



Using the
Social Footprint Method
to Calculate and Report

Global Warming Footprints



www.sustainableinnovation.org

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Executive Summary

- One measure of corporate sustainability is how much a company is contributing to the mitigation of major ecological problems on earth (positively *or* negatively)
- Anthropogenic global warming is one such problem
- Many models exist that attempt to plot out solutions to global warming, mostly with an eye towards reaching some level of stabilized greenhouse gas (GHG) concentrations in the atmosphere by a certain date
- In this report, we apply one such model (the WRE350 scenario*), according to which carbon dioxide (CO₂) concentrations continue to rise in the near-term, and then eventually level out to 350 parts per million (ppm) by 2150 (current levels of CO₂ are at about 385 ppm)

*Source: MAGICC/SCENGEN emissions library at <http://www.cgd.ucar.edu/cas/wigley/magicc>

Executive Summary (cont.)

- The question our analysis explicitly asks is: *To what extent is an organization contributing to the mitigation of CO₂ concentrations in the atmosphere per the WRE350 plan?*
- We then ask: *Is the organization's contribution to achieving the plan sustainable?* We answer with a numerical score
- Note that many other GHG mitigation scenarios (or plans) exist that vary in their degree of difficulty (to achieve), and any one of them could have been used for this illustration of the Social Footprint Method
- We chose the WRE350 scenario because it entails making changes from current emission levels almost immediately; thus, it is a relatively challenging (but attractive) scenario

Executive Summary (cont.)

- Our scientific grounding:
 - At the heart of our approach is the WRE350* CO₂ stabilization scenario mentioned above
 - WRE350 is a scientific model that attempts to forecast what it will take in terms of carbon emission reductions to lower CO₂ build-ups in the earth's atmosphere, and stabilize them at a non-threatening level of 350 parts per million (ppm) by 2150
 - Based on this scientific grounding, we are able to evaluate actual carbon emissions by companies in terms of their proportionate contributions to climate change mitigation, and score them accordingly
 - Thus, the global warming application of the Social Footprint is grounded both in the science of climatology, and also in *social* science, in terms of whether or not a company's contributions to climate change mitigation are socially sustainable!

*Developed by Tom Wigley et al at the National Center for Atmospheric Research in Boulder, CO.

Executive Summary (cont.)

- The examples contained in this report show **Social Footprint** results (CO₂-related only) of three kinds. More specifically, each example contains:
 - A social bottom line expressed in terms of cumulative whole-organization performance over a range of years
 - A social bottom line expressed in terms of per-capita performance for several individual years in isolation, and
 - A social bottom line expressed in terms of per-capita performance cumulatively over time
- Note that the WRE350 plan begins with year 2000 as a starting point, and most of the organizations included in this report have been reporting for the entire WRE350 plan to date
- The examples included in this report show varied results, with some organizations displaying sustainable contributions to GHG mitigation, and others not

The Social Footprint

- What is it?
 - A corporate sustainability accounting method that makes it possible to calculate social bottom lines for organizations and other human social systems
 - A product of a joint effort between the Center for Sustainable Innovation in Vermont and the University of Groningen in the Netherlands
 - Most “footprint” methods developed thus far (e.g., the Ecological Footprint*) focus on environmental measures, which look at the sustainability of human behaviors in terms of their impacts on natural or ecological systems
 - The Social Footprint, by contrast, focuses on the sustainability of organizational behaviors relative to their impacts on what we call *anthro capital* – social, human, and constructed capitals – as required for human well-being

*See www.footprintnetwork.org

The Social Footprint (cont.)

- What is it (cont.)?
 - In the case of the global warming issue addressed in this report, the Social Footprint is used to assess the sustainability of organizational operations in terms of their impacts on strategies for achieving climate change mitigation
 - Thus, whereas ecological footprints normally focus on the sustainability of human behaviors in terms of their ecological impacts, per se, the Social Footprint focuses on the sustainability of organizational behaviors in terms of their *social* impacts, especially those related to solving major problems on earth
 - **Global Warming Footprints are just a type of Social Footprints**

How Global Warming Footprints Work

- They are quantitative measures of an organization's emissions performance against a specific mitigation plan
- They result in numerical “social bottom line” scores
- They take the form of *quotients*:
 - Denominators express the per-capita*, or per-organization, share of impacts on social conditions required to achieve or maintain human well-being (in the case of climate change, it is expressed in terms of maximum allowable CO₂ emissions/year according to a mitigation plan)
 - Numerators express actual impacts per-capita*, or per-organization, in a time period (i.e., actual CO₂ emissions per year)
- Actual CO₂ emission levels (in numerators) that do not exceed permissible ranges (in denominators) per a mitigation plan are scored as sustainable (i.e., their scores are ≤ 1)
- Scores of > 1 reflect unsustainable operations

*Note: We use an adjusted headcount metric called ‘People Feet’ to reflect time spent at work vs. elsewhere

