Using the Social Footprint Method to Measure and Report Global Warming Social Footprints

A Sustainability Metric Developed by the Center for Sustainable Organizations

Version 5.0 – January 2011

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 presentation, we use the *Social Footprint Method* in conjunction with one such model (the WRE350 scenario*), according to which carbon dioxide (CO_2) concentrations continue to rise in the near-term, and then eventually level out to 350 parts per million (ppm) by 2150 (current levels of CO_2 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 its fair share to the mitigation of CO_2 concentrations in the atmosphere per the WRE350 scenario?*
- We then ask: *Is the organization's contribution to climate change mitigation per the WRE350 scenario 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 involves making changes from current emissions levels immediately; thus, it is a relatively challenging (but arguably attractive) scenario

Executive Summary (cont.)

- Our scientific grounding:
  - At the heart of our approach is the WRE350* CO_2 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 CO_2 build-ups in the earth's atmosphere, and stabilize them at a safe 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 consistency with a CO_2 stabilization scenario, and score them accordingly
  - Thus, the global warming application of the *Social Footprint Method* is grounded in both the science of climatology and *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 Method* results (CO_2-related only) of three kinds:
  - 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 scenario we used features 2000 as a baseline year, and that all of the organizations included in this report have, in fact, been reporting emissions since then
- The examples included in this report show varied results, with some organizations displaying sustainable contributions to GHG mitigation, and others not

The Social Footprint Method

- What is it?
  - A sustainability accounting method that makes it possible to calculate social bottom lines for organizations and other human social systems
  - The product of a joint effort between the Center for Sustainable Organizations in Vermont and the University of Groningen
  - 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 Method*, by contrast, focuses on the sustainability of organizational behaviors relative to their impacts on what we call *anthro capital* – human, social and constructed capitals – as required for human well-being

***See www.footprintnetwork.org**

The Social Footprint Method (cont.)

- What is it (cont.)?
  - In the case of the global warming issue addressed in this report, the *Social Footprint Method* is used to assess the sustainability of organizations 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 Method* focuses on the sustainability of organizational behaviors in terms of their *social* impacts aimed at ensuring human well-being
  - **Global Warming Social Footprints, therefore, are just a type of Social Footprint**

Global Warming Social Footprints

- Are quantitative measures of an organization's emissions performance against specific mitigation targets
- Use CO_2 emissions as a proxy for anthro capital contributions
- Take the form of *quotients*:
  - Denominators express the per-capita*, or per-organization, share of impacts on social conditions required to achieve and/or maintain human well-being (in the case of climate change, such impacts are expressed in terms of maximum allowable CO_2 emissions/year according to a specific mitigation plan)
  - Numerators express actual impacts per-capita*, or per-organization, in a time period (i.e., actual CO_2 emissions per year)
- Actual CO_2 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 ≤ 1.0)
- Scores of > 1.0 indicate *unsustainable* operations

*Note: We use a 'per capita equivalent' metric to reflect organizational headcount (i.e., total employee hours divided by 8760 hours).

Global Warming As a Social Issue

- 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 mitigation solutions
- Focuses on related contributions to anthro capitals required to achieve climate change mitigation
- Looks, in particular, at organizational contributions to achieving a specific solution to global warming – a GHG mitigation and CO_2 stabilization scenario called WRE350*
- WRE350 is a scenario that calls for the reduction of carbon emissions on earth to safe levels, such that global CO_2 concentrations will drop to 350 parts per million by 2150

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

Global Warming as a Social Issue (cont.)

- This presentation includes six examples of actual *Global Warming Social Footprints* calculated in 2006 using real data from the following sources (anonymously presented):
  - Company A: International Producer of Aluminum
  - Company B: Fortune 500 Chemical and Consumer Products Co.
  - Company C: Fortune 500 Automobile Manufacturer
  - Company D: Fortune 500 Pharmaceutical and Biotechnology Co.
  - Company E: International Energy and Petrochemicals Co.
  - Company F: International Semiconductor Co.
- Results:
  - Half of the six cases scored sustainably over a 5-year period
  - Company C had the best score as of the end of 2005 (0.928)
  - Company A had the worst score as of the end of 2005 (1.135)

Each of the six sample reports follows below…….

