Radical Material and Resources Reporting Criteria in LEEDv4

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NRMCA

Proliferation of Green Standards

GREEN BUILDING

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED V4)

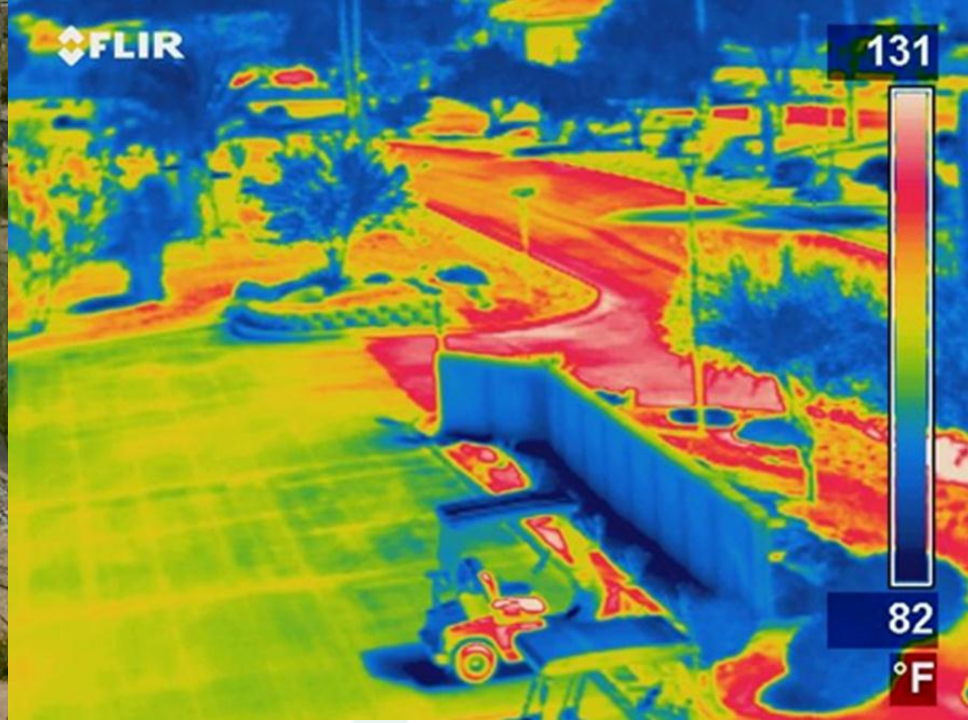
LEED Credit Category	LEED v4 Points	LEED 2009 Points	Concrete Contributes
IP – Integrative Process	1	0	✓
LT - Location & Transport	16	0	✓
SS - Sustainable Sites	10	26	✓
WE - Water Efficiency	11	10	✓
EA - Energy & Atmosphere	33	35	✓
MR - Materials & Resources	13	14	✓
EQ - Indoor Environ Quality	16	15	✓
ID - Innovation	6	6	✓
RP - Regional Priority	4	4	✓
TOTAL	**110**	**110**	**74**

Walkable Streets

Surrounding Density and Diverse Uses

Access to Quality Transit

Rainwater Management

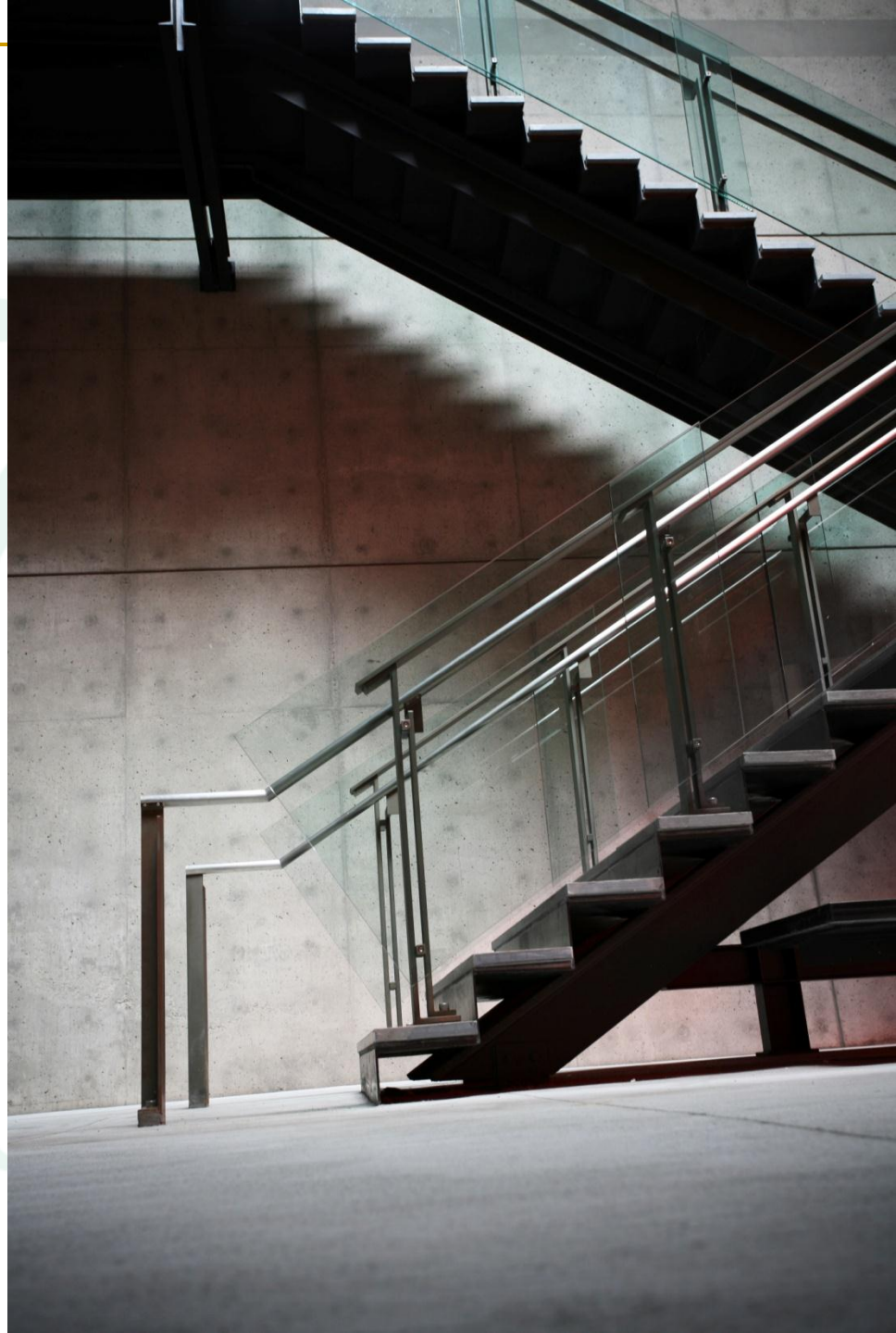


Heat Island Reduction

Water use Reduction

Optimized Energy Performance

Low Emitting Interiors



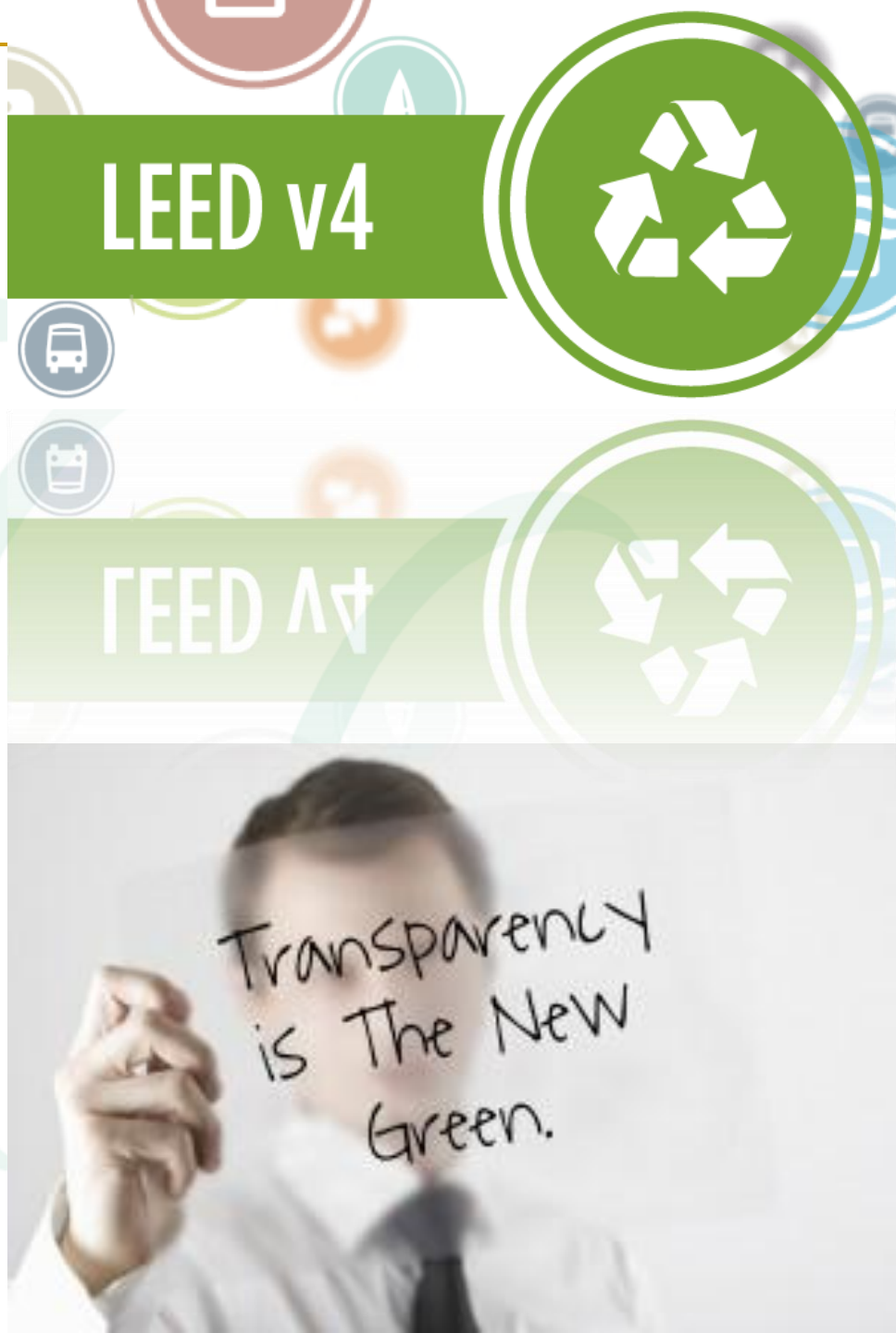

Daylight

Acoustic Performance

MR: Materials and Resources

- Recycled content for structural materials eliminated
- Regional Material eliminated
- Certified Wood eliminated

LEED v4 Materials & Resources Credits



LEED v4

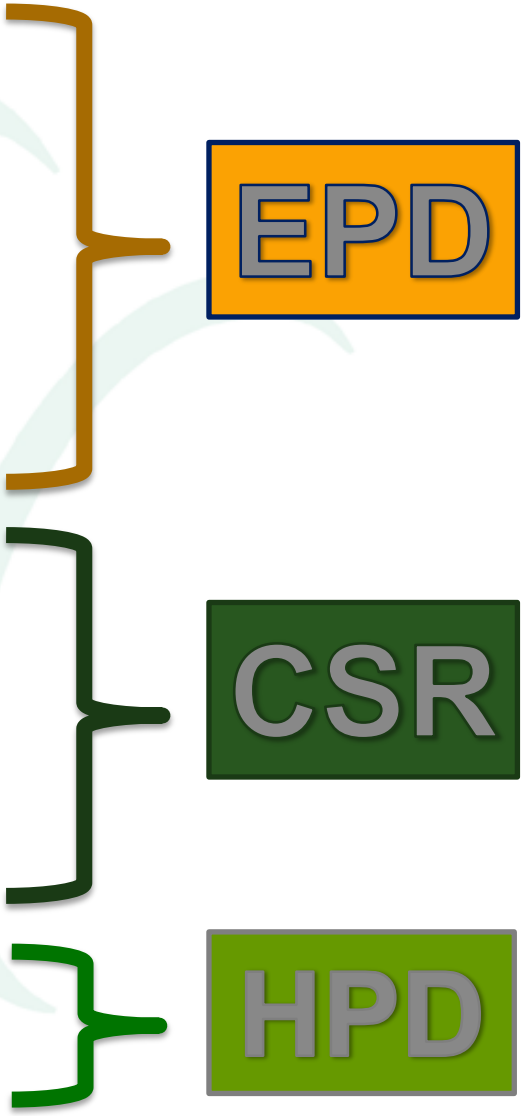
MATERIALS & RESOURCES		POSSIBLE 13
MRp1	Storage and collection of recyclables	REQ
MRp2	Construction and demolition waste management planning	REQ
MRC1	Building life-cycle impact reduction	5
MRc2	Building product disclosure and optimization – environmental product declarations	2
MRc3	Building product disclosure and optimization – sourcing of raw materials	2
MRc4	Building product disclosure and optimization – material ingredients	2
MRc5	Construction and demolition waste management	2

