107,830	884,206	1,237,888	1,768,412
Platte	4,488	22,440	31,416	44,880	368,016	515,222	736,032



County	Acreege as of Sept. 2004	Yield at 5 dry tons per acre	Yield at 7 dry tons per acre	Yield at 10 dry tons per acre	Btu at 5 Tons per acre (millions Btu)* <sup>88</sup>	Btu at 7 Tons per acre (millions Btu)*	Btu at 10 Tons per acre (millions Btu)*
Polk	1,126	5,630	7,882	11,260	92,332	129,265	184,664
Pulaski	0	0	0	0	0	0	0
Putnam	34,417	172,085	240,919	344,170	2,822,194	3,951,072	5,644,388
Ralls	19,802	99,010	138,614	198,020	1,623,764	2,273,270	3,247,528
Randolph	33,894	169,470	237,258	338,940	2,779,308	3,891,031	5,558,616
Ray	25,169	125,845	176,183	251,690	2,063,858	2,889,401	4,127,716
Reynolds		0	0	0	0	0	0
Ripley	1,278	6,390	8,946	12,780	104,796	146,714	209,592
St Charles	687	3,435	4,809	6,870	56,334	78,868	112,668
St Clair	5,450	27,250	38,150	54,500	446,900	625,660	893,800
St Francois	651	3,255	4,557	6,510	53,382	74,735	106,764
St Louis	126	630	882	1,260	10,332	14,465	20,664
Ste Genevieve	4,677	23,385	32,739	46,770	383,514	536,920	767,028
Saline	12,983	64,915	90,881	129,830	1,064,606	1,490,448	2,129,212
Schuyler	18,920	94,600	132,440	189,200	1,551,440	2,172,016	3,102,880
Scotland	42,789	213,945	299,523	427,890	3,508,698	4,912,177	7,017,396
Scott	3,236	16,180	22,652	32,360	265,352	371,493	530,704
Shannon		0	0	0	0	0	0
Shelby	17,087	85,435	119,609	170,870	1,401,134	1,961,588	2,802,268
Stoddard	20,041	100,205	140,287	200,410	1,643,362	2,300,707	3,286,724
Stone	42	210	294	420	3,444	4,822	6,888
Sullivan	59,261	296,305	414,827	592,610	4,859,402	6,803,163	9,718,804
Taney		0	0	0	0	0	0
Texas		0	0	0	0	0	0
Vernon	35,606	178,030	249,242	356,060	2,919,692	4,087,569	5,839,384
Warren	3,962	19,810	27,734	39,620	324,884	454,838	649,768
Washington		0	0	0	0	0	0
Wayne	497	2,485	3,479	4,970	40,754	57,056	81,508
Webster	102	510	714	1,020	8,364	11,710	16,728
Worth	29,801	149,005	208,607	298,010	2,443,682	3,421,155	4,887,364
Wright	0	0	0	0	0	0	0
St Louis city	0	0	0	0	0	0	0
Totals		7,783,935	10,897,509	15,567,870	127,656,534	178,719,148	255,313,068

\* rounding errors can result in differences

## Appendix C, Table 1. Landfill gas potential based on projected 2004-2008 average annual gas flow<sup>89</sup>

County	Landfill Name	Landfill Gas Recovery - 2004-2008 Average		Power Generating Potential	Natural Gas Equivalent	Btu (millions) <sup>90</sup>	County Btu (millions)
		(cfm)	(MMBtu/hr)	(MW)	(Mcf)		
Barton	Prairieview	495	15.0	1.4	130.1	131,647	131,647
Boone	Columbia	341	10.4	0.9	89.6	90,690	90,690
Buchanan	St. Josephs	469	14.2	1.3	123.3	124,732	124,732
Butler	Butler County	624	18.9	1.7	164.0	165,955	165,955
Clay	Courtney Ridge	1,787	54.3	4.9	469.6	475,259	475,259
Cole	Jefferson City	779	23.7	2.2	204.7	207,178	207,178
Greene	Springfield	1,025	31.1	2.8	269.4	272,602	272,602
Jackson	Southeast	1,744	52.9	4.8	458.3	463,823	682,969
	Rumble 2	824	25.0	2.3	216.5	219,146	
Johnson	Show Me Regional	1,117	33.9	3.1	293.5	297,070	502,386
	Lee's Summit	772	23.4	2.1	202.9	205,316	
Lewis	Backridge	347	10.5	1.0	91.2	92,286	92,286
Newton	Newton McDonald	277	8.4	0.8	72.8	73,669	73,669
Pettis	Central Missouri	676	20.5	1.9	177.7	179,785	179,785
St. Louis	Bridgeton	3,826	116.2	10.6	1,005.5	1,017,538	2,276,563
	Missouri Pass	2,512	76.3	6.9	660.2	668,075	
	Fred Weber	966	29.3	2.7	253.9	256,911	
	Onyx Maple Hill	956	29.0	2.6	251.2	254,252	
	Onyx Oak Ridge	300	9.1	0.8	78.8	79,786	
Stoddard	Lemons East	629	19.1	1.7	165.3	167,285	167,285
Warren	Autoshred	1,200	36.4	3.3	315.4	319,144	319,144
Wright	Black Oak	592	18.0	1.6	155.6	157,445	157,445
Potential LFG		22,258	676	61	5,849	5,919,595	5,919,595

<sup>89</sup> Table may not sum due to rounding

<sup>90</sup> Btu found by taking cfm times 506 times 60 minutes per hour times 24 hours per day times 365 days per year as per data of John Noller, Energy Center, MDNR

## Appendix C, Table 2. Landfill gas potential based on projected 2004-2014 minimum annual gas flow<sup>91</sup>

		Landfill Gas Recovery - 2005-2014 Minimum		Power Generating Potential	Natural Gas Equivalent		
County	Landfill Name	(cfm)	(MMBtu/hr)	(MW)	(Mcf)	Btu (millions) <sup>92</sup>	County Btu (millions)
Barton	Prairieview	452	13.7	1.2	118.8	120,211	120,211
Boone	Columbia	319	9.7	0.9	83.8	84,839	84,839
Buchanan	St. Josephs	346	10.5	1.0	90.9	92,020	92,020
Butler	Butler County	604	18.3	1.7	158.7	160,636	160,636
Clay	Courtney Ridge	1,650	50.1	4.6	433.6	438,823	438,823
Cole	Jefferson City	709	21.5	2.0	186.3	188,561	188,561
Greene	Springfield	994	30.2	2.7	261.2	264,358	264,358
Jackson	Southeast	1,264	38.4	3.5	332.2	336,165	493,344
	Rumble 2	591	17.9	1.6	155.3	157,179	
Johnson	Show Me Regional	1,021	31.0	2.8	268.3	271,539	468,876
	Lee Summit	742	22.5	2.0	195.0	197,338	
Lewis	Backridge	320	9.7	0.9	84.1	85,105	85,105
Newton	Newton McDonald	201	6.1	0.6	52.8	53,457	53,457
Pettis	Central Missouri	497	15.1	1.4	130.6	132,179	132,179
St. Louis	Bridgeton	3,055	92.7	8.4	802.9	812,488	1,838,005
	Missouri Pass	1,821	55.3	5.0	478.6	484,302	
	Onyx Maple Hill	918	27.9	2.5	241.3	244,145	
	Fred Weber	817	24.8	2.3	214.7	217,284	
	Onyx Oak Ridge	300	9.1	0.8	78.8	79,786	
Stoddard	Lemons East	589	17.9	1.6	154.8	156,647	156,647
Warren	Autoshred	870	26.4	2.4	228.6	231,380	231,380
Wright	Black Oak	522	15.8	1.4	137.2	138,828	138,828
Potential LFG		18,602	564.8	51.3	4,888.6	4,947,269	4,947,269

Counties not reporting are Adair, Andrew, Atchison, Audrain, Barry, Bates, Benton, Bollinger, Caldwell, Callaway, Camden, Cape Girardeau, Carroll, Carter, Cass, Cedar, Chariton, Christian, Clark, Clinton, Cooper, Crawford, Dade, Dallas, Daviess, DeKalb, Dent, Douglas, Dunklin, Franklin, Gasconade, Gentry, Grundy, Harrison, Henry, Hickory, Holt, Howard, Howell, Iron, Jasper, Jefferson, Knox, Laclede, Lafayette, Lawrence, Lincoln, Linn, Livingston, McDonald, Macon, Madison, Maries, Marion, Mercer, Miller, Mississippi, Moniteau, Monroe, Montgomery, Morgan, New Madrid, Nodaway, Oregon, Osage, Ozark, Pemiscot, Perry, Phelps, Pike, Platte, Polk, Pulaski, Putnam, Ralls, Randolph, Ray, Reynolds, Ripley, St. Charles, St. Clair, Ste. Genevieve, St. Francois, Saline, Schuyler, Scotland, Scott, Shannon, Shelby, Stone, Sullivan, Taney, Texas, Vernon, Washington, Wayne, Webster, Worth, and St Louis City.

<sup>91</sup> Tables may not sum due to rounding

<sup>92</sup> Btu found by taking cfm times 506 times 60 minutes per hour times 24 hours per day times 365 days per year as per data of John Noller, Energy Center, MDNR

**Appendix D. Table 1. Total animal wastes per species and county total (includes Class 1A, 1B, and 1C and Class II MDNR animal feeding operations).<sup>93</sup>**

County	Type	Number of Animals/yr	Amount of dry waste per year	County amount of dry waste per year	Btu (Millions) <sup>94</sup>	County Btu (Millions)
Atchison	Swine	4,600	1,679,000	1,679,000	13,489	13,489
Audrain	Chickens	50,000	1,022,000	18,636,900	4,729	146,247
	Swine	48,260	17,614,900		141,518	
Barry	Chickens	6,829,725	139,599,579	185,998,562	645,927	932,116
	Turkey	564,980	46,398,983		286,189	
Barton	Swine	2,142	781,830	781,830	6,281	6,281
Bates	Beef	8,720	19,096,800	23,781,575	133,678	171,315
	Swine	12,835	4,684,775		37,637	
Benton	Chickens	1,535,375	31,383,065	31,383,065	145,209	145,209
Bollinger	Chickens	160,000	3,270,400	3,270,400	15,132	15,132
Boone	Swine	15,401	5,621,365	5,621,365	45,162	45,162
Caldwell	Swine	11,530	4,208,450	4,208,450	33,811	33,811
Callaway	Dairy	605	1,589,940	16,601,295	11,284	131,885
	Swine	41,127	15,011,355		120,601	
Camden	Swine	9,008	3,287,920	3,287,920	26,415	26,415
Carroll	Swine	10,000	3,650,000	3,650,000	29,324	29,324
Cass	Swine	18,268	6,667,820	6,667,820	53,569	53,569
Chariton	Beef	450	985,500	4,599,730	6,899	35,935
	Swine	9,902	3,614,230		29,037	
Christian	Turkey	82,740	6,795,023	6,795,023	41,912	41,912
Cole	Swine	23,060	8,416,900	8,416,900	67,621	67,621
Cooper	Beef	1,200	2,628,000	7,308,249	18,396	49,061
	Chickens	99,600	2,035,824		9,420	
	Swine	7,245	2,644,425		21,245	
Dade	Swine	8,710	3,179,150	8,420,860	25,541	57,872
	Turkey	63,826	5,241,710		32,331	
Dallas	Dairy	145	381,060	2,833,860	2,704	14,053
	Chickens	120,000	2,452,800		11,349	
Daviess	Swine	67,853	24,766,345	24,766,345	198,973	198,973
De Kalb	Swine	7,440	2,715,600	2,715,600	21,817	21,817
Franklin	Dairy	150	394,200	5,230,085	2,798	41,649
	Swine	13,249	4,835,885		38,852	
Gasconade	Dairy	160	420,480	1,588,480	2,984	12,368
	Swine	3,200	1,168,000		9,384	
Gentry	Swine	104,310	38,073,150	38,073,150	305,880	305,880
Grundy	Swine	9,600	3,504,000	3,504,000	28,151	28,151

<sup>93</sup> Tables may not sum due to rounding

<sup>94</sup> Btu found by taking number of animals times 1 pound per day for swine, .056 pounds per day for chickens, .225 pounds per day for turkeys, 6 pounds per day for beef, 7 pounds per day for Dairy, times 365 days per year, times 8,034 Btu per pound for swine, 4,627 Btu per pound for chickens, 6,168 Btu per pound for turkeys, 7,000 Btu for beef, and 7,097 for dairy (all weights are dry pounds)