Global Warming As a Social Issue

- Involves a type of social capital (a social plan of action, in this case) included in what we call *anthro capital*
- Starts with knowledge of the problem (i.e., that current levels of GHG emissions are unsustainable because they exceed the assimilative capacity of the earth's ecology to absorb them) and focuses, in response, on social solutions
- Looks, in particular, at organizational contributions to achieving a specific solution to global warming – a GHG mitigation and CO₂ stabilization plan called WRE350*
- WRE350 is a plan to curb carbon emissions starting in 2000, such that CO₂ concentrations on earth will drop to 350 parts per million (ppm) by 2150

*Source: MAGICC/SCENGEN emissions library at <http://www.cgd.ucar.edu/cas/wigley/magicc>

Global Warming (cont.)

- This report includes six examples of actual *Global Warming Social Footprints* calculated in 2006 using real data from the following sources:
 - *Alcoa*
 - *E. I. dupont de Nemours & Co.*
 - *Ford Motor Company*
 - *Johnson & Johnson*
 - *Royal Dutch Shell plc*
 - *STMicroelectronics*
- Results:
 - Only half of the six cases scored sustainably, over a five-year period
 - Ford had the best score as of the end of 2005 (0.928)
 - Alcoa had the worst score as of the end of 2005 (1.135)

Each of the six sample reports follows below.....

**Global Warming Social Footprint Analysis for Alcoa
re: Carbon Emissions and Contributions to Climate Change Mitigation**

	2001	2002	2003	2004	2005
Number of People Feet at Alcoa					
Full Time Employees (FTE) ¹	129,000	127,000	120,000	119,000	129,000
Average Annual Proportion of Full-Time Employee Time Spent at Alcoa Per Year (Estimated)	0.24	0.24	0.24	0.24	0.24
Total Number of People Feet at Alcoa	30,960	30,480	28,800	28,560	30,960
Carbon Emissions Required to Stabilize CO₂ at 350 ppm: The Denominator					
Annual Global Emissions Allowed to Achieve Stabilized CO ₂ Concentrations at 350 ppm by 2150 (GtC/yr) ²	6.930	6.964	6.999	7.033	7.067
Maximum Cumulative Global Carbon Emissions Allowed Under 350 ppm Stabilization Plan (GtC) ²	13.826	20.791	27.789	34.822	41.889
Global Change in Cumulative Carbon Emissions Relative to 2000 Baseline Level of 6.896 GtC/yr Under 350 Plan ²	200.496%	301.488%	402.976%	504.959%	607.439%
Annual Carbon Emissions Allowed at Alcoa Under 350 ppm Plan (53,600,000,000 tC in 2000) ³	53,865,823.67	54,131,647.33	54,397,471.00	54,663,294.66	54,929,118.33
Cumulative Carbon Emissions Allowed at Alcoa Under 350 ppm Stabilization Plan (tC): The Denominator _a	107,465,823.67	161,597,471.00	215,994,942.00	270,658,236.66	325,587,354.99
Global Carbon Emissions Allowed Per Capita/People Foot at Alcoa Under 350 ppm Plan (tC/yr): The Denominator _b	1,580.57	1,588.37	1,596.17	1,603.97	1,611.77
Cumulative Carbon Emissions Allowed Per Capita/People Foot at Alcoa Under 350 ppm Plan: The Denominator _c	3,153.34	4,741.71	6,337.88	7,941.85	9,553.62
Actual Carbon Emissions at Alcoa: The Numerator					
Actual Annual Carbon Emissions at Alcoa (tC/yr) ³	54,700,000.00	52,400,000.00	56,200,000.00	56,800,000.00	57,200,000.00
Actual Cumulative Carbon Emissions at Alcoa (tC): The Numerator _a	108,300,000.00	160,700,000.00	216,900,000.00	273,700,000.00	330,900,000.00
Actual Annual Carbon Emissions Per Capita/People Foot at Alcoa (tC/yr): The Numerator _b	1,766.80	1,719.16	1,951.39	1,988.80	1,847.55
Actual Cumulative Carbon Emissions Per Capita/People Foot at Alcoa (tC): The Numerator _c	3,339.57	5,058.73	7,010.11	8,998.91	10,846.46
Alcoa's Global Warming Social Footprint (CO₂ Stabilization-related Only)					
Actual Cumulative Carbon Emissions at Alcoa (tC): The Numerator _a	108,300,000.00	160,700,000.00	216,900,000.00	273,700,000.00	330,900,000.00
Cumulative Carbon Emissions Allowed at Alcoa Under 350 ppm Stabilization Plan (tC): The Denominator _a	107,465,823.67	161,597,471.00	215,994,942.00	270,658,236.66	325,587,354.99
Global Warming Societal Quotient "Q" Expressed in Terms of Cumulative Emissions Perspective ⁴	1.008	0.994	1.004	1.011	1.016
Actual Annual Carbon Emissions Per Capita/People Foot at Alcoa (tC/yr): The Numerator _b	1,766.80	1,719.16	1,951.39	1,988.80	1,847.55
Global Carbon Emissions Allowed Per Capita/People Foot at Alcoa Under 350 ppm Plan (tC/yr): The Denominator _b	1,580.57	1,588.37	1,596.17	1,603.97	1,611.77
Global Warming Societal Quotient "Q" Expressed in Terms of Annual Per Capita/ People Foot Perspective ⁴	1.118	1.082	1.223	1.240	1.146
Actual Cumulative Carbon Emissions Per Capita/People Foot at Alcoa (tC): The Numerator _c	3,339.57	5,058.73	7,010.11	8,998.91	10,846.46
Cumulative Carbon Emissions Allowed Per Capita/People Foot at Alcoa Under 350 ppm Plan: The Denominator _c	3,153.34	4,741.71	6,337.88	7,941.85	9,553.62
Global Warming Societal Quotient "Q" Expressed in Terms of Cumulative Per Capita/People Foot Emissions Perspective ⁴	1.059	1.067	1.106	1.133	1.135

