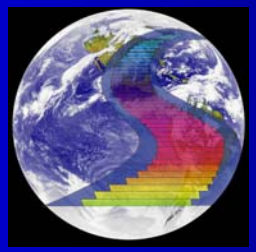
Ecologically V

Measuring Sustainable Production



David Burdick PE
Sustainable Steps
4917 SE Aldercrest Rd.
Milwaukie, Oregon 97222
USA

Tel: (+1) 503 654 2070
Fax: (+1) 503 654 2121
Email: dwburdick@sustainablesteps.com
website: www.sustainablesteps.com

Framework which:

- *Urgency*
- *Motivate*
- *Simple*
- *Effective*
- *Contextual*

What is Sustainability?

1. "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Bruntland 1986)
2. Development which integrates the symbiotic and interdependent relationship that exists between the environment, the economy and the community.
3. "Improve the quality of human life while living within the carrying capacity of supporting ecosystems." The World Conservation Union, United Nations Environmental Programme, and The World Wide Fund for Nature, in 1991

Sustainable Consumption

Ecological Footprint per ***capita***

= **Total amount of biophysical resources used by person[1] x 100%**

Total amount of biophysical resources allocated to person[2]

Compare amount used to amount allocated:

If < 100% : Restorative

If =100% Sustainable

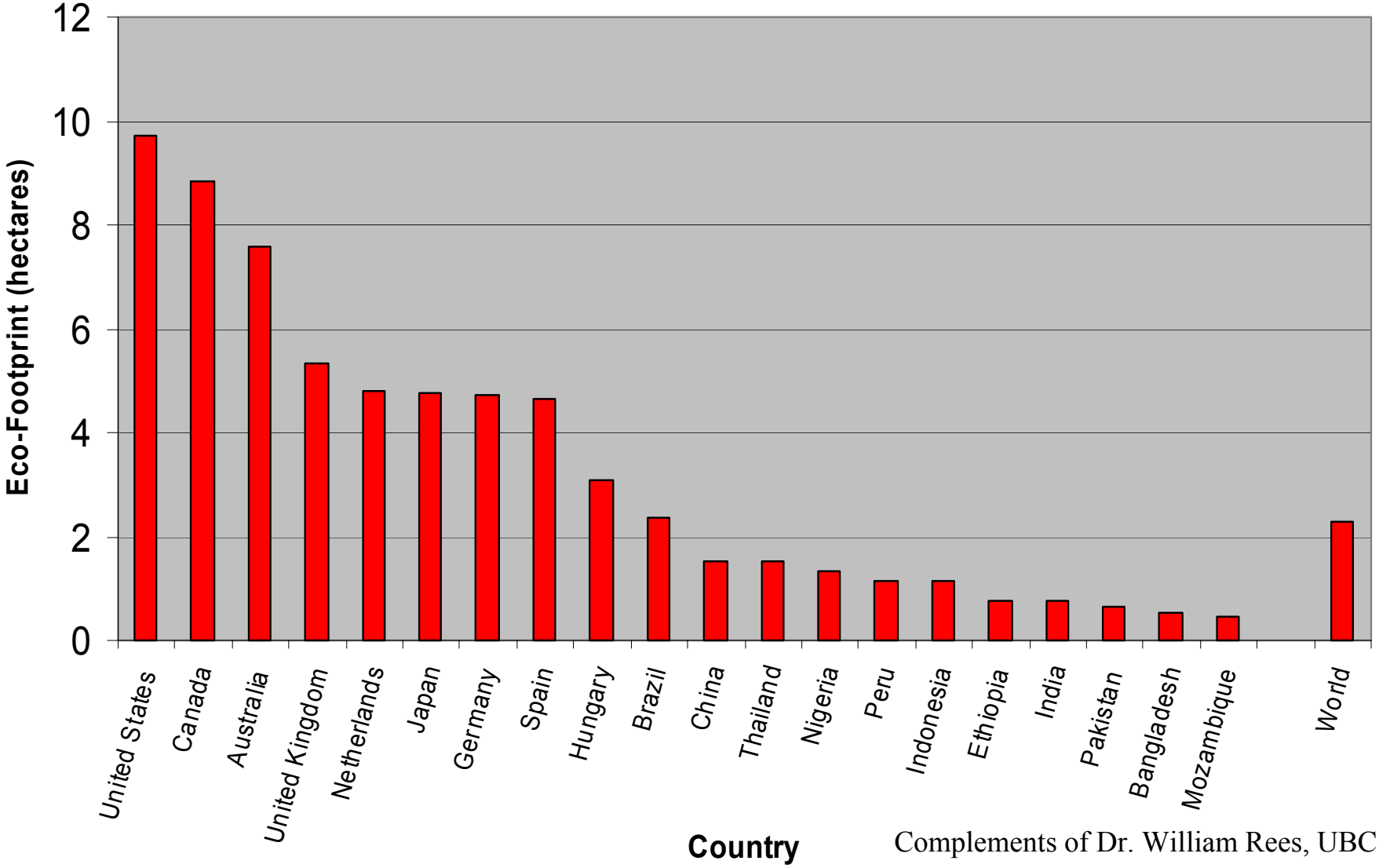
If >100% Ecological Deficit

1. Conduct an total impact analysis for person (including purchases and activities)
2. Convert this into biophysical equivalences of land.
3. Allocate biophysical quantities of total land (**148 x 10^6 sq. km**) divide by population (6 billion)

How it works: examples of ecological land equivalents

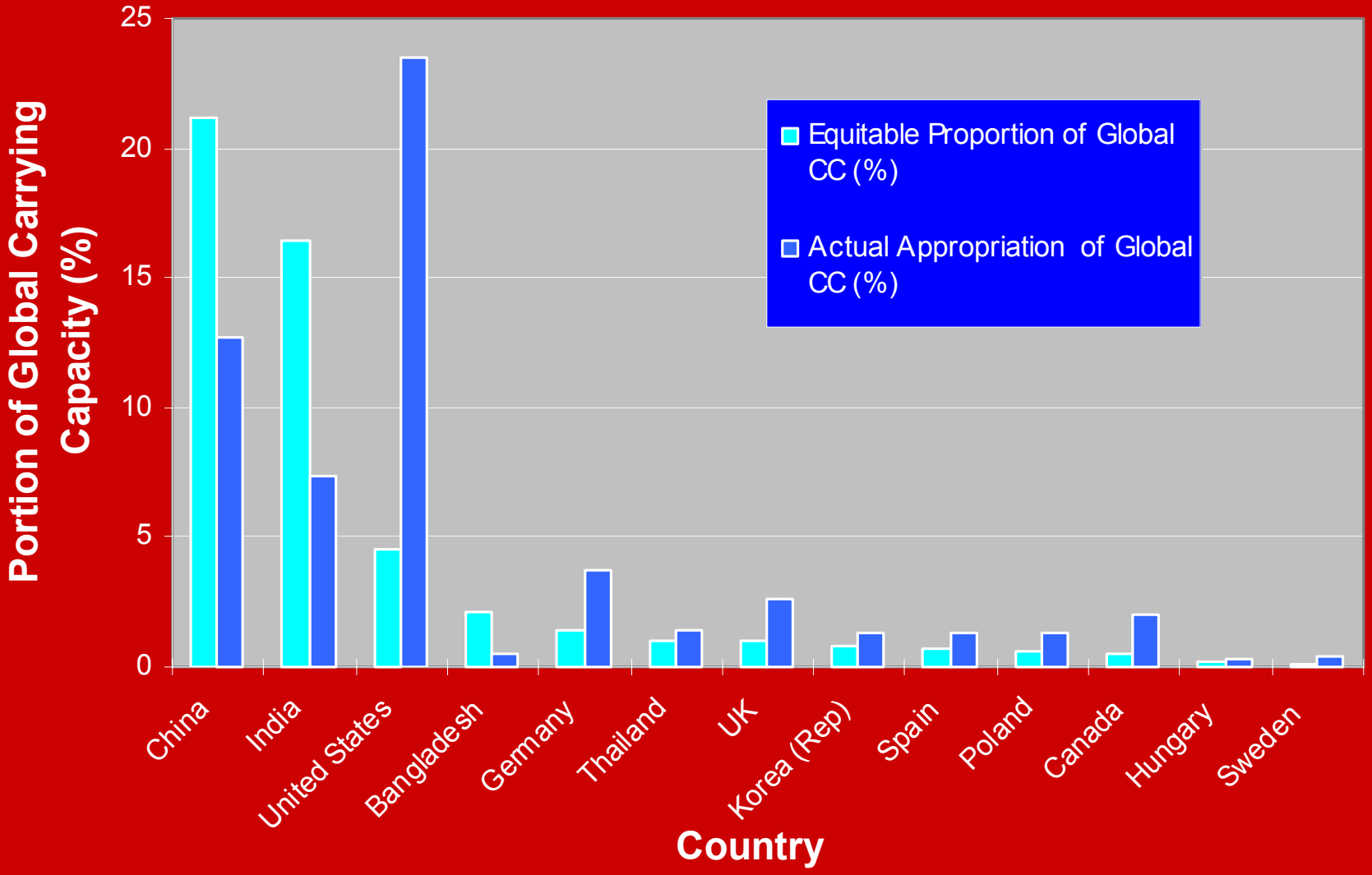
- 1 kg red meat: 306 sq m (.0306 hectare)
- 1 kwh electricity 1.96 sq m (.00019 hectare)
- 1 avg. km by car: 1.86 sq m (.00018 hectare)

