

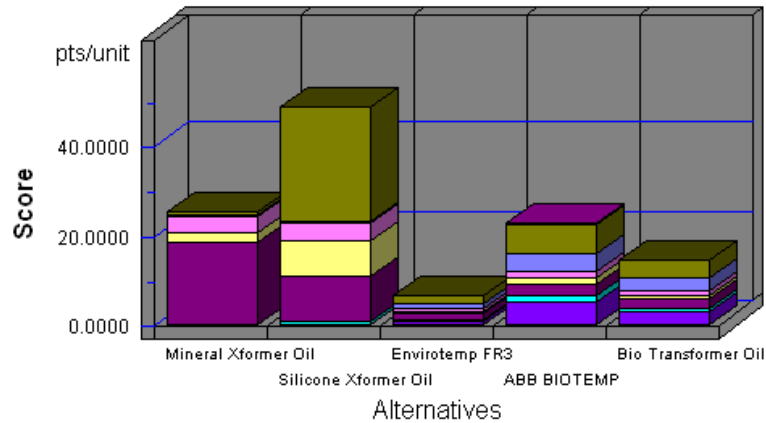
BEES[®]

The BEES (Building for Environmental and Economic Sustainability) software was developed by the National Institute of Standards and Technology with support from the U.S. Department of Commerce, U.S. Environmental Protection Agency, Technology Administration, and the Office of Pollution Prevention and Toxins.

The software is used as a decision support tool by evaluating a product's total life cycle "tax" on the planet. Below are some results from the BEES software comparing Envirotemp FR3 fluid to all other leading transformer fluids.

Environmental Performance

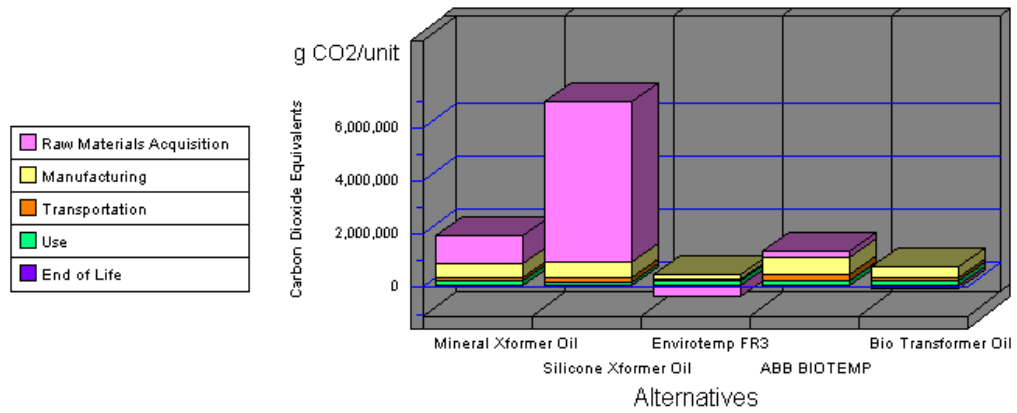
Acidification
Crit. Air Pollutants
Ecological Toxicity
Eutrophication
Fossil Fuel Depletion
Global Warming
Habitat Alteration
Human Health
Indoor Air
Ozone Depletion
Smog
Water Intake



Note: Lower values are better

Category	MineralOil	SiliconOil	Envirotemp	BIOTEMP	BioXfmrOil
Acidification--3%	0.0003	0.0007	0.0002	0.0010	0.0006
Crit. Air Pollutants--9%	0.1009	0.3262	0.0803	0.1777	0.1290
Ecolog. Toxicity--7%	0.7461	25.3483	1.6057	6.5148	4.0603
Eutrophication--6%	0.4300	0.3838	1.3264	3.9384	2.6324
Fossil Fuel Depl.--10%	3.5100	3.9580	0.7577	1.4585	1.1081
Global Warming--29%	2.1538	7.8368	0.0388	1.4996	0.7692
Habitat Alteration--6%	0.0000	0.0000	0.0000	0.0000	0.0000
Human Health--13%	18.1919	10.0546	1.6295	2.5838	2.1067
Indoor Air--3%	0.0000	0.0000	0.0000	0.0000	0.0000
Ozone Depletion--2%	0.0000	0.0001	0.0000	0.0000	0.0000
Smog--4%	0.2080	0.8747	0.2184	1.3149	0.7667
Water Intake--8%	0.1040	0.1539	1.0249	5.2099	3.1174
Sum	25.4450	48.9371	6.6819	22.6986	14.6904