County	Type	Number of Animals/yr	Amount of dry waste per year	County amount of dry waste per year	Btu (Millions) <sup>94</sup>	County Btu (Millions)
Harrison	Chickens	810,000	16,556,400	20,952,825	76,606	111,927
	Swine	12,045	4,396,425		35,321	
Henry	Chickens	118,300	2,418,052	10,203,502	11,188	73,737
	Swine	21,330	7,785,450		62,548	
Jasper	Chickens	235,560	4,814,846	28,248,084	22,278	168,381
	Swine	2,300	839,500		6,745	
	Turkey	275,114	22,593,737		139,358	
Johnson	Chickens	1,440,000	29,433,600	30,018,330	136,189	140,887
	Swine	1,602	584,730		4,698	
Lafayette	Swine	6,400	2,336,000	2,336,000	18,767	18,767
Lawrence	Dairy	100	262,800	48,177,491	1,865	252,758
	Chickens	1,417,400	28,971,656		134,052	
	Turkey	230,661	18,943,035		116,841	
Lewis	Dairy	2,625	6,898,500	6,898,500	48,959	48,959
Lincoln	Chickens	1,300,000	26,572,000	26,572,000	122,949	122,949
Linn	Swine	6,240	2,277,600	2,277,600	18,298	18,298
Livingston	Swine	7,680	2,803,200	2,803,200	22,521	22,521
Macon	Swine	15,980	5,832,700	5,832,700	46,860	46,860
Madison	Swine	1,592	581,080	581,080	4,668	4,668
Maries	Swine	12,000	4,380,000	4,380,000	35,189	35,189
Marion	Swine	3,840	1,401,600	1,401,600	11,260	11,260
McDonald	Chickens	4,832,538	98,777,077	106,912,927	457,042	522,405
	Swine	22,290	8,135,850		65,363	
Mercer	Swine	412,917	150,714,705	150,714,705	1,210,842	1,210,842
Miller	Swine	72,180	26,345,700	26,345,700	211,661	211,661
Mississippi	Chickens	384,000	7,848,960	8,724,960	36,317	43,355
	Swine	2,400	876,000		7,038	
Moniteau	Chickens	659,400	13,478,136	21,216,136	62,363	124,530
	Swine	21,200	7,738,000		62,167	
Monroe	Swine	46,170	16,852,050	16,852,050	135,389	135,389
Montgomery	Swine	11,987	4,375,255	4,375,255	35,151	35,151
Morgan	Chickens	1,543,800	31,555,272	40,169,272	146,006	215,211
	Swine	23,600	8,614,000		69,205	
New Madrid	Chickens	327,200	6,687,968	6,687,968	30,945	30,945
Newton	Dairy	400	1,051,200	68,773,373	7,460	348,860
	Chickens	2,422,700	49,519,988		229,129	
	Turkey	221,640	18,202,185		112,271	
Nodaway	Swine	6,530	2,383,450	2,383,450	19,149	19,149
Osage	Swine	820	299,300	299,300	2,405	2,405
Ozark	Turkey	86,000	7,062,750	7,062,750	43,563	43,563
Pettis	Beef	1,500	3,285,000	162,266,444	22,995	1,025,456
	Dairy	113	296,964		2,108	
	Chickens	3,942,000	80,574,480		372,818	
	Swine	214,000	78,110,000		627,536	
Phelps	Swine	12,160	4,438,400	4,438,400	35,658	35,658
Pike	Swine	4,600	1,679,000	1,679,000	13,489	13,489

County	Type	Number of Animals/yr	Amount of dry waste per year	County amount of dry waste per year	Btu (Millions) <sup>94</sup>	County Btu (Millions)
Platte	Swine	8,580	3,131,700	3,131,700	25,160	25,160
Polk	Dairy	820	2,154,960	2,154,960	15,294	15,294
Pulaski	Swine	17,600	6,424,000	6,424,000	51,610	51,610
Putnam	Swine	236,392	86,283,080	86,283,080	693,198	693,198
Ralls	Swine	13,240	4,832,600	4,832,600	38,825	38,825
Randolph	Swine	17,230	6,288,950	6,288,950	50,525	50,525
Saline	Chickens	149,400	3,053,736	33,556,056	14,130	259,185
	Swine	83,568	30,502,320		245,056	
Scott	Chickens	1,600,000	32,704,000	32,704,000	151,321	151,321
Shelby	Swine	16,469	6,011,185	6,011,185	48,294	48,294
St. Charles	Swine	3,716	1,356,340	1,356,340	10,897	10,897
St. Clair	Swine	2,000	730,000	730,000	5,865	5,865
St. Francois	Chickens	322,000	6,581,680	6,581,680	30,453	30,453
Stoddard	Chickens	3,246,250	66,353,350	66,353,350	307,017	307,017
Stone	Turkey	75,000	6,159,375	6,159,375	37,991	37,991
Sullivan	Swine	370,347	135,176,655	135,176,655	1,086,009	1,086,009
Vernon	Chickens	340,800	6,965,952	42,000,112	32,231	313,696
	Swine	95,984	35,034,160		281,464	
Warren	Swine	2,078	758,470	758,470	6,094	6,094
Webster	Chickens	280,000	5,723,200	5,723,200	26,481	26,481
Worth	Swine	10,400	3,796,000	3,796,000	30,497	30,497
Wright	Swine	5,130	1,872,450	1,872,450	15,043	15,043
Totals	Beef	11,870	25,995,300	197,955,998	181,967	1,281,768
	Dairy	5,118	13,450,104	152,258,044	95,455	865,826
	Swine	2,252,337	822,103,005	595,154,710	6,604,776	4,771,692
	Chickens	34,166,048	698,354,021	725,913,328	3,231,284	3,881,186
	Turkey	1,599,961	131,396,797	20,017,148	810,455	123,466
	<i>Totals</i>	38,035,334	1,691,299,227	1,691,299,227	10,923,938	10,923,938

Counties not reporting are Adair, Andrew, Buchanan, Butler, Cape Girardeau, Carter, Cedar, Clark, Clay, Clinton, Crawford, Dent, Douglas, Dunklin, Greene, Hickory, Holt, Howard, Howell, Iron, Jackson, Jefferson, Knox, Laclede, Oregon, Pemiscot, Perry, Ray, Reynolds, Ripley, Ste. Genevieve, St. Louis, Schuyler, Scotland, Shannon, Taney, Texas, Washington, Wayne, Webster, and St Louis City.

**Appendix D, Table 2. Animal wastes per species and county total for MDNR classifications 1A, 1B, and 1C animal feeding operations.**

County	Type	Number of Animals	Amount of dry waste per year	County amount of dry waste per year	Btu (Millions) <sup>95</sup>	County Btu (Millions)
Atchison	Swine	4,600	1,679,000	1,679,000	13,489	13,489
Audrain	Chickens	50,000	1,022,000	16,300,900	4,729	127,479
	Swine	41,860	15,278,900		122,751	
Barry	Chickens	6,829,725	139,599,579	178,396,989	645,927	885,230
	Turkey	472,419	38,797,410		239,302	
Barton	Swine	1,642	599,330	599,330	4,815	4,815
Bates	Beef	8,720	19,096,800	23,781,575	133,678	171,315
	Swine	12,835	4,684,775		37,637	
Benton	Chickens	1,336,175	27,311,417	27,311,417	126,370	126,370
Bollinger	Chickens	160,000	3,270,400	3,270,400	15,132	15,132
Boone	Swine	15,401	5,621,365	5,621,365	45,162	45,162
Caldwell	Swine	11,530	4,208,450	4,208,450	33,811	33,811
Callaway	Swine	41,127	15,011,355	15,011,355	120,601	120,601
Camden	Swine	4,800	1,752,000	1,752,000	14,076	14,076
Carroll	Swine	10,000	3,650,000	3,650,000	29,324	29,324
Cass	Swine	18,268	6,667,820	6,667,820	53,569	53,569
Chariton	Beef	450	985,500	4,322,330	6,899	33,707
	Swine	9,142	3,336,830		26,808	
Christian	Turkey	82,740	6,795,023	6,795,023	41,912	41,912
Cole	Swine	20,100	7,336,500	7,336,500	58,941	58,941
Cooper	Beef	1,200	2,628,000	3,650,000	18,396	26,607
	Swine	2,800	1,022,000		8,211	
Dade	Swine	7,450	2,719,250	7,960,960	21,846	54,177
	Turkey	63,826	5,241,710		32,331	
Dallas	Chickens	120,000	2,452,800	2,452,800	11,349	11,349
Daviess	Swine	65,145	23,777,925	23,777,925	191,032	191,032
De Kalb	Swine	7,440	2,715,600	2,715,600	21,817	21,817
Franklin	Swine	7,405	2,702,825	2,702,825	21,714	21,714
Gentry	Swine	104,310	38,073,150	38,073,150	305,880	305,880
Grundy	Swine	9,600	3,504,000	3,504,000	28,151	28,151
Harrison	Chickens	810,000	16,556,400	20,952,825	76,606	111,927
	Swine	12,045	4,396,425		35,321	
Henry	Swine	8,530	3,113,450	3,113,450	25,013	25,013
Jasper	Chickens	235,560	4,814,846	27,408,584	22,278	161,636
	Turkey	275,114	22,593,737		139,358	
Johnson	Chickens	1,440,000	29,433,600	29,908,830	136,189	140,007

<sup>95</sup> Btu found by taking number of animals times 1 pound per day for swine, .056 pounds per day for chickens, .225 pounds per day for turkeys, 6 pounds per day for beef, 7 pounds per day for Dairy, times 365 days per year, times 8,034 Btu per pound for swine, 4,627 Btu per pound for chickens, 6,168 Btu per pound for turkeys, 7,000 Btu for beef, and 7,097 for dairy (weights are dry pounds)

County	Type	Number of Animals	Amount of dry waste per year	County amount of dry waste per year	Btu (Millions) <sup>95</sup>	County Btu (Millions)
	Swine	1,302	475,230		3,818	
Lawrence	Dairy	100	262,800	48,177,491	1,865	252,758
	Chickens	1,417,400	28,971,656		134,052	
	Turkey	230,661	18,943,035		116,841	
Lewis	Dairy	2,625	6,898,500	6,898,500	48,959	48,959
Lincoln	Chickens	1,300,000	26,572,000	26,572,000	122,949	122,949
Linn	Swine	3,840	1,401,600	1,401,600	11,260	11,260
Livingston	Swine	7,680	2,803,200	2,803,200	22,521	22,521
Macon	Swine	15,080	5,504,200	5,504,200	44,221	44,221
Madison	Swine	1,592	581,080	581,080	4,668	4,668
Maries	Swine	4,000	1,460,000	1,460,000	11,730	11,730
Marion	Swine	3,840	1,401,600	1,401,600	11,260	11,260
McDonald	Chickens	4,832,538	98,777,077	104,033,077	457,042	499,268
	Swine	14,400	5,256,000		42,227	
Mercer	Swine	412,917	150,714,705	150,714,705	1,210,842	1,210,842
Miller	Swine	59,380	21,673,700	21,673,700	174,127	174,127
Mississippi	Chickens	384,000	7,848,960	7,848,960	36,317	36,317
Moniteau	Chickens	659,400	13,478,136	18,880,136	62,363	105,763
	Swine	14,800	5,402,000		43,400	
Monroe	Swine	43,420	15,848,300	15,848,300	127,325	127,325
Montgomery	Swine	11,200	4,088,000	4,088,000	32,843	32,843
Morgan	Chickens	1,070,700	21,885,108	26,571,708	101,262	138,915
	Swine	12,840	4,686,600		37,652	
New Madrid	Chickens	327,200	6,687,968	6,687,968	30,945	30,945
Newton	Chickens	2,422,700	49,519,988	67,722,173	229,129	341,400
	Turkey	221,640	18,202,185		112,271	
Nodaway	Swine	6,530	2,383,450	2,383,450	19,149	19,149
Ozark	Turkey	86,000	7,062,750	7,062,750	43,563	43,563
Pettis	Beef	1,500	3,285,000	145,713,548	22,995	948,133
	Chickens	3,146,700	64,318,548		297,602	
	Swine	214,000	78,110,000		627,536	
Phelps	Swine	12,160	4,438,400	4,438,400	35,658	35,658
Platte	Swine	3,880	1,416,200	1,416,200	11,378	11,378
Pulaski	Swine	6,400	2,336,000	2,336,000	18,767	18,767
Putnam	Swine	233,992	85,407,080	85,407,080	686,160	686,160
Ralls	Swine	12,360	4,511,400	4,511,400	36,245	36,245
Randolph	Swine	17,230	6,288,950	6,288,950	50,525	50,525
Saline	Chickens	149,400	3,053,736	27,854,756	14,130	213,381
	Swine	67,948	24,801,020		199,251	
Scott	Chickens	1,600,000	32,704,000	32,704,000	151,321	151,321
Shelby	Swine	16,469	6,011,185	6,011,185	48,294	48,294
St. Charles	Swine	3,716	1,356,340	1,356,340	10,897	10,897
St. Francois	Chickens	322,000	6,581,680	6,581,680	30,453	30,453
Stoddard	Chickens	3,246,250	66,353,350	66,353,350	307,017	307,017
Stone	Turkey	75,000	6,159,375	6,159,375	37,991	37,991
Sullivan	Swine	370,347	135,176,655	135,176,655	1,086,009	1,086,009
Vernon	Chickens	340,800	6,965,952	42,000,112	32,231	313,696



<b>County</b>	<b>Type</b>	<b>Number of Animals</b>	<b>Amount of dry waste per year</b>	<b>County amount of dry waste per year</b>	<b>Btu (Millions)<sup>95</sup></b>	<b>County Btu (Millions)</b>
	Swine	95,984	35,034,160		281,464	
Warren	Swine	2,078	758,470	758,470	6,094	6,094
Webster	Chickens	280,000	5,723,200	5,723,200	26,481	26,481
Worth	Swine	10,400	3,796,000	3,796,000	30,497	30,497
Wright	Swine	5,130	1,872,450	1,872,450	15,043	15,043
Totals	Beef	11,870	25,995,300	177,467,453	181,967	1,179,761
	Dairy	2,725	7,161,300	55,075,991	50,824	301,716
	Swine	2,100,945	766,844,925	589,602,695	6,160,832	4,727,087
	Chickens	32,480,548	663,902,401	745,535,865	3,071,876	3,897,038
	Turkey	1,507,400	123,795,225	20,017,148	763,569	123,466
	Totals	36,103,488	1,587,699,151	1,587,699,151	10,229,068	10,229,068