Equivalence-Adjusted Per Capita Ecological Footprints of Selected Countries (data from WWF 2002)



Complements of Dr. William Rees, UBC

Equitable (Population-Based) vs. Actual Appropriations of Global Carrying Capacity by Selected Countries based on Ecological Footprint Analysis



Sustainability Solution
(from a consumption perspective)
(2.2 hectares/person)

1. Reduce global population?
2. Buy less stuff?
3. Acquire more earths?
4. Purchase products and services which are sustainable (e.g. living within the earth's carrying capacity)?

Sustainable Production:

$$= \frac{\text{Total amount of biophysical resources required by company}^{1}}{\text{Total amount of biophysical resources allocated to company}^{2}} \times 100\%$$

Compare amount used to amount allocated:

- If < 100% : Restorative
- If =100% Sustainable
- If >100% Ecological Deficit

1. Conduct an total impact analysis for corporation (including suppliers, manufacturing, transport, use and disposal of product) and convert impacts to total amounts of land, air, water and ocean used.
2. Allocate biophysical quantities of land, air, water and ocean to organization relative to its revenues to world "GDP"

Allocating the commons:

Global commons used by businesses for supplying goods and services
(58% of total biophysical resources)

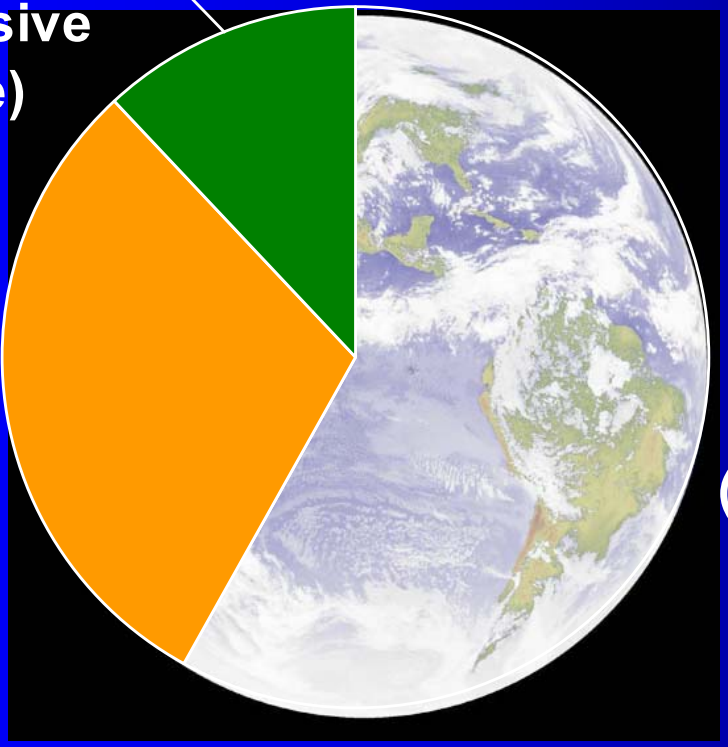
Land: 86 (x10^6) sq. km

Air: 8.6 (x10^9) cu. km

Fresh water: 25,000 (x10^{12}) liters/

Oceans: 775 (x10^6) cu. km

Biodiversity 12% (mutually exclusive use)



Informal economy 30% (non paid activities--rural farming, childcare, etc)

Business 58% (Economic activities)

Allocating the business commons per corporation:

Straight average:

- Total number of company worldwide/land?

Weighted average :

- By employees/company?
- By number of customers/company?
- By revenues?

