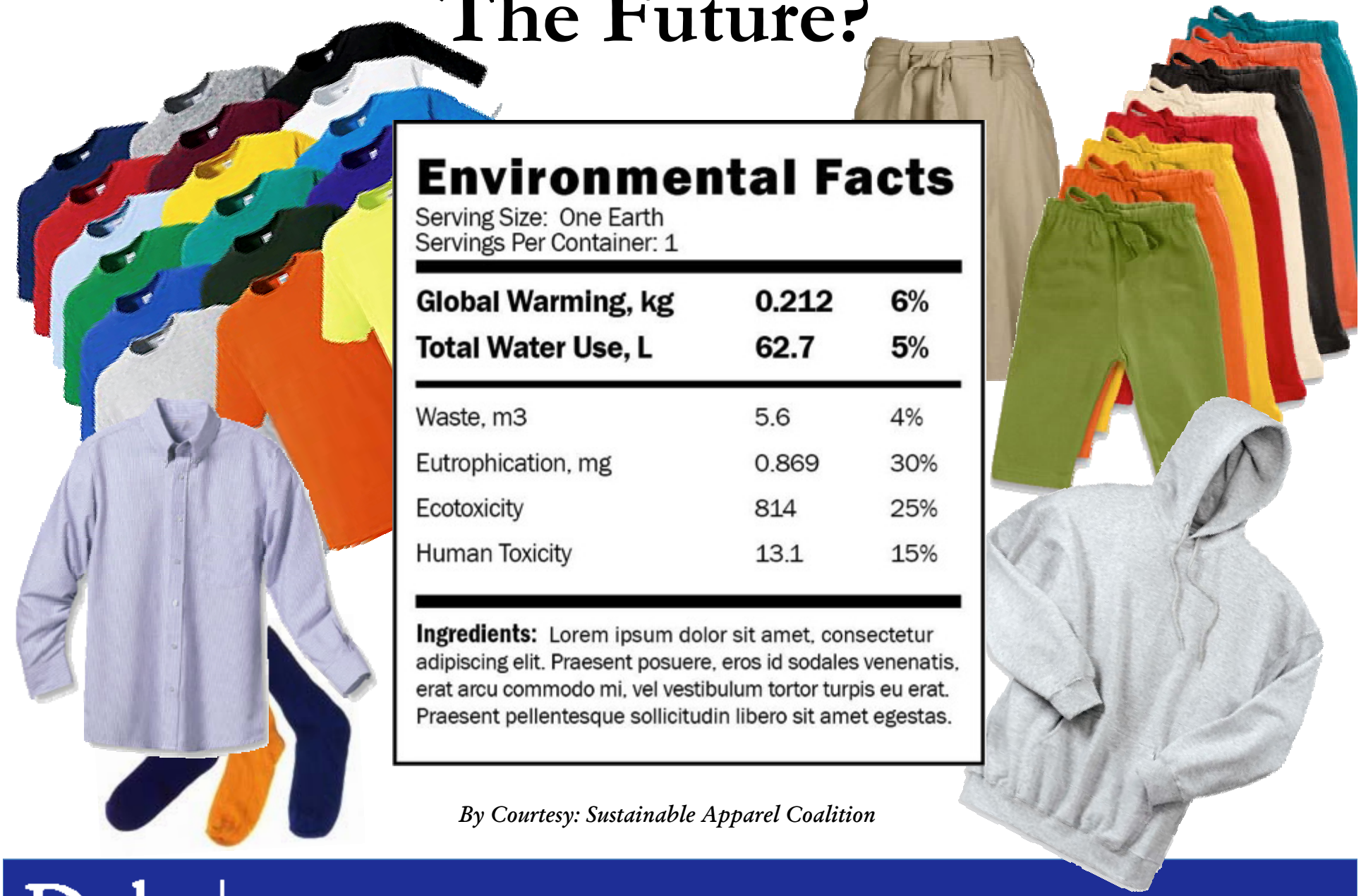
Emerging Sustainability & Life Cycle Initiatives: Implications for Fleets & Ports

Duke | CENTER for SUSTAINABILITY & COMMERCE
a.k.a. Nicholas Institute for Environmental Policy Solutions

Dr. Jay S. Golden, Director

The Future?



Environmental Facts

Serving Size: One Earth
Servings Per Container: 1

Global Warming, kg	**0.212**	**6%**
Total Water Use, L	**62.7**	**5%**
Waste, m3	5.6	4%
Eutrophication, mg	0.869	30%
Ecotoxicity	814	25%
Human Toxicity	13.1	15%

Ingredients: Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent posuere, eros id sodales venenatis, erat arcu commodo mi, vel vestibulum tortor turpis eu erat. Praesent pellentesque sollicitudin libero sit amet egestas.