**Appendix D, Table 3. Animal wastes per species and county total for MDNR class II animal feeding operations.**

County	Type	Number of Animals	Amount of waste per year	County amount of waste per year	Btu (Millions) <sup>96</sup>	County Btu (Millions)
Audrain	Swine	6400	2,336,000	2,336,000	18,767	18,767
Barry	Turkey	92561	7,601,572	7,601,572	46,886	46,886
Barton	Swine	500	182,500	182,500	1,466	1,466
Benton	Chickens	199200	4,071,648	4,071,648	18,840	18,840
Callaway	Dairy	605	1,589,940	1,589,940	11,284	11,284
Camden	Swine	4208	1,535,920	1,535,920	12,340	12,340
Chariton	Swine	760	277,400	277,400	2,229	2,229
Cole	Swine	2960	1,080,400	1,080,400	8,680	8,680
Cooper	Chickens	99600	2,035,824	3,658,249	9,420	22,454
	Swine	4445	1,622,425		13,035	
Dade	Swine	1260	459,900	459,900	3,695	3,695
Dallas	Dairy	145	381,060	381,060	2,704	2,704
Daviess	Swine	2708	988,420	988,420	7,941	7,941
Franklin	Dairy	150	394,200	2,527,260	2,798	19,935
	Swine	5844	2,133,060		17,137	
Gasconade	Dairy	160	420,480	1,588,480	2,984	12,368
	Swine	3200	1,168,000		9,384	
Henry	Chickens	118300	2,418,052	7,090,052	11,188	48,723
	Swine	12800	4,672,000		37,535	
Jasper	Swine	2300	839,500	839,500	6,745	6,745
Johnson	Swine	300	109,500	109,500	880	880
Lafayette	Swine	6400	2,336,000	2,336,000	18,767	18,767
Linn	Swine	2400	876,000	876,000	7,038	7,038
Macon	Swine	900	328,500	328,500	2,639	2,639
Maries	Swine	8000	2,920,000	2,920,000	23,459	23,459
Miller	Swine	12800	4,672,000	4,672,000	37,535	37,535
Mississippi	Swine	2400	876,000	876,000	7,038	7,038
Moniteau	Swine	6400	2,336,000	2,336,000	18,767	18,767
Monroe	Swine	2750	1,003,750	1,003,750	8,064	8,064
Montgomery	Swine	787	287,255	287,255	2,308	2,308
Morgan	Chickens	473100	9,670,164	13,597,564	44,744	76,297
	Swine	10760	3,927,400		31,553	
Newton	Dairy	400	1,051,200	1,051,200	7,460	7,460
Osage	Swine	820	299,300	299,300	2,405	2,405
Pettis	Dairy	113	296,964	16,552,896	2,108	77,324
	Chickens	795300	16,255,932		75,216	
Pike	Swine	4600	1,679,000	1,679,000	13,489	13,489
Platte	Swine	4700	1,715,500	1,715,500	13,782	13,782

<sup>96</sup> Btu found by taking number of animals times 1 pound per day for swine, .056 pounds per day for chickens, .225 pounds per day for turkeys, 6 pounds per day for beef, 7 pounds per day for Dairy, times 365 days per year, times 8,034 Btu per pound for swine, 4,627 Btu per pound for chickens, 6,168 Btu per pound for turkeys, 7,000 Btu for beef, and 7,097 for dairy.

<b>County</b>	<b>Type</b>	<b>Number of Animals</b>	<b>Amount of waste per year</b>	<b>County amount of waste per year</b>	<b>Btu (Millions)<sup>96</sup></b>	<b>County Btu (Millions)</b>
Polk	Dairy	820	2,154,960	2,154,960	15,294	15,294
Pulaski	Swine	11200	4,088,000	4,088,000	32,843	32,843
Putnam	Swine	2400	876,000	876,000	7,038	7,038
Ralls	Swine	880	321,200	321,200	2,581	2,581
Saline	Swine	15620	5,701,300	5,701,300	45,804	45,804
St. Clair	Swine	2000	730,000	730,000	5,865	5,865
Totals	Beef	0	0	0	0	0
	Dairy	2,393	6,288,804	25,845,796	44,632	146,369
	Swine	143,502	52,378,230	38,855,345	420,807	312,164
	Chickens	1,685,500	34,451,620	28,417,513	159,408	166,314
	Turkey	92,561	7,601,572	7,601,572	46,886	46,886
	Totals	1,923,956	100,720,226	100,720,226	671,732	671,732

**Appendix E, Table 1. Distribution of timber harvest residues using a Btu value of 8,550 Btu per pound of dry matter.<sup>97</sup>**

County	CuFt	Tons (green) <sup>98</sup>	Tons (dry) <sup>38</sup>	Million Btu <sup>99</sup>
Adair	272,762	4,131	2,407	41,166
Andrew	171,374	2,595	1,513	25,864
Atchison	226,263	3,426	1,997	34,148
Audrain	383,723	5,811	3,387	57,913
Barry	920,432	13,939	8,124	138,915
Barton	797,271	12,074	7,037	120,327
Bates	323,479	4,899	2,855	48,821
Benton	233,947	3,543	2,065	35,308
Bollinger	2,234,362	33,836	19,720	337,218
Boone	548,652	8,309	4,842	82,804
Buchanan	233,710	3,539	2,063	35,272
Butler	1,795,618	27,192	15,848	271,001
Caldwell	321,406	4,867	2,837	48,508
Callaway	595,122	9,012	5,253	89,818
Camden	773,368	11,712	6,826	116,719
Cape Girardeau	1,340,664	20,303	11,833	202,338
Carroll	423,384	6,412	3,737	63,899
Carter	2,107,283	31,912	18,599	318,039
Cass	63,403	960	560	9,569
Cedar	550,102	8,331	4,855	83,023
Chariton	1,246,270	18,873	11,000	188,092
Christian	981,269	14,860	8,661	148,097
Clark	537,889	8,146	4,747	81,180
Clay	77,224	1,169	682	11,655
Clinton	173,130	2,622	1,528	26,129
Cole	125,948	1,907	1,112	19,009
Cooper	149,329	2,261	1,318	22,537
Crawford	3,221,534	48,786	28,433	486,205
Dade	218,855	3,314	1,932	33,030
Dallas	161,830	2,451	1,428	24,424
Daviess	494,464	7,488	4,364	74,626
De Kalb	278,514	4,218	2,458	42,034
Dent	3,305,167	50,052	29,171	498,828
Douglas	3,043,333	46,087	26,860	459,311
Dunkin	106,870	1,618	943	16,129
Franklin	390,462	5,913	3,446	58,930
Gasconade	897,977	13,599	7,925	135,526
Gentry	138,841	2,103	1,225	20,954
Greene	144,558	2,189	1,276	21,817
Grundy	322,415	4,883	2,846	48,660

<sup>97</sup> Tables may not sum due to rounding

<sup>98</sup> Green weight taken times 58% to arrive at dry weight

<sup>99</sup> Btu found by taking tons of dry matter times 8,550 Btu per pound of dry matter.

County	CuFt	Tons (green) <sup>98</sup>	Tons (dry) <sup>38</sup>	Million Btu <sup>99</sup>
Harrison	326,163	4,939	2,879	49,226
Henry	273,314	4,139	2,412	41,250
Hickory	168,214	2,547	1,485	25,388
Holt	120,506	1,825	1,064	18,187
Howard	1,057,103	16,008	9,330	159,542
Howell	3,546,290	53,704	31,299	535,219
Iron	3,261,064	49,384	28,782	492,171
Jackson	16,250	246	143	2,453
Jasper	235,799	3,571	2,081	35,588
Jefferson	742,531	11,245	6,554	112,065
Johnson	14,906	226	132	2,250
Knox	392,017	5,937	3,460	59,165
Laclede	1,019,365	15,437	8,997	153,846
Lafayette	173,596	2,629	1,532	26,200
Lawrence	401,664	6,083	3,545	60,621
Lewis	433,883	6,571	3,829	65,483
Lincoln	559,283	8,470	4,936	84,409
Linn	530,951	8,041	4,686	80,133
Livingston	546,152	8,271	4,820	82,427
Mc Donald	1,361,606	20,620	12,017	205,498
Macon	568,495	8,609	5,018	85,799
Madison	1,659,328	25,128	14,645	250,432
Maries	1,215,550	18,408	10,728	183,455
Marion	396,699	6,007	3,501	59,871
Mercer	250,820	3,798	2,214	37,855
Miller	542,379	8,214	4,787	81,858
Mississippi	2,788	42	25	421
Moniteau	80,801	1,224	713	12,195
Monroe	658,585	9,973	5,813	99,396
Montgomery	362,267	5,486	3,197	54,675
Morgan	242,662	3,675	2,142	36,623
New Madrid	288,787	4,373	2,549	43,585
Newton	900,698	13,640	7,950	135,937
Nodaway	52,305	792	462	7,894
Oregon	4,082,374	61,822	36,031	616,126
Osage	1,080,241	16,359	9,534	163,034
Ozark	813,356	12,317	7,179	122,755
Pemiscot	96,988	1,469	856	14,638
Perry	1,203,358	18,223	10,621	181,615
Pettis	43,910	665	388	6,627
Phelps	1,195,713	18,107	10,553	180,461
Pike	945,901	14,324	8,348	142,759
Platte	86,064	1,303	760	12,989
Polk	164,998	2,499	1,456	24,902
Pulaski	1,415,002	21,428	12,489	213,557
Putnam	232,679	3,524	2,054	35,117
Rallis	569,894	8,630	5,030	86,010
Randolph	1,481,645	22,437	13,077	223,615

County	CuFt	Tons (green) <sup>98</sup>	Tons (dry) <sup>38</sup>	Million Btu <sup>99</sup>
Ray	163,522	2,476	1,443	24,679
Reynolds	4,571,590	69,230	40,349	689,961
Ripley	3,684,998	55,804	32,524	556,153
St. Charles	669,993	10,146	5,913	101,118
St. Clair	417,009	6,315	3,680	62,936
St. Francois	540,447	8,184	4,770	81,566
St. Louis	175,912	2,664	1,553	26,549
Saline	264,129	4,000	2,331	39,863
Schuyler	81,008	1,227	715	12,226
Scotland	313,865	4,753	2,770	47,370
Scott	156,540	2,371	1,382	23,626
Shannon	4,856,197	73,540	42,860	732,915
Shelby	301,827	4,571	2,664	45,553
Stoddard	298,000	4,513	2,630	44,975
Stone	481,703	7,295	4,251	72,700
Sullivan	223,962	3,392	1,977	33,801
Taney	695,247	10,529	6,136	104,929
Texas	3,756,503	56,887	33,155	566,945
Vernon	470,643	7,127	4,154	71,031
Warren	476,202	7,211	4,203	71,870
Washington	2,593,421	39,274	22,889	391,408
Wayne	3,952,923	59,862	34,888	596,589
Webster	388,872	5,889	3,432	58,690
Worth	101,087	1,531	892	15,256
Wright	1,885,188	28,549	16,639	284,519
Totals	98,748,929	1,495,416	871,552	14,740,393

County not reporting is Ste. Genevieve.

## Appendix E, Table 2. Standing timber potentially available from thinning on a county basis using a Btu value of 8,550 Btu per pound of dry matter

County	Basal Area All Live (Dry Tonnage)			Thinning Tonnages			Btu (millions) <sup>103</sup>
	Total	81-120 sq. ft./acre	120+ sq. ft./acre	From BA = 81 to 120 sq. ft./acre Acres <sup>100</sup>	From BA = 120+ sqft/acre Acres <sup>101</sup>	Total Tonnage From Thinnings <sup>102</sup>	
Adair	2,387,456	1,524,666	10,336	533,633	4,134	537,768	459,791
Andrew	831,658	16,526	768,791	5,784	307,516	313,301	267,872
Atchison	832,168	455,951	222,469	159,583	88,988	248,570	212,528
Audrain	2,913,223	618,589	1,763,499	216,506	705,400	921,906	788,229
Barry	8,756,343	4,156,850	3,539,523	1,454,898	1,415,809	2,870,707	2,454,454
Barton	2,024,952	795,340	536,151	278,369	214,460	492,829	421,369
Bates	2,799,697	1,570,480	398,480	549,668	159,392	709,060	606,246
Benton	9,629,862	6,033,984	1,798,792	2,111,894	719,517	2,831,411	2,420,857
Bollinger	8,969,275	4,621,214	1,613,920	1,617,425	645,568	2,262,993	1,934,859
Boone	6,382,381	2,683,582	2,371,717	939,254	948,687	1,887,941	1,614,189
Buchanan	2,167,559	765,536	524,152	267,938	209,661	477,598	408,347
Butler	5,680,469	2,025,378	1,776,608	708,882	710,643	1,419,526	1,213,694
Caldwell	506,764	154,038	0	53,913	0	53,913	46,096
Callaway	8,456,553	3,077,771	3,812,306	1,077,220	1,524,922	2,602,142	2,224,832
Camden	9,664,322	5,842,861	1,126,782	2,045,001	450,713	2,495,714	2,133,836
Cape Girardeau	4,577,642	1,912,715	1,843,948	669,450	737,579	1,407,029	1,203,010
Carroll	324,919	0	0	0	0	0	0
Carter	11,353,538	6,666,720	1,581,434	2,333,352	632,574	2,965,926	2,535,866
Cass	4,142,804	1,111,603	2,670,203	389,061	1,068,081	1,457,142	1,245,857
Cedar	4,361,787	1,509,094	1,889,917	528,183	755,967	1,284,150	1,097,948
Chariton	2,963,978	1,901,934	660,576	665,677	264,230	929,907	795,071
Christian	5,563,259	2,317,193	1,937,603	811,018	775,041	1,586,059	1,356,080
Clark	1,591,223	461,438	0	161,503	0	161,503	138,085
Clay	1,178,034	326,528	652,634	114,285	261,054	375,338	320,914
Clinton	132,894	0	132,894	0	53,158	53,158	45,450
Cole	3,565,992	1,450,165	1,482,409	507,558	592,964	1,100,521	940,946
Cooper	2,335,247	561,209	999,084	196,423	399,634	596,057	509,629
Crawford	11,988,382	6,837,356	2,052,427	2,393,075	820,971	3,214,045	2,748,009
Dade	2,302,680	1,341,560	456,466	469,546	182,586	652,132	557,573
Dallas	6,150,620	3,240,578	1,258,253	1,134,202	503,301	1,637,504	1,400,065
Daviess	2,475,227	1,779,184	546,893	622,714	218,757	841,472	719,458
De Kalb	636,427	460,268	0	161,094	0	161,094	137,735
Dent	11,006,666	5,053,647	1,782,960	1,768,776	713,184	2,481,960	2,122,076
Douglas	9,320,786	3,763,892	1,539,063	1,317,362	615,625	1,932,987	1,652,704
Dunklin	407,977	234,375	173,602	82,031	69,441	151,472	129,509
Franklin	12,224,402	5,661,462	4,760,108	1,981,512	1,904,043	3,885,555	3,322,149
Gasconade	7,407,531	3,466,325	2,809,179	1,213,214	1,123,672	2,336,885	1,998,037