Allocation of biophysical resources per dollar of revenue[1]

- Land = 86 x 10^6 sq km / \$32 x10^{12} = 2.7 sq km/\$m revenue
- Air = 8.6 x 10^9 cu km / \$32 x10^{12} = 270 cu km/\$m revenue
- Water = 25,000 x 10^{12} liters / \$32 x10^{12} = 780 liters/\$ revenue
- Ocean = 775 x 10^6 cu km / \$32 x10^{12} = 24 cu km/\$m revenue

1. Based on ratio of Total Corporate Revenues to Gross World Revenues (presently \$US 32 trillion (10^{12}))

Biophysical resources allocated to businesses.

Apportioned in accordance to ratio of Total Corporate Revenues to Gross World Revenues (GWR) of $US 32 trillion ($10^{12}$)

	Biophysical Shares			
Revenues (in millions (10^6)/yr)	32	500	2,000	32,000
Percent of total GWR	0.0001	0.0016	0.0062	0.1
Land (sq km)	86	1,375	5,330	86,000
Air (1,000 cu km)	8.6	138	534	8,600
Water (giga (10^9) litres)	25	400	1,575	25,000
Sea (cu. km)	772	12,400	48,100	772,000

Example: ACME Semiconductor Co. ($2 Bil.) Present level of sustainable production:

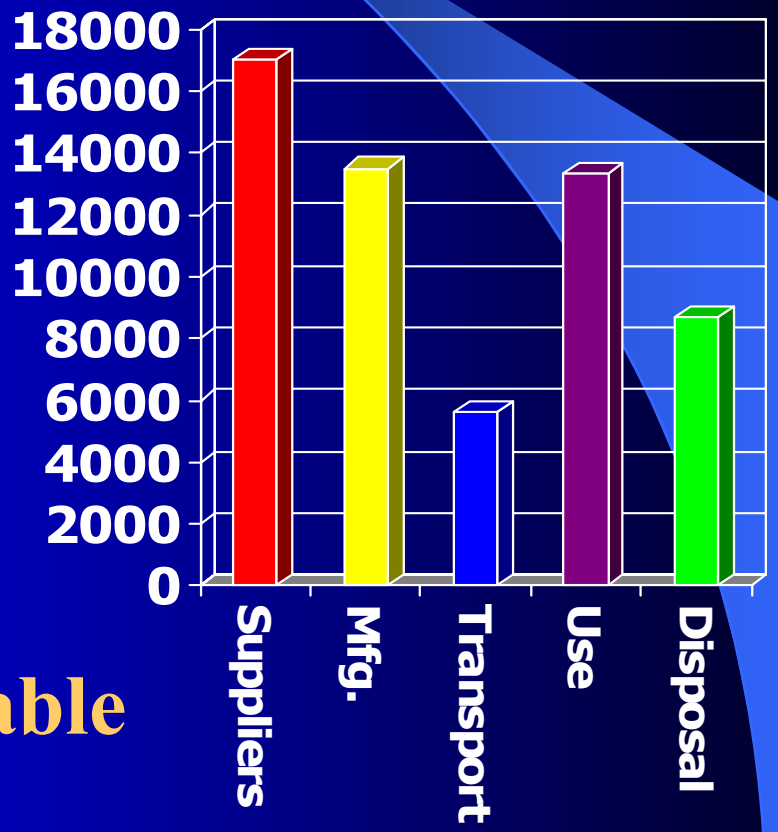
Sq. km of land used to produce, use and dispose

- Suppliers 17,000*
- Mfg. 13,500
- Transport 5,600
- Use 13,300
- Disposal 8,700