LEED v4 MR Credits

Global warming potential
Depletion of stratospheric ozone layer
Acidification of land and water sources
Eutrophication
Formation of tropospheric ozone
Depletion of nonrenewable energy

Land use
Water use
Biodiversity
Human rights
Noise

Human health (cancer)
Human health (non-cancer)



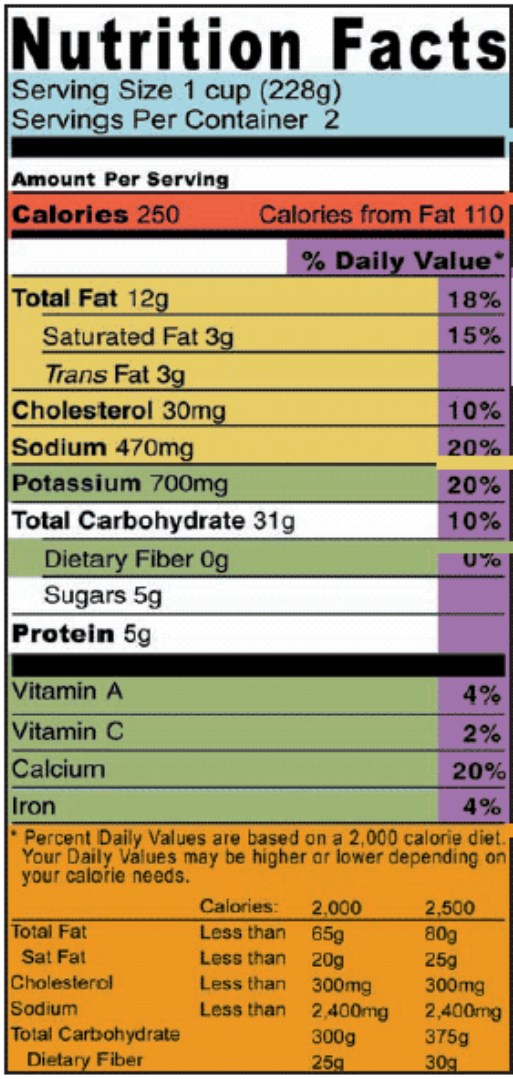
MRc2: ENVIRONMENTAL PRODUCT DECLARATIONS

Environmental Product Declarations

Option 1 – EPDs (1 point)

20 Permanently Installed Products

- **Product specific declaration** – publicly available (1/4 product)
- **Industry average EPD** – Third party certified Type III (1/2 product)
- **Product specific EPD** – Third party certified Type III (Full product)
- USGBC Approved Program



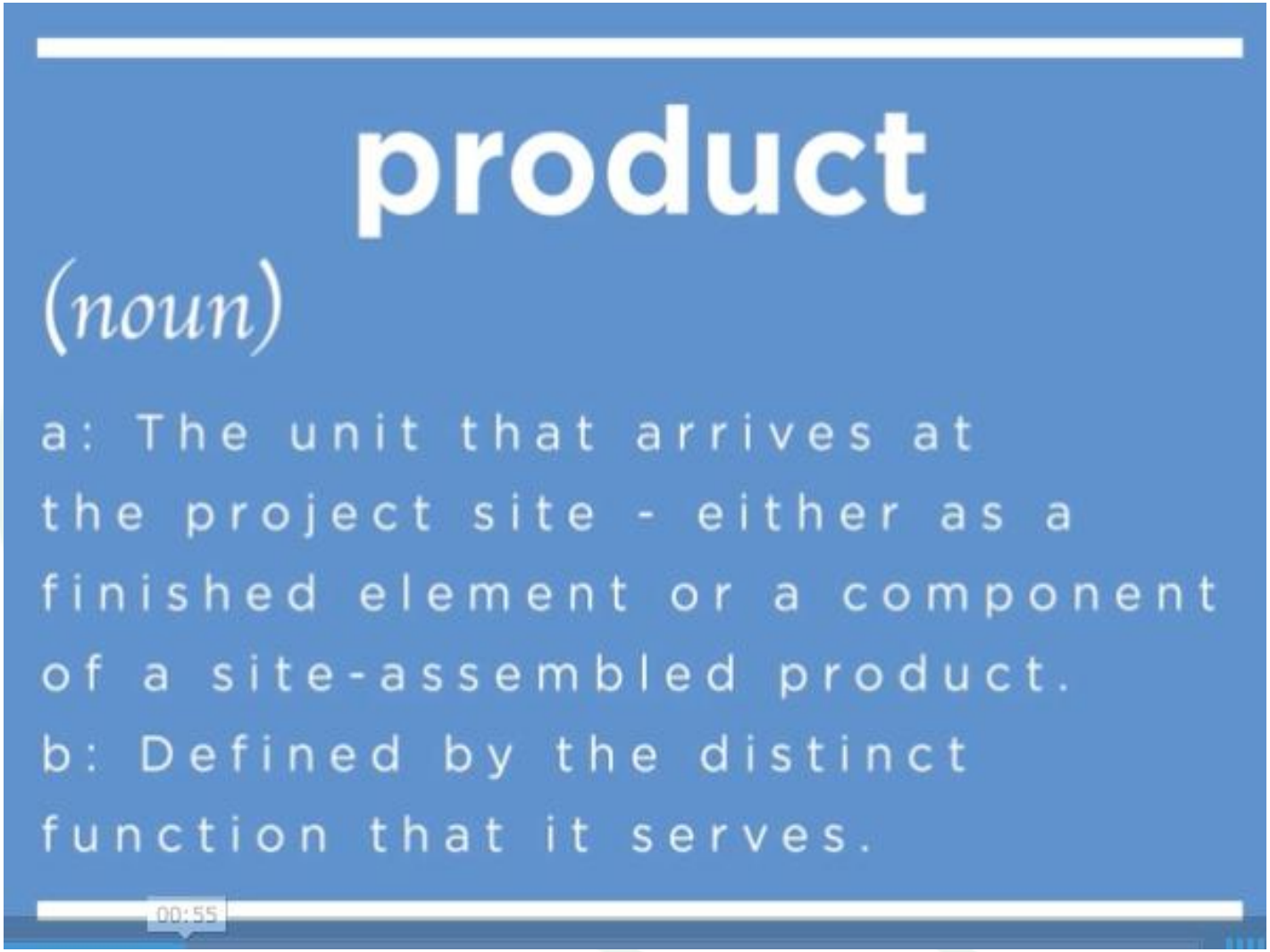
Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving	
Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 3g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Potassium 700mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g


product
(noun)
a: The unit that arrives at the project site - either as a finished element or a component of a site-assembled product.
b: Defined by the distinct function that it serves.
00:55

Advantage: Concrete

Roof slab

Lightweight slabs

Parapets

Normal weight slabs

Shear Walls

Lightweight beams

Stairs

Normal weight beams

Exterior walls

4000 psi columns

Sidewalks

6000 psi columns

Plazas

Basement slabs

Parking areas

Grade beams

Pervious concrete

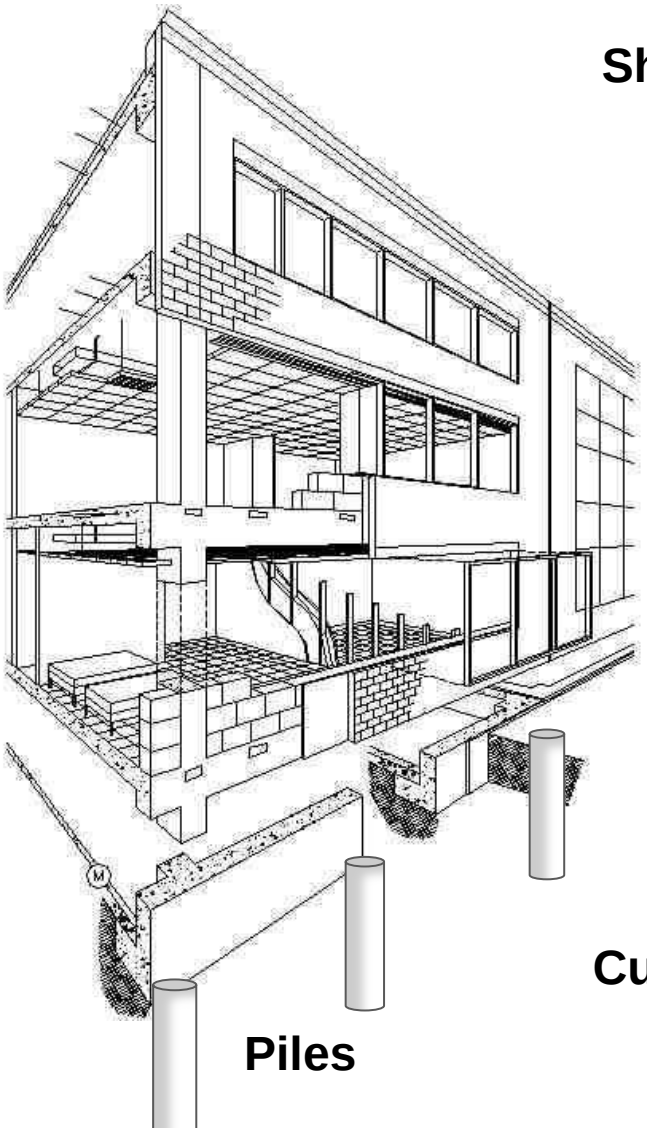
Spread footings

Driveways

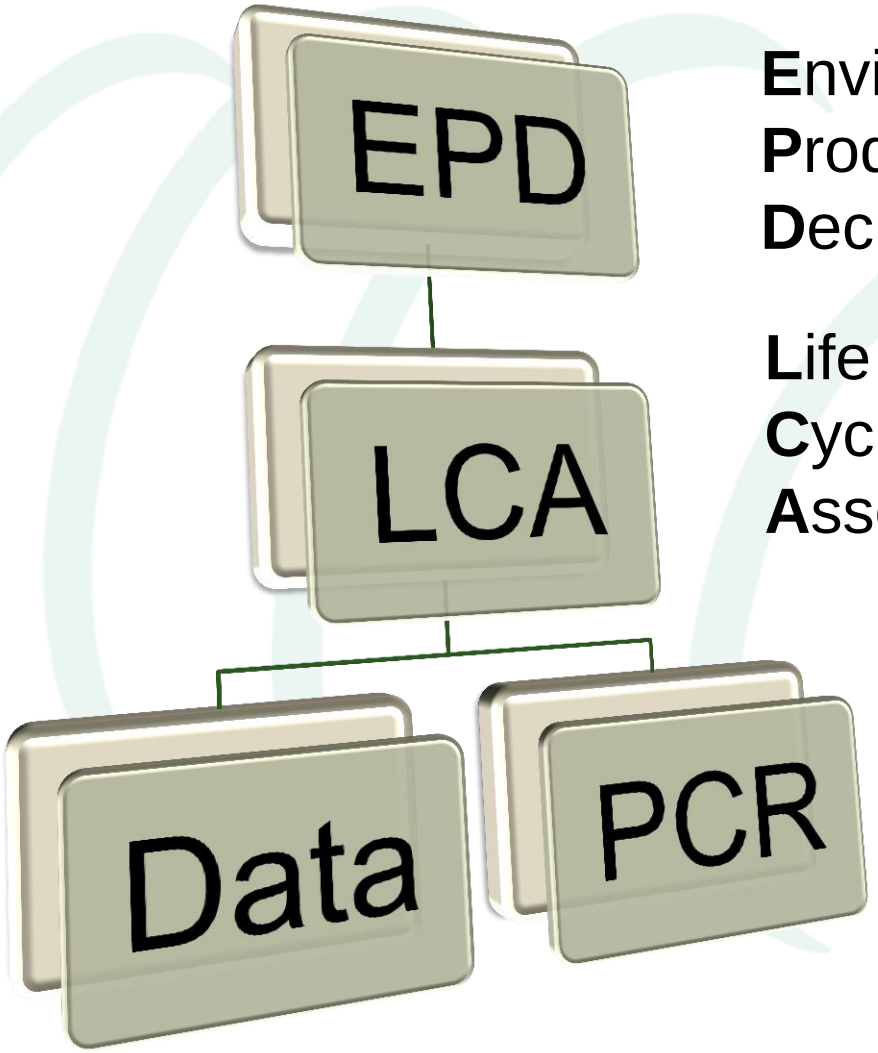
Caissons

Curbs

Piles



What are EPDs?