¹Source: Alcoa 2004; 2005 Sustainability Reports

²Source: MAGIC C/SCENGEN emissions library at <http://www.ogd.ucar.edu/cas/wigley/magic/>

³Source: Alcoa Emissions, Effluents, & Waste—Performance Data 2005
http://www.alcoa.com/global/en/about_alcoa/sustainability/env_eww_past_perf.asp#null

⁴≤ 1 = Sustainable; > 1 = Unsustainable

**Global Warming Social Footprint Analysis for E. I. duPont de Nemours and Company
re: CO₂ Emissions and Contributions to CO₂ Stabilization at 350 ppm**

	2001	2002	2003	2004	2005
Number of People Feet¹ at DuPont					
Number of Employees ²	79,000	79,000	81,000	60,000	60,000
Average Annual Proportion of Employee Time Spent at Work Per Year (Estimated)	0.24	0.24	0.24	0.24	0.24
Total Number of People Feet ¹ at DuPont	18,960	18,960	19,440	14,400	14,400
Carbon Emissions Required to Stabilize CO₂ at 350 ppm: The Denominator					
Maximum Annual Global Emissions Allowed to Achieve Stabilized CO ₂ Concentrations at 350 ppm by 2150 (GtC/yr) ³	7.043	7.191	7.338	7.486	7.633
Maximum Cumulative Global Carbon Emissions Allowed Under 350 ppm Stabilization Plan (GtC) ³	13.939	21.130	28.468	35.954	43.587
Allowed Change in Cumulative Carbon Emissions Relative to 2000 Baseline Level of 6.896 GtC/yr Under 350 Plan ³	200.496%	301.488%	402.976%	504.959%	607.439%
Global Carbon Emissions Allowed at DuPont Under 350 ppm Plan (based on 35.7 X 10 ⁹ lbs. emitted in 2000 ¹) in GtCO ₂ /yr	35.9	36.1	36.2	36.4	36.6
Annual CO ₂ Emissions Allowed at DuPont (converted to metric tonnes) Under 350 ppm Plan (MtCO ₂ /yr)	16,273,552.84	16,353,871.29	16,434,189.73	16,514,346.24	16,594,826.61
Cumulative CO ₂ Emissions Allowed at DuPont Under 350 ppm Stabilization Plan (MtCO ₂): The Denominator _a	32,466,787.24	48,820,658.53	65,254,848.26	81,769,194.49	98,364,021.11
Annual CO ₂ Emissions Allowed Per Capita/People Foot at DuPont Under 350 ppm Plan (MtCO ₂ /yr) ³ : The Denominator _b	729.10	732.70	736.30	739.89	743.50
Cumulative CO ₂ Emissions Allowed Per Capita/People Foot at DuPont Under 350 ppm Plan (MtCO ₂): The Denominator _c	1,454.61	2,187.31	2,923.60	3,663.49	4,406.99
Actual Carbon Emissions at DuPont: The Numerator					
Actual Annual CO ₂ Emissions at DuPont (10 ⁹ lbs/yr) ⁴	35.50	34.80	33.70	19.80	
Actual Annual CO ₂ Emissions (converted to metric tonnes) at DuPont (tCO ₂ /yr) ⁴	16,102,516.00	15,785,001.60	15,286,050.40	8,981,121.60	9,340,000.00
Actual Cumulative CO ₂ Emissions at DuPont (10 ⁹ lbs)	71.20	106.00	139.70	159.50	159.50
Actual Cumulative CO ₂ Emissions (converted to metric tonnes) at DuPont (tCO ₂): The Numerator _a	32,295,750.40	48,080,752.00	63,366,802.40	72,347,924.00	81,687,924.00
Actual Annual CO ₂ Emissions Per Capita/People Foot at DuPont (tCO ₂ /yr): The Numerator _b	849.29	832.54	786.32	623.69	648.61
Actual Cumulative CO ₂ Emissions Per Capita/People Foot at DuPont (tCO ₂): The Numerator _c	1,574.79	2,407.33	3,193.65	3,817.34	4,465.95
DuPont's Global Warming Social Footprint (CO₂ Stabilization-related Only)					
Actual Cumulative CO ₂ Emissions (converted to metric tonnes) at DuPont (tCO ₂): The Numerator _a	32,295,750.40	48,080,752.00	63,366,802.40	72,347,924.00	81,687,924.00
Cumulative CO ₂ Emissions Allowed at DuPont Under 350 ppm Stabilization Plan (tCO ₂): The Denominator _a	32,466,787.24	48,820,658.53	65,254,848.26	81,769,194.49	98,364,021.11
Global Warming Social Footprint "a" Expressed in Terms of Organization-wide Cumulative Emissions Perspective ⁵	0.995	0.985	0.971	0.885	0.830
Actual Annual CO ₂ Emissions Per Capita/People Foot at DuPont (tCO ₂ /yr): The Numerator _b	849.29	832.54	786.32	623.69	648.61
Annual CO ₂ Emissions Allowed Per Capita/People Foot at DuPont Under 350 ppm Plan (tCO ₂ /yr) ⁴ : The Denominator _b	729.10	732.70	736.30	739.89	743.50
Global Warming Social Footprint "b" Expressed in Terms of Annual Per Capita/People Foot Perspective ⁵	1.165	1.136	1.068	0.843	0.872
Actual Cumulative CO ₂ Emissions Per Capita/People Foot at DuPont (tCO ₂): The Numerator _c	1,574.79	2,407.33	3,193.65	3,817.34	4,465.95
Cumulative CO ₂ Emissions Allowed Per Capita/People Foot at DuPont Under 350 ppm Plan (tCO ₂): The Denominator _c	1,454.61	2,187.31	2,923.60	3,663.49	4,406.99
Global Warming Social Footprint "c" Expressed in Terms of Cumulative Per Capita/People Foot Perspective ⁵	1.083	1.101	1.092	1.042	1.013

