What Happens to Greenhouse Gases When Oxide Gas is Dispersed to the Open-Air Via YSZ Ceramics:

1. The oxide radical dissolves preferentially into the ambient water of the atmosphere, where there is a minimum of 1% humidity and forms doublet hydroxyl: 2OH*. It is not an O^{1D} ozone atom, because it has less energy, and revert to the OH- ion in three hours.

2. The 2OH* react ubiquitously with all of the atmosphere's gases, simply based on their presences. 98% is CO_2 and 1-2% reacts with all of the other gases. Weather causes the changed gases (CO_2 to HCO_3-, and breakdown products to fall to the ground harmlessly). This sink is 15+GT in size for the CO_2/yr.

3. For every Tonne of released O* 2.125 T of OH* are created. Thus 0.98 of this can be apportioned to CO_2 and 0.02 to the SGHGs based upon well known atmospheric percentages.

4. Each 60cm tube of YSZ ceramic is known to release 3T of oxide per year and can easily be metered. This results in 16.17 T of CO_2, and 33.15 T CO_2e other GHGs being removed/tube/yr (based on a large example basket of SGHGs which are included below). 6 Tubes need only $1M^2$.

5. This approach holistically treats the actual 63.2 GT problem of GHGs that humanity is grappling with, and, like the fully characterized fossil record demonstrated "oxidation/oxygenation" events of the past, the consequences of the treatment are cooling, increased mineral and increased biodiversity, and decreased weather extremes.

6. Hydroxyl in nature is fully peer-reviewed and characterized as the main scrubber in the air and in the oceans, created by photolysis. This technique fully respects the natural system, and it also like nature, leaves no unwanted residues. See our policy brief at https://www.reductiontech.com/white-papers-2/

