

| TABLE 1: Fuel Consumption Rates | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|
| From: The Food and Agricultural Organization of the United Nations (FAO) estimate on heavy equipment fuel efficiency http://www.fao.org/docrep/T0579E/t0579e05.htm | | |
| Reference Table | | |
| LMPH = liters of fuel used per machine hour | | |
| $LMPH = (K * GHP * LF) / KPL$ | | |
| | Gasoline | Diesel |
| K (Fuel Consumption kg/brake hp-hour) | 0.21 | 0.17 |
| KPL (weight kg/liter) | 0.72 | 0.84 |
| LF (Load Factor) -Low | 0.38 | 0.38 |
| LF (Load Factor) -Med | 0.54 | 0.54 |
| LF (Load Factor) -High | 0.7 | 0.7 |
| 1 Liter = 0.264172 US Gallons | | |

| TABLE 2: Carbon Dioxide (CO2) Emission Rates | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|-------------|--------------|
| From: The EPA's AP-42 Compilation of Air Emission Factors (Chapter 3.3) Gasoline and Diesel Industrial Engines; Table 3.3-1 https://www3.epa.gov/ttn/chieff/ap42/ch03/final/c03s03.pdf | | | | |
| From: U.S. Department of Energy - Fuel Properties Comparison https://www.afdc.energy.gov/fuels/fuel_properties.php | | | | |
| | Gasoline | Units | Diesel | Units |
| Carbon Dioxide Emissions Factor | 154 | lb/mmbtu | 164 | lb/mmbtu |
| Energy Content of Fuel | 0.11609 | mmbtu/gal | 0.128488 | mmbtu/gal |
| Carbon Dioxide Equivalent per Volume of Fuel | 17.87786 | lb/gal | 21.072032 | lb/gal |
| Carbon Dioxide Equivalent per Volume of Fuel | 0.00893893 | ton CO2e/gal | 0.010536016 | ton CO2e/gal |

| Table 3: Typical Equipment Usage on AML Projects | | | |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------|------------------------------------|
| From: 35+ years of construction experience and input from DAML Design and Construction Engineers and Construction Staff | | | |
| Machine | Project Size Less Than \$500 K | Project Size Greater Than \$500 K | Hours Used Per Week (40-hour Week) |
| Dozer - D4 (John Deere 450) | X | | 10 |
| Excavator 1 - small (John Deere 60g) | X | | 40 |
| Excavator 2 - medium (John Deere 75g) | X | | 40 |
| Dump Truck - 6-wheel (Kenworth T880 Daycab) | X | | 30 |
| Skid Steer/Compact Track Loader (John Deere 3202/333g) | X | | 40 |
| | | X | |
| Dozer - D4 (John Deere 450) | | X | 30 |
| Dozer - D7 (John Deere D750) | | X | 40 |
| Track Loader (John Deere 755K) | | X | 30 |
| Excavator 1 - medium (John Deere 75g) | | X | 40 |
| Excavator 2 - large (John Deere 245g) | | X | 30 |
| Dump Truck 1 - 6-wheel (Kenworth T880 Daycab) | | X | 40 |
| Dump Truck 2 - 6-wheel (Kenworth T880 Daycab) | | X | 40 |
| Skid Steer/Compact Track Loader (John Deere 3202/333g) | | X | 40 |

| Table 4: Fuel and Emissions Calculations Per Machine | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|----------------------------|--------------------------------------|---------------------------|-----------------------------------------|-------------------------------|
| From: Table 1, Table 2, and Table 3 information; horsepower ratings of machines found on manufactures websites. | | | | | | | |
| Type of Vehicle | Gas or Diesel | Gross Engine Horsepower (GHP) | Hours Vehicle Ran Per Week | Liters of Fuel Used per Machine Hour | Gallons Consumed Per Week | Amount of Carbon Dioxide Emitted (tons) | Gallons Used Per Machine Hour |
| John Deere 450 Dozer | Diesel | 57 | 10 | 6.229285714 | 16.456 | 0.173380981 | 1.645602866 |
| John Deere 60g Excavator | Diesel | 53 | 40 | 5.792142857 | 61.2049 | 0.644855579 | 1.530121963 |
| John Deere 75g | Diesel | 56.9 | 40 | 6.218357143 | 65.7086 | 0.692307216 | 1.642715843 |
| Kenworth T880 Daycab (Average HP) | Diesel | 410 | 30 | 44.80714286 | 355.104 | 3.741379069 | 11.83679254 |
| John Deere 320e/333g | Diesel | 66 | 40 | 7.212857143 | 76.2174 | 0.803027703 | 1.905434897 |
| John Deere 750 | Diesel | 165 | 40 | 18.03214286 | 190.543 | 2.007569256 | 4.763587243 |
| John Deere 755k | Diesel | 140 | 30 | 15.3 | 121.255 | 1.277544072 | 4.0418316 |
| Cat 735c | Diesel | 452 | 40 | 49.39714286 | 521.974 | 5.499523054 | 13.04934202 |
| John Deere 245g | Diesel | 156 | 30 | 17.04857143 | 135.113 | 1.423549109 | 4.503755211 |

| Table 5: CO2 Emissions Per Week | |
|---------------------------------------|--------------------------------|
| From: Table 3 and Table 4 Information | |
| Project Size | Tons of CO2 Emissions per Week |
| < \$500,000 | 6.054950548 |
| > \$500,000 | 19.35965953 |

| Table 6: CO2 Emissions Per Project | | | | |
|----------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------|-----------------------------------|-------------------------------------------------------------------|
| From: table 5 Infomration and DAML experience regarding general correlation of contract length to contract amount \$ | | | | |
| Job Size in dollars \$ | Typical Contract Length in Weeks | Tons of CO2 Emissions per Week | Tons of CO2 Emissions per Project | Comparison: Percentage (%) of Kentucky's Total 2015 CO2 Emissions |
| < \$250,000.00 | 12 | 6.0549505 | 72.659406 | 0.000000558918508 |
| \$250,001.00 - \$500,000.00 | 18 | 6.0549505 | 108.989109 | 0.000000838377762 |
| \$500,001.00 - \$750,000.00 | 24 | 19.35966 | 464.63184 | 0.000003574091077 |
| \$750,001.00 - \$1,000,000.00 | 36 | 19.35966 | 696.94776 | 0.000005361136615 |
| > \$1,000,000.00 | 48 | 19.35966 | 929.26368 | 0.000007148182154 |

Kentucky's Total 2015 CO2 emissions was approximately 130 million metric tons per Department of Energy (DOE)
<https://www.eia.gov/environment/emissions/state/>