Environmental
Product
Declarations

Life
Cycle
Assessment

Product
Category
Rule

Data:
Life Cycle Inventory Data, plant specific

Environmental Product Declaration

- Provide quality assured and comparable information regarding environmental performance of a product and/or service

Type	Standard	3rd party reviewed	Endorsement	Shorthand
I	ISO 14024	Yes	Yes	Eco-label
II	ISO 14021	No	Yes	Self-declaration
III	ISO 14025	Yes	No	Nutrition label

Type III EPD

Nutrition Facts

Serving Size 1/2 cup dry (40 g)
Servings Per container: 13

Amount Per Serving

Calories 150 Calories from Fat 25

% Daily Value*

Total Fat 3 g	**4%**
Saturated Fat 0.5 g	**2%**
Trans Fat 0 g	**0%**
Cholesterol 0 mg	**0%**
Sodium 0 mg	**0%**
Total Carbohydrate 27 g	**9%**
Dietary Fiber 4 g	**15%**
Sugars 1 g	
Protein 5 g	
Vitamin A	**0%**
Vitamin C	**0%**
Calcium	**0%**
Iron	**10%**

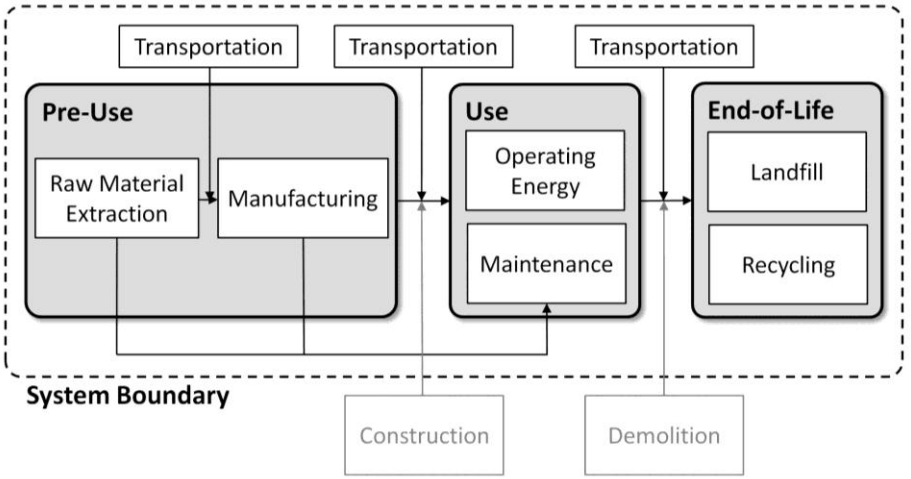
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

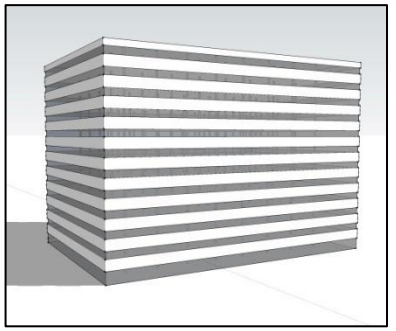
	Calories:	2,000	2,500
Total Fat	Less than	65 g	80 g
Sat Fat	Less than	20 g	25 g
Cholesterol	Less than	300 mg	300 mg
Sodium	Less than	2,400 mg	2,400 mg
Total Carbohydrate		300 g	375 g
Dietary Fiber		25 g	30 g

Impact Category	Impacts (SI Units)	Impacts (US Units)	Reference
Total Primary Energy	2957 MJ/m3	2.13 MBTU/yd3	N/A
Non-renewable	2665 MJ/m3	1.92 MBTU/yd3	N/A
Renewable	281 MJ/m3	0.21 MBTU/yd3	N/A
Batch Water	127 kg/m3	210 lbs/yd3	N/A
Wash Water	18 kg/m3	30 lbs/yd3	N/A
Total Waste Disposed	24 kg/m3	40 lbs/yd3	N/A
Global Warming Potential	334 kg CO2eq/m3	254 kg CO2 eq/yd3	TRACI
Ozone Depletion	0.00 kg CFC11 eq/m3	0.00 kg CFC11 eq/yd3	TRACI
Acidification Potential	0.78 kg SO2 eq/m3	0.59 kg SO2 eq/yd3	TRACI
Eutrophication Potential Air	0.00 kg N eq/yd3	0.00 kg N eq/yd3	TRACI
Eutrophication Potential Water	0.09 kg N eq/m3	0.07 kg N eq/yd3	TRACI
Photochemical Ozone Createion/Smog	0.06 kg C2H6 eq/m3	0.05 kg C2H6 eq/yd3	TRACI
Human Health Criteria (particulate matter)	0.49 kg PM10/m3	0.38 kg PM10/yd3	TRACI
Human Health CF Non-cancer	2.67E-5 CTUconcancer/m3	2.03E-5 CTUnoncancer/yd3	TRACI
Human Health CF cancer	7.29E-6CTUcancer/m3	5.54E-6 CTUcancer/yd3	TRACI

Product Category Rules (PCR)

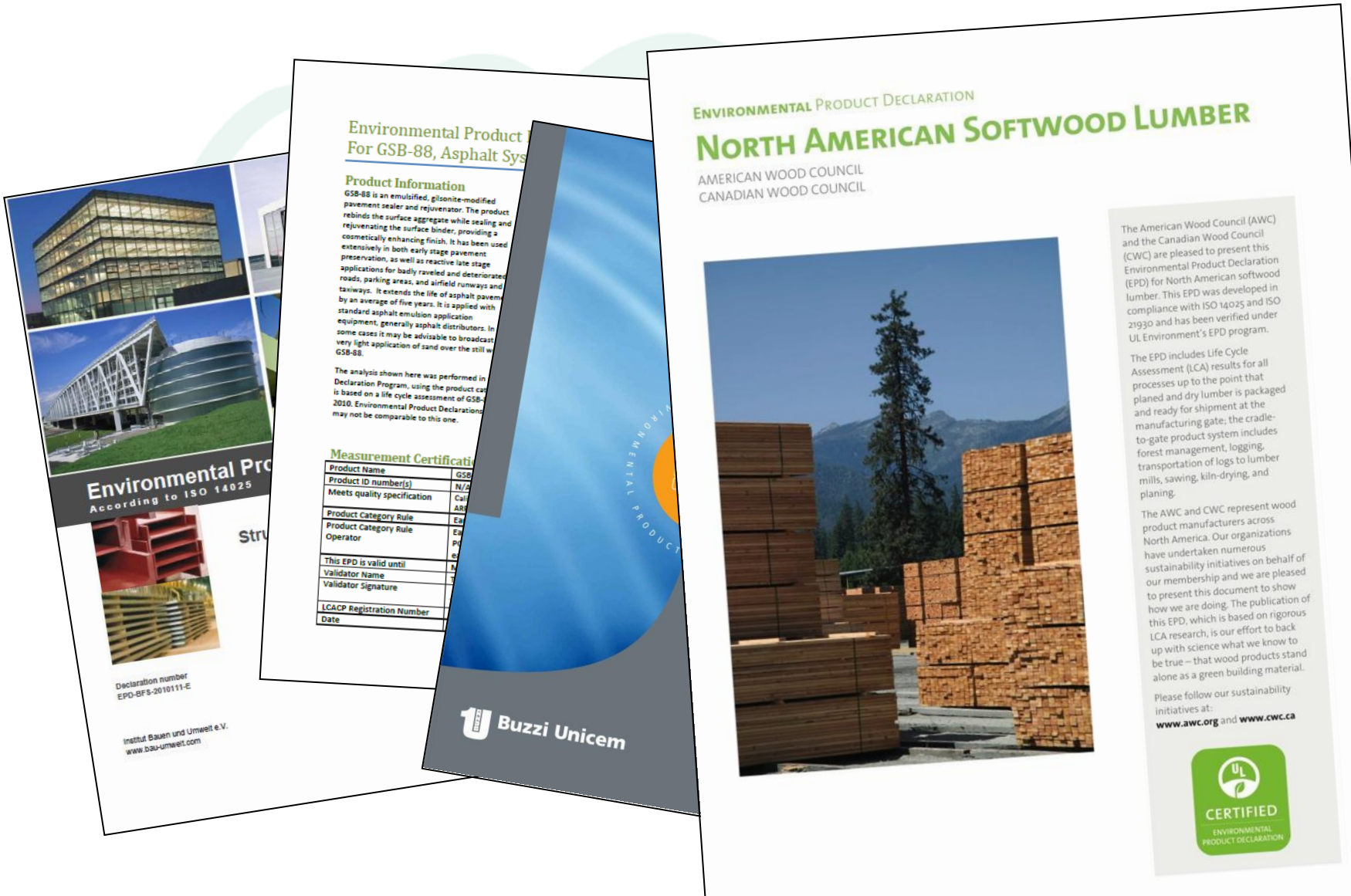
- Instructions on how and what to report via the EPD
  - Product studied
  - Functional unit
  - System boundaries
  - Life cycle stages included
  - Impacts reported