<sup>100</sup> This tonnage is calculated by multiplying the “Basal area all live, 81-120 sq. ft./acre” tonnage column by 35%.

<sup>101</sup> This tonnage is calculated by multiplying the “Basal area all live, 120+ sq. ft./acre” tonnage by 40%.”

<sup>102</sup> This tonnage is calculated by adding the values from the two preceding columns of thinning tonnages.

<sup>103</sup> Btu content is found by taking “Total Tonnage from Thinnings times 2,000 pounds per ton times 8,550 Btu per pound of dry hardwood divided by 20 years (to annualize).” Table may not sum due to rounding.

County	Basal Area All Live (Dry Tonnage)			Thinning Tonnages			Btu (millions) <sup>103</sup>
	Total	81-120 sq. ft./acre	120+ sq. ft./acre	From BA = 81 to 120 sq. ft./acre Acres <sup>100</sup>	From BA = 120+ sqft/acre Acres <sup>101</sup>	Total Tonnage From Thinnings <sup>102</sup>	
Gentry	2,319,963	1,047,853	556,888	366,749	222,755	589,504	504,026
Greene	3,807,256	1,921,600	1,144,347	672,560	457,739	1,130,299	966,405
Grundy	1,265,186	931,564	0	326,047	0	326,047	278,771
Harrison	2,653,795	950,523	527,221	332,683	210,888	543,571	464,754
Henry	3,281,402	1,817,808	514,808	636,233	205,923	842,156	720,043
Hickory	4,743,664	2,645,870	421,735	926,055	168,694	1,094,749	936,010
Holt	911,231	749,418	0	262,296	0	262,296	224,263
Howard	2,915,243	1,213,615	860,322	424,765	344,129	768,894	657,404
Howell	11,768,990	5,211,725	3,486,675	1,824,104	1,394,670	3,218,774	2,752,052
Iron	11,033,227	6,599,856	839,310	2,309,950	335,724	2,645,674	2,262,051
Jackson	3,353,378	685,475	2,184,095	239,916	873,638	1,113,554	952,089
Jasper	1,560,301	582,606	504,424	203,912	201,770	405,682	346,858
Jefferson	10,123,676	4,252,913	4,757,375	1,488,520	1,902,950	3,391,470	2,899,706
Johnson	3,235,150	1,695,724	1,016,985	593,503	406,794	1,000,297	855,254
Knox	1,644,299	820,656	291,045	287,230	116,418	403,648	345,119
Laclede	9,821,577	5,192,844	2,052,356	1,817,495	820,942	2,638,438	2,255,864
Lafayette	811,295	661,588	0	231,556	0	231,556	197,980
Lawrence	2,580,495	882,486	1,007,752	308,870	403,101	711,971	608,735
Lewis	2,141,914	912,063	398,833	319,222	159,533	478,755	409,336
Lincoln	5,087,592	1,614,793	2,554,704	565,178	1,021,882	1,587,059	1,356,936
Linn	1,203,701	896,516	132,971	313,781	53,188	366,969	313,758
Livingston	1,598,642	867,953	365,246	303,784	146,098	449,882	384,649
McDonald	6,824,027	4,119,299	1,352,848	1,441,755	541,139	1,982,894	1,695,374
Macon	3,220,144	1,107,529	833,480	387,635	333,392	721,027	616,478
Madison	9,121,611	4,851,344	1,989,444	1,697,970	795,778	2,493,748	2,132,155
Maries	5,790,358	4,053,056	431,165	1,418,570	172,466	1,591,036	1,360,335
Marion	2,792,317	1,206,847	1,495,401	422,396	598,160	1,020,557	872,576
Mercer	1,686,872	614,448	533,390	215,057	213,356	428,413	366,293
Miller	7,645,031	1,823,150	3,037,732	638,103	1,215,093	1,853,195	1,584,482
Mississippi	782,652	0	583,482	0	233,393	233,393	199,551
Moniteau	1,738,957	408,997	935,865	143,149	374,346	517,495	442,458
Monroe	4,571,048	1,691,324	1,932,873	591,963	773,149	1,365,113	1,167,171
Montgomery	3,942,947	1,995,145	1,353,317	698,301	541,327	1,239,628	1,059,882
Morgan	7,544,112	3,726,209	1,457,351	1,304,173	582,940	1,887,114	1,613,482
New Madrid	605,267	0	443,507	0	177,403	177,403	151,679
Newton	6,343,055	2,598,453	2,818,886	909,459	1,127,554	2,037,013	1,741,646
Nodaway	713,098	202,138	144,683	70,748	57,873	128,622	109,971
Oregon	11,508,960	6,308,484	1,566,933	2,207,969	626,773	2,834,743	2,423,705
Osage	7,624,693	3,839,292	2,657,723	1,343,752	1,063,089	2,406,841	2,057,849
Ozark	9,577,555	4,654,017	1,511,013	1,628,906	604,405	2,233,311	1,909,481
Pemiscot	43,300	43,300	0	15,155	0	15,155	12,958
Perry	4,741,196	2,419,361	1,327,513	846,776	531,005	1,377,782	1,178,003
Pettis	1,858,019	805,804	686,947	282,031	274,779	556,810	476,073
Phelps	8,033,334	4,161,066	1,234,352	1,456,373	493,741	1,950,114	1,667,347
Pike	5,600,627	2,721,043	1,266,903	952,365	506,761	1,459,126	1,247,553
Platte	1,747,673	384,864	1,084,354	134,702	433,742	568,444	486,020
Polk	3,567,765	1,712,795	1,104,007	599,478	441,603	1,041,081	890,124
Pulaski	8,446,711	3,442,435	2,217,883	1,204,852	887,153	2,092,005	1,788,665
Putnam	1,780,296	404,459	555,333	141,561	222,133	363,694	310,958
Ralls	1,888,005	1,066,763	644,513	373,367	257,805	631,172	539,652



County	Basal Area All Live (Dry Tonnage)			Thinning Tonnages			Btu (millions) <sup>103</sup>
	Total	81-120 sq. ft./acre	120+ sq. ft./acre	From BA = 81 to120 sq. ft./acre Acres <sup>100</sup>	From BA = 120+ sqft/acre Acres <sup>101</sup>	Total Tonnage From Thinnings <sup>102</sup>	
Randolph	2,687,819	1,768,865	540,410	619,103	216,164	835,267	714,153
Ray	1,817,815	1,005,953	534,119	352,084	213,648	565,731	483,700
Reynolds	15,857,728	9,587,167	1,793,460	3,355,508	717,384	4,072,892	3,482,323
Ripley	9,646,830	4,589,231	2,239,688	1,606,231	895,875	2,502,106	2,139,301
St. Charles	3,901,358	2,477,735	960,755	867,207	384,302	1,251,509	1,070,040
St. Clair	5,857,418	3,057,163	255,516	1,070,007	102,206	1,172,213	1,002,242
Ste. Genevieve	8,738,496	4,305,505	3,365,348	1,506,927	1,346,139	2,853,066	2,439,371
St. Francois	6,716,625	3,034,745	2,256,670	1,062,161	902,668	1,964,829	1,679,929
St. Louis	2,808,040	1,560,595	1,103,461	546,208	441,384	987,593	844,392
Saline	3,682,323	1,792,072	995,880	627,225	398,352	1,025,577	876,869
Schuyler	1,363,786	896,543	0	313,790	0	313,790	268,290
Scotland	1,633,399	717,295	385,649	251,053	154,260	405,313	346,542
Scott	1,108,362	277,627	772,810	97,169	309,124	406,293	347,381
Shannon	19,185,540	10,904,089	3,348,878	3,816,431	1,339,551	5,155,982	4,408,365
Shelby	1,897,056	542,874	330,757	190,006	132,303	322,309	275,574
Stoddard	1,763,836	408,630	1,117,625	143,021	447,050	590,071	504,510
Stone	5,504,572	2,612,822	1,481,384	914,488	592,554	1,507,041	1,288,520
Sullivan	3,708,712	1,621,171	1,740,118	567,410	696,047	1,263,457	1,080,256
Taney	10,101,659	5,611,423	2,130,775	1,963,998	852,310	2,816,308	2,407,943
Texas	15,617,851	6,567,588	4,463,010	2,298,656	1,785,204	4,083,860	3,491,700
Vernon	3,279,809	1,226,297	1,134,673	429,204	453,869	883,073	755,028
Warren	7,410,337	4,068,390	2,289,362	1,423,937	915,745	2,339,681	2,000,428
Washington	14,598,533	9,430,150	2,106,601	3,300,553	842,640	4,143,193	3,542,430
Wayne	15,180,643	8,061,043	2,995,574	2,821,365	1,198,230	4,019,595	3,436,753
Webster	6,416,715	3,596,869	1,737,300	1,258,904	694,920	1,953,824	1,670,520
Worth	360,446	0	321,813	0	128,725	128,725	110,060
Wright	6,756,703	2,725,845	1,188,163	954,046	475,265	1,429,311	1,222,061
City of St Louis	0	0	0	0	0	0	0
St. Louis city	0	0	0	0	0	0	0
<b>Total</b>	<b>573,218,722</b>	<b>279,364,770</b>	<b>149,900,971</b>	<b>97,777,670</b>	<b>59,960,388</b>	<b>157,738,058</b>	<b>134,866,038</b>

**Appendix E, Table 3. Distribution of primary mill residues on a county basis including both hardwoods and softwoods using green weights.<sup>104</sup>**

County	Wood Residues in green tons (thousands) Total Wood				Btu (millions) <sup>105</sup>				
	Residues		Bark		Residues		Bark		Total
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
Audrain	0	16.39	0	4.32	0	159,704	0	42,094	201,798
Barry	1.72	13.2	0.29	3.53	17,358	128,621	2,927	34,396	183,302
Bollinger	0.02	20.38	0.01	5.57	202	198,583	101	54,274	253,160
Butler	0.26	4.72	0.07	1.27	2,624	45,992	706	12,375	61,697
Callaway	1.77	7.65	0.29	2.06	17,863	74,542	2,927	20,073	115,404
Camden	0.56	7.22	0.11	1.93	5,652	70,352	1,110	18,806	95,919
Cape Girardeau	0.02	7.78	0	2.21	202	75,808	0	21,534	97,544
Carter	9.63	48.41	3.24	12.82	97,186	471,707	32,698	124,918	726,509
Christian	0	18.84	0	5.03	0	183,577	0	49,012	232,589
Clark	0.02	11.48	0	2.99	202	111,861	0	29,135	141,198
Cooper	0	0.85	0	0.22	0	8,282	0	2,144	10,426
Crawford	1.49	63.97	0.53	16.61	15,037	623,324	5,349	161,848	805,557
Dallas	0.11	0.74	0.02	0.21	1,110	7,211	202	2,046	10,569
Daviess	0	24.79	0	6.57	0	241,554	0	64,018	305,572
Dent	1.68	49.66	2.4	12.81	16,955	483,887	24,221	124,821	649,883
Douglas	0.54	16.12	0.15	4.32	5,450	157,073	1,514	42,094	206,131
Franklin	0	1.95	0	0.53	0	19,001	0	5,164	24,165
Howell	0.11	58.51	0.03	15.84	1,110	570,121	303	154,345	725,879
Iron	2.03	52.32	0.41	14.05	20,487	509,806	4,138	136,903	671,334
Lawrence	0	15.5	0	4.15	0	151,032	0	40,438	191,470
Lewis	0.01	6.33	0	1.71	101	61,680	0	16,662	78,443
Lincoln	0	22.29	0	5.99	0	217,194	0	58,367	275,560
Macon	0.01	19.66	0	5.33	101	191,567	0	51,936	243,603
Madison	2.29	43.5	0.61	11.55	23,111	423,864	6,156	112,543	565,674
Miller	0.43	12.7	0.07	3.39	4,340	123,749	706	33,032	161,827
Moniteau	4.66	2.04	0.93	0.64	47,029	19,878	9,386	6,236	82,528
Newton	0	26.34	0	6.97	0	256,657	0	67,916	324,573
Oregon	1.76	65.76	0.47	17.25	17,762	640,765	4,743	168,084	831,355
Osage	2.23	18.35	0.36	4.84	22,505	178,802	3,633	47,161	252,102
Ozark	2.12	6.89	0.34	1.85	21,395	67,136	3,431	18,026	109,989
Perry	0	65.03	0	20.33	0	633,652	0	198,096	831,748
Phelps	0	32.68	0	8.52	0	318,434	0	83,019	401,453
Pike	0	12.2	0	3.57	0	118,877	0	34,786	153,663
Ralls	0	9.22	0	2.47	0	89,840	0	24,068	113,907
Randolph	0	42.52	0	11.39	0	414,315	0	110,984	525,299
Reynolds	4.51	95.05	1.21	25.45	45,515	926,167	12,211	247,985	1,231,878

<sup>104</sup> Tables may not sum due to rounding

<sup>105</sup> Btu found by taking 58% of green weights (to get dry weights) times 8,700 Btu per pound of dry weight for softwoods, and 8,400 Btu per pound of dry weight for hardwoods.