Company A: International Producer of Aluminum

Company A's Global Warming Social Footprint (CO_2 Stabilization-related Only)

	2001	2002	2003	2004	2005
- Cumulative Organizational View:					
Actual Cumulative CO_2 Emissions at Company A Inclusive of 2000 Emissions of 53,600,000 (tCO_2): The Numerator	108,300,000.00	160,700,000.00	216,900,000.00	273,700,000.00	330,900,000.00
Cumulative CO_2 Emissions Allowed at Company A Under WRE350 ppm Stabilization Scenario (tCO_2)[2,3]: The Denominator	107,465,823.67	161,597,471.00	215,994,942.00	270,658,236.66	325,587,354.95
Global Warming Social Footprint Expressed in Terms of Organization-wide Cumulative Emissions Perspective[5]	1.008	0.994	1.004	1.011	1.016
- Annual Per Capita[4] View:					
Actual Annual CO_2 Emissions Per Capita at Company A (tCO_2/yr): The Numerator	1,766.80	1,719.16	1,951.39	1,988.80	1,847.55
Annual CO_2 Emissions Allowed Per Capita at Company A Under WRE350 ppm Scenario (tCO_2/yr)[2,3]: The Denominator	1,580.57	1,588.37	1,596.17	1,603.97	1,611.77
Global Warming Social Footprint Expressed in Terms of Annual Per Capita Perspective[5]	1.118	1.082	1.223	1.240	1.146
- Cumulative Per Capita[4] View:					
Actual Cumulative CO_2 Emissions Per Capita at Company A Inclusive of 2000 Emissions of 1572.77 (tCO_2): The Numerator	3,339.57	5,058.73	7,010.11	8,998.91	10,846.46
Cumulative CO_2 Emissions Allowed Per Capita at Company A Under 350 ppm Plan (tCO_2)[2,3]: The Denominator	3,153.34	4,741.71	6,337.88	7,941.85	9,553.62
Global Warming Social Footprint Expressed in Terms of Cumulative Per Capita Perspective[5]	1.059	1.067	1.106	1.133	1.135

[1]Source of Emissions Data: From Company A's published reports and/or disclosures to third parties.
[2]Based on WRE350 Scenario found at MAGICC/SCENGEN emissions library at http://www.cgd.ucar.edu/cas/wigley/magicc
[3]Based on progressions specified in WRE350 Scenario as of 2006
[4]The per capita size of an organization is total employee hours divided by 8760 (i.e., total number of hours in a year).
[5]≤1 = Sustainable; > 1 = Unsustainable [*Environmental* scoring convention used in this case due to the use of environmental impacts as a proxy for social impacts].

Caveats:
1. The data contained in this report have not been updated since it was prepared in 2006 or independently verified in any way.
2. The methodology used in this report has since been updated to reflect the statistical effects of changes in employee populations over multi-year periods of time when computing cumulative performance.
3. Normative emissions under the WRE350 scenario have also been updated since this report was prepared.

Company B: Chemical and Consumer Products Co.

Company B's Global Warming Social Footprint (CO_2 Stabilization-related Only)[1]

