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Carbon Debt Analysis of Durham Manufacturing Photovoltaic System

Pfister Energy provided services to Durham Manufacturing Company that included performing a carbon debt analysis for Durham Manufacturing's proposed solar installation (the Project). The purpose of this analysis was to determine whether the Project can have a net improvement in carbon reduction compared to the loss of 1.45 acres of trees. The Project site is approximately 18.08 acres and the Project will require removing 1.45 acres of trees representing 8% of the project site.

The analysis relied upon a US Environmental Protection Agency (US EPA) conversion factor to identify the amount of carbon sequestered in one year by one acre of average U.S. forest: 0.85 metric tons (MT) CO₂ (US EPA, 2017). As the Project requires the removal of approximately 1.45 acres of trees, the associated "carbon debt" is estimated to be 1.23 MT CO₂ per year. Over 20 years, this would equate to the sequestration of 24.6 MT CO₂.

The Project is expected to produce approximately 1,833MWh of energy in its first year of operation. Using the US EPA Greenhouse Gas Equivalencies Calculator, the estimated annual carbon offset of the Project is 1,364 MT CO₂. Attachment A provides greenhouse gas equivalencies for this estimated offset, examples of which include:

- 292 passenger vehicles driven for one year;
- 153,499 gallons of gasoline consumed; and
- 147 homes' energy use for one year.

Anticipating an annual "carbon debt" of 1.23 MT CO₂ and an annual carbon offset of 1,364 MT CO₂, Pfister Energy performed the following calculation to determine the duration of time to offset the carbon debt of the tree clearing:

Offset Time in days= Annual Carbon Debt/(Annual MT CO₂ Offset/days per year)

Using this formula, Pfister Energy has determined that it would take approximately 0.33 days to produce a net improvement in carbon reduction. It would take approximately 6.6 days to recover the loss of carbon sequestration by the 1.45 acres of cleared trees over 20 years.

This analysis does not account for energy used as part of material extraction; solar panel manufacturing and production; manufacturing of balance of system components or project installation, including the act of land clearing. It also does not include the carbon dioxide that is expected to be released from the trees upon removal or the net carbon effect of the existing Christmas tree farm located on the site.



References

U.S. Environmental Protection Agency (US EPA). (2017). Greenhouse Gases Equivalencies Calculator - Calculations and References. Retrieved March 1st 2018, from <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>

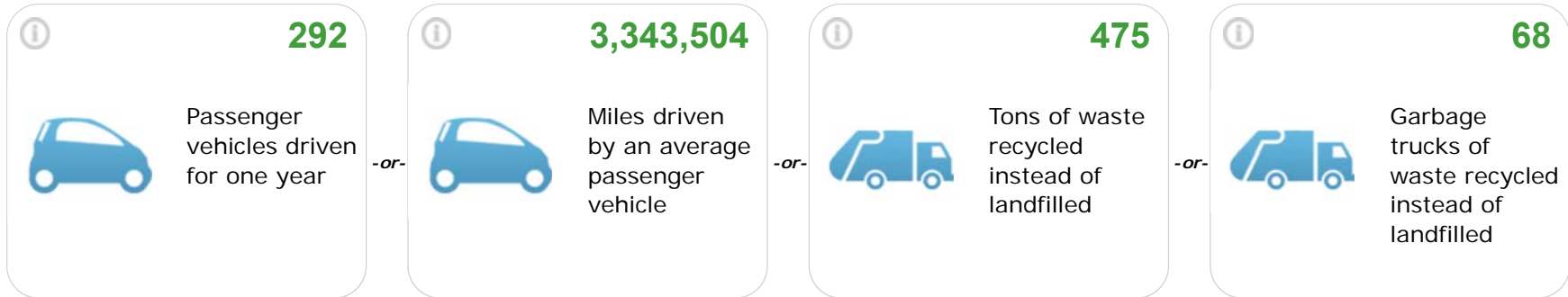
U.S. Environmental Protection Agency (US EPA). (2017). Greenhouse Gas Equivalencies Calculator Retrieved March 1st, 2018 from <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Equivalency Results [How are they calculated?](#)