By Courtesy: Sustainable Apparel Coalition

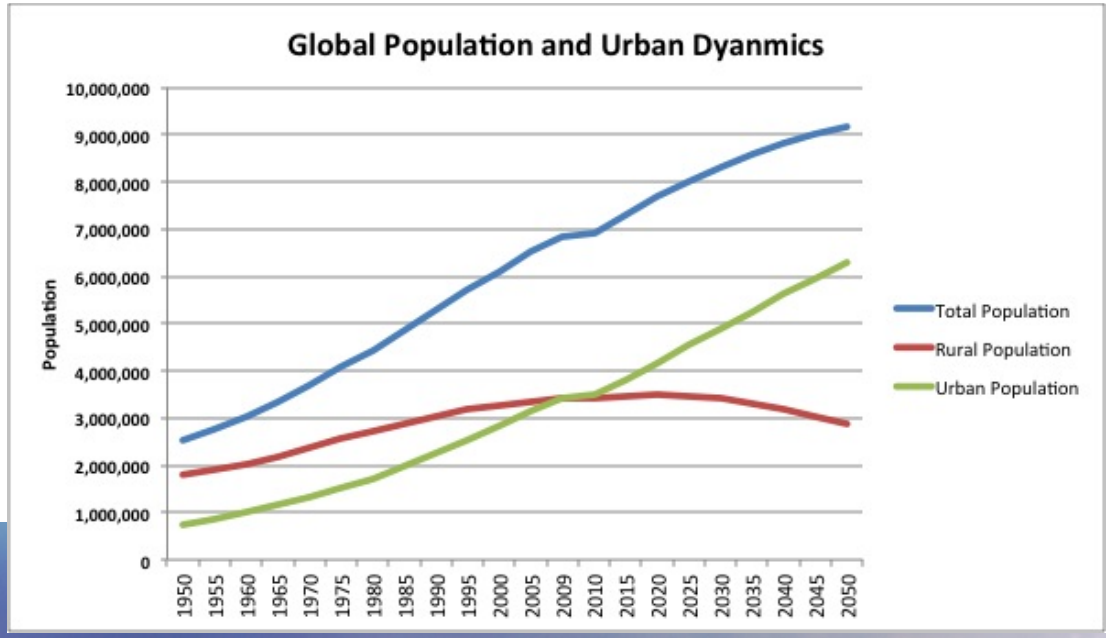
300 Years of Regional Population Growth

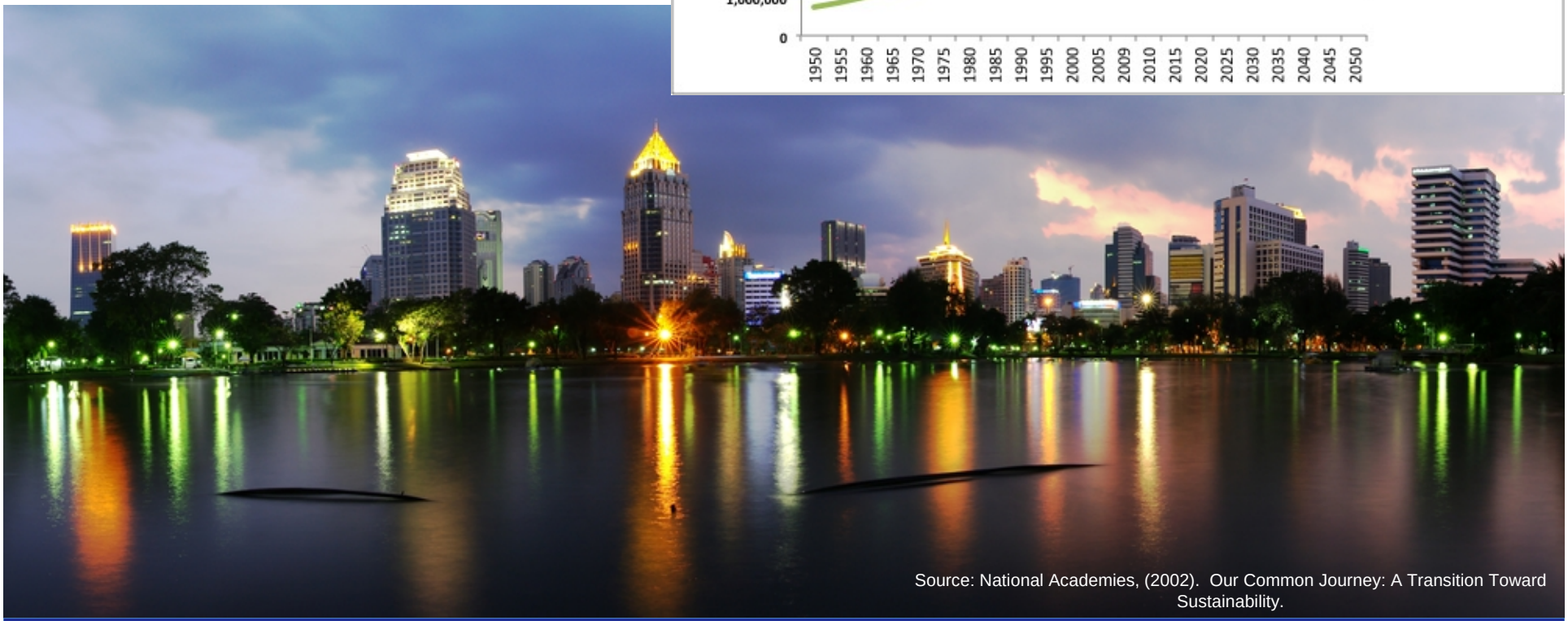
Year	Africa	Asia	Europe	Latin Am. & Caribbean	Northern America	Oceania	World
1750	106,000,000	502,000,000	163,000,000	16,000,000	2,000,000	2,000,000	791,000,000
1800	107,000,000	635,000,000	203,000,000	24,000,000	7,000,000	2,000,000	978,000,000
1850	111,000,000	809,000,000	276,000,000	38,000,000	26,000,000	2,000,000	1,262,000,000
1900	133,000,000	947,000,000	408,000,000	74,000,000	82,000,000	6,000,000	1,650,000,000
1950	221,000,000	1,402,000,000	547,000,000	167,000,000	172,000,000	13,000,000	2,521,000,000
1998	749,000,000	3,585,000,000	729,000,000	504,000,000	305,000,000	30,000,000	5,901,000,000
2050	1,766,000,000	5,268,000,000	628,000,000	809,000,000	392,000,000	46,000,000	**8,909,000,000**

source: United Nations, 1973. "The Determinants and Consequences of Population Trends, Vol.1" (United Nations, New York). United Nations, (forthcoming). "World Population Prospects: The 1998 Revision" (United Nations, New York).

•Equals 80 million new urban dwellers a year every year during the transition

•Over the next 2 generations the equivalent of 1,000 great cities (>5M) will be built-an average of 20 each year





Source: National Academies, (2002). Our Common Journey: A Transition Toward Sustainability.