	2001	2002	2003	2004	2005
- Cumulative Organizational View:					
Actual Cumulative CO_2 Emissions at Company B Inclusive of 2000 Emissions of 16,193,234.40 (tCO_2): The Numerator	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 Company B Under WRE350 ppm Stabilization Scenario (tCO_2)[2,3]: The Denominator	32,466,787.24	48,820,658.53	65,254,848.26	81,769,194.49	98,364,021.11
Global Warming Social Footprint Expressed in Terms of Organization-wide Cumulative Emissions Perspective[5]	0.995	0.985	0.971	0.885	0.830
- Annual Per Capita[4] View:					
Actual Annual CO_2 Emissions Per Capita at Company B (tCO_2/yr): The Numerator	849.29	832.54	786.32	623.69	648.61
Annual CO_2 Emissions Allowed Per Capita at Company B Under WRE350 ppm Scenario (tCO_2/yr)[2,3]: The Denominator	729.10	732.70	736.30	739.89	743.50
Global Warming Social Footprint Expressed in Terms of Annual Per Capita Perspective[5]	1.165	1.136	1.068	0.843	0.872
- Cumulative Per Capita[4] View:					
Actual Cumulative CO_2 Emissions Per Capita at Company B Inclusive of 2000 Emissions of 725.5 (tCO_2): The Numerator	1,574.79	2,407.33	3,193.65	3,817.34	4,465.95
Cumulative CO_2 Emissions Allowed Per Capita at Company B Under 350 ppm Plan (tCO_2)[2,3]: The Denominator	1,454.61	2,187.31	2,923.60	3,663.49	4,406.99
Global Warming Social Footprint Expressed in Terms of Cumulative Per Capita Perspective[5]	1.083	1.101	1.092	1.042	1.013

[1]Source of Emissions Data: From Company B's published reports and/or disclosures to third parties.
[2]Based on WRE350 Scenario found at MAGICC/SCENGEN emissions library at http://www.cgd.ucar.edu/cas/wigley/magicc
[3]Based on progressions specified in WRE350 Scenario as of 2006
[4]The per capita size of an organization is total employee hours divided by 8760 (i.e., total number of hours in a year).
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Company C: Fortune 500 Automobile Manufacturer

Company C's Global Warming Social Footprint (CO_2 Stabilization-related Only)[1]

	2001	2002	2003	2004	2005
- Cumulative Organizational View:					
Actual Cumulative CO_2 Emissions at Company C Inclusive of 2000 Emissions of 9,800,000 (tCO_2): The Numerator	19,000,000.00	27,700,000.00	36,200,000.00	44,600,000.00	52,600,000.00
Cumulative CO_2 Emissions Allowed at Company C Under WRE350 ppm Stabilization Scenario (tCO_2)[2,3]: The Denominator	19,648,602.09	29,545,806.26	39,491,612.53	49,486,020.88	59,529,031.32
Global Warming Social Footprint Expressed in Terms of Organization-wide Cumulative Emissions Perspective[3]	0.967	0.938	0.917	0.901	0.884
- Annual Per Capita[4] View:					
Actual Annual CO_2 Emissions Per Capita at Company C (tCO_2/yr): The Numerator	108.15	111.95	108.13	107.74	111.11
Annual CO_2 Emissions Allowed Per Capita at Company C Under WRE350 ppm Scenario (tCO_2/yr)[2,3]: The Denominator	118.60	119.19	119.77	120.36	120.94
Global Warming Social Footprint Expressed in Terms of Annual Per Capita Perspective[3]	0.912	0.939	0.903	0.895	0.919
- Cumulative Per Capita[4] View:					
Actual Cumulative CO_2 Emissions Per Capita at Company C Inclusive of 2000 Emissions of 118.02 (tCO_2): The Numerator	226.17	338.12	446.25	553.99	665.10
Cumulative CO_2 Emissions Allowed Per Capita at Company C Under 350 ppm Plan (tCO_2)[2,3]: The Denominator	236.62	355.81	475.59	595.95	716.89
Global Warming Social Footprint Expressed in Terms of Cumulative Per Capita Perspective[5]	0.956	0.950	0.938	0.930	0.928

[1] Source of Emissions Data: From Company C's published reports and/or disclosures to third parties.
[2] Based on WRE350 Scenario found at MAGICC/SCENGEN emissions library at http://www.cgd.ucar.edu/cas/wigley/magicc
[3] Based on progressions specified in WRE350 Scenario as of 2006
[4] The per capita size of an organization is total employee hours divided by 8760 (i.e., total number of hours in a year).
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Company D: Fortune 500 Pharma and Biotech Co.