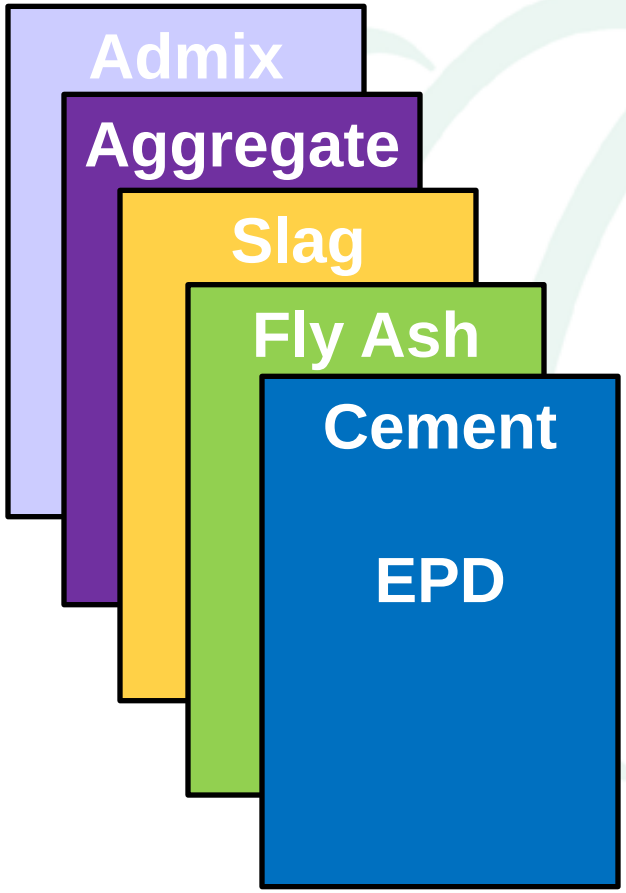


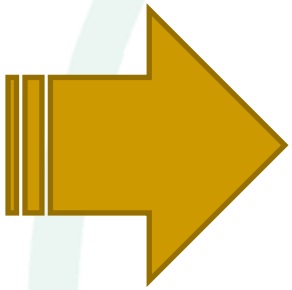
Mix Code	Plant	Perf. CS	Impacts TPE	CWB	CWW	GWP	ODP	AP	EP	POCP
	minimum	*2,000*	*2.155E+03*	*6.871E-02*	*4.504E-03*	*2.058E+02*	*3.634E-06*	*1.513E+00*	*8.143E-02*	*2.568E+01*
	maximum	*6,000*	*3.629E+03*	*7.287E-02*	*4.504E-03*	*4.819E+02*	*6.637E-06*	*3.466E+00*	*1.395E-01*	*4.745E+01*
325PC901	Brentwood	2,500	2.556E+03	6.871E-02	4.504E-03	3.058E+02	4.237E-06	2.174E+00	9.251E-02	3.072E+01
325PC902	Brentwood	2,500	2.552E+03	7.287E-02	4.504E-03	3.056E+02	4.249E-06	2.173E+00	9.197E-02	3.067E+01
325PC9D1	Brentwood	2,500	2.231E+03	6.871E-02	4.504E-03	2.529E+02	3.634E-06	1.786E+00	8.243E-02	2.572E+01
325PC9D2	Brentwood	2,500	2.225E+03	7.287E-02	4.504E-03	2.525E+02	3.638E-06	1.784E+00	8.143E-02	2.568E+01
325PC9Q1	Brentwood	2,500	2.161E+03	6.871E-02	4.504E-03	2.062E+02	4.591E-06	1.515E+00	1.004E-01	2.760E+01
325PC9Q2	Brentwood	2,500	2.155E+03	7.287E-02	4.504E-03	2.058E+02	4.571E-06	1.513E+00	9.997E-02	2.754E+01
325PG9C1	Brentwood	2,500	2.536E+03	6.871E-02	4.504E-03	3.047E+02	4.147E-06	2.170E+00	8.987E-02	3.063E+01
325PG9D1	Brentwood	2,500	2.311E+03	6.871E-02	4.504E-03	2.674E+02	3.760E-06	1.894E+00	8.401E-02	2.707E+01
325PG9Q1	Brentwood	2,500	2.344E+03	6.871E-02	4.504E-03	2.310E+02	5.036E-06	1.704E+00	1.109E-01	3.082E+01
335PC9D1	Brentwood	3,500	2.550E+03	6.871E-02	4.504E-03	3.053E+02	4.178E-06	2.171E+00	9.132E-02	3.072E+01
335PC9D2	Brentwood	3,500	2.545E+03	7.287E-02	4.504E-03	3.050E+02	4.187E-06	2.169E+00	9.022E-02	3.069E+01
335PC9Q1	Brentwood	3,500	2.392E+03	6.871E-02	4.504E-03	2.364E+02	5.160E-06	1.741E+00	1.139E-01	3.149E+01
335PC9Q2	Brentwood	3,500	2.389E+03	7.287E-02	4.504E-03	2.363E+02	5.178E-06	1.740E+00	1.133E-01	3.147E+01
335PG901	Brentwood	3,500	2.898E+03	6.871E-02	4.504E-03	3.635E+02	4.811E-06	2.602E+00	1.010E-01	3.619E+01
335PG902	Brentwood	3,500	2.897E+03	7.287E-02	4.504E-03	3.639E+02	4.835E-06	2.604E+00	1.006E-01	3.620E+01
335PG9C1	Brentwood	3,500	2.873E+03	6.871E-02	4.504E-03	3.600E+02	4.724E-06	2.576E+00	9.928E-02	3.590E+01
335PG9C2	Brentwood	3,500	2.883E+03	7.079E-02	4.504E-03	3.617E+02	4.768E-06	2.589E+00	9.895E-02	3.606E+01
335PG9D1	Brentwood	3,500	2.642E+03	6.871E-02	4.504E-03	3.217E+02	4.324E-06	2.292E+00	9.328E-02	3.224E+01
335PG9Q1	Brentwood	3,500	2.567E+03	6.871E-02	4.504E-03	2.612E+02	5.602E-06	1.937E+00	1.211E-01	3.479E+01
335PG9Q2	Brentwood	3,500	2.592E+03	7.287E-02	4.504E-03	2.648E+02	5.697E-06	1.964E+00	1.219E-01	3.525E+01
340PC901	Brentwood	4,000	2.804E+03	6.871E-02	4.504E-03	3.464E+02	4.667E-06	2.473E+00	9.961E-02	3.459E+01
340PC902	Brentwood	4,000	2.807E+03	7.287E-02	4.504E-03	3.475E+02	4.696E-06	2.480E+00	9.924E-02	3.466E+01
340PC9C1	Brentwood	4,000	2.655E+03	6.871E-02	4.504E-03	3.221E+02	4.380E-06	2.292E+00	9.509E-02	3.229E+01
340PC9C2	Brentwood	4,000	2.654E+03	7.287E-02	4.504E-03	3.221E+02	4.405E-06	2.292E+00	9.471E-02	3.227E+01

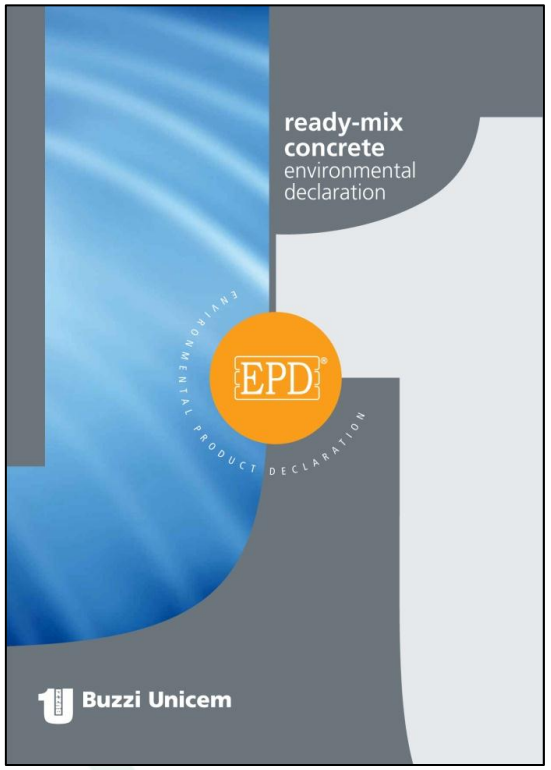
PRODUCT Manufactures EPDs



Supplier EPDs







Supplier EPDs

Product EPD

Product EPDs to Whole Building LCA

Product EPDs

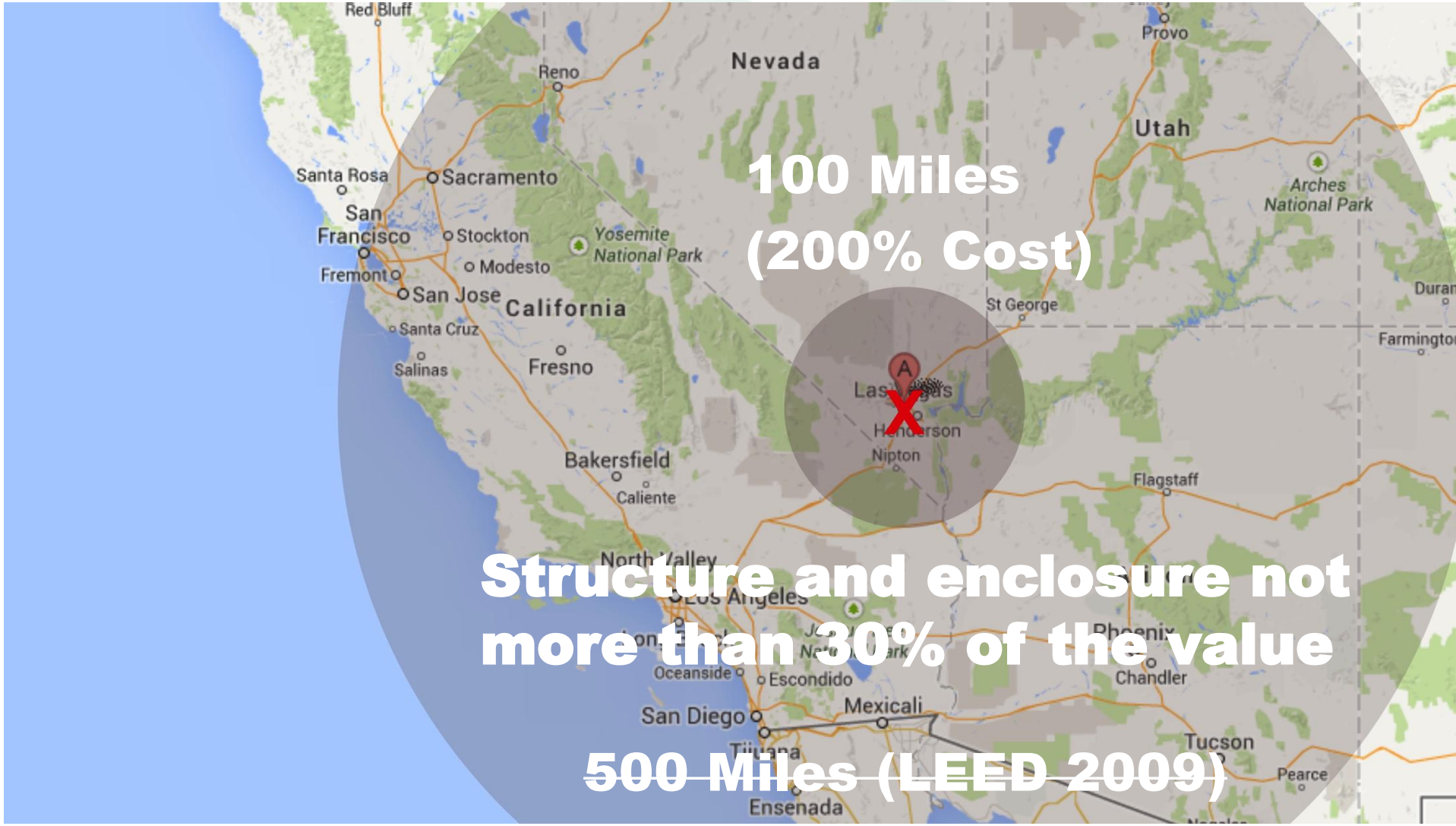
Whole Building LCA

Environmental Product Declarations

Option 2 – Multi-Attribute Optimization
(1 point) 50% by Cost

- **Environmental Impact Reduction below industry average**– USGBC Approved Certification Program – (100% Value)
  - GWP
  - Ozone depletion
  - Eutrophication
  - Smog formation
  - Acidification
  - Depletion of nonrenewable energy

Environmental Product Declarations (Locally Sourced still matters)



MRc3: RESPONSIBLE SOURCING

Sourcing of Raw Materials

Option 1: Raw Material Source and Extraction Reporting (1 point)

- **Manufacturer declared commitment** (1/2 product)
- **Corporate Sustainability Report** (Third Party Verified CSR) (Full product)

