

Calculations to Compare Carbon Reduction Value of Trees VS Solar Panels
SOURCES of FIGURES

0.000707 metric tons CO2e/KWh
 Marginal Emissions Factor (Avg CO2 emissions for electricity generation in US)

0.000232 metric tons CO2e/KWh

A better emissions factor for NY

5,743,361 KWh/year

Solar generation on 20ac. of forested land

1332.459752 metric tons CO2e/year

Annual emission reduction from solar array over traditional electric generation

(per EPA calculator website
<https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>) *there is probably a local factor for NY that is more accurate
 (per Jessica Price, this is what is reported for NY from US Energy Information Admin.)
 (per developer's proposal to Town of New Paltz)
 (5,743,361 * .000232)

140 metric tons/acre

Carbon stored in one acre of standing trees in good to high quality forest

120 metric tons/acre

Carbon stored in one acre of standing trees in "average" low to medium quality forest

Based on carbon offset project evaluations by TNC in NY
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1.4 - 1.6 metric tons CO2e/ac./yr

Annual carbon sequestration of poor to average quality forest in NY

2.0 - 2.2 metric tons CO2e/ac./yr

Annual carbon sequestration of high to very high quality forest in NY

Based on carbon offset project evaluations by TNC in NY
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CALCULATION to COMPARE CARBON REDUCTION VALUE OF SOLAR PANELS VS TREES, using figures for New Paltz Landfill Proposal

Solar Panel Calculation

1 Carbon emissions from traditional fossil fuel sources reduction
 0.000232 x 5,743,361 = 1332.45 metric tons CO2e/yr

x Project KWh/yr = annual emissions reduction from solar array over traditional generation

Tree Carbon Calculation

- 2 Carbon Value in standing trees, 6"-9" dbh x # acres, High quality, NE Forest Type
140 metric tons per acre X 20 acres = 2820 metric tons

Carbon Value in standing trees, 6"-9" dbh x # acres, low quality, NE Forest Type
120 metric tons per acre X 20 acres = 2400 metric tons

- 3 Carbon sequestration by trees over lifetime of solar project
low quality forest
1.4 metric tons CO₂e/ac/yr x 20 acres = 30 metric tons
year x 20 years = 600 tons over 20 years

high quality forest
2.2 metric tons CO₂e/ac/yr x 20 acres = 44 metric tons
year x 20 years = 880 tons over 20 years

- 4 Total of standing carbon plus sequestration over 20 years
low quality forest
2400 metric tons + 600 metric tons = 3000 metric tons
high quality forest
2820 metric tons + 880 metric tons = 3,700 metric tons

- 5 Loss of carbon reduction capacity over 20 years by removing 20 acres of trees
low quality forest (3000 metric tons)
high quality forest (3,700 metric tons)
carbon reduction by solar panels PER YEAR
1332 metric tons (PER YEAR)
- 6 Carbon payback period
3,700 metric tons CO₂e/1332 metric tons CO₂e/yr =
2.78 years (high quality forest)
3,000 metric tons CO₂e/1332 metric tons CO₂e/yr =
2.25 years (lower quality forest)

This calculation only addresses carbon and does not reflect the other values provided by trees and forest, such as habitat, water quality, cooling and air quality.