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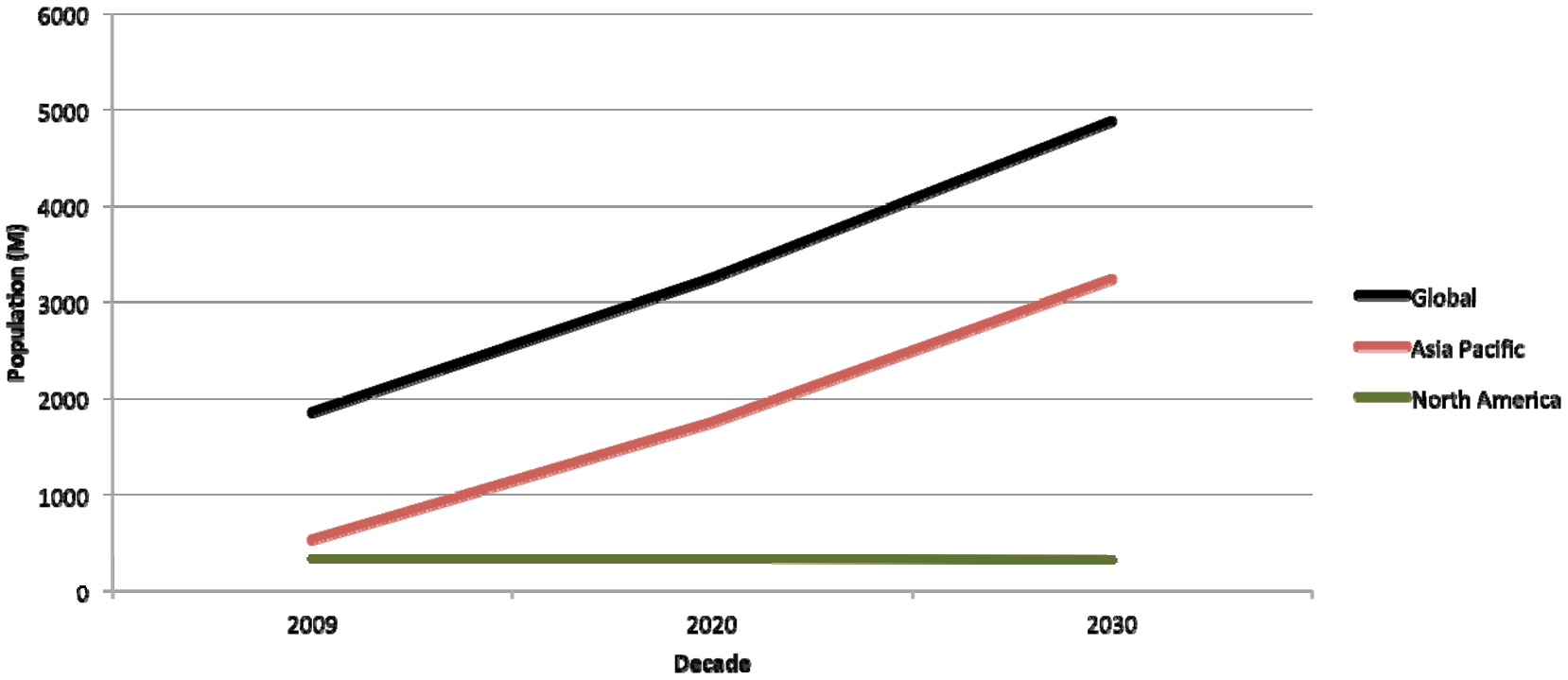