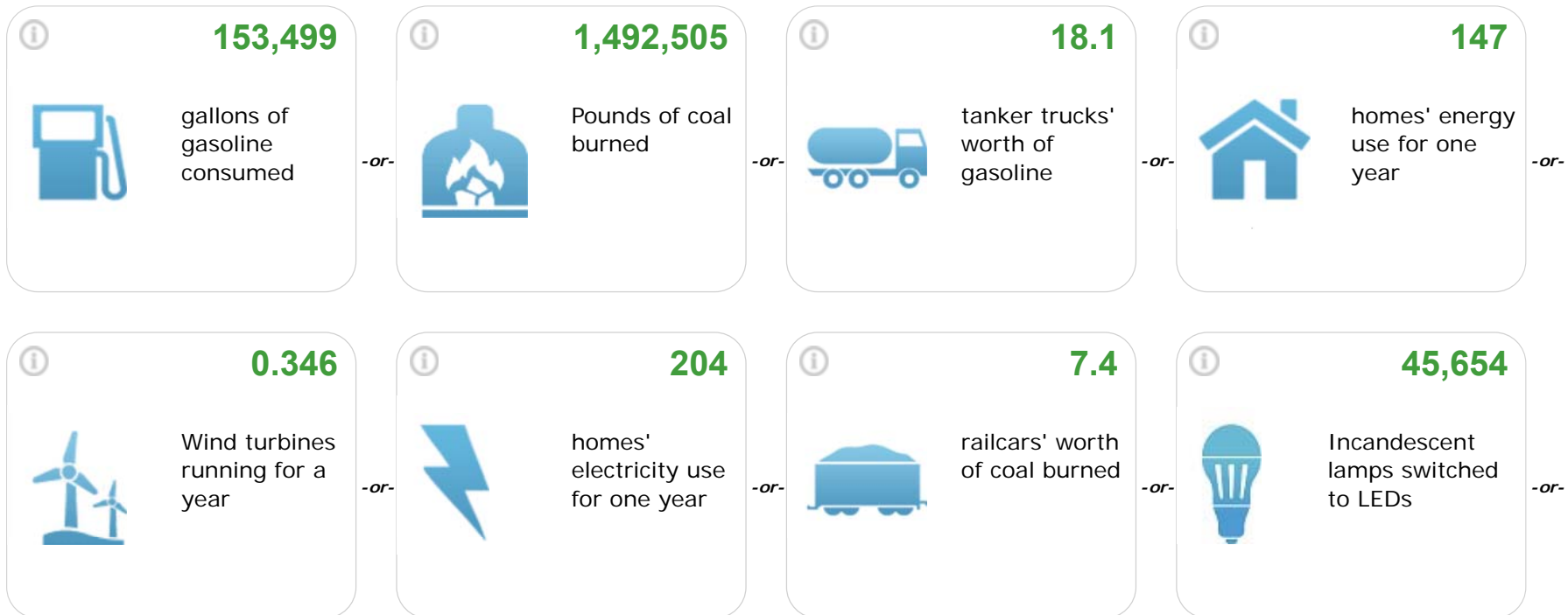
The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

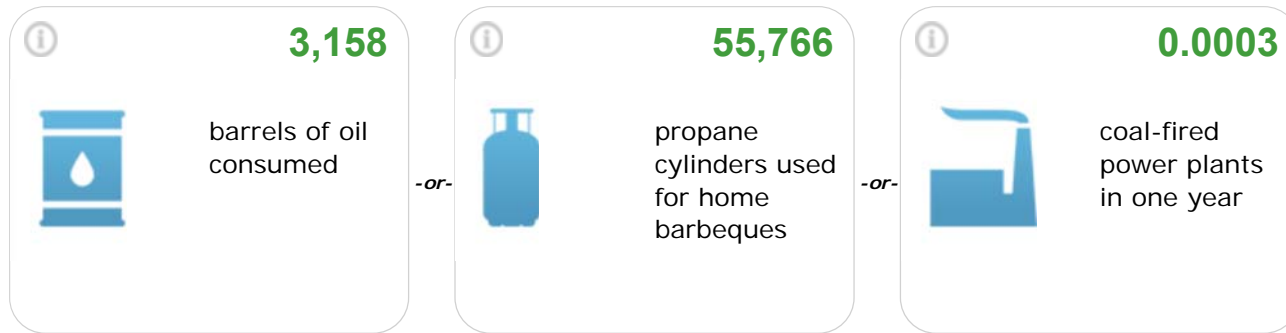
1,364 Metric Tons

Greenhouse gas emissions from



CO₂ emissions from





Carbon sequestered by