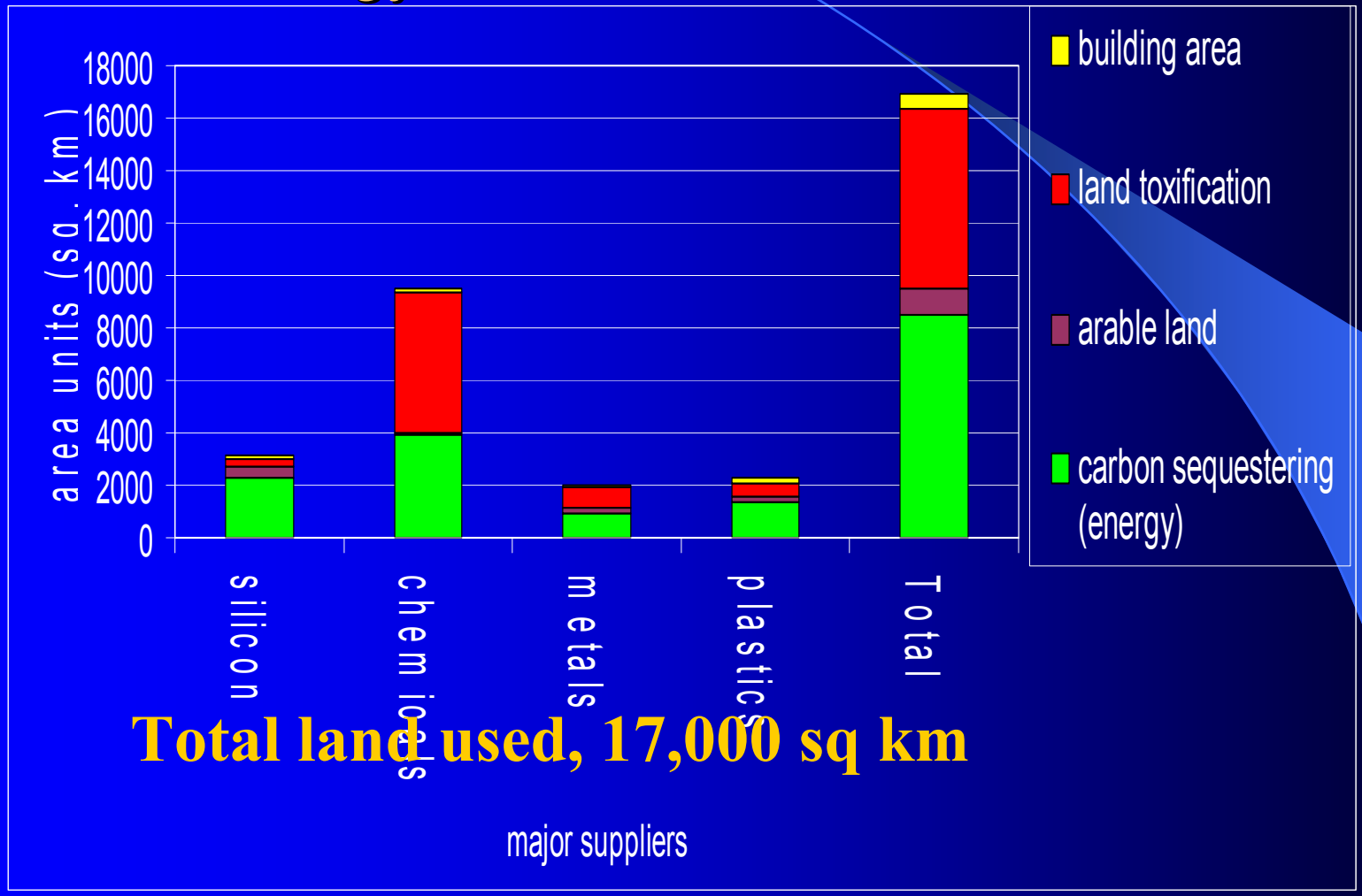
Total of 58,100 sq. km of land.