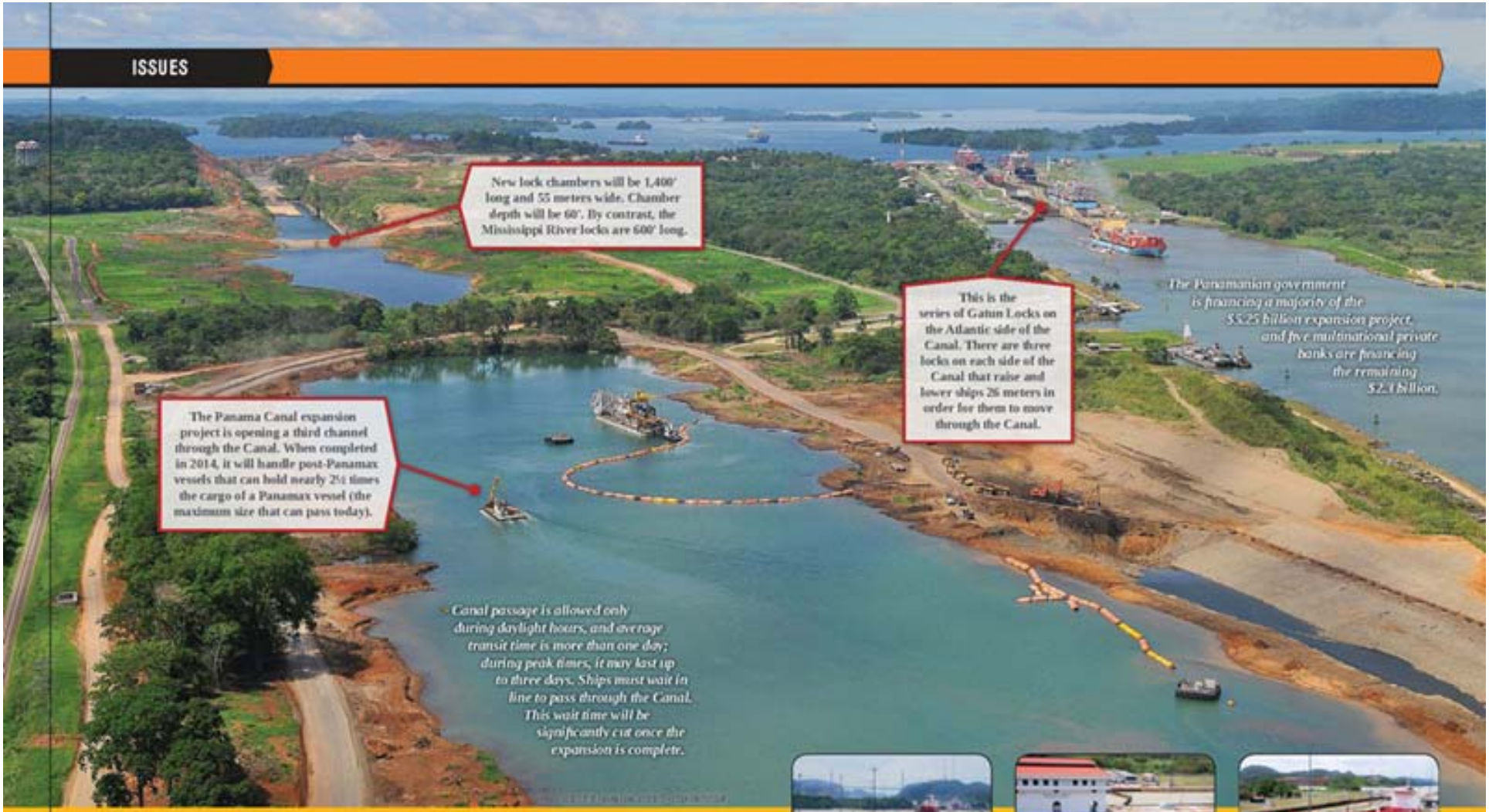
Expansion of the Global Middle Class