¹A 'People Foot' Equates to a 24-hour Person Day

²Source: Reports found on DuPont Website and from Carbon Disclosure Project

³Based on WRE350 Plan Found at MAOICC/SCEN GEN emissions library at <http://www.cgd.ucar.edu/cas/wigley/magic>

⁴Based on Progressions Specified in WRE350 Plan

⁵≤ 1 = Sustainable; > 1 = Unsustainable

**Global Warming Social Footprint Analysis for Ford Motor Company (Ford)
re: Carbon Emissions and Contributions to Climate Change Mitigation**

	2001	2002	2003	2004	2005
Number of People Feet at Ford					
Full Time Employees (FTE) ¹	354,431	323,813	327,531	324,864	300,000
Average Annual Proportion of Full-Time Employee Time Spent at Ford Per Year (Estimated)	0.24	0.24	0.24	0.24	0.24
Total Number of People Feet at Ford	85,063	77,715	78,607	77,967	72,000
Carbon Emissions Required to Stabilize CO₂ at 350 ppm: The Denominator					
Annual Global Emissions Allowed to Achieve Stabilized CO ₂ Concentrations at 350 ppm by 2150 (GtC/yr) ²	6.930	6.964	6.999	7.033	7.067
Maximum Cumulative Global Carbon Emissions Allowed Under 350 ppm Stabilization Plan (GtC) ²	13.826	20.791	27.789	34.822	41.889
Change in Cumulative Carbon Emissions Relative to 2000 Baseline Level of 6.896 GtC/yr Under 350 Plan ²	200.496%	301.488%	402.976%	504.959%	607.439%
Annual Carbon Emissions Allowed at Ford Under 350 ppm Plan (9,800,000 tC in 2000) ³	9,948,602.09	9,897,204.18	9,945,806.26	9,994,408.35	10,043,010.44
Cumulative Carbon Emissions Allowed at Ford Under 350 ppm Stabilization Plan (tC): The Denominator ^a	19,648,602.09	29,545,806.26	39,491,612.53	49,486,020.88	59,529,031.32
Actual Carbon Emissions Allowed Per Capita/People Foot at Ford Under 350 ppm Plan (tC/yr): The Denominator ^b	118.60	119.19	119.77	120.36	120.94
Cumulative Carbon Emissions Allowed Per Capita/People Foot at Ford Under 350 ppm Plan: The Denominator ^c	236.62	355.81	475.59	595.95	716.89
Actual Carbon Emissions at Ford: The Numerator					
Actual Annual Carbon Emissions at Ford (tC/yr) ³	9,200,000.00	8,700,000.00	8,500,000.00	8,400,000.00	8,000,000.00
Actual Cumulative Carbon Emissions at Ford (tC): The Numerator ^a	19,000,000.00	27,700,000.00	36,200,000.00	44,600,000.00	52,600,000.00
Actual Annual Carbon Emissions Per Capita/People Foot at Ford (tC/yr): The Numerator ^b	108.15	111.95	108.13	107.74	111.11
Actual Cumulative Carbon Emissions Per Capita/People Foot at Ford (tC): The Numerator ^c	226.17	338.12	446.25	553.99	665.10
Ford's Global Warming Social Footprint (CO₂ Stabilization-related Only)					
Actual Cumulative Carbon Emissions at Ford (tC): The Numerator ^a	19,000,000.00	27,700,000.00	36,200,000.00	44,600,000.00	52,600,000.00
Cumulative Carbon Emissions Allowed at Ford Under 350 ppm Stabilization Plan (tC): The Denominator ^a	19,648,602.09	29,545,806.26	39,491,612.53	49,486,020.88	59,529,031.32