Allocated (at 2.7 sq km/$m revenue) **5,330 sq. km**

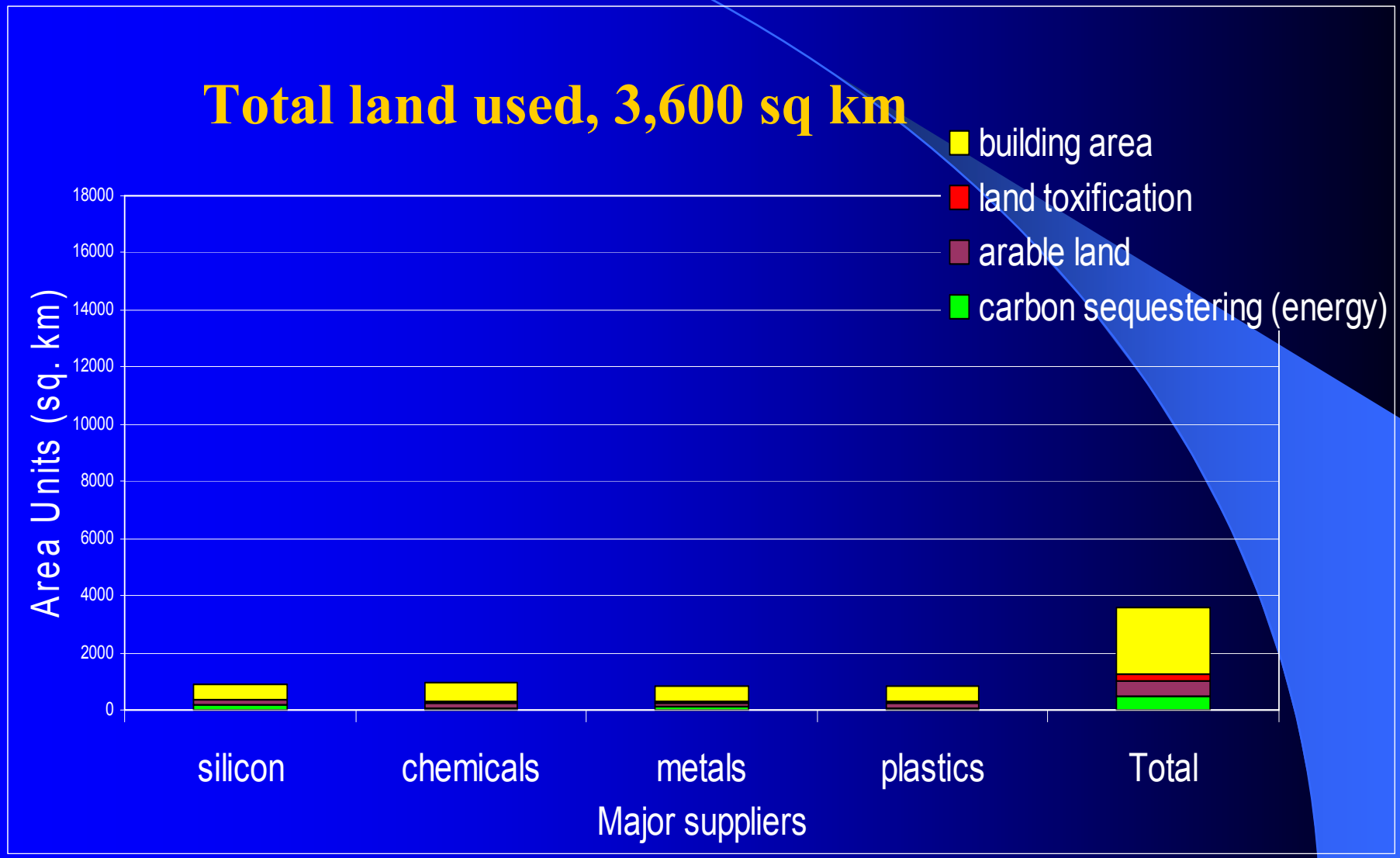
= 1100% above sustainable production level



Improving Acme's level of Sustainable Production:
Step 1: Prioritize largest factor: Suppliers.
Cause: Energy and toxic chemicals



Breakdown of land used by suppliers in 2003 after reduction in toxic chemicals and fossil fuel energy.



Suppliers: 17,000 sq. km → 3,600 sq. km.

Repeat analysis for other product phases

- Mfg: 13,500 sq. km → 730 sq. km
- Transport: 5,600 sq. km → 300 sq. km
- Use 13,300 sq. km → 300 sq. km
- Disposal: 8,700 sq. km → 400 sq. km

Total 58,100 sq. km → 5,330 sq. km

15 year goal is to achieve corporate land footprint From 58,100 to 5,330 sq. km.= sustainable product (land component)

To determine full sustainability level

Repeat for the 3 other biophysical indicators

- Water
- Sea
- Air

Potential benefits from measuring Sustainable Production

1. Prioritizes corporate efforts
2. Enhances corporate credibility
3. Simple, easily understood, intuitive
4. Demonstrates corporate leadership
5. Allows purchasers to consume sustainably
6. Offers market advantage
7. Leverage sustainability actions
8. Create synergy along whole supply chain

Research will address these questions:

1. Are the four biophysical indicators useful to the organization to:
   a. Educate its employees,
   b. Prioritize its environmental efforts and
   c. Market its goods and services as environmentally superior?

2. Does this methodology effectively leverage consumer demand for sustainable production?

3. Needs?
   Funding

- Questions?
- Comments?
- Criticisms?
- Funding?

Contact:

David Burdick PE
Sustainable Steps
4917 SE Aldercrest Rd.
Milwaukie, Oregon 97222
USA

Tel: (+1) 503 654 2070
Fax: (+1) 503 654 2121
Email: Dwburdick@sustainablesteps.com
website: www.sustainablesteps.com