County	Wood Residues in green tons (thousands) Total Wood				Btu (millions) <sup>105</sup>				
	Residues		Bark		Residues		Bark		Total
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
Ripley	3.28	41.38	0.84	10.93	33,102	403,207	8,477	106,502	551,288
Shannon	2.28	85.7	0.61	23.3	23,010	835,061	6,156	227,035	1,091,262
Ste Genevieve	1.48	6.21	0.4	1.69	14,936	60,510	4,037	16,467	95,951
Taney	7.95	0.21	1.28	0.06	80,231	2,046	12,918	585	95,780
Texas	4.42	67.08	2.87	18.05	44,607	653,628	28,964	175,879	903,077
Washington	2.68	22.86	0.68	6.16	27,047	222,748	6,863	60,023	316,680
Wayne	1.86	33.84	0.5	9.02	18,771	329,737	5,046	87,891	441,445
Wright	0	10.62	0	2.86	0	103,481	0	27,868	131,349
Sum of counties <3 mills	4.67	243.4	0.91	64.55	47,130	2,371,690	9,184	628,975	3,056,978
Totals	66.6	1,432.32	19.61	384.88	672,127	13,956,721	198,106	3,750,563	18,577,517

0 = Less than 50 green tons

*Table may not sum due to rounding.*

Counties not reporting are Adair, Andrew, Atchison, Barton, Bates, Benton, Boone, Buchanan, Caldwell, Carroll, Cass, Cedar, Chariton, Clay, Clinton, Cole, Dade, DeKalb, Dunklin, Gasconade, Gentry, Greene, Grundy, Harrison, Henry, Hickory, Holt, Howard, Jackson, Jasper, Jefferson, Johnson, Knox, Laclede, Lafayette, Linn, Livingston, McDonald, Maries, Marion, Mercer, Mississippi, Monroe, Montgomery, Morgan, New Madrid, Nodaway, Pemiscot, Pettis, Platte, Polk, Pulaski, Putnam, Ray, St. Charles, St. Clair, St. Francois, St. Louis, Saline, Schuyler, Scotland, Scott, Shelby, Stoddard, Stone, Sullivan, Vernon, Warren, Webster, Worth, and St Louis City

**Appendix F, Table 1. The estimated output and Btu content of energy producing components of municipal solid waste from landfills in the state (paper, organics and plastics).<sup>106</sup>**

County	Landfill facility <sup>107</sup>	Facility Type	Tons/year	County Tons/year	Btu (millions) <sup>108</sup>	County Btu (millions)
Atchison	American Recycling & Sanitation, Inc.	Rural	8,506	8,506	69,103	69,103
Barton	Prairie View Regional Waste Facility	Rural	500,609	500,609	4,066,948	4,066,948
Boone	City of Columbia Sanitary Landfill	Small Metropolitan	157,971	157,971	576,278	576,278
Buchanan	St. Joseph City Sanitary Landfill	Small Metropolitan	106,379	106,379	388,071	388,071
Butler	Butler County Sanitary Landfill	Rural	160,741	160,741	1,305,860	1,305,860
Caldwell	Burke Sanitation	Rural	2,141	2,141	17,393	17,393
Callaway	City of Fulton Sanitary Landfill	Rural	15,613	15,613	126,840	126,840
Cape Girardeau	CWI-Jackson Regional Transfer Station	Rural	34,876	34,876	283,333	283,333
Cass	Rye Creek Demolition Landfill	Rural	5,940	6,144	48,257	49,914
Cass	Roll-Off Service Transfer Station	Rural	204		1,657	
Cedar	El-Dorado Springs SW Transfer Station	Rural	8,995	8,995	73,075	73,075
Clay	Heritage Environmental Services, LLC	Large Metropolitan	18	18	89	89
Cole	Jefferson City Sanitary Landfill	Rural	198,021	198,021	1,608,723	1,608,723
Crawford	Prairie Valley Sanitary Landfill	Rural	40,119	40,119	325,927	325,927
Franklin	City of Washington Sanitary Landfill	Rural	10,881	53,223	88,397	432,384
Franklin	Northside Sanitary Landfill	Rural	42,342		343,986	
Greene	Springfield Sanitary Landfill	Small Metropolitan	116,871	116,871	426,345	426,345
Jackson	Courtney Ridge Recycling & Disposal Facility	Large Metropolitan	402,467	484,264	1,980,138	2,382,579

<sup>106</sup> Tables may not sum due to rounding

<sup>107</sup> Transfer station tonnages are only those that passed out-of-state and do not include tonnage deposited in Missouri landfills.

<sup>108</sup> Btu based on type of landfill, and percentages of paper, plastic, and organics from Table 4 times 6,000 Btu per pound.

County	Landfill facility <sup>107</sup>	Facility Type	Tons/ year	County Tons/ year	Btu (millions) <sup>108</sup>	County Btu (millions)
Jackson	Lee's Summit Sanitary Landfill	Large Metropolitan	81,797		402,441	
Jasper	Joplin Transfer Station, Sunray Services	Rural	50,178	50,178	407,646	407,646
Jefferson	Jefferson County Transfer Station	Rural	53,224	107,499	432,392	873,322
Jefferson	Kraemer Hauling Transfer Station	Rural	7,559		61,409	
Jefferson	Meremac Transfer Station	Rural	46,716		379,521	
Lewis	Schroder DBA Backridge Sanitary Landfill	Rural	100,181	100,181	813,870	813,870
Macon	Onyx Maple Hill Landfill	Rural	154,955	154,955	1,258,854	1,258,854
Newton	Neosho Transfer Station	Rural	16,872	16,872	137,068	137,068
Nodaway	City of Maryville Solid Waste Transfer Station	Rural	11,119	11,119	90,331	90,331
Perry	Perry County Transfer Station	Rural	13,804	13,804	112,144	112,144
Pettis	Central Missouri Landfill, Inc.	Rural	94,727	94,727	769,562	769,562
Pike	East Ridge Landfill	Rural	87,375	87,375	709,835	709,835
Randolph	Moberly Municipal Sanitary Landfill	Rural	21,050	21,050	171,010	171,010
Scotland	Scotland County Transfer Station	Rural	489	119,909	3,973	974,141
Scotland	Show Me Regional Sanitary Landfill	Rural	119,420		970,168	
St. Charles	O'Fallon Regional Waste Transfer Station	Rural	12,215	123,506	99,235	646,786
St. Charles	Waste Mgmt. of St. Louis Recycling and Transfer Facility	Large Metropolitan	111,291		547,552	
St. Louis	Bridgeton Sanitary Landfill	Large Metropolitan	171,837	1,959,477	845,438	9,640,627
St. Louis	Fred Weber, Inc. Sanitary Landfill	Large Metropolitan	559,885		2,754,634	
St. Louis	Only Oak Ridge Landfill	Large Metropolitan	483,308		2,377,875	
St. Louis	Peerless Land Co. Demolition Landfill	Large Metropolitan	129,107		635,206	
St. Louis	Rock Hill Demolition Landfill	Large Metropolitan	73,233		360,306	
St. Louis	St. Louis Waste Transfer Station	Large Metropolitan	410,292		2,018,637	

County	Landfill facility <sup>107</sup>	Facility Type	Tons/ year	County Tons/ year	Btu (millions) <sup>108</sup>	County Btu (millions)
St. Louis	Waste Mgmt. of MO, Inc. South City Transfer Facility	Large Metropolitan	131,815		648,530	
St. Louis City	St. Louis Solid Waste Processing Facility	Large Metropolitan	277,848	277,848	1,367,012	1,367,012
Stoddard	Lemons Landfill	Rural	199,503	199,503	1,620,762	1,620,762
Washington	CWI of Missouri, Inc. Transfer Station	Rural	25,029	81,160	203,336	659,344
Washington	Gilliam Transfer Station	Rural	36,575		297,135	
Washington	IESI Timber Ridge Landfill	Rural	19,556		158,873	
Wright	Black Oak Recycling & Disposal Facility	Rural	269,575	269,575	2,190,027	2,190,027
<b>Totals</b>			<b>5,583,229</b>	<b>5,583,229</b>	<b>34,575,202</b>	<b>34,575,202</b>

Counties not reporting are Adair, Andrew, Audrain, Barry, Bates, Benton, Bollinger, Camden, Carroll, Carter, Chariton, Christian, Clark, Clinton, Cooper, Dade, Dallas, Daviess, DeKalb, Dent, Douglas, Dunklin, Franklin, Gentry, Grundy, Harrison, Henry, Hickory, Holt, Howard, Howell, Iron, Johnson, Knox, Laclede, Lafayette, Lawrence, Lincoln, Linn, Livingston, McDonald, Macon, Maries, Marion, Mercer, Miller, Mississippi, Moniteau, Monroe, Montgomery, Morgan, New Madrid, Oregon, Osage, Ozark, Pemiscot, Phelps, Platte, Polk, Pulaski, Putnam, Ralls, Ray, Reynolds, Ripley, St. Clair, Ste. Genevieve, St. Francois, Saline, Schuyler, Scott, Shannon, Shelby, Stone, Sullivan, Taney, Texas, Vernon, Warren, Wayne, Webster, and Worth.

**Appendix G, Table 1. Estimated numbers and energy content of waste tires disposed of annually in Missouri.** <sup>109</sup>

County	Population Estimate July, 2003	Tire Generated per year	Btu (millions) <sup>110</sup>
Adair	24,790	24,790	4,512
Andrew	16,813	16,813	3,060
Atchison	6,286	6,286	1,144
Audrain	25,716	25,716	4,680
Barry	34,629	34,629	6,302
Barton	12,999	12,999	2,366
Bates	16,937	16,937	3,083
Benton	18,076	18,076	3,290
Bollinger	12,318	12,318	2,242
Boone	141,122	141,122	25,684
Buchanan	84,909	84,909	15,453
Butler	40,854	40,854	7,435
Caldwell	9,159	9,159	1,667
Callaway	42,225	42,225	7,685
Camden	38,302	38,302	6,971
Cape Girardeau	69,876	69,876	12,717
Carroll	10,149	10,149	1,847
Carter	5,974	5,974	1,087
Cass	88,834	88,834	16,168
Cedar	13,838	13,838	2,519
Chariton	8,251	8,251	1,502
Christian	61,571	61,571	11,206
Clark	7,420	7,420	1,350
Clay	194,247	194,247	35,353
Clinton	20,140	20,140	3,665
Cole	72,454	72,454	13,187
Cooper	17,009	17,009	3,096
Crawford	23,513	23,513	4,279
Dade	7,845	7,845	1,428
Dallas	16,113	16,113	2,933
Daviess	8,004	8,004	1,457
DeKalb	13,063	13,063	2,377
Dent	14,921	14,921	2,716
Douglas	13,363	13,363	2,432
Dunklin	32,654	32,654	5,943
Franklin	96,905	96,905	17,637
Gasconade	15,542	15,542	2,829
Gentry	6,566	6,566	1,195
Greene	245,765	245,765	44,729

<sup>109</sup> Tables may not sum due to rounding

<sup>110</sup> Numbers of tires are calculated based on the assumption that one 20-pound passenger tire equivalent (PTE) is disposed of for each person in the state. Btu determined using 182,000 Btu per tire.