corporate social responsibility

re·spon·si·bil·i·ty (ri spän′sə bil′

the condition of being responsible

responsibility for the error.] **2.** a th

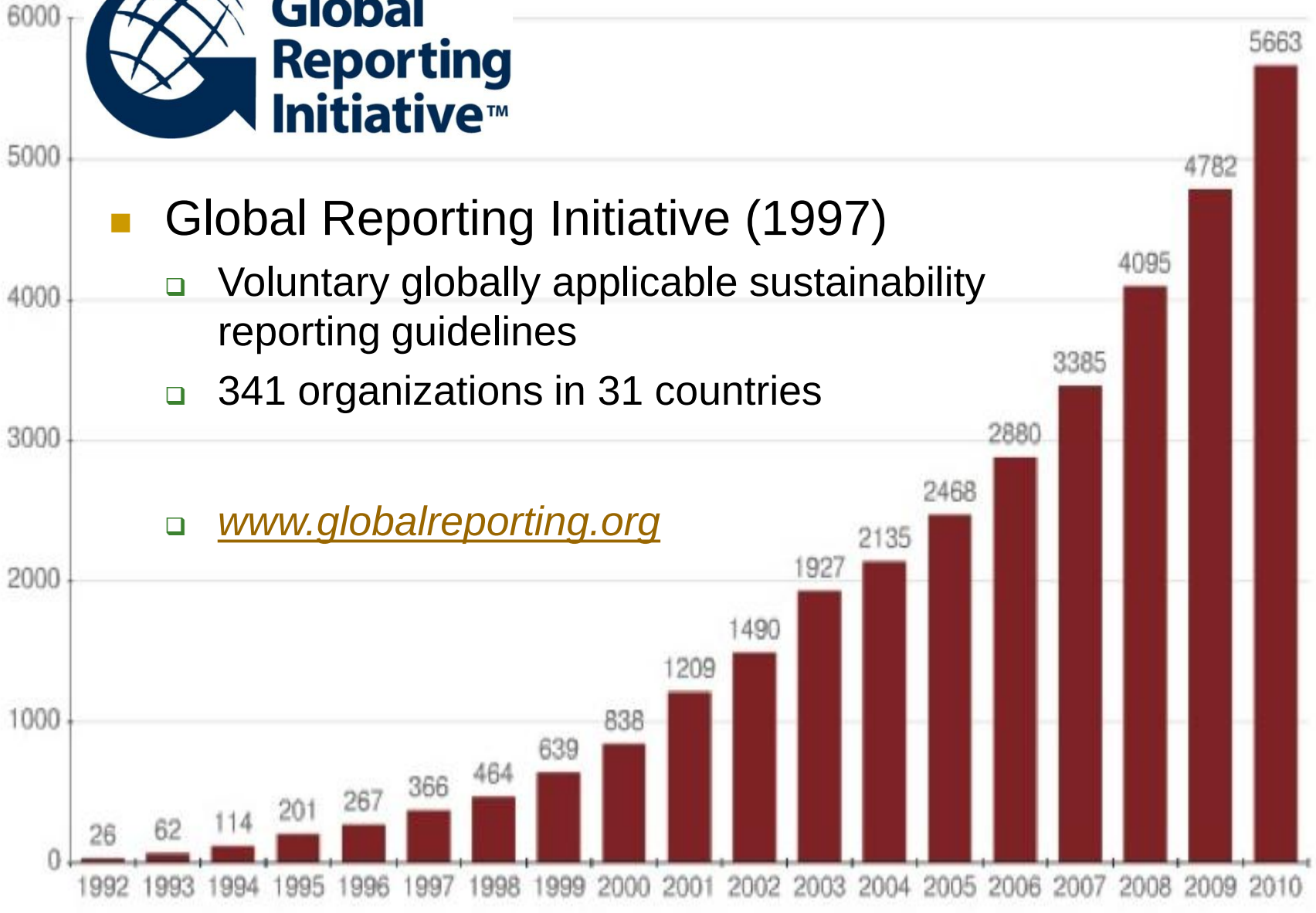
that one is supposed to look after,

[Her education will be my *responsib*

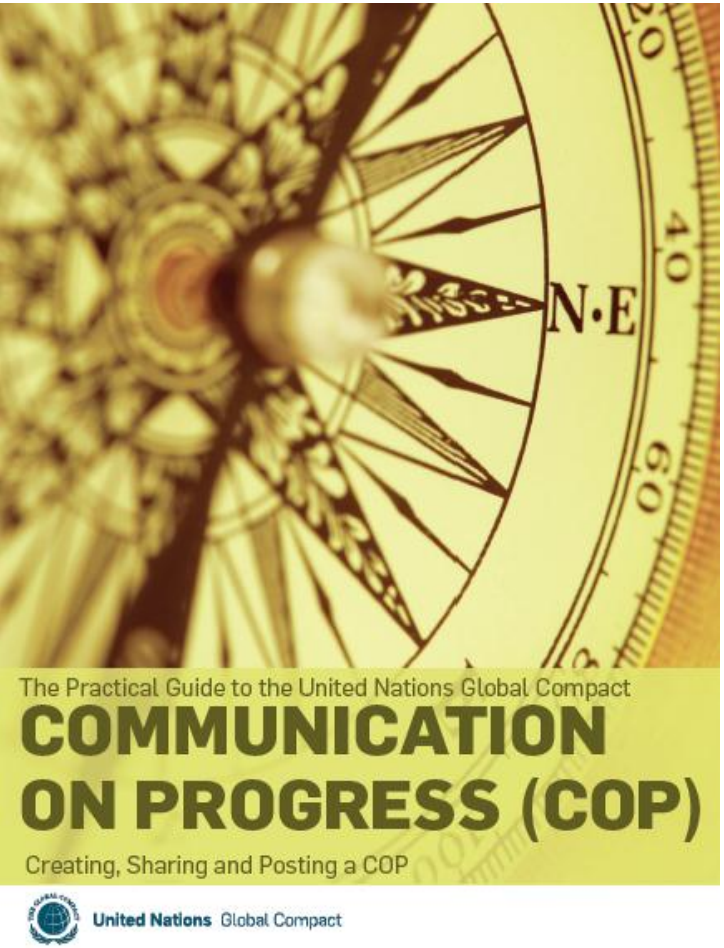
spon′si·bil′i·ties, *pl.*

re·spon·si·ble (ri spän′sə bl), *adj.*

- Global Reporting Initiative (1997)
  - Voluntary globally applicable sustainability reporting guidelines
  - 341 organizations in 31 countries
  - *www.globalreporting.org*



UN Global Compact -COP



HUMAN RIGHTS

Principle 1 Businesses should support and respect the protection of internationally proclain human rights; and

Principle 2 make sure that they are not complicit in human rights abuses.

LABOUR

Principle 3 Businesses should uphold the freedom of association and the effective recognitio the right to collective bargaining;

Principle 4 the elimination of all forms of forced and compulsory labour;

Principle 5 the effective abolition of child labour; and

Principle 6 the elimination of discrimination in respect of employment and occupation.

ENVIRONMENT

Principle 7 Businesses are asked to support a precautionary approach to environmental challen

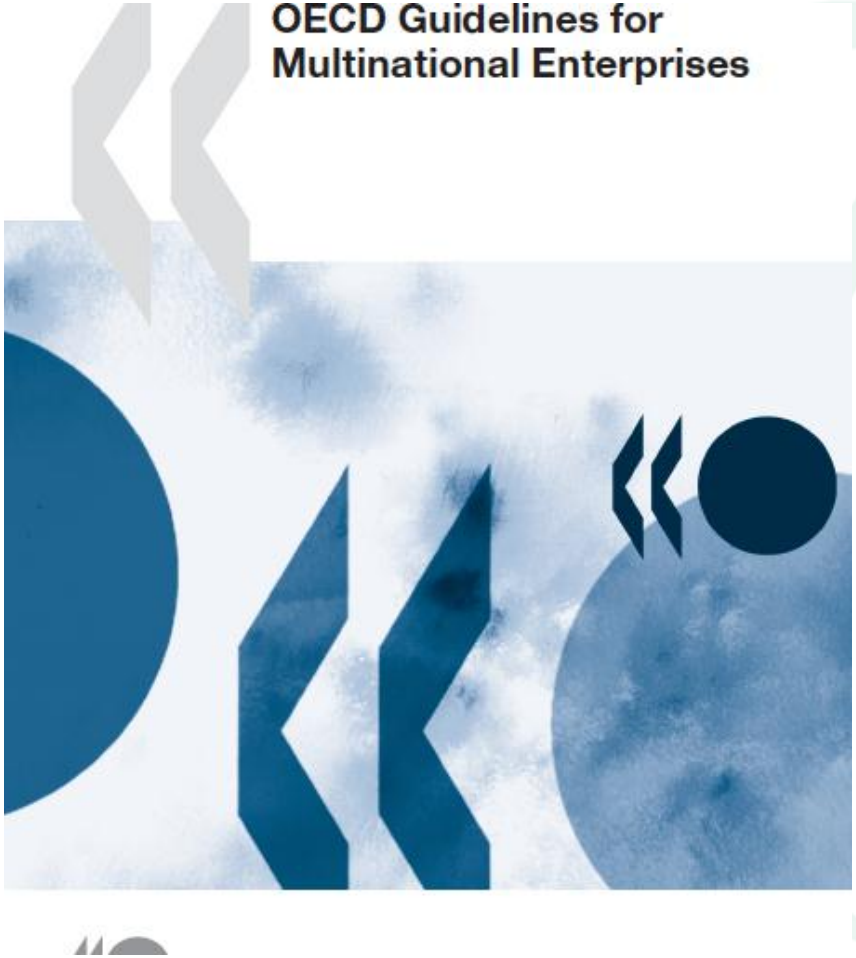
Principle 8 undertake initiatives to promote greater environmental responsibility; and

Principle 9 encourage the development and diffusion of environmentally friendly technolo

ANTI-CORRUPTION

Principle 10 Businesses should work against corruption in all its forms, including extortion a

OECD Guidelines for Multinational Enterprises



- information disclosure
- employment and industrial relations
- the environment
- bribery
- consumer interests
- science and technology
- competition and taxation

ISO 26000: 2010 Guidance on Social Responsibility

What's in the Report- GRI Example

Content, in context - 11 key issues, 33 indicators

- Environmental Issues
  - Climate change and energy (4 indicators)
  - Ecosystem services (2 indicators)
  - Local environmental impacts (4 indicators)
- Health and Safety Issues
  - Workforce protection (3 indicators)
  - Product health, safety and environmental risks (1 indicator)
  - Process safety and asset integrity (1 indicator)
- Social and Economic Issues
  - Community and society (4 indicators)
  - Local content (3 indicators)
  - Human rights (3 indicators)
  - Business ethics and transparency (4 indicators)
  - Labor practices (4 indicators)

MR Credit 3- Responsible Sourcing

- Option 2. Leadership Extraction Practices (1 point) 25% by Cost
  - Extended producer responsibility
  - Bio-based materials (Sustainable Agriculture Standard)
  - Wood products (FSC)
  - Materials reuse (salvaged, refurbished, or reused)
  - Recycled content (postconsumer + ½ preconsumer)
  - USGBC approved program

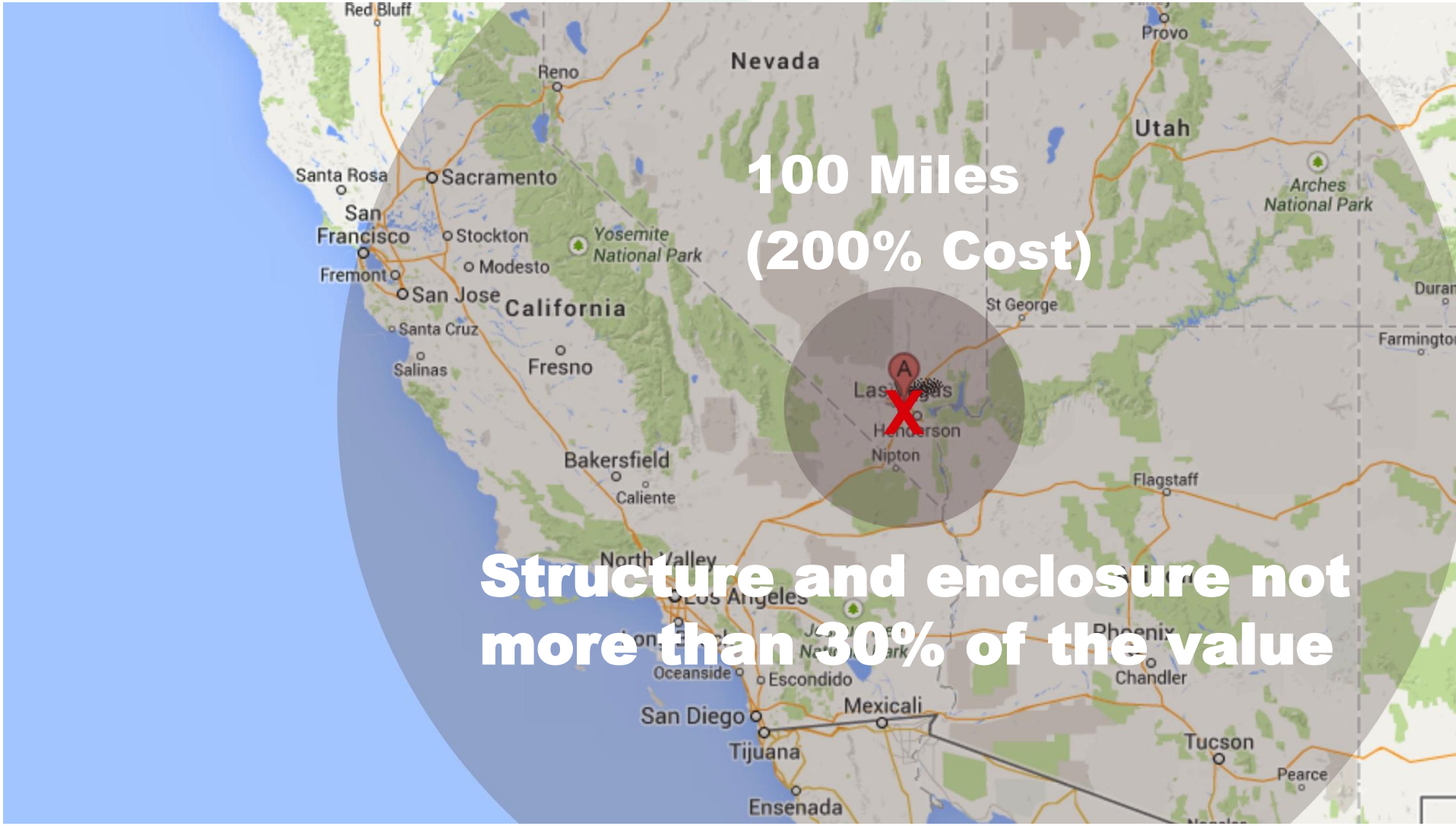
Recycled Content

Use materials with recycled content such that the sum of post consumer recycled content plus 1/2 of the pre-consumer content

Post-Consumer: Waste material generated by households or by commercial, industrial and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.

Pre-Consumer: Material diverted from the waste stream during the manufacturing process.