Company D's Global Warming Social Footprint (CO_2 Stabilization-related Only)

	2001	2002	2003	2004	2005
- Cumulative Organizational View:					
Actual Cumulative CO_2 Emissions at Company D Inclusive of 2000 Emissions of 961,000 (tCO_2): The Numerator	1,966,000.00	3,022,000.00	4,069,000.00	5,012,000.00	5,874,000.00
Cumulative CO_2 Emissions Allowed at Company D Under WRE350 ppm Stabilization Scenario (tCO_2)[2,3]: The Denominator	1,926,765.98	2,897,297.94	3,872,595.88	4,852,659.80	5,837,489.70
Global Warming Social Footprint Expressed in Terms of Organization-wide Cumulative Emissions Perspective[5]	1.020	1.043	1.051	1.033	1.006
- Annual Per Capita[4] View:					
Actual Annual CO_2 Emissions Per Capita at Company D (tCO_2/yr): The Numerator	41.13	40.63	39.44	35.75	31.07
Annual CO_2 Emissions Allowed Per Capita at Company D Under WRE350 ppm Scenario (tCO_2/yr)[2,3]: The Denominator	39.88	40.08	40.27	40.47	40.67
Global Warming Social Footprint Expressed in Terms of Annual Per Capita Perspective[5]	1.031	1.014	0.979	0.883	0.764
- Cumulative Per Capita[4] View:					
Actual Cumulative CO_2 Emissions Per Capita at Company D Inclusive of 2000 Emissions of 39.69 (tCO_2): The Numerator	80.82	121.45	160.89	196.64	227.71
Cumulative CO_2 Emissions Allowed Per Capita at Company D Under 350 ppm Plan (tCO_2)[2,3]: The Denominator	79.57	119.64	159.92	200.39	241.06
Global Warming Social Footprint Expressed in Terms of Cumulative Per Capita Perspective[5]	1.016	1.016	1.006	0.981	0.945

[1]Source of Emissions Data: From Company D's published reports and/or disclosures to third parties.
[2]Based on WRE350 Scenario found at MAGICC/SCENGEN emissions library at http://www.cgd.ucar.edu/cas/wigley/magicc
[3]Based on progressions specified in WRE350 Scenario as of 2006
[4]The per capita size of an organization is total employee hours divided by 8760 (i.e., total number of hours in a year).
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Company E: Int'l Energy and Petrochemicals Company

Company E's Global Warming Social Footprint (CO_2 Stabilization-related Only)

	2001	2002	2003	2004	2005
- Cumulative Organizational View:					
Actual Cumulative CO_2 Emissions at Company E Inclusive of 2000 Emissions of 92,000,000 (tCO_2): The Numerator	187,000,000.00	287,000,000.00	393,000,000.00	499,000,000.00	599,000,000.00
Cumulative CO_2 Emissions Allowed at Company E Under WRE350 ppm Stabilization Scenario (tCO_2)[2,3]: The Denominator	184,456,264.50	277,368,793.50	370,737,587.01	464,562,645.01	558,843,967.52
Global Warming Social Footprint Expressed in Terms of Organization-wide Cumulative Emissions Perspective[5]	1.014	1.035	1.060	1.074	1.072
- Annual Per Capita[4] View:					
Actual Annual CO_2 Emissions Per Capita at Company E (tCO_2/yr): The Numerator	1,070.33	1,030.19	1,094.58	1,092.47	1,059.26
Annual CO_2 Emissions Allowed Per Capita at Company E Under WRE350 ppm Scenario (tCO_2/yr)[2,3]: The Denominator	1,095.09	1,100.50	1,105.90	1,111.31	1,116.71
Global Warming Social Footprint Expressed in Terms of Annual Per Capita Perspective[5]	0.977	0.936	0.990	0.983	0.949
- Cumulative Per Capita[4] View:					
Actual Cumulative CO_2 Emissions Per Capita at Company E Inclusive of 2000 Emissions of 1089.69 (tCO_2): The Numerator	2,160.02	3,190.21	4,284.79	5,377.26	6,436.52
Cumulative CO_2 Emissions Allowed Per Capita at Company E Under 350 ppm Plan (tCO_2)[2,3]: The Denominator	2,184.78	3,285.28	4,391.19	5,502.49	6,619.20
Global Warming Social Footprint Expressed in Terms of Cumulative Per Capita Perspective[5]	0.989	0.971	0.976	0.977	0.972