Global Warming Societal Quotient ^a Expressed in Terms of Cumulative Emissions Perspective [*]	0.967	0.938	0.917	0.901	0.884
Actual Annual Carbon Emissions Per Capita/People Foot at Ford (tC/yr): The Numerator ^b	108.15	111.95	108.13	107.74	111.11
Actual Carbon Emissions Allowed Per Capita/People Foot at Ford Under 350 ppm Plan (tC/yr): The Denominator ^b	118.60	119.19	119.77	120.36	120.94
Global Warming Societal Quotient ^b Expressed in Terms of Annual Per Capita/People Foot Perspective [*]	0.912	0.939	0.903	0.895	0.919
Actual Cumulative Carbon Emissions Per Capita/People Foot at Ford (tC): The Numerator ^c	226.17	338.12	446.25	553.99	665.10
Cumulative Carbon Emissions Allowed Per Capita/People Foot at Ford Under 350 ppm Plan: The Denominator ^c	236.62	355.81	475.59	595.95	716.89
Global Warming Societal Quotient ^c Expressed in Terms of Cumulative Per Capita/People Foot Emissions Perspective [*]	0.956	0.950	0.938	0.930	0.928

¹Source: Combination of Ford Annual and Corporate Citizenship Reports 2000 - 2005

²Source: MAGICC/SCENGEN emissions library at <http://www.ogd.ucar.edu/cas/wigley/magicc/>

³Source: Ford Corporate Citizenship Reports for 2000 - 2005

* ≤ 1 = Sustainable; > 1 = Unsustainable

**Global Warming Social Footprint Analysis for Johnson & Johnson (J&J)
re: Carbon Emissions and Contributions to Climate Change Mitigation**

	2001	2002	2003	2004	2005
Number of People Feet at J&J					
Full-Time Employees (FTE) ¹	101,800	108,300	110,800	109,900	115,600
Average Annual Proportion of Full-Time Employee Time Spent at J&J Per Year (Estimated)	0.24	0.24	0.24	0.24	0.24
Total Number of People Feet at J&J	24,432	25,992	26,544	26,376	27,744

Carbon Emissions Required to Stabilize CO₂ at 350 ppm: The Denominator

Annual Carbon Emissions Allowed to Achieve Stabilized CO ₂ Concentrations at 350 ppm by 2150 (GtC/yr) ²	6.930	6.964	6.999	7.033	7.067
Maximum Cumulative Global Carbon Emissions Allowed Under 350 ppm Stabilization Plan (GtC) ²	13.826	20.791	27.789	34.822	41.889
Range of Cumulative Carbon Emission Targets vs. 2000 Baseline Level of 6.896 GtC/yr Under 350 Plan ²	200.496%	301.488%	402.976%	504.959%	607.439%
Annual Carbon Emissions Allowed at J&J Under 350 ppm Plan (tC/yr)	965,766	970,532	975,298	980,064	984,830
Emissions Allowed at J&J Under 350 ppm Stabilization Plan (961,000 tC/yr in 2000) ³ : The Denominator _B	1,926,765.98	2,897,297.94	3,872,595.88	4,852,659.80	5,837,489.70
Carbon Emissions Allowed Per Capita/People Foot at J&J Under 350 ppm Plan (tC/yr): The Denominator _B	39.88	40.08	40.27	40.47	40.67
Annual Carbon Emissions Allowed Per Capita/People Foot at J&J Under 350 ppm Plan: The Denominator _C	79.57	119.64	159.92	200.39	241.06