Sourcing of Raw Materials



MRc4: MATERIAL INGREDIENTS

Material Ingredients

Option 1: Material Ingredients Reporting

(1 Point)

20 Permanently Installed Products

- **Manufacturer Inventory**
- **Health Product Declaration (HPD)**
- **Cradle to Cradle (Basic)**
- **USGBC Approved Program**
- Inventoried to 1000 ppm

Material Ingredients

Option 2: Material Ingredients Optimization

(1 Point) 25% by Cost

- **Manufacturer Inventory**
- **Cradle to Cradle Certification**
- **USGBC Approved Program**
- **International Alternate – REACH**

Option 3: Product Manufacturer Supply Chain Optimization (1 point) 25% by Cost

- Transparently of chemical ingredients

Chemicals of Concern

REDLIST (Living Building)

BANNED LIST (C2C)

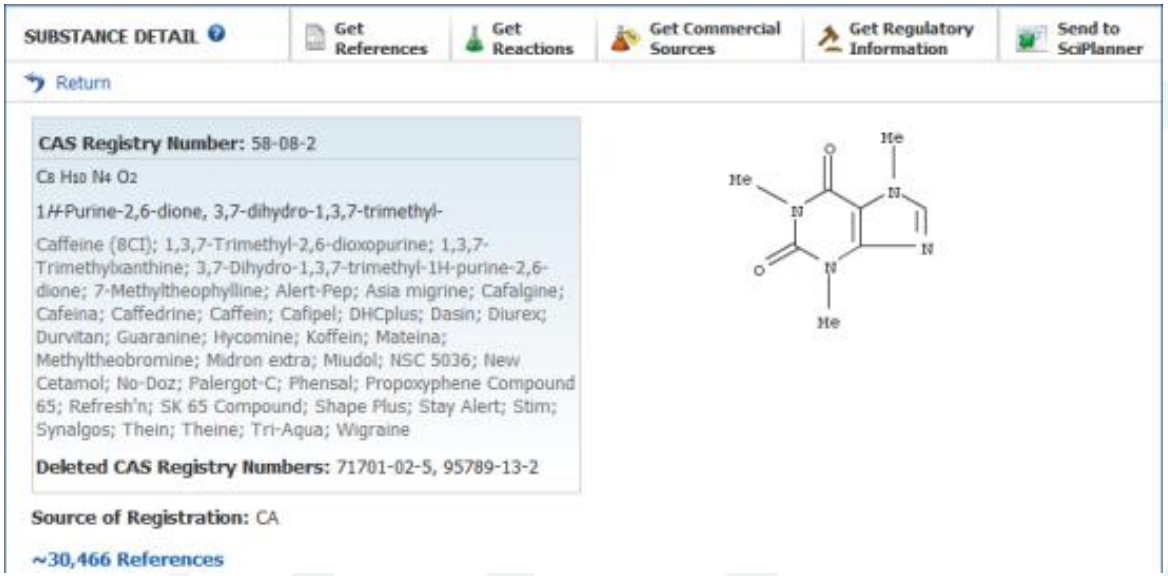
TECHNICAL

- Arsenic
- Cadmium
- Chromium
- Mercury
- PVC
- PCB + more

BIOLOGICAL

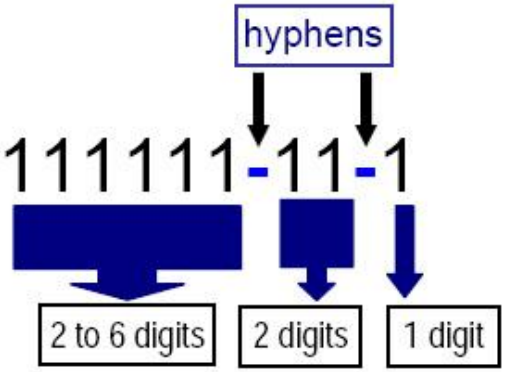
- Arsenic
- Cadmium
- Mercury
- Lead
- PVC
- PBDE + more
- Penta-BDE

Chemical Abstract Service (CAS)

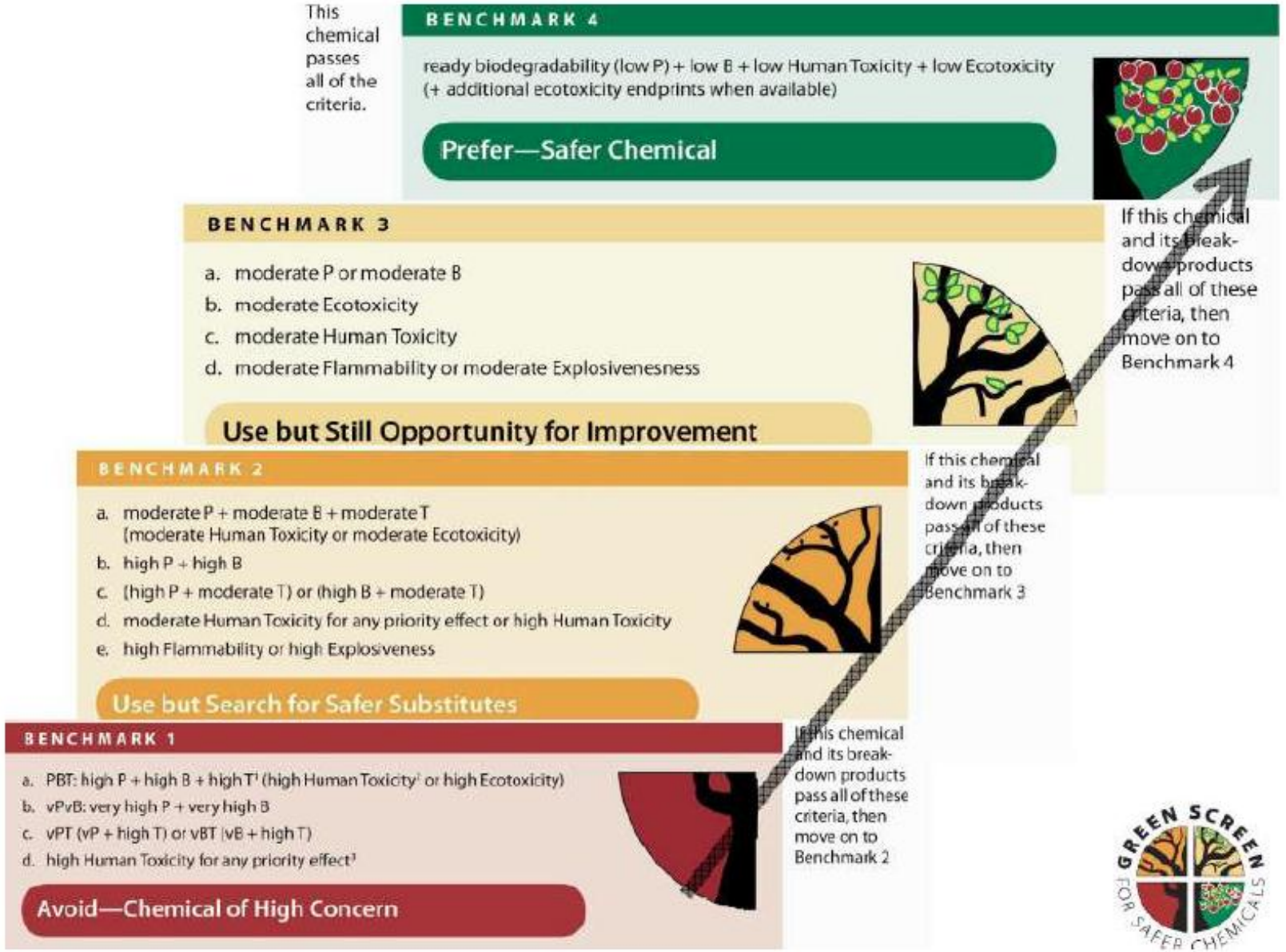


CAS REGISTRY℠

Example CAS Number:



GreenScreen

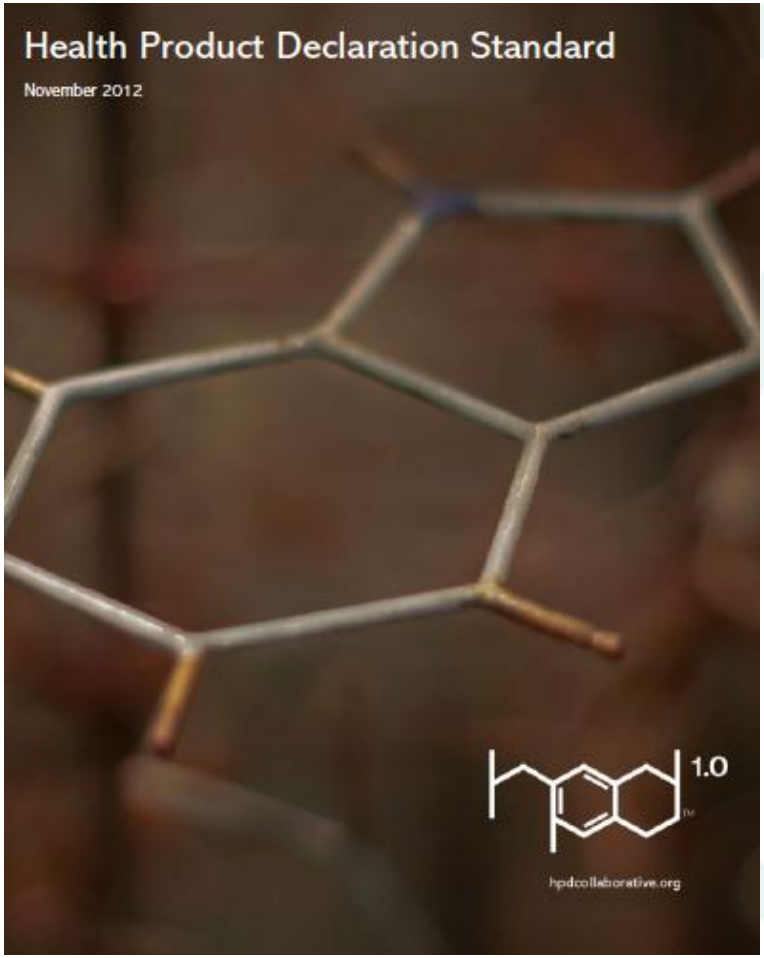


Cradle2Cradle (C2C)

- Material Health
- Material Reutilization
- Renewable Energy
- Water Stewardship
- Social Fairness

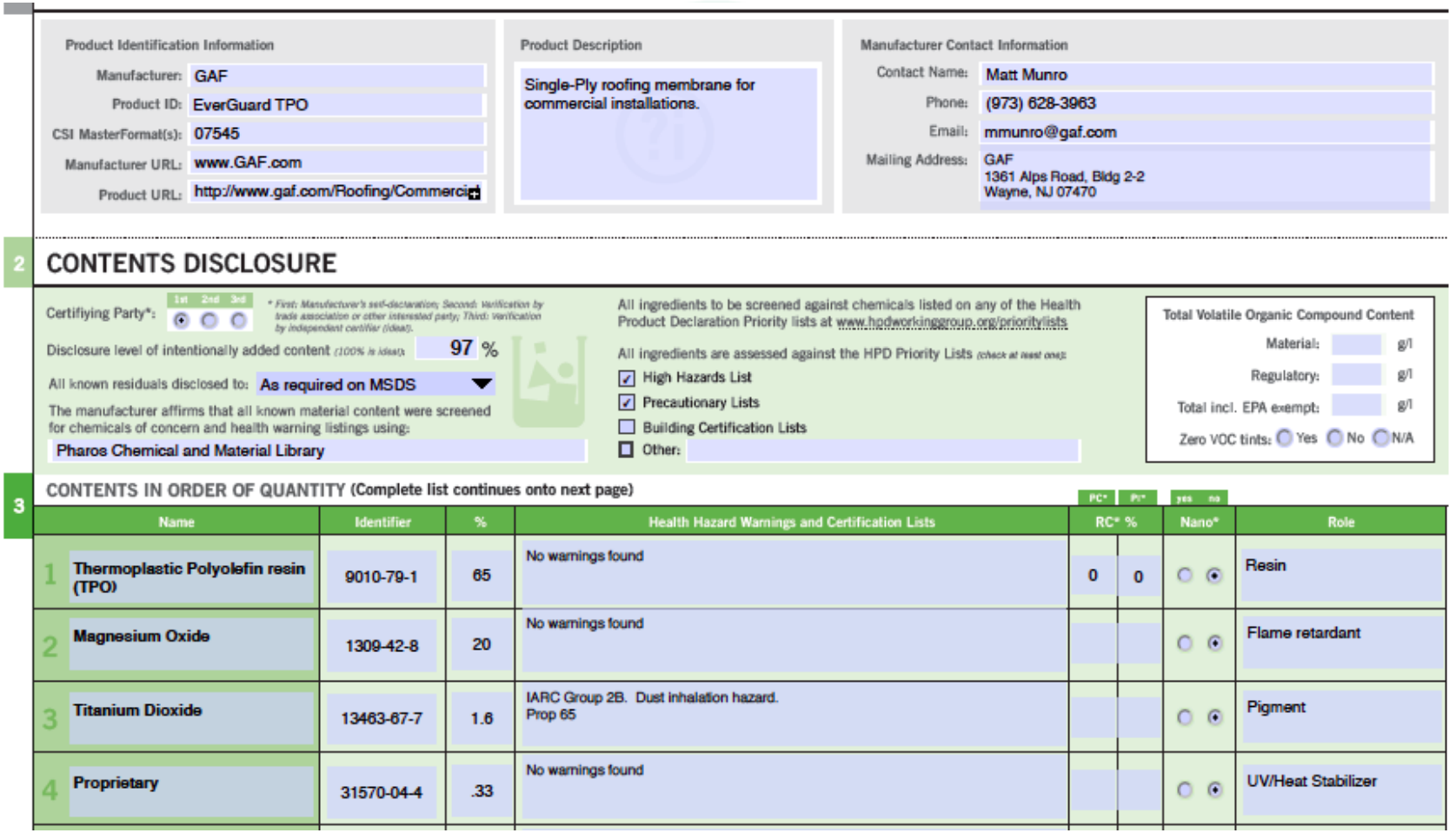
- Certification Levels
  - ~~Basic~~
  - Bronze
  - Silver
  - Gold
  - Platinum

Health Product Declaration (HPD)



- IDENTIFY
- INVENTORY
- ASSESS
- COMPLIANCE
- ACCESSORIES
- SUMMARIZE
- PUBLISH

HPD- Example



Product Identification Information

Manufacturer:	GAF
Product ID:	EverGuard TPO
CSI MasterFormat(s):	07545
Manufacturer URL:	www.GAF.com
Product URL:	http://www.gaf.com/Roofing/Commercia

Product Description

Single-Ply roofing membrane for commercial installations.