US$6,000 - $30,000

2009-2030





The Panama Canal Expansion Project

U.S. agriculture and the Panama Canal have a mutually beneficial relationship. Grain and oilseeds originating in the U.S. account for nearly 6% of Panama Canal revenues. This makes up nearly 27% of total Canal cargo and 30% of its dry bulk vessel tonnage. Total cost of the Panama Canal expansion project: $5.25 billion. — *Greg Vincent*

> A tanker ship waits in queue at the Miraflores Locks on the Pacific side. Wait times will be dramatically cut in 2014.

> The existing locks structure displaces a great deal of water from Gatun Lake. The new design will use 7% less water.

> The current draft in the existing locks is 108'. Post-Panamax vessels 160' wide will pass through the new channel.

What is sustainability?

Sustainability in Maersk Line is defined as our commitment to conduct our business in a **financial**, **environmental** and **socially** **responsible** manner.

We define sustainability as **a *business approach*** that strives for the **best possible outcome for our business, the people whose lives we touch, and the natural environment** on which we depend, now and in the future.

MAERSK LINE

What is sustainability?

Innovating for the Environment Since 1933

1907 UPS Founded

1913 Begins consolidating deliveries

1933 Deploys vehicles powered by electricity

1966 Begins use of rail

1980s DC-8 aircraft meet Stage III noise requirements

1982 Deploys vehicles fueled with propane

1985 Deploys vehicles fueled with compressed natural gas (CNG)

1989 Purchases first 757 aircraft

1990 Introduces the DIAD (Delivery Information Acquisition Device)

1992 Delivers in 220 countries and territories

1994 Deploys vehicles fueled with liquefied natural gas (LNG)

1995 Re-engines 727-100 aircraft for noise reduction and fuel efficiency

1998 Introduces vehicles with hybrid electric drivetrains (HEV)

Partners with EDF for responsible packaging

2003 Deploys hydrogen fuel cell vehicles

2006 Deploys vehicles with hybrid hydraulic drivetrain (HHV)

2008 Retires last 727 aircraft

Entire airfleet meets Stage IV noise requirements

Powers distribution facility with Bloom Energy fuel cell

2009 Introduces carbon neutral shipping within the U.S.

2010 Deployment of proprietary telematics system reaches 40 percent of U.S. ground delivery fleet

Expands carbon neutral shipping to anywhere in the world from 36 countries

Introduces the Eco Responsible Packaging Program

Extends proprietary telematics system to freight operations

P&G | Investor Relations | Careers | Partners & Suppliers | WORLDWIDE SITES | SEARCH

Company | Brands | Sustainability | News & Media

Sustainability

- Overview
- Performance at a Glance
- Environmental Sustainability
- Social Responsibility
- Product Safety
- Privacy
- Employee Engagement
- Points of View
- Heritage
- Reports

Overview

Sustainability is about ensuring a better quality of life today, for people and our planet.

P&G does this through the products and services we offer, making these products in an environmentally responsible manner, and through our social responsibility programs that improve lives for those in need around the world.

We define sustainability broadly at P&G to include both environmental sustainability and social responsibility.

Commitment to Everyday Life
P&G is working towards our commitments in environmental and social responsibility, to touch and improve lives around the world.

2011 Sustainability Overview Report (PDF)
2011 Sustainability Full Report (PDF)

Our Programs

Environmental Sustainability

Social Responsibility

Our Enablers

From Firm to Product Sustainability

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at the Nicholas Institute for Environmental Policy Solutions

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Operational Improvements

End-to-End Strategy

Manufacturing

Finished Product Logistics

Supplier Engagement

Home | About Us | Suppliers | Sustainable Purchasing

Sustainable Purchasing

Through their processes and in relations with suppliers, Purchasing naturally incorporates the company's social and environmental commitments. The latter are factors measuring performance and progress in their