<b>County</b>	<b>Population Estimate July, 2003</b>	<b>Tire Generated per year</b>	<b>Btu (millions)<sup>110</sup></b>
Grundy	10,311	10,311	1,877
Harrison	8,828	8,828	1,607
Henry	22,419	22,419	4,080
Hickory	9,005	9,005	1,639
Holt	5,145	5,145	936
Howard	10,007	10,007	1,821
Howell	37,499	37,499	6,825
Iron	10,306	10,306	1,876
Jackson	659,723	659,723	120,070
Jasper	108,112	108,112	19,676
Jefferson	206,786	206,786	37,635
Johnson	50,262	50,262	9,148
Knox	4,311	4,311	785
Laclede	33,326	33,326	6,065
Lafayette	32,951	32,951	5,997
Lawrence	36,426	36,426	6,630
Lewis	10,226	10,226	1,861
Lincoln	44,207	44,207	8,046
Linn	13,460	13,460	2,450
Livingston	14,387	14,387	2,618
McDonald	21,973	21,973	3,999
Macon	15,577	15,577	2,835
Madison	11,804	11,804	2,148
Maries	8,841	8,841	1,609
Marion	28,289	28,289	5,149
Mercer	3,596	3,596	654
Miller	24,255	24,255	4,414
Mississippi	14,386	14,386	2,618
Moniteau	14,965	14,965	2,724
Monroe	9,396	9,396	1,710
Montgomery	12,068	12,068	2,196
Morgan	20,000	20,000	3,640
New Madrid	19,187	19,187	3,492
Newton	54,033	54,033	9,834
Nodaway	21,743	21,743	3,957
Oregon	10,301	10,301	1,875
Osage	13,134	13,134	2,390
Ozark	9,498	9,498	1,729
Pemiscot	19,729	19,729	3,591
Perry	18,225	18,225	3,317
Pettis	39,344	39,344	7,161
Phelps	41,668	41,668	7,584
Pike	18,519	18,519	3,370
Platte	79,390	79,390	14,449
Polk	28,081	28,081	5,111
Pulaski	45,254	45,254	8,236
Putnam	5,148	5,148	937



<b>County</b>	<b>Population Estimate July, 2003</b>	<b>Tire Generated per year</b>	<b>Btu (millions)<sup>110</sup></b>
Ralls	9,653	9,653	1,757
Randolph	25,045	25,045	4,558
Ray	23,926	23,926	4,355
Reynolds	6,581	6,581	1,198
Ripley	13,781	13,781	2,508
St Charles	311,531	311,531	56,699
St Clair	9,679	9,679	1,762
Ste Genevieve	18,094	18,094	3,293
St Francois	57,929	57,929	10,543
St Louis	1,013,123	1,013,123	184,388
Saline	22,887	22,887	4,165
Schuyler	4,209	4,209	766
Scotland	4,905	4,905	893
Scott	40,779	40,779	7,422
Shannon	8,293	8,293	1,509
Shelby	6,702	6,702	1,220
Stoddard	29,626	29,626	5,392
Stone	29,941	29,941	5,449
Sullivan	7,080	7,080	1,289
Taney	41,403	41,403	7,535
Texas	24,142	24,142	4,394
Vernon	20,283	20,283	3,692
Warren	26,862	26,862	4,889
Washington	23,884	23,884	4,347
Wayne	13,090	13,090	2,382
Webster	33,124	33,124	6,029
Worth	2,270	2,270	413
Wright	18,186	18,186	3,310
St Louis City	332,223	332,223	60,465
<b>Totals</b>	<b>5,704,484</b>	<b>5,704,484</b>	<b>1,038,216</b>

**Appendix G, Table 2. Estimated energy content of the approximately 2.3 million tires currently located in unpermitted dumps in Missouri.**

County	City	Site Name	#Tires (PTE) <sup>111</sup>	County #Tires (PTE)	BTU (millions) <sup>112</sup>
Adair	Kirkville	Hatcher, Jeremy J.	1,000	1,000	182
Andrew	Savannah	Miller Property	2,000	2,000	364
Atchison	Fairfax	David's Salvage Yard	200	1,200	218
		Ellison Property	1,000		
Audrain	Mexico	Moody Property	500	500	91
Barry	Cassville	Williamson, Rondal (Roland?)	3,000	4,245	773
	Jenkins	Lassiter Property	1,000		
	Purdy	Holt Property	200		
	Washburn	Butts Property	45		
Barton	Lamar	Cross Tractor Salvage (Robert Enright)	3,680	3,680	670
Bates	Adrian	Nelson, Edwin	206	206	37
Benton	Warsaw	Davis, Bob & Judith	800	800	146
Bollinger	Grassy	Francis, Kelly Property	6,100	26,100	4,750
	Marble Hill	McCormick Property	2,000		
	Sedgewickville	Reando, Bud	8,000		
	Zalma	Meyers, Melvin Property	10,000		
Butler	Ellsinore	Cox Property	850	1,150	209
	Neelyville	Nash, Jewel	300		
Caldwell	Hamilton	Old Burlington Railroad Property	50	50	9
Callaway	Auxvasse	Schneider Property/Llamas-Soto	10,000	10,175	1,852
	Holts Summit	Gibson, Walter	175		
Camden	Climax Springs	JR's Old Cars, Trucks and Parts	1,000	1,600	291
	Lake Ozark	Evans, Ed Property	600		
Carroll	Carrollton	Mid-West Method Land Management	750	1,550	282
	Carrollton	Turner Scrap/Tonnar Salvage	800		
Carter	Ellsinore	Powell Property	3,800	3,800	692
Cass	Cleveland	Norris Property	55	1,005,255	182,956
	Drexel	Bishop, Wayne & Mary Lou	1,000,000		
	Peculiar	Sturges, Margaret	1,000		
	Pleasant Hill	Ford, Raymond	700		
	Pleasant Hill	Judd, Stanley	3,500		
Christian	Billings	M & M Auto Clinic	57	63,907	11,631
	Billings	Rensch Property	300		
	Ozark	Scott Property	250		

<sup>111</sup> PTE is Passenger Tire Equivalent.

<sup>112</sup> Btu found by taking number of tires times 182,000 Btu per tire.

County	City	Site Name	#Tires (PTE) <sup>111</sup>	County #Tires (PTE)	BTU (millions) <sup>112</sup>
	Seymour	Minear Property	300		
	Willard	Newell, Roger	63,000		
Clay	Excelsior Springs	Brown, Edward	45	125	23
	Kearney	Yoakum, Mary	30		
	Mosby	Teer Salvage Yard	50		
Clinton	Lathrop	Hedges Property	6,860	88,540	16,114
	Lathrop	Keck Property	11,830		
	Lathrop	McGregor Property	8,890		
	Lathrop	Newell Property	120		
	Lathrop	Young Property	840		
	Plattsburg	Devling, Robert	60,000		
	Plattsburg	Langston, Lowell & Mildred			
Cole	Centertown	Driver Property	0	950	173
	Honey Creek	Turpin Property (Turps Salvage)			
	Jefferson City	Stech Property	950		
Cooper	Prairie Home	Ahrens Property	50	50	9
Crawford	Leasburg	Davis	2,000	2,000	364
Dade	Dadeville	Raymond, Henry/Broach, Terez	1,500	1,500	273
Dallas	Buffalo	Beckner Property	1,000	2,830	515
	Louisburg	Jackson, Wayne	1,080		
	Louisburg	Pitts, Marv	500		
	Urbana	Greer, Bob	250		
Dunklin	Malden	Acup Recycling	14,541	14,841	2,701
	Malden	Wilson, R. V. (Second Occurrence at site)	300		
Franklin		IDS Sanitary Landfill	300	37,150	6,761
		Richardson, Vernon	500		
	Pacific	Steffen's Towing Salvage Yard	9,500		
	St. Clair	Sohn Property	900		
	Sullivan	Reed Jr., James	450		
	Union	Peirick, Leo/Jeff Freesburg Road Site	500		
	Union	Peirick, Leo/Tractor Trailers Site	15,000		
	Union	Peirick, Leo/Washington Ave. Site	10,000		
Gasconade		Limberg, Delmar & Donald	75	75	14
Greene	Springfield	Campbell Property	1,000	36,200	6,588
	Springfield	Charter Express, Incorporated	4,750		
	Springfield	Northside Loan and Investments	350		
	Springfield	Peck, Richard/Wilson Tire Company	30,000		
	Springfield	Wilson Tire Company	100		
Henry	Windsor	David Ward Enterprises	2,000	2,000	364

County	City	Site Name	#Tires (PTE) <sup>111</sup>	County #Tires (PTE)	BTU (millions) <sup>112</sup>
Howell	Mountain View	Johnson, Jewel Property	600	600	109
Iron	Ironton	Supattanasiri Property	100	100	18
Jackson	Independence	Ron's Auto Salvage	2,500	34,759	6,326
	Kansas City	Collins, Joanne	2,000		
	Kansas City	East Side Auto Parts	3,000		
	Kansas City	Haney Property	2,000		
	Kansas City	Kluska/Edwards Property	16,729		
	Kansas City	Little Will's Auto Salvage	500		
	Kansas City	Wilkins Property	5,000		
	Sibley	Davis Property	30		
	Sibley	Hollingsworth Property	3,000		
Jasper	Carthage	Arnold Property	5,000	5,000	910
Jefferson	Cedar Hill	Wallach, Thomas & Patrici	1,000	7,000	1,274
	Crystal City	Jefferson Memorial Hospital	0		
	DeSoto	Boyer Property	0		
	Festus	Bradshaw Property	0		
	Festus	Intermodal Tire Services	6,000		
Johnson	Holden	Burden Property	50	50	9
Laclede	Lebanon	American General Finance	250	700	127
	Lebanon	Claxton Property	50		
	Lebanon	Mid State Auto Salvage	350		
	Lebanon	Talley, Richard and Diana	50		
Lafayette	Lexington	Barnes Property	4,200	4,200	764
Lawrence	Pierce City	Moennig Property	500	500	91
Lewis	Durham	Griesbaum, Jamie	225	475	86
	LaBelle	Hankins/Newell	250		
Lincoln	Winfield	Beckwith Property	150	450	82
	Wright City	Scott Garage and Auto Repair	300		
Linn	Brookfield	Mayhew Property	700	700	127
Livingston		Farmers Sanitary Landfill/Trager	600	600	109
Madison	Fredericktown	Webb, James C. & Dorothy	14,216	16,016	2,915
	Fredicktown	Kennon Property	1,800		
McDonald	Anderson	Alexander	150	150	27
Marion	Hannibal	Market Street Salvage (Bob's Salvage)	3,000	3,600	655
	Maywood	Parke, Steve	600		
Miller	Eldon	Bruns Service Center/Webery Property	18	3,018	549
	Iberia	Baker Site	3,000		
Moniteau	Jefferson City	Hartley Site	1,000	1,000	182
Montgomery	New Florence	Jones, Francis Property	50	50	9
Morgan	Smithton	Wilson, Roy	200	27,525	5,010
	Stover	Lehman Property	275		

County	City	Site Name	#Tires (PTE) <sup>111</sup>	County #Tires (PTE)	BTU (millions) <sup>112</sup>
	Versailles	Capps, Jerry and Teresa	50		
	Versailles	Purinton, Roy & Myra	27,000		
New Madrid	Kewanee	Hansen Property/former Browns Tire Shop	500	500	91
Newton	Diamond	Greninger Salvage Yard	2,000	4,500	819
	Neosho	Red's Tire Sales - Office	2,500		
Nodaway	Guilford	Morris, Wayne E. - Site #7	500	500	91
Ozark	Theodosia	U.S. Army Corps of Engineers	175	175	32
Pettis	Sedalia	Crabtree Property	100	40,100	7,298
	Sedalia	Smith, Carl L. & Carl W.	40,000		
Pike	Bowling Green	Chandler Property	750	950	173
	New London	Howes Property	200		
Platte	Edgerton	Smith Property/Kirk, Theophilis	900	900	164
Polk	Bolivar	DWM of Mid-America, Inc.	750,000	750,000	136,500
Pulaski	Dixon	Willis Property	500	800	146
	St. Robert	Lowe Chevrolet	300		
Ralls	Center	White, Margaret	1,000	1,550	282
	New London	Coulter, Reese Property	550		
Randolph	Clifton Hill	Jordon Property	150	1,200	218
	Higbee	Leonard	50		
	Higbee	Nixon, Arvin	1,000		
Ray	Excelsior Springs	Whitworth Property	50	19,920	3,625
	Orrick	McClelland Property	19,870		
Ripley	Doniphan	Hesselrode Property	600	600	109
St. Charles	Overland	Overland Fund and Contract	400	400	73
St. Clair	Collins	Chance Property	100	350	64
	Collins	Slatten Property	250		
St. Francois	Bonne Terre	Barton, John	3,500	3,575	651
	French Village	Carver Property	75		
St. Louis	Bridgeton	Bob's Auto Parts	33,000	33,000	6,006
Shannon	Winona	Elliott Property	300	300	55
Stone	Blue Eye	Curbow Property	255	405	74
	Hurley	Domann Property	150		
Sullivan	Kirksville	Rhoads Property	900	900	164
Taney	Forsyth	Simmons, Megnoma	500	500	91
Texas	Plato	Murray, Nicolle and Donald	550	550	100
Vernon	Moundville	H & H Tire (Hallam Property)	5,000	5,000	910
Warren	Pendleton	Amerin, Jim	6,000	6,400	1,165
	Washington	Bob's Home Service Sanitary Landfill	400		
Washington	Caledonia	J & L Service Station	300	300	55
Wright	Hartville	Tooley, Bob and Marjorie	1,225	1,385	252

<b>County</b>	<b>City</b>	<b>Site Name</b>	<b>#Tires (PTE)<sup>111</sup></b>	<b>County #Tires (PTE)</b>	<b>BTU (millions) <sup>112</sup></b>
	Norwood	Collins, Terry and Michelle	60		
	Norwood	Menzie Property	100		
Misc. Counties		Schroeder Property	100	100	18
<i>Totals</i>				<i>2,294,732</i>	<i>417,659</i>

Counties not reporting are Boone, Buchanan, Caldwell, Callaway, Camden, Carroll, Carter, Cass, Christian, Clay, Clinton, Cole, Cooper, Crawford, Dade, Dallas, Dunklin, Franklin, Gasconade, Greene, Henry, Howell, Iron, Jackson, Jasper, Jefferson, Johnson, Laclede, Lafayette, Lawrence, Lewis, Lincoln, Linn, Livingston, McDonald, Madison, Marion, Miller, Moniteau, Montgomery, Morgan, New Madrid, Newton, Nodaway, Ozark, Pettis, Pike, Platte, Polk, Pulaski, Ralls, Randolph, Ray, Ripley, St. Charles, St. Clair, St. Francois, St. Louis, Shannon, Stone, Sullivan, Taney, Texas, Vernon, Warren, Washington, Wright, and St Louis City.