Manufacturer Contact Information

Contact Name:	Matt Munro
Phone:	(973) 628-3963
Email:	mmunro@gaf.com
Mailing Address:	GAF 1361 Alps Road, Bldg 2-2 Wayne, NJ 07470

2 CONTENTS DISCLOSURE

Certifying Party*: 1st 2nd 3rd

* First: Manufacturer's self-declaration; Second: Verification by trade association or other interested party; Third: Verification by independent certifier (ideal).

Disclosure level of intentionally added content (100% is ideal): 97 %

All known residuals disclosed to: As required on MSDS

The manufacturer affirms that all known material content were screened for chemicals of concern and health warning listings using:

Pharos Chemical and Material Library

All ingredients to be screened against chemicals listed on any of the Health Product Declaration Priority lists at www.hpdworkinggroup.org/prioritylists

All ingredients are assessed against the HPD Priority Lists (check at least one):

- [x] High Hazards List
- [x] Precautionary Lists
- [ ] Building Certification Lists
- [ ] Other:

Total Volatile Organic Compound Content

Material:	g/l
Regulatory:	g/l
Total incl. EPA exempt:	g/l
Zero VOC tints:	Yes No N/A

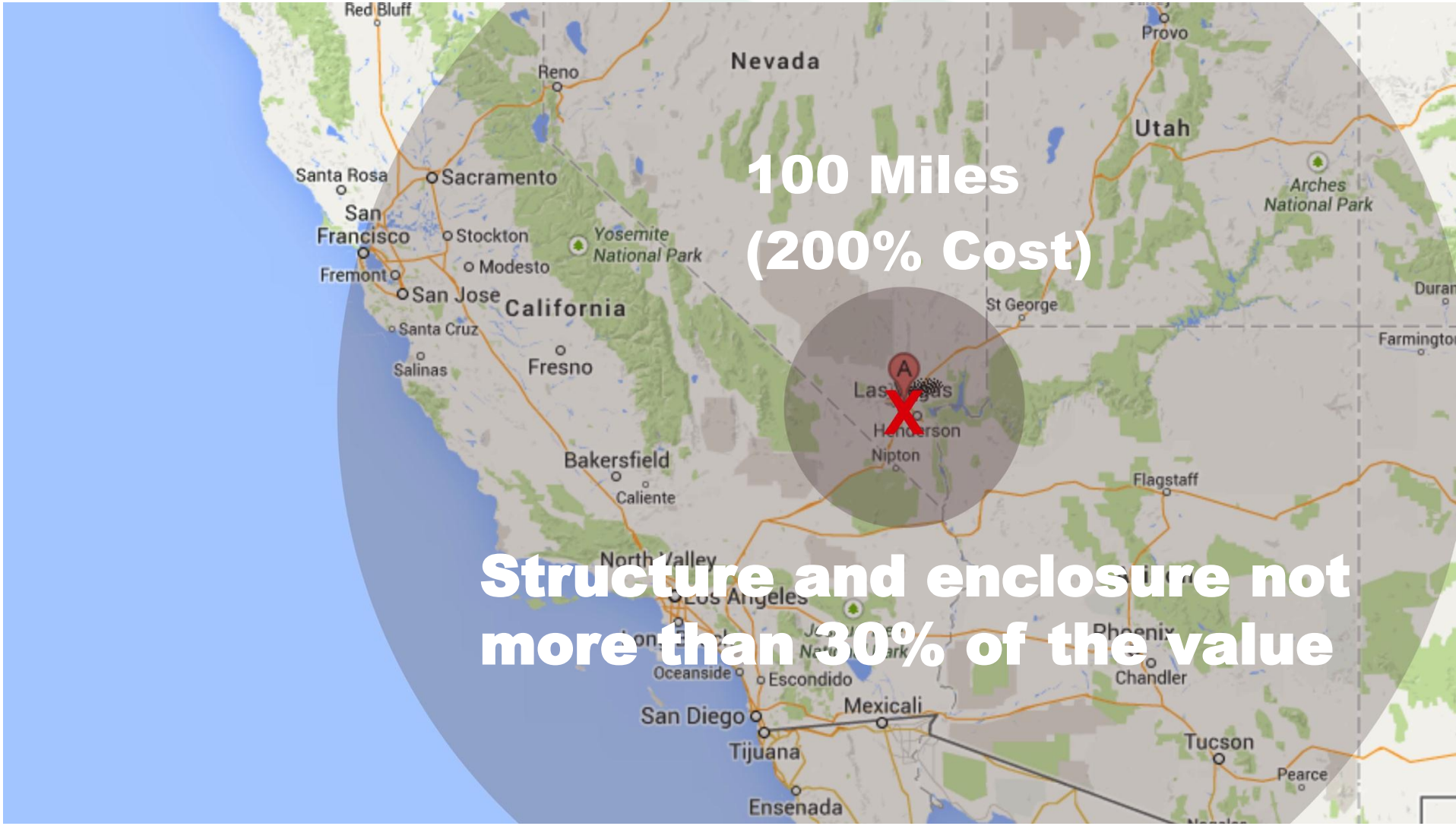
3 CONTENTS IN ORDER OF QUANTITY (Complete list continues onto next page)

	Name	Identifier	%	Health Hazard Warnings and Certification Lists	RC* %	PC* %	Nano* yes	Nano* no	Role
1	Thermoplastic Polyolefin resin (TPO)	9010-79-1	65	No warnings found	0	0		●	Resin
2	Magnesium Oxide	1309-42-8	20	No warnings found				●	Flame retardant
3	Titanium Dioxide	13463-67-7	1.6	IARC Group 2B. Dust inhalation hazard. Prop 65				●	Pigment
4	Proprietary	31570-04-4	.33	No warnings found				●	UV/Heat Stabilizer

REACH

- Registration
- Evaluation
- Authorization
- Restriction

Material Ingredients



Exemplary Performance (Innovation)

- Environmental Product Declaration
  - Option 1. Source at least 40 qualifying products from 5 manufacturers.
  - Option 2. Purchase 75%, by cost, of permanently installed building products that meet required attributes.
- Sourcing of Raw Materials
  - Option 1. Source at least 40 qualifying products from 5 manufacturers.
  - Option 2. Purchase 50%, by cost, of the total value of permanently installed building products that meet responsible extraction criteria.
- Material Ingredients
  - Option 1. Source at least 40 qualifying products from 5 manufacturers
  - Option 2. Source at least 50%, by cost, of permanently installed building products that meet the credit criteria.

What Does This Mean To You?


OPPORTUNITY
OPPORTUNITY
OPPORTUNITY
OPPORTUNITY
CHALLENGES AHEAD

OPPORTUNITY
Be part of the solution
It’s the right thing to do

OPPORTUNITY Demanded by A/E Firms

GGLO
architecture | interior design |
landscape architecture |
planning & urban design

