

US EPA ARCHIVE DOCUMENT

Clinton Tax Credit for High MPG Cars

Note	Item, Unit	Data	Unit Solar Energy sej/unit	Solar Energy Sej/yr
1	CO2 avoided, J	4.78E10	1.29E4	6.15E14
2	Gas saved, J	5.14E10	6.60E4	3.40E15
3	\$ not spent gas	3.67E2	1.20E12	4.40E14
4	Tax credit, \$	3.00E3	1.20E12	3.60E15

Benefits	Lines Allocated	Total Benefit or (Deficit)
To car owner	3 + 4 =	4.04E15 sej/yr
To U.S. economy	4 - 3 =	3.16E15 sej/yr
To national security	1 + 2 - 4 =	4.10E14 sej/yr
To globe	1 + 2 =	4.01E15 sej/yr

Notes

- 1 Assumes 93% Octane (2,2,4-trimethylpentane) gasoline (7% heptane)
 Specific gravity = 0.72
 Avg. weight = 45 lb/ft³
 Approximate molecular weight = (0.93*114g/mol) + (0.07*100g/mol) = 113g/mol
 Potential CO₂ release: (0.93*8 mol C/mol gas) + (0.07 *7 mol C/mol gas) = 7.93 mol C/mol gas
 CO₂ to gas ratio: (7.93 mol CO₂*44 g/mol)/(1 mol gas*113 g/mol)=3.09g CO₂/g gas
 Gas saved: [(10,000 mi/yr)/(30 mi/gal)]*(0.72*0.13368 ft³/gal)*(45 lb/ft³)*(454g/lb) = 1.264E6 g gas/yr
 CO₂ avoided, g=(3.09 g CO₂/g gas)*(1.264E6 g gas)=3.91E6g CO₂/yr
 CO₂, J = 12240 J/g CO₂ (based on oil equivalents from Ulgiati 1994)
 CO₂ avoided, J = (3.91E6g CO₂/yr)*(12240 J/g CO₂) = 4.78E10 J/yr
 CO₂ transformity estimate
 Annual solar energy flux = 3.93E24 sej/yr
 Assume 14% split to air: annual solar energy flux to atmosphere=5.5E23 sej/yr
 Annual solar flux over US = 5.5E23 sej/yr * (1.09E13 m²/1.27 E14m²) = 4.72E22 sej/yr
 Annual liquid fuel energy flux in US (1983) = 3.95 E18 J
 Ratio CO₂ flux as emissions to gas used = 0.929 J CO₂ / J gas
 Estimated annual CO₂ energy flux to US atmosphere = (0.929 J CO₂ / J gas) * (3.95E18 J gas) = 3.67E1 J
 Transformity = US atmospheric solar energy flux/ CO₂ energy flux = 1.29E4 sej/J
- 2 Gas saved, kg = 1264 kg/yr (see note 1)
 Heat value = 4.07E7 J/kg (Ulgiati 1994)
 Gas saved, J = 5.14E10 J/yr
- 3 Gas saved, gal = 333.33 gal/yr
 Assume \$1.10/gal
 \$ not spent = \$367