**Appendix H, Table 1. Summary, by county, of energy available in crop residue and processing feedstocks available in Missouri. (Values from Appendix A, Tables 1-7 and 10) and (Btu Values in Million Btu).**

County	Corn	Sorghum	Winter Wheat	Rice	Soybeans	Cotton Field Waste	Cotton Gin Waste	Fescue Seed	Total Crops
Adair	170,264	0	27,949	0	179,942	0	0	3	378,157
Andrew	636,854	5,468	19,858	0	345,411	0	0	0	1,007,592
Atchison	1,799,860	0	3,146	0	512,420	0	0	0	2,315,425
Audrain	773,879	334,832	272,583	0	553,595	0	0	601	1,935,490
Barry	11,346	0	5,333	0	234,247	0	0	6,119	257,045
Barton	286,196	318,364	411,347	0	241,218	0	0	1,256	1,258,382
Bates	460,152	85,844	309,971	0	364,622	0	0	2,265	1,222,853
Benton	71,215	39,917	63,572	0	92,988	0	0	709	268,401
Bollinger	164,846	27,304	30,972	0	83,808	0	0	2,601	309,531
Boone	221,710	26,964	107,010	0	215,136	0	0	0	570,819
Buchanan	595,552	7,232	38,479	0	256,487	0	0	9	897,758
Butler	244,440	126,769	188,628	1,187,141	410,562	2,228	770	0	2,160,537
Caldwell	244,012	4,629	39,272	0	241,070	0	0	0	528,982
Callaway	258,854	81,598	105,633	0	337,460	0	0	189	783,733
Camden	0	0	0	0	0	0	0	689	689
Cape Girardeau	506,470	41,328	173,439	0	221,820	0	0	984	944,041
Carroll	971,397	17,493	201,438	0	491,657	0	0	45	1,682,030
Carter	0	0	0	0	0	0	0	9	9
Cass	297,436	37,485	118,589	0	309,015	0	0	203	762,728
Cedar	20,122	5,859	10,265	0	55,391	0	0	2,153	93,790
Chariton	883,499	9,412	226,204	0	479,264	0	0	0	1,598,379
Christian	2,478	0	2,341	0	296,271	0	0	1,519	302,609
Clark	678,258	0	54,704	0	112,293	0	0	0	845,255
Clay	117,193	670	24,131	0	247,955	0	0	0	389,948
Clinton	375,820	4,305	20,553	0	44,235	0	0	0	444,913
Cole	71,833	5,012	19,720	0	249,386	0	0	742	346,693
Cooper	472,311	13,492	212,016	0	139,138	0	0	545	837,502
Crawford	0	0	238	0	0	0	0	221	459

County	Corn	Sorghum	Winter Wheat	Rice	Soybeans	Cotton Field Waste	Cotton Gin Waste	Fescue Seed	Total Crops
Dade	60,946	80,249	173,585	0	122,081	506	175	4,103	441,645
Dallas	403	0	1,012	0	313,578	0	0	1,976	316,969
Daviess	329,024	16,821	52,163	0	167,684	0	0	0	565,692
De Kalb	305,991	9,573	25,139	0	263,507	0	0	0	604,210
Dent	0	0	0	0	0	0	0	181	181
Douglas	0	0	0	0	0	0	0	844	844
Dunklin	253,651	103,874	298,767	129,635	142,587	872,978	301,770	0	2,103,262
Franklin	216,947	8,505	51,909	0	34,749	0	0	274	312,383
Gasconade	75,600	8,782	20,509	0	237,236	0	0	1,145	343,271
Gentry	366,660	5,739	27,642	0	38,133	0	0	0	438,175
Greene	6,591	0	11,066	0	269,393	0	0	1,850	288,900
Grundy	245,687	28,337	54,141	0	257,415	0	0	0	585,581
Harrison	539,091	1,652	24,404	0	195,183	0	0	0	760,330
Henry	171,284	104,063	159,377	0	43,835	0	0	7,323	485,882
Hickory	6,633	4,297	2,403	0	453,222	0	0	2,198	468,752
Holt	1,468,921	7,352	13,528	0	196,101	0	0	0	1,685,902
Howard	428,287	586	96,244	0	170,505	0	0	96	695,717
Howell	0	0	870	0	0	0	0	3,733	4,603
Iron	0	0	0	0	0	0	0	0	0
Jackson	213,822	5,214	95,910	0	132,233	0	0	0	447,179
Jasper	121,288	97,096	207,113	0	67,774	0	0	2,637	495,907
Jefferson	36,893	0	12,969	0	284,790	0	0	19	334,671
Johnson	339,066	54,508	94,471	0	272,768	0	0	2,353	763,165
Knox	393,712	1,952	73,023	0	506,804	0	0	0	975,490
Laclede	6,294	0	2,103	0	67,703	0	0	1,032	77,132
Lafayette	1,314,734	4,007	145,524	0	266,625	0	0	190	1,731,080
Lawrence	42,084	12,129	56,248	0	305,897	0	0	7,861	424,219
Lewis	628,375	0	97,579	0	246,996	0	0	0	972,950
Lincoln	583,657	16,030	159,753	0	389,556	0	0	0	1,148,996
Linn	228,362	14,322	69,330	0	283,028	0	0	0	595,042
Livingston	267,397	64,298	134,550	0	9,223	0	0	1	475,469
McDonald	0	0	219	0	0	0	0	1,033	1,252
Macon	260,606	18,409	88,754	0	248,184	0	0	0	615,952
Madison	0	0	0	0	0	0	0	0	0



County	Corn	Sorghum	Winter Wheat	Rice	Soybeans	Cotton Field Waste	Cotton Gin Waste	Fescue Seed	Total Crops
Maries	13,941	0	4,504	0	89,765	0	0	2,645	110,855
Marion	645,158	13,511	147,819	0	209,480	0	0	21	1,015,988
Mercer	190,877	1,901	5,988	0	20,143	0	0	0	218,910
Miller	23,877	0	3,382	0	682,668	0	0	5,524	715,451
Mississippi	1,205,140	182,461	603,919	0	120,123	6,521	2,254	0	2,120,417
Moniteau	145,530	13,766	51,554	0	292,653	0	0	8,096	511,598
Monroe	430,277	147,596	165,115	0	320,220	0	0	18	1,063,226
Montgomery	537,062	42,122	163,446	0	57,996	0	0	89	800,715
Morgan	71,228	4,792	19,989	0	607,230	0	0	3,316	706,555
New Madrid	1,264,108	265,243	436,509	325,415	42,921	607,014	209,832	0	3,151,040
Newton	14,868	9,376	31,512	0	637,740	0	0	4,575	698,071
Nodaway	1,430,667	3,504	22,366	0	67,041	0	0	14	1,523,592
Oregon	0	0	803	0	0	0	0	4,457	5,260
Osage	112,417	11,540	12,437	0	513,162	0	0	1,951	651,508
Ozark	0	0	0	0	0	0	0	2,131	2,131
Pemiscot	347,798	150,331	423,615	180,072	217,815	482,355	166,740	0	1,968,726
Perry	356,101	8,949	129,480	0	309,866	0	0	1,124	805,518
Pettis	456,448	78,523	247,088	0	178,592	0	0	2,593	963,244
Phelps	4,757	0	250	0	294,570	0	0	257	299,834
Pike	669,337	54,432	160,733	0	237,668	0	0	405	1,122,575
Platte	475,637	7,736	44,759	0	126,087	0	0	0	654,220
Polk	16,425	2,361	9,508	0	81,135	0	0	7,916	117,346
Pulaski	3,525	0	0	0	370,643	0	0	923	375,090
Putnam	129,402	0	4,974	0	134,568	0	0	0	268,944
Ralls	461,702	101,392	167,431	0	433,094	0	0	65	1,163,683
Randolph	161,897	16,879	84,936	0	60,764	0	0	0	324,476
Ray	469,300	7,598	92,635	0	633,623	0	0	0	1,203,154
Reynolds	0	0	0	0	0	0	0	0	0
Ripley	24,218	14,815	13,382	78,469	121,275	0	0	321	252,481
St. Charles	651,546	3,292	109,534	0	277,601	0	0	0	1,041,973
St. Clair	80,489	64,424	119,069	0	376,812	0	0	7,550	648,343
Ste. Genevieve	187,690	2,481	49,259	0	348,219	0	0	1,483	589,132
St. Francois	16,192	0	2,817	0	244,715	0	0	0	263,723
St. Louis	78,271	901	26,347	0	115,614	0	0	0	221,133

County	Corn	Sorghum	Winter Wheat	Rice	Soybeans	Cotton Field Waste	Cotton Gin Waste	Fescue Seed	Total Crops
Saline	1,913,323	7,744	175,609	0	29,781	0	0	100	2,126,557
Schuyler	104,895	0	8,852	0	148,595	0	0	0	262,342
Scotland	469,715	912	41,352	0	78,084	0	0	0	590,063
Scott	1,130,321	98,532	445,439	0	613,008	60,750	21,000	0	2,369,049
Shannon	0	0	0	0	0	0	0	239	239
Shelby	469,640	77,855	177,675	0	103,964	0	0	213	829,347
Stoddard	1,910,551	170,982	586,978	1,008,042	239,072	253,166	87,514	0	4,256,303
Stone	0	0	0	0	0	0	0	120	120
Sullivan	109,822	0	8,316	0	151,106	0	0	0	269,243
Taney	0	0	0	0	0	0	0	189	189
Texas	5,043	0	0	0	67,871	0	0	4,859	77,773
Vernon	321,035	201,915	262,068	0	132,948	0	0	3,531	921,498
Warren	256,599	9,958	58,898	0	0	0	0	0	325,455
Washington	0	0	0	0	0	0	0	0	0
Wayne	23,927	2,465	5,226	0	0	0	0	0	31,618
Webster	3,653	0	3,057	0	0	0	0	1,651	8,360
Worth	162,716	462	2,015	0	0	0	0	0	165,194
Wright	0	0	315	0	0	0	0	2,369	2,684
St. Louis City	0	0	0	0	0	0	0	0	0
Misc. Counties	0	0	0	0	0	0	0	1,103	1,103
Sum of counties <3 mills	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>36,805,127</b>	<b>3,642,524</b>	<b>10,068,655</b>	<b>2,908,773</b>	<b>22,490,394</b>	<b>2,285,516</b>	<b>790,055</b>	<b>129,559</b>	<b>79,120,603</b>

**Appendix H, Table 2. Summary, by county, of annualized energy content of Missouri Biomass.<sup>113</sup> (Btu Values in Million Btu).**

County	Total Crops	Switchgrass	Poplar	Landfill Gas	Animal Wastes	Timber Harvest	Timber Thinning	Timber Mill	Tires	Municipal Solid Waste	Total
Adair	378,157	3,349,502	3,678,307	0	0	41,166	459,791	0	4,512	0	4,233,128
Andrew	1,007,592	2,100,482	2,306,676	0	0	25,864	267,872	0	3,060	0	3,404,870
Atchison	2,315,425	945,024	1,037,792	0	13,489	34,148	212,528	0	1,144	69,103	3,590,861
Audrain	1,935,490	1,652,223	1,814,414	0	146,247	57,913	788,229	201,798	4,680	0	4,786,581
Barry	257,045	39,306	43,165	0	932,116	138,915	2,454,454	183,302	6,302	0	4,011,441
Barton	1,258,382	2,221,119	2,439,156	131,647	6,281	120,327	421,369	0	2,366	4,066,948	8,228,439
Bates	1,222,853	1,949,738	2,141,135	0	171,315	48,821	606,246	0	3,083	0	4,002,056
Benton	268,401	124,400	136,612	0	145,209	35,308	2,420,857	0	3,290	0	2,997,465
Bollinger	309,531	287,689	315,930	0	15,132	337,218	1,934,859	253,160	2,242	0	3,139,830
Boone	570,819	952,655	1,046,172	90,690	45,162	82,804	1,614,189	0	25,684	576,278	3,958,282
Buchanan	897,758	1,089,704	1,196,675	124,732	0	35,272	408,347	0	15,453	388,071	2,959,338
Butler	2,160,537	69,936	76,801	165,955	0	271,001	1,213,694	61,697	7,435	1,305,860	5,256,116
Caldwell	528,982	4,479,035	4,918,721	0	33,811	48,508	46,096	0	1,667	17,393	5,155,492
Callaway	783,733	1,315,715	1,444,873	0	131,885	89,818	2,224,832	115,404	7,685	126,840	4,795,912
Camden	689	0	0	0	26,415	116,719	2,133,836	95,919	6,971	0	2,380,549
Cape Girardeau	944,041	1,434,052	1,574,826	0	0	202,338	1,203,010	97,544	12,717	283,333	4,177,036
Carroll	1,682,030	6,022,225	6,613,398	0	29,324	63,899	0	0	1,847	0	7,799,325
Carter	9	9,513	10,447	0	0	318,039	2,535,866	726,509	1,087	0	3,591,023
Cass	762,728	944,396	1,037,103	0	53,569	9,569	1,245,857	0	16,168	49,914	3,082,201
Cedar	93,790	361,911	397,438	0	0	83,023	1,097,948	0	2,519	73,075	1,712,266
Chariton	1,598,379	4,124,024	4,528,860	0	35,935	188,092	795,071	0	1,502	0	6,743,002
Christian	302,609	21,953	24,108	0	41,912	148,097	1,356,080	232,589	11,206	0	2,114,446
Clark	845,255	2,484,346	2,728,222	0	0	81,180	138,085	141,198	1,350	0	3,691,414
Clay	389,948	161,720	177,596	475,259	0	11,655	320,914	0	35,353	89	1,394,938
Clinton	444,913	2,323,253	2,551,315	0	0	26,129	45,450	0	3,665	0	2,843,411

<sup>113</sup> Total crop residues are included in the summary. For individual crop residues, see preceding table. Since CRP ground can be used only once, the values for switchgrass are included. For individual crop residue values, that are combined in the Total Crops column, see preceding table. Values in the Switchgrass through Landfill columns are from Appendices B through G. Values in the Total column do not include the Btu value from CRP-Poplar since only one crop can be grown on a given CRP acre and no hybrid poplar plantations have been established on Missouri CRP acres.