DETERMINING THE BASKET OF GASES THAT OH REACTS WITH AND ITS POTENCY STOICHIOMETRICALLY

Common Name Equation Global Warming Potential (CO_2e)	**Destroyed 1 ton of each of these GHGs with the appropriate O2- dose**			Molar Mass	Average Molar Mass	
Inputs Outputs Net Reduction GWP						
		CO2 e	lbs of Oxide			
1 Methane $CH_4 + H_2O + 3O_{2-}$ $CO_2 + 3H_2O$ 1t CH_4 = GWP 21	2.44t	18	2531.25	16	16	
2 Nitrous Oxide $N_2O + 3O_{2-} + H_2O$ $N_2O_4 + H_2O$ $2HNO_3 + O$ 1t N_2O = GWP 310 0t CO_2e 310		310		44	44	
3 Perflouromethane $CF_4 + 6O_{2-}$ $CO_2 + 2OF_2$ 1t CF_4 = GWP 6,500 0.50t CO_2e 6,499		6499	3860	88	88	
4 Perflouroethane $C_2F_6 + 7O_{2-}$ $2 CO_2 + 3OF_2$ 1t C_2F_6 = GWP 9,200 0.64t CO_2e 9,199		9199	811	118	118	
5 Sulphur Hexaflouride $SF_6 + 5O_{2-}$ $SO_2 + 3OF_2$ 1t SF_6 = GWP 23,900 0t CO_2e 23,900		23900	547.94	126	126	
6 HFC-23 $CHF_3 + 6 O_{-2}$ $CO_2 + H_2O + 2OF_2$ 1t HFC -23 = GWP 11,700 0.63t CO2e 11,699		11699	1371	70	70	
7 HFC-134a $CHF_3CH_2F + 8 O_{-2}$ $2CO_2 + 2OF_2 + 2H_2O$ 1t HFC-134a = GWP 1,300 0.85t CO2e 1,299		1299	1242.7	103	103	
8 HFC-152a $CH_3CHF_2 + 8 O_{-2}$ $2CO_2 + 2H_2O + OF_2$ 1t HFC-152a = GWP 140 0.66t CO2e 139		139	1939.39	64	64	
9 CFC-11 CFCl3 + 9 O_{-2} CO2+ OF2 +3CLO2 1t CFC-11 = 3,800 0.32t CO2e 3,799		3799	1090.9	136	136	
10 Nitrogen Triflouride $2NF_3 + 6O_{2-}$ $2NO_2 + 2OF_2$ 12t NF_3= GWP 12,300 0t CO_2e 12,300		12300	1352	85	85	
11 CFC-12 $CCl_2F_2 + 5O_{2-}$ $CO_2 + Cl_2 + 2OF_2$ 1t CCl_2F_2 = GWP 8,100 0.36t CO_2e 8,099.64		8099.64	667	85	85	
12 CFC-13 $CF_3Cl + 6 O_{-2}$ $CO_2 + 2OF_2 + ClO_2$ 1t CFC-13 = GWP 10,800 0.42t CO2e 10,799		10799	905.7	66	66	
13 CFC-113 $CF_2ClCFCl_2 + 11 O_{-2}$ $2CO_2 + 2OF_2 + 2ClO_2$ 1t CFC-113 = GWP 4,800 0.47t CO2e 4,799		4799	946.24	174	174	
14 CFC-114 $CF_2ClCF_2Cl + 10 O_{-2}$ $2CO_2 + 2ClO_2 + 2OF_2$ 1t CFC-114 = GWP 8,040 0.51t CO2e 8,049		8049	941.18	170	170	
15 CFC-115 $CF_3CF_2Cl + 9 O_{-2}$ $2CO_2 + ClO_2$, + $2OF_2$ 1t CFC-115 = GWP 5,310 0.57t CO2e 5,309		5309	935	166	166	
16 Carbon Tetrachloride $CCl_4 + 9 O_{-2}$ $CO_2 + 2ClO_2$ 1t CCl4 = GWP 1,400 0.28t CO2e 1,399		1399	947.37	152	152	
17 Methyl Chloroform $CH_3CCl_3 + 12 O_{-2}$ $2CO_2 + 2H_2O$, + $2ClO_2$ 1t CH3CCl3 = GWP 506 0.66t CO2e 505		505	1454.55	122	122	
18 HCFC-22 $CH_3CFCl2 + 11 O_{-2}$ $2CO_2 + 2H_2O + OF_2 + 2ClO_2$ 1t HCFC – 22 =GWP 1,500 0.75t CO2e 1,499		1499	1517.24	46	46	
19 HCFC-141b $CH_2CF_2Cl + 9 O_{-2}$ $2CO_2 + 2H_2O + OF_2 + ClO_2$ 1t HCFC-141b = GWP 2,250 0.76t CO2e 2,249		2249	919.54	97	97	
20 HCFC-142b $2CHClF_2 + 5O_{2-}$ $CO_2 + ClO + OF_2 + H_2O$ 1t HCFC-142b = GWP 1,800 0.25t CO2e 1,799		1799	597.01	168	168	t to T
21 Halon-1211 $CF_3Br + 6 O_{-2}$ $CO_2 + 2OF_2 + BrO_2$ 1t Halon-1211 = GWP 4,750 0.29t CO2e 4,749		4749	644.3	149	149	10.96525909
22 Halon-1301 $CF_2BrCF_2Br + 10 O_{-2}$ $2CO_2 + OF_2 + 2BrO_2$ 1t Halon-1301 = GWP 5,400 0.16t CO2e 5,399		5399	754.72	256	256	
23 Halon-2402 $CF_2ClBr + 7 O_{-2}$ $CO_2 + OF_2 + ClO_2 + BrO_2$ 1t Halon-2402 = GWP 3,680 0.27t CO2e 3,679		3679	678.79	163	163	
	CO2 e total	127495.64	24123.57 lbs Oxide used in 22 t of LLGHG		115.826087	
	<u>Per ton</u> <u>CO2 equivs</u>	**<u>5795.256364</u>**	12.061785 tons Oxide per 22 tons of these gases			
		480.46424	CO2 eq per ton OH			
		528.5106641	CO2 eq per Tonne OH	converted to metric		
		13212.7666	$ per Tonne @ $20 per tonne			
		6606.383301	50% efficiency			
		<u>$6,606.38</u>	**<u>per Tonne value</u>**			
*LLGHG is long lived GHG		264.255332	CO2e per Tonnes			

One CO_2e of each gas in this basket were reacted with the oxidant, OH*. This was done in lbs and then converted to metric tonnes to get a value for the CO_2e of the gases removed by one tonne of OH*. Then, 0.98 fraction is apportioned to CO_2, and 0.02 fraction of 1 tonne is apportioned to the basket CO_2e average of these gases reacted in 1 tonne of OH*. For this, the OH* is converted to moles, and thus the moles of CO_2 are found. This important step reveals the true CO_2 tonnage removed by OH*. Tis basket of gases was provided by Offsetters Inc.

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