Actual Carbon Emissions at J&J: The Numerator

Actual Annual Carbon Emissions at J&J (kgC/yr) ⁴	1,005,000,000	1,056,000,000	1,047,000,000	943,000,000	862,000,000
Actual Annual Carbon Emissions (converted to metric tonnes) at J&J (tC/yr)	1,005,000	1,056,000	1,047,000	943,000	862,000
Actual Cumulative Carbon Emissions at J&J (tC): The Numerator _B	1,966,000.00	3,022,000.00	4,069,000.00	5,012,000.00	5,874,000.00
Actual Annual Carbon Emissions Per Capita/People Foot at J&J (tC/yr): The Numerator _B	41.13	40.63	39.44	35.75	31.07
Actual Cumulative Carbon Emissions Per Capita/People Foot at J&J (tC): The Numerator _C	80.82	121.45	160.89	196.64	227.71

J&J's Global Warming Social Footprint (CO₂ Stabilization-related Only)

Actual Cumulative Carbon Emissions at J&J (tC): The Numerator _B	1,966,000.00	3,022,000.00	4,069,000.00	5,012,000.00	5,874,000.00
Emissions Allowed at J&J Under 350 ppm Stabilization Plan (961,000 tC/yr in 2000) ³ : The Denominator _B	1,926,765.98	2,897,297.94	3,872,595.88	4,852,659.80	5,837,489.70
Global Warming Societal Quotient "a" Expressed in Terms of Cumulative Emissions Perspective ⁴	1.020	1.043	1.051	1.033	1.006
Actual Annual Carbon Emissions Per Capita/People Foot at J&J (tC/yr): The Numerator _B	41.13	40.63	39.44	35.75	31.07
Carbon Emissions Allowed Per Capita/People Foot at J&J Under 350 ppm Plan (tC/yr): The Denominator _B	39.88	40.08	40.27	40.47	40.67
Global Warming Societal Quotient "b" Expressed in Terms of Annual Per Capita/People Foot Perspective ⁴	1.031	1.014	0.979	0.883	0.764
Actual Cumulative Carbon Emissions Per Capita/People Foot at J&J (tC): The Numerator _C	80.82	121.45	160.89	196.64	227.71
Annual Carbon Emissions Allowed Per Capita/People Foot at J&J Under 350 ppm Plan: The Denominator _C	79.57	119.64	159.92	200.39	241.06
Societal Quotient "b" Expressed in Terms of Cumulative Per Capita/People Foot Emissions Perspective ⁴	1.016	1.015	1.006	0.981	0.945

¹Source: Johnson & Johnson 2005 Annual Report

²Source: MAGICC/SCENGEN emissions library at <http://www.ogd.ucar.edu/cas/wigley/magicc/>

³Source: Johnson & Johnson 2005 Sustainability Report

⁴≤ 1 = Sustainable; > 1 = Unsustainable

**Global Warming Social Footprint Analysis for Royal Dutch Shell (Shell)
re: Carbon Emissions and Contributions to Climate Change Mitigation**

	2001	2002	2003	2004	2005
Number of People Feet at Shell					
Full-Time Employees (FTE) ¹	369,822.00	404,457.00	403,503.00	404,283.00	393,357.00
Average Annual Proportion of Full-Time Employee Time Spent at Shell Per Year (Estimated)	0.24	0.24	0.24	0.24	0.24
Total Number of People Feet at Shell	88,757.28	97,069.68	96,840.72	97,027.92	94,405.68

Carbon Emissions Required to Stabilize CO₂ at 350 ppm: The Denominator

Global Carbon Emissions Allowed to Achieve Stabilized CO ₂ Concentrations at 350 ppm by 2150 (GtC/yr) ²	6.93	6.96	7.00	7.03	7.07
Maximum Cumulative Global Carbon Emissions Allowed Under 350 ppm Stabilization Plan (GtC) ²	13.83	20.79	27.79	34.82	41.89
Increase in Cumulative Carbon Emissions Relative to 2000 Baseline Level of 6.896 GtC/yr Under 350 Plan ²	200.496%	301.488%	402.976%	504.959%	607.439%
Annual Carbon Emissions Allowed at Shell Under 350 ppm Plan (92,000,000 tC in 2000) ³	92,456,264.50	92,912,529.00	93,368,793.50	93,825,058.00	94,281,322.51
Carbon Emissions Allowed at Shell Under 350 ppm Plan (92,000,000 tC in 2000) ³ : The Denominator _a	184,456,264.50	277,368,793.50	370,737,587.01	464,562,645.01	558,843,967.52
Carbon Emissions Allowed Per Capita/People Foot at Shell Under 350 ppm Plan (tC/yr): The Denominator _b	1,095.09	1,100.50	1,105.90	1,111.31	1,116.71
Carbon Emissions Allowed Per Capita/People Foot at Shell Under 350 ppm Plan (tC): The Denominator _c	2,184.78	3,285.28	4,391.19	5,502.49	6,619.20