MILLER HULL

CANNONDESIGN
AN IDEAS BASED PRACTICE

YOST GRUBE HALL
ARCHITECTURE

boora
architects

LAKE | FLATO
ARCHITECTS

SMITHGROUP
architecture engineering interiors planning

HDR

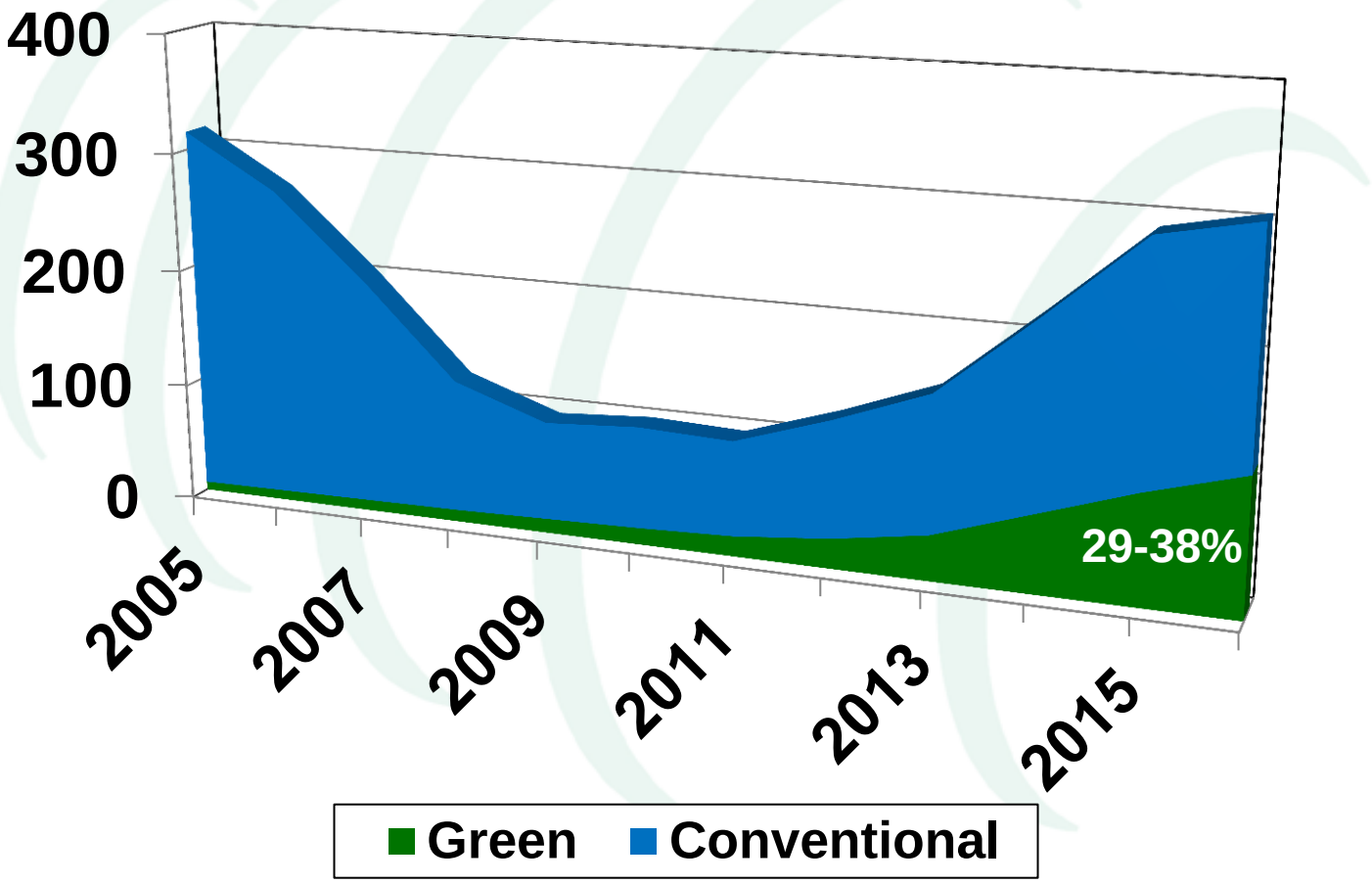
OPPORTUNITY

Defined metrics for environmental impacts

OPPORTUNITY

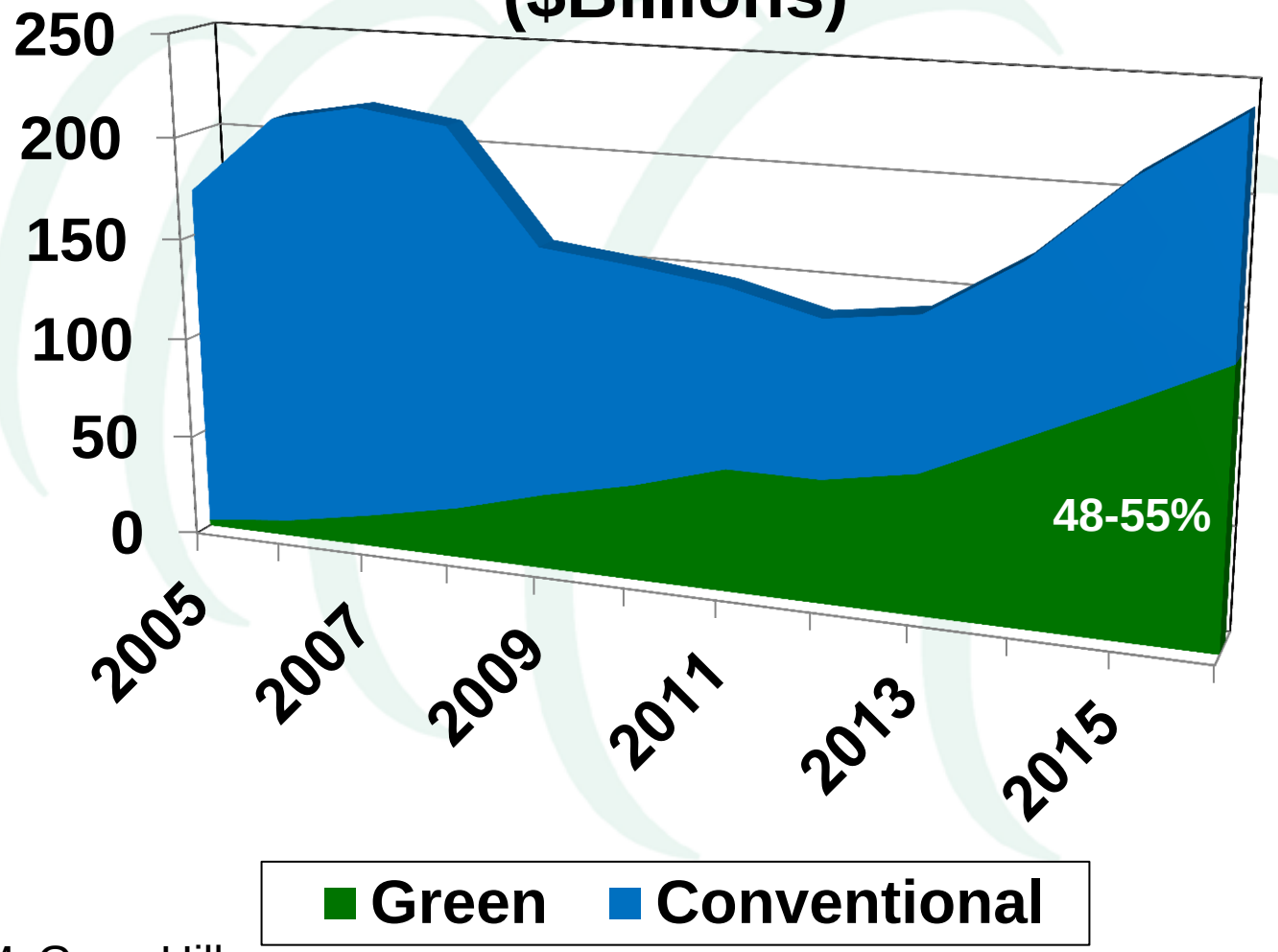
Potential market advantage for early adopters

U.S. Residential Green Building Market 2005-2016 ($Billions)



Source: McGraw Hill

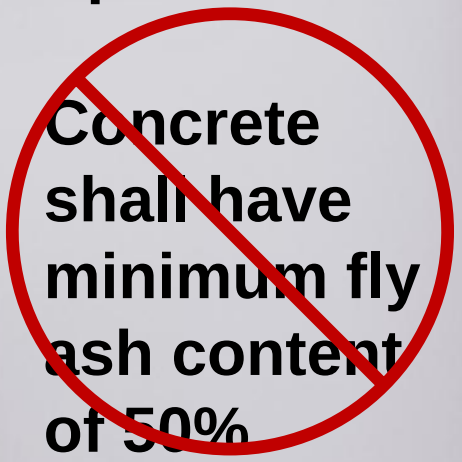
U.S. Nonresidential Green Building Market 2005-2016 ($Billions)



Source: McGraw Hill

OPPORTUNITY

Prescriptive Specification



Concrete shall have minimum fly ash content of 50%

Performance Specification

Concrete shall have maximum Global Warming Potential of 350 kg CO_2e/m^3

CHALLENGE

Just more paperwork


CHALLENGE
Just more regulation

U.S. CONCRETE INDUSTRY

5000 Plants
1000 Products/Plant

5,000,000 EPDs and HPDs?

5000 CSRs?

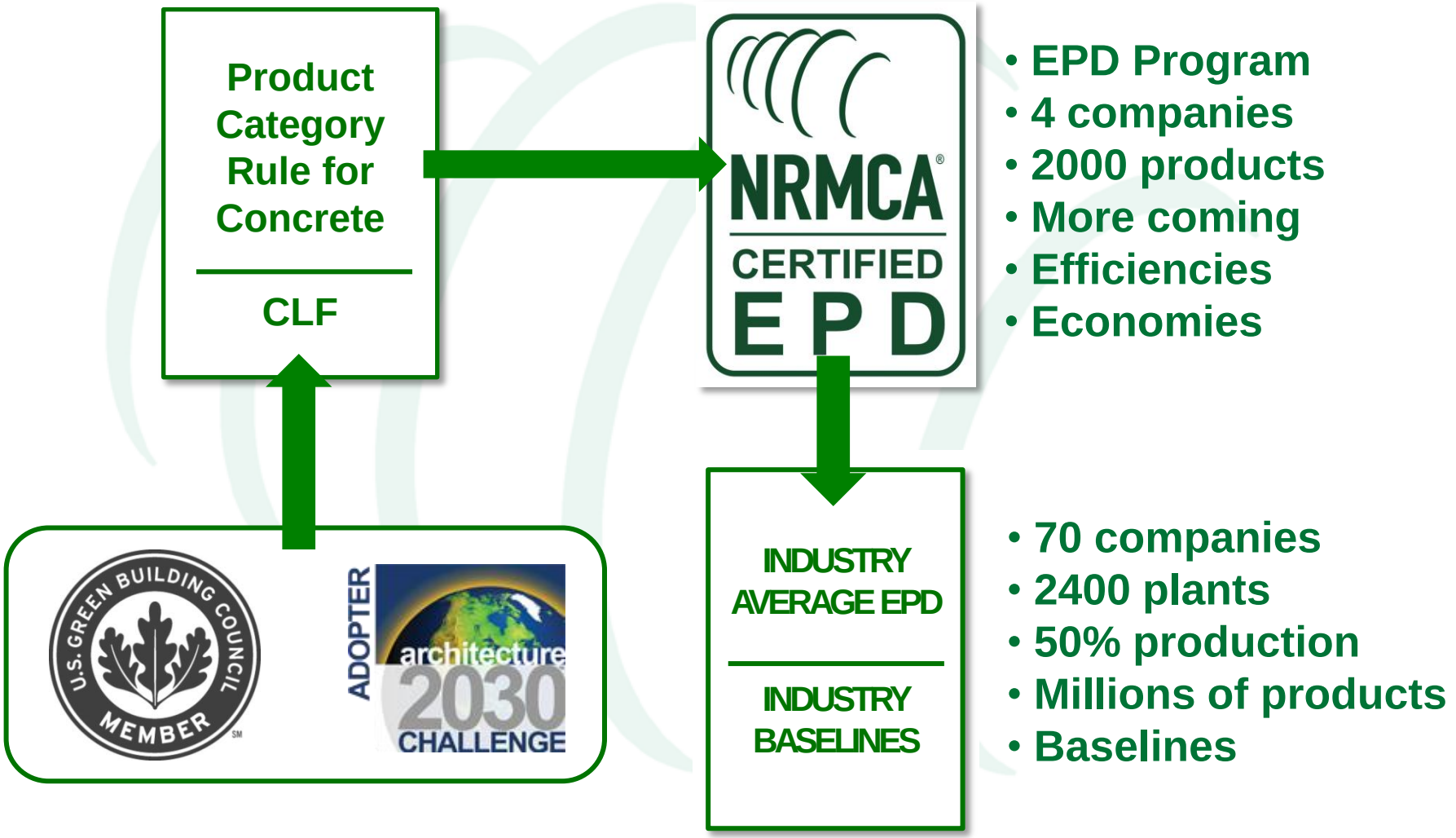

CHALLENGE
Will transparency result in lower environmental impacts…
…or just increase product costs?

BUT DOES IT REALLY MATTER?

It’s here whether we like it or not

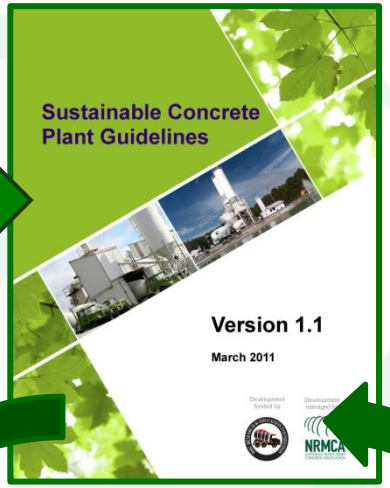
What's NRMCA Doing to Help?

Environmental Product Declarations



Responsible Sourcing

GREEN-STAR NRMCA



NRMCA Sustainable Concrete Plant Certification

U.S. GREEN BUILDING COUNCIL MEMBER

FSC

CONCRETE SUSTAINABILITY COUNCIL

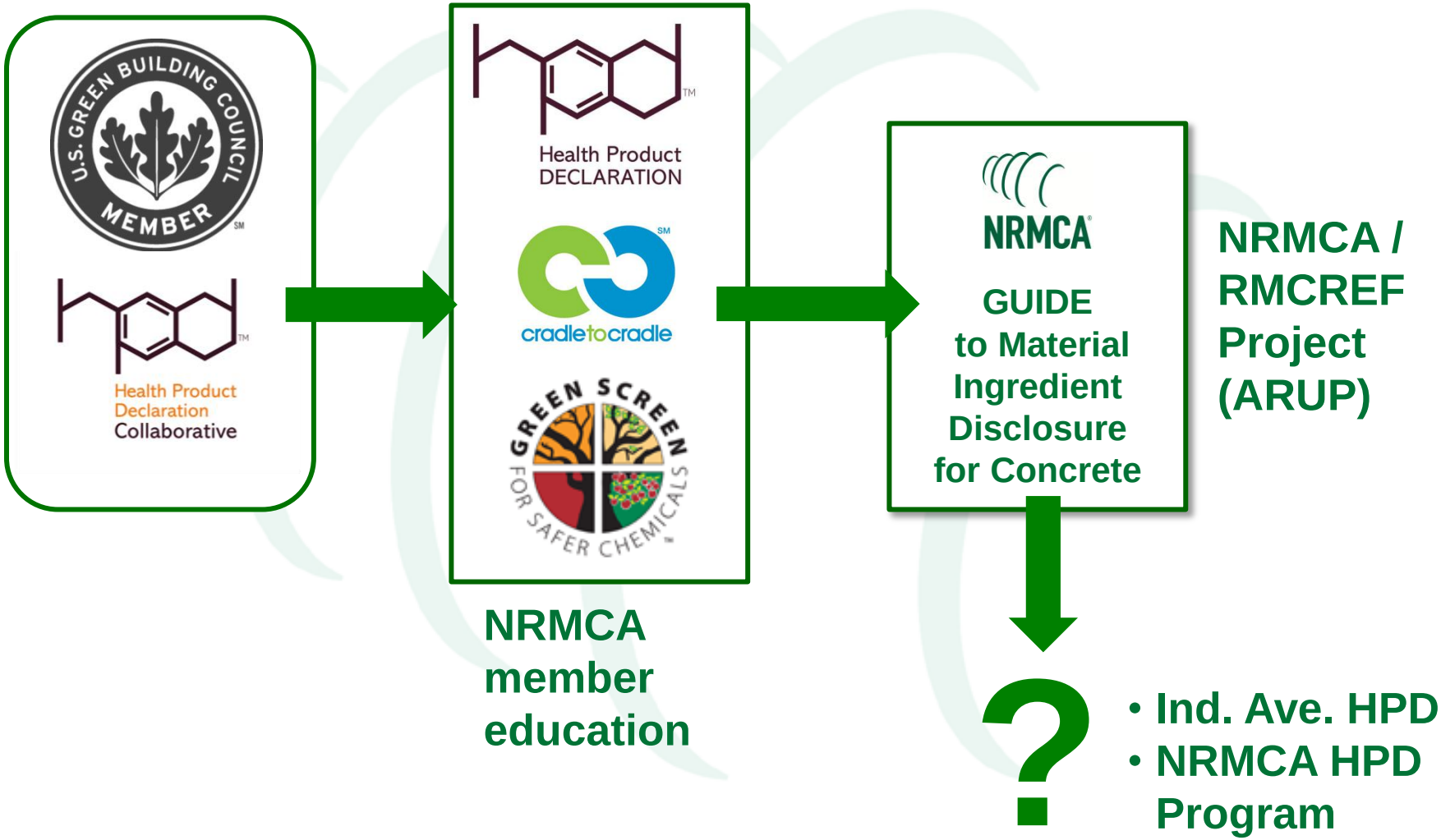
Responsible Sourcing of Concrete

BES 6001

ISO 26000

International Responsible Sourcing System

Material Ingredient Disclosure



www.nrmca.org/sustainability

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NRMCA