Global Warming by Life-Cycle Stage

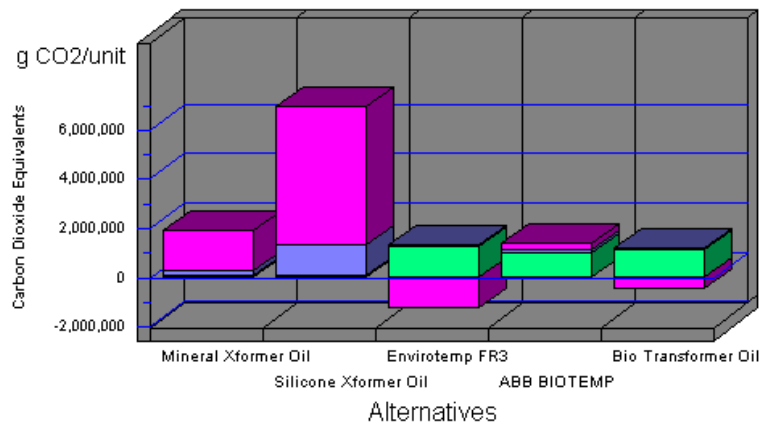


Note: Lower values are better

Category	MineralOil	SiliconOil	Envirotemp	BIOTEMP	BioXfmrOil
1. Raw Materials	1048184	5995287	-381590	248063	-66764
2. Manufacturing	544363	612914	160212	636876	398544
3. Transportation	122478	135576	71498	253224	162361
4. Use	154124	154124	153450	154124	153787
5. End of Life	30825	15412	30690	30570	30630
Sum	1899973	6913314	34260	1322857	678559

Global Warming by Flow

Carbon Dioxide
Carbon Tetrachloride
Carbon Tetrafluoride
CFC 12
Chloroform
Halon 1301
HCFC 22
Methane
Methyl Bromide
Methyl Chloride
Methylene Chloride
Nitrous Oxide
Trichloroethane



Note: Lower values are better

Category	MineralOil	SiliconOil	Envirotemp	BIOTEMP	BioXfmrOil
(a) Carbon Dioxide (CO ₂ , net)	1657482	5653984	-1271796	261592	-505102
(a) Carbon Tetrachloride (CCl ₄)	0	0	0	0	0
(a) Carbon Tetrafluoride (CF ₄)	0	0	0	0	0
(a) CFC 12 (CCl ₂ F ₂)	0	0	0	1	0
(a) Chloroform (CHCl ₃ , HC-20)	0	0	0	0	0
(a) Halon 1301 (CF ₃ Br)	0	0	0	0	0
(a) HCFC 22 (CHF ₂ Cl)	0	0	0	0	0
(a) Methane (CH ₄)	227972	1223010	109169	137981	123575
(a) Methyl Bromide (CH ₃ Br)	0	0	0	0	0
(a) Methyl Chloride (CH ₃ Cl)	0	1	0	0	0
(a) Methylene Chloride (CH ₂ Cl ₂)	1	1	0	1	0
(a) Nitrous Oxide (N ₂ O)	14519	36317	1196886	923282	1060084
(a) Trichloroethane (1,1,1-CH ₃ CCl ₃)	0	0	0	0	0
Sum	1899973	6913314	34260	1322857	678559

As evaluated using this National Institute of Standards & Testing (NIST) software for carbon footprinting, FR3 fluid scores much more favorably than mineral oil as it produces significantly less CO₂ in its life cycle. Taking this a step further, if the premise is accepted that FR3 extends the life of transformer insulation (which we have compelling empirical data to support), FR3 fluid will reduce total cost through new purchase avoidance and additional positive impact on green house gas emissions.

With utility support, it is our hope that "Green" product usage, such as FR3, may become eligible for carbon credits.