[1] Source of Emissions Data: From Company E's published reports and/or disclosures to third parties.
[2] Based on WRE350 Scenario found at MAGICC/SCENGEN emissions library at http://www.cgd.ucar.edu/cas/wigley/magicc
[3] Based on progressions specified in WRE350 Scenario as of 2006
[4] The per capita size of an organization is total employee hours divided by 8760 (i.e., total number of hours in a year).
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Company F: International Semiconductor Company

Company F's Global Warming Social Footprint (CO_2 Stabilization-related Only)

	2001	2002	2003	2004	2005
- Cumulative Organizational View:					
Actual Cumulative CO_2 Emissions at Company F Inclusive of 2000 Emissions of 1,511,000 (tCO_2): The Numerator	3,072,000.00	4,613,000.00	6,252,000.00	7,996,000.00	9,849,000.00
Cumulative CO_2 Emissions Allowed at Company F Under WRE350 ppm Stabilization Scenario (tCO_2)[2,3]: The Denominator	3,029,493.65	4,555,480.95	6,088,961.69	7,629,936.48	9,178,404.73
Global Warming Social Footprint Expressed in Terms of Organization-wide Cumulative Emissions Perspective[5]	1.014	1.013	1.027	1.048	1.073
- Annual Per Capita[4] View:					
Actual Annual CO_2 Emissions Per Capita at Company F (tCO_2/yr): The Numerator	161.39	148.73	149.43	146.80	154.42
Annual CO_2 Emissions Allowed Per Capita at Company F Under WRE350 ppm Scenario (tCO_2/yr)[2,3]: The Denominator	144.95	145.67	146.38	147.10	147.81
Global Warming Social Footprint Expressed in Terms of Annual Per Capita Perspective[5]	1.113	1.021	1.021	0.998	1.045
- Cumulative Per Capita[4] View:					
Actual Cumulative CO_2 Emissions Per Capita at Company F Inclusive of 2000 Emissions of 144.23 (tCO_2): The Numerator	305.63	454.36	603.80	750.60	905.01
Cumulative CO_2 Emissions Allowed Per Capita at Company F Under 350 ppm Plan (tCO_2)[2,3]: The Denominator	289.18	434.85	581.23	728.33	876.14
Global Warming Social Footprint Expressed in Terms of Cumulative Per Capita Perspective[5]	1.057	1.045	1.039	1.031	1.033

[1]Source of Emissions Data: From Company F's published reports and/or disclosures to third parties.
[2]Based on WRE350 Scenario found at MAGICC/SCENGEN emissions library at http://www.cgd.ucar.edu/cas/wigley/magicc
[3]Based on progressions specified in WRE350 Scenario as of 2006
[4]The per capita size of an organization is total employee hours divided by 8760 (i.e., total number of hours in a year).
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Discussion

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

Discussion (cont.)

- The third perspective (cumulative per capita) is arguably the most meaningful, since it:
  - Normalizes inter-year disparities using a common metric (per capita)
  - Provides a cumulative view of performance, not an isolated annual one (can more easily track progress against a multi-year plan)
- Thus, according to the third analytical view:
  - Half of the organizations were performing sustainably as of the end of 2005 (companies C, D and E), and the other half were not (companies A, B and F)
  - Only companies C and E were sustainable all five years
  - Only one of the six, company C, consistently improved year over year
  - Company B was gaining on sustainability by the end of 2005, since its individual year performances in 2004 and 2005 were both sustainable
  - Company F was also hovering around the sustainability threshold: it scored sustainably in 2004, then fell back in 2005

Thank You!

Comments and questions most welcome

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