

To Calculate the Carbon Footprint of the Building

City For LADWP Territory Data Taken from Power Profiler

Building Area (m2) **116,485.0**m2

Yearly Values	Conversion Factor	lbs CO2e/yr
Total Electricity	per kWhr	5,662,685
Total Fuel	per kWhr	21,949
EUI	kWhr/m2 year	81
EUI	kBtus/sq ft year	25

2. Construction:
Build Carbon Neutral <http://buildcarbonneutral.org/> Build Carbon Neutral Provides an Easy way to calculate Embodied Emissions or Athena Eco Calculator for Assemblies <http://www.athenasmi.org/tools/ecocalculator/index.html>

metric tonnes	lbs per metric tonne	2205.0	Construction	83,944,350	lbs CO2e	38,070,000.0	kgs CO2e/yr
life expectancy of the building. Default is average in the USA		73.0	Per Year	1,149,923	lbs CO2e/yr		

3. Water:
CO2e factor per Million Gallons: 1,331 lbs of CO2

gallons of water	per gallon of water	0.001331	Water	16,144	lbs CO2e/yr	7,321.6	kgs CO2e/yr
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4. Waste:
EPA WARM Model or <https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-waste-reduction-model>
EPA Personal Emissions Calculator http://www.epa.gov/climatechange/emissions/ind_calculator.html
<https://www3.epa.gov/carbon-footprint-calculator/>
Warm Model <https://www.epa.gov/warm/versions-waste-reduction-model-warm#WARM Tool V14>

			Waste	8,000	lbs CO2e/yr	3,628.1	kgs CO2e/yr
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total	6,858,701	lbs CO2e / yr	3,110,521.9	kgs CO2e/yr
total	3,111,052	kgs CO2e / yr	1,410,907.9	kgs CO2e/yr
total	3,111	metric tonnes CO2e / yr	1,410.9	kgs CO2e/yr
	27	kgs CO2e / m2 yr		
	5.47	lbs CO2e/sqft-yr		

Renewable Energy

Total Energy Generated on Site kWhr	3,502,655	kWhr	per kWhr	0.62	2,171,646	lbs CO2 sequestered on site by renewable system
Total kWhr/m2/yr:	30	kWhr/m2/yr				

ZERO NET CARBON
The numbers below are for 2030 Architecture's definition of Zero Net Carbon

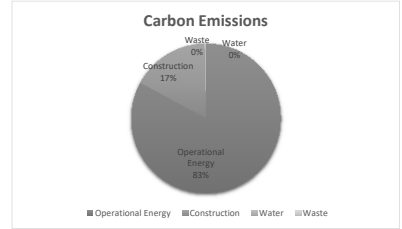
total energy used	9,396,249	kWhr
total renewable energy generated	3,502,655	kWhr
annual energy balance	5,893,594	kWhr
EUI	51	kWhr/m2 year
EUI	16	kBtus/sq ft year
TOTAL CARBON	3,654,028	lbs CO2e / yr
TOTAL CARBON	1,657,441	kgs CO2e / yr
CUI: CARBON USE INTENSITY	14.2	kgs CO2e/m2-yr
CUI: CARBON USE INTENSITY	2.9	lbs CO2e /sf yr

CARBON NEUTRAL

The numbers below are for carbon emissions after renewables and should be zero or better to be carbon neutral

	4,687,055	lbs CO2e-yr	2,125,648.4	kgs CO2e/yr	emissions after renewables
	2,126,011	kgs CO2e-yr	964,177.1	kgs CO2e/yr	emissions after renewables
	2,126	metric tonnes CO2e-yr	964.2	kgs CO2e/yr	emissions after renewables
CUI: CARBON USE INTENSITY	40.2	kgs CO2e/m2-yr	18.2	kgs CO2e/yr	emissions after renewables
CUI: CARBON USE INTENSITY	8.2	lbs CO2e /sf yr			

Tbe = Oe + Ce + We + Wa - Rs
 O >= Tbe
 Where
 Tbe total building emissions
 Oe operation emissions (energy)
 Ce construction emissions
 We water emissions
 Wa waste emissions
 Rs renewable strategies



Useful Information

For Site
Size of the lot sq ft
Area that is covered with vegetation
Number of trees planted

For Construction Material or Descrip Area Sq Ft
Foundations and Footings
Columns and Beams
Intermediate Floors
Exterior Walls
Interior Walls
Windows
Roofs

Data

median life of a building in the USA is 73 yrs
 20.32 lbs of waste = 1 lb of CO2e
 california 0.33 kg CO2e per kWh
 A mixed hardwood accumulates 0.01 t C (carbon) per year for 20 years
 1 kilowatthour = 3,412 Btu

Burning Gas According to the EIA
 Per million BTUs of Natural Gas 117 lbs of CO2
<https://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11>
 0 lbs of CO2 per BTU of Gas
 0 lbs of CO2 per kBTU of Gas
 0 lbs of CO2 per kWhr of Gas

GAS EIA
 For gas it is: 0.42 lbs of CO2 per kWh or 11.93 lbs of CO2 per Therm
 DEFRA
 For gas it is: 0.184070 kgCO2 per kWh
 0.083492847
 116,999 Pounds of CO2 per million Btu

For Energy

Electricity use per year
Gas Use per year
Electricity produced by renewables per year

another source	12	lbs per 100000 btus
	0	lbs per btu
	0	lbs per kbtu

For Water

Water use per year

For Waste

lbs of trash per year
percentage of trash that is recycled
if we have this by categories it would be even better: aluminum, plastic, glass, paper

This website provides equivalencies for calculations
<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