Actual Carbon Emissions at Shell: The Numerator

Actual Annual Carbon Emissions at Shell (tC/yr) ¹	95,000,000.00	100,000,000.00	106,000,000.00	106,000,000.00	100,000,000.00
Actual Cumulative Carbon Emissions at Shell (tC): The Numerator _a	187,000,000.00	287,000,000.00	393,000,000.00	499,000,000.00	599,000,000.00
Actual Annual Carbon Emissions Per Capita/People Foot at Shell (tC/yr): The Numerator _b	1,070.33	1,030.19	1,094.58	1,092.47	1,059.26
Actual Cumulative Carbon Emissions Per Capita/People Foot at Shell (tC): The Numerator _c	2,160.02	3,190.21	4,284.79	5,377.26	6,436.52

Shell's Global Warming Social Footprint (CO₂ Stabilization-related Only)

Actual Cumulative Carbon Emissions at Shell (tC): The Numerator _a	187,000,000.00	287,000,000.00	393,000,000.00	499,000,000.00	599,000,000.00
Carbon Emissions Allowed at Shell Under 350 ppm Plan (92,000,000 tC in 2000) ³ : The Denominator _a	184,456,264.50	277,368,793.50	370,737,587.01	464,562,645.01	558,843,967.52
Global Warming Societal Quotient "a" Expressed in Terms of Cumulative Emissions Perspective ⁴	1.01	1.035	1.060	1.074	1.072
Actual Annual Carbon Emissions Per Capita/People Foot at Shell (tC/yr): The Numerator _b	1,070.33	1,030.19	1,094.58	1,092.47	1,059.26
Carbon Emissions Allowed Per Capita/People Foot at Shell Under 350 ppm Plan (tC/yr): The Denominator _b	1,095.09	1,100.50	1,105.90	1,111.31	1,116.71
Global Warming Societal Quotient "b" Expressed in Terms of Annual Per Capita/People Foot Perspective ⁴	0.977	0.936	0.990	0.983	0.949
Actual Cumulative Carbon Emissions Per Capita/People Foot at Shell (tC): The Numerator _c	2,160.02	3,190.21	4,284.79	5,377.26	6,436.52
Carbon Emissions Allowed Per Capita/People Foot at Shell Under 350 ppm Plan (tC): The Denominator _c	2,184.78	3,285.28	4,391.19	5,502.49	6,619.20
Global Warming Societal Quotient "c" Expressed in Terms of Cumulative Per Capita/People Foot Emissions Perspective ⁴	0.989	0.971	0.976	0.977	0.972

¹Source: The Shell Sustainability Report 2005; Data Tables (FTE includes calculation for employees and contractors)

²Source: MAGIC/SCENGEN emissions library at <http://www.cgd.ucar.edu/cas/catalog/magic/>

³Source: Shell Sustainability Report 2003

⁴ ≤ 1 = Sustainable; > 1 = Unsustainable

**Global Warming Social Footprint Analysis for STMicroelectronics (ST)
re: Carbon Emissions and Contributions to Climate Change Mitigation**

	2001	2002	2003	2004	2005
Number of People Feet at STMicroelectronics (ST)					
Full Time Employees (FTE) ¹	40,300	43,170	45,700	49,500	50,000
Average Annual Proportion of Full-Time Employee Time Spent at ST Per Year (Estimated)	0.24	0.24	0.24	0.24	0.24
Total Number of People Feet at ST	9,672	10,361	10,968	11,880	12,000

Carbon Emissions Required to Stabilize CO₂ at 350 ppm: The Denominator

Annual Global Emissions Allowed to Achieve Stabilized CO ₂ Concentrations at 350 ppm by 2150 (GtC/yr) ²	6.930	6.964	6.999	7.033	7.067
Maximum Cumulative Global Carbon Emissions Allowed Under 350 ppm Stabilization Plan (GtC) ²	13.826	20.791	27.789	34.822	41.899
% Change in Cumulative Carbon Emissions Relative to 2000 Baseline Level of 6.896 GtC/yr Under 350 Plan ²	200.496%	301.488%	402.976%	504.959%	607.439%
Annual Carbon Emissions Allowed at ST Under 350 ppm Plan (1,511,000 tC in 2000) ³	1,518,493.65	1,525,987.30	1,533,480.95	1,540,974.59	1,548,468.24
Cumulative Carbon Emissions Allowed at ST Under 350 ppm Stabilization Plan (tC): The Denominator _a	3,029,493.65	4,555,480.95	6,088,961.89	7,629,936.48	9,178,404.73
Annual Carbon Emissions Allowed Per Capita/People Foot at ST Under 350 ppm Plan (tC/yr): The Denominator _b	144.950	145.665	146.380	147.096	147.811
Cumulative Carbon Emissions Allowed Per Capita/People Foot at ST Under 350 ppm Plan: The Denominator _c	289.184	434.849	581.230	728.325	876.136