County	Total Crops	Switchgrass	Poplar	Landfill Gas	Animal Wastes	Timber Harvest	Timber Thinning	Timber Mill	Tires	Municipal Solid Waste	Total
Cole	346,693	143,322	157,391	207,178	67,621	19,009	940,946	0	13,187	1,608,723	3,346,677
Cooper	837,502	1,636,961	1,797,653	0	49,061	22,537	509,629	10,426	3,096	0	3,069,211
Crawford	459	35,752	39,262	0	0	486,205	2,748,009	805,557	4,279	325,927	4,406,189
Dade	441,645	528,858	580,773	0	57,872	33,030	557,573	0	1,428	0	1,620,407
Dallas	316,969	40,247	44,198	0	14,053	24,424	1,400,065	10,569	2,933	0	1,809,260
Daviess	565,692	5,971,838	6,558,065	0	198,973	74,626	719,458	305,572	1,457	0	7,837,615
De Kalb	604,210	4,514,787	4,957,982	0	21,817	42,034	137,735	0	2,377	0	5,322,961
Dent	181	17,249	18,942	0	0	498,828	2,122,076	649,883	2,716	0	3,290,932
Douglas	844	81,435	89,429	0	0	459,311	1,652,704	206,131	2,432	0	2,402,857
Dunklin	2,103,262	184,405	202,507	0	0	16,129	129,509	0	5,943	0	2,439,248
Franklin	312,383	525,094	576,640	0	41,649	58,930	3,322,149	24,165	17,637	432,384	4,734,392
Gasconade	343,271	115,096	126,395	0	12,368	135,526	1,998,037	0	2,829	0	2,607,127
Gentry	438,175	6,120,595	6,721,425	0	305,880	20,954	504,026	0	1,195	0	7,390,825
Greene	288,900	8,886	9,758	272,602	0	21,817	966,405	0	44,729	426,345	2,029,685
Grundy	585,581	4,882,656	5,361,964	0	28,151	48,660	278,771	0	1,877	0	5,825,696
Harrison	760,330	8,169,331	8,971,276	0	111,927	49,226	464,754	0	1,607	0	9,557,174
Henry	485,882	995,620	1,093,355	0	73,737	41,250	720,043	0	4,080	0	2,320,612
Hickory	468,752	50,596	55,563	0	0	25,388	936,010	0	1,639	0	1,482,385
Holt	1,685,902	622,628	683,749	0	0	18,187	224,263	0	936	0	2,551,917
Howard	695,717	1,799,831	1,976,512	0	0	159,542	657,404	0	1,821	0	3,314,315
Howell	4,603	24,776	27,208	0	0	535,219	2,752,052	725,879	6,825	0	4,049,353
Iron	0	5,331	5,855	0	0	492,171	2,262,051	671,334	1,876	0	3,432,763
Jackson	447,179	39,934	43,854	682,969	0	2,453	952,089	0	120,070	2,382,579	4,627,271
Jasper	495,907	1,018,096	1,118,037	0	168,381	35,588	346,858	0	19,676	407,646	2,492,152
Jefferson	334,671	39,202	43,050	0	0	112,065	2,899,706	0	37,635	873,322	4,296,601
Johnson	763,165	1,147,514	1,260,160	502,386	140,887	2,250	855,254	0	9,148	0	3,420,604
Knox	975,490	4,216,122	4,629,999	0	0	59,165	345,119	0	785	0	5,596,680
Laclede	77,132	37,738	41,443	0	0	153,846	2,255,864	0	6,065	0	2,530,646
Lafayette	1,731,080	744,311	817,376	0	18,767	26,200	197,980	0	5,997	0	2,724,335
Lawrence	424,219	635,591	697,984	0	252,758	60,621	608,735	191,470	6,630	0	2,180,022
Lewis	972,950	2,535,151	2,784,015	92,286	48,959	65,483	409,336	78,443	1,861	813,870	5,018,339
Lincoln	1,148,996	1,020,814	1,121,022	0	122,949	84,409	1,356,936	275,560	8,046	0	4,017,709
Linn	595,042	6,604,293	7,252,605	0	18,298	80,133	313,758	0	2,450	0	7,613,974
Livingston	475,469	4,176,293	4,586,260	0	22,521	82,427	384,649	0	2,618	0	5,143,978
McDonald	1,252	17,040	18,712	0	522,405	205,498	1,695,374	0	3,999	0	2,445,568

County	Total Crops	Switchgrass	Poplar	Landfill Gas	Animal Wastes	Timber Harvest	Timber Thinning	Timber Mill	Tires	Municipal Solid Waste	Total
Macon	615,952	5,352,659	5,878,104	0	46,860	85,799	616,478	243,603	2,835	1,258,854	8,223,042
Madison	0	24,880	27,322	0	4,668	250,432	2,132,155	565,674	2,148	0	2,979,957
Maries	110,855	44,010	48,331	0	35,189	183,455	1,360,335	0	1,609	0	1,735,454
Marion	1,015,988	1,618,771	1,777,678	0	11,260	59,871	872,576	0	5,149	0	3,583,616
Mercer	218,910	4,595,177	5,046,264	0	1,210,842	37,855	366,293	0	654	0	6,429,731
Miller	715,451	2,823	3,100	0	211,661	81,858	1,584,482	161,827	4,414	0	2,762,516
Mississippi	2,120,417	175,206	192,405	0	43,355	421	199,551	0	2,618	0	2,541,567
Moniteau	511,598	1,061,270	1,165,450	0	124,530	12,195	442,458	82,528	2,724	0	2,237,303
Monroe	1,063,226	3,577,709	3,928,915	0	135,389	99,396	1,167,171	0	1,710	0	6,044,602
Montgomery	800,715	755,601	829,774	0	35,151	54,675	1,059,882	0	2,196	0	2,708,219
Morgan	706,555	53,523	58,778	0	215,211	36,623	1,613,482	0	3,640	0	2,629,035
New Madrid	3,151,040	160,466	176,218	0	30,945	43,585	151,679	0	3,492	0	3,541,208
Newton	698,071	265,213	291,248	73,669	348,860	135,937	1,741,646	324,573	9,834	137,068	3,734,871
Nodaway	1,523,592	5,247,808	5,762,960	0	19,149	7,894	109,971	0	3,957	90,331	7,002,702
Oregon	5,260	12,963	14,235	0	0	616,126	2,423,705	831,355	1,875	0	3,891,284
Osage	651,508	63,245	69,454	0	2,405	163,034	2,057,849	252,102	2,390	0	3,192,533
Ozark	2,131	4,704	5,166	0	43,563	122,755	1,909,481	109,989	1,729	0	2,194,351
Pemiscot	1,968,726	106,942	117,440	0	0	14,638	12,958	0	3,591	0	2,106,854
Perry	805,518	737,829	810,258	0	0	181,615	1,178,003	831,748	3,317	112,144	3,850,175
Pettis	963,244	1,247,138	1,369,564	179,785	1,025,456	6,627	476,073	0	7,161	769,562	4,675,046
Phelps	299,834	21,012	23,075	0	35,658	180,461	1,667,347	401,453	7,584	0	2,613,349
Pike	1,122,575	1,127,233	1,237,888	0	13,489	142,759	1,247,553	153,663	3,370	709,835	4,520,477
Platte	654,220	469,167	515,222	0	25,160	12,989	486,020	0	14,449	0	1,662,004
Polk	117,346	117,710	129,265	0	15,294	24,902	890,124	0	5,111	0	1,170,486
Pulaski	375,090	0	0	0	51,610	213,557	1,788,665	0	8,236	0	2,437,159
Putnam	268,944	3,597,884	3,951,072	0	693,198	35,117	310,958	0	937	0	4,907,038
Ralls	1,163,683	2,070,061	2,273,270	0	38,825	86,010	539,652	113,907	1,757	0	4,013,897
Randolph	324,476	3,543,211	3,891,031	0	50,525	223,615	714,153	525,299	4,558	171,010	5,556,848
Ray	1,203,154	2,631,117	2,889,401	0	0	24,679	483,700	0	4,355	0	4,347,005
Reynolds	0	0	0	0	0	689,961	3,482,323	1,231,878	1,198	0	5,405,360
Ripley	252,481	133,600	146,714	0	0	556,153	2,139,301	551,288	2,508	0	3,635,330
St. Charles	1,041,973	71,818	78,868	0	10,897	101,118	1,070,040	0	56,699	646,786	2,999,331
St. Clair	648,343	569,732	625,660	0	5,865	62,936	1,002,242	0	1,762	0	2,290,881
Ste. Genevieve	589,132	488,924	536,920	0	0	0	2,439,371	95,951	3,293	0	3,616,671

County	Total Crops	Switchgrass	Poplar	Landfill Gas	Animal Wastes	Timber Harvest	Timber Thinning	Timber Mill	Tires	Municipal Solid Waste	Total
St. Francois	263,723	68,054	74,735	0	30,453	81,566	1,679,929	0	10,543	0	2,134,269
St. Louis	221,133	13,172	14,465	2,276,563	0	26,549	844,392	0	184,388	9,640,627	13,206,824
Saline	2,126,557	1,357,217	1,490,448	0	259,185	39,863	876,869	0	4,165	0	4,663,856
Schuyler	262,342	1,977,859	2,172,016	0	0	12,226	268,290	0	766	0	2,521,483
Scotland	590,063	4,473,076	4,912,177	0	0	47,370	346,542	0	893	974,141	6,432,085
Scott	2,369,049	338,285	371,493	0	151,321	23,626	347,381	0	7,422	0	3,237,084
Shannon	239	0	0	0	0	732,915	4,408,365	1,091,262	1,509	0	6,234,290
Shelby	829,347	1,786,241	1,961,588	0	48,294	45,553	275,574	0	1,220	0	2,986,228
Stoddard	4,256,303	2,095,046	2,300,707	167,285	307,017	44,975	504,510	0	5,392	1,620,762	9,001,290
Stone	120	4,391	4,822	0	37,991	72,700	1,288,520	0	5,449	0	1,409,172
Sullivan	269,243	6,195,026	6,803,163	0	1,086,009	33,801	1,080,256	0	1,289	0	8,665,624
Taney	189	0	0	0	0	104,929	2,407,943	95,780	7,535	0	2,616,377
Texas	77,773	0	0	0	0	566,945	3,491,700	903,077	4,394	0	5,043,889
Vernon	921,498	3,722,180	4,087,569	0	313,696	71,031	755,028	0	3,692	0	5,787,124
Warren	325,455	414,180	454,838	319,144	6,094	71,870	2,000,428	0	4,889	0	3,142,059
Washington	0	0	0	0	0	391,408	3,542,430	316,680	4,347	659,344	4,914,209
Wayne	31,618	51,955	57,056	0	0	596,589	3,436,753	441,445	2,382	0	4,560,744
Webster	8,360	10,663	11,710	0	26,481	58,690	1,670,520	0	6,029	0	1,780,742
Worth	165,194	3,115,337	3,421,155	0	30,497	15,256	110,060	0	413	0	3,436,758
Wright	2,684	0	0	157,445	15,043	284,519	1,222,061	131,349	3,310	2,190,027	4,006,438
St. Louis City	0	0	0	0	0	0	0	0	60,465	1,367,012	1,427,477
Misc. Counties	1,103	0	0	0	0	0	0	0	0	0	1,103
Sum of counties <3 mills	0	0	0	0	0	0	0	3,056,978	0	0	3,056,978
<b>Total</b>	<b>79,120,603</b>	<b>162,743,399</b>	<b>178,719,148</b>	<b>5,919,595</b>	<b>10,923,938</b>	<b>14,740,393</b>	<b>134,866,038</b>	<b>18,577,517</b>	<b>1,038,216</b>	<b>34,575,202</b>	<b>462,504,902</b>

Total column does not contain CRP-Poplar BTU as only one crop can be grown on a given CRP acre and no hybrid poplar plantations have been established on Missouri CRP acres.