Actual Carbon Emissions at ST: The Numerator

Actual Annual Carbon Emissions at ST (tC/yr) ³	1,561,000.00	1,541,000.00	1,639,000.00	1,744,000.00	1,853,000.00
Actual Cumulative Carbon Emissions at ST (tC): The Numerator _a	3,072,000.00	4,613,000.00	6,252,000.00	7,996,000.00	9,849,000.00
Actual Annual Carbon Emissions Per Capita/People Foot at ST (tC/yr): The Numerator _b	161.394	148.734	149.435	146.801	154.417
Actual Cumulative Carbon Emissions Per Capita/People Foot at ST (tC): The Numerator _c	305.628	454.362	603.797	750.598	905.015

ST's Global Warming Social Footprint (CO₂ Stabilization-related Only)

Actual Cumulative Carbon Emissions at ST (tC): The Numerator _a	3,072,000.00	4,613,000.00	6,252,000.00	7,996,000.00	9,849,000.00
Cumulative Carbon Emissions Allowed at ST Under 350 ppm Stabilization Plan (tC): The Denominator _a	3,029,493.65	4,555,480.95	6,088,961.89	7,629,936.48	9,178,404.73
Global Warming Societal Quotient "q" Expressed in Terms of Cumulative Emissions Perspective ⁴	1.014	1.013	1.027	1.048	1.073
Actual Annual Carbon Emissions Per Capita/People Foot at ST (tC/yr): The Numerator _b	161.39	148.73	149.43	146.80	154.42
Annual Carbon Emissions Allowed Per Capita/People Foot at ST Under 350 ppm Plan (tC/yr): The Denominator _b	144.95	145.67	146.38	147.10	147.81
Global Warming Societal Quotient "q" Expressed in Terms of Annual Per Capita/People Foot Perspective ⁴	1.113	1.021	1.021	0.998	1.045
Actual Cumulative Carbon Emissions Per Capita/People Foot at ST (tC): The Numerator _c	305.63	454.36	603.80	750.60	905.01
Cumulative Carbon Emissions Allowed Per Capita/People Foot at ST Under 350 ppm Plan: The Denominator _c	289.18	434.85	581.23	728.33	876.14
Global Warming Societal Quotient "q" Expressed in Terms of Cumulative Per Capita/People Foot Emissions Perspective ⁴	1.057	1.045	1.039	1.031	1.033

¹Source: STMicroelectronics NV 2005 Form 20-F; STMicroelectronics 2002 Annual Report

²Source: MAGIC C/SCENGEN emissions library at <http://www.cgd.ucar.edu/cas/wigley/magic/>

³Source: STMicroelectronics Corporate Responsibility Report 2005

⁴≤ 1 = Sustainable; > 1 = Unsustainable

Discussion

- Each analysis includes three social bottom lines, or Societal Quotients, representing three analytical perspectives:
 - A cumulative organization-level bottom line
 - An annual per capita (People Foot) bottom line
 - A cumulative per capita (People Foot) bottom line
- The first bottom line assesses sustainability at an organizational level of analysis, cumulatively over the date ranges shown
- The second bottom line assesses sustainability on a per capita basis (adjusted per our People Foot metric) for five individual years in isolation (i.e., not cumulatively)
- The third bottom line assesses sustainability on a per capita basis (adjusted per our People Foot metric), cumulatively over the date ranges shown

Discussion (cont.)

- The third perspective (cumulative per capita) is arguably the most meaningful, since it:
 - Resolves multi-year differences to a common metric (“People Feet”)
 - Provides a cumulative view of performance, not an isolated annual one (can more easily track progress against a multi-year plan)
- According to the third analytical view:
 - Half of the organizations were performing sustainably as of the end of 2005 (Ford, Johnson & Johnson, and Royal Dutch Shell), and the other half were not (Alcoa, DuPont, and STMicroelectronics)
 - Only Ford and Shell were sustainable all five years
 - Only one of the six, Ford, consistently improved year over year
 - DuPont is on the verge of crossing the sustainability line, since its individual year performances in 2004 and 2005 were both sustainable
 - STMicroelectronics is also hovering around the sustainability threshold, and actually scored sustainably in 2004 and then fell back in 2005

Summary – The Social Footprint....

- Is a tool that makes it possible to calculate organizational social bottom lines in a broad range of areas relative to impacts on human capital, social capital, and constructed capital – or what we collectively call *anthro capital*
- Focuses on the sustainability of organizational contributions to causing or closing gaps in social well-being, and on remedial plans of action
- Is concerned with the sustainability of organizational contributions to the resolution of social problems, and/or to achieving social plans of action aimed at improving the health and well-being of people
- Can be applied to all sorts of social issues, including those related to the mitigation of ecological problems that involve risks to humans

Our analysis shows that organizational social bottom lines can be used to measure and score the sustainability of corporate contributions to social plans of action, including climate change mitigation!

Thank you – comments most welcome!

Please feel free to contact us with feedback or for more information about how the [Social Footprint Method](#) can be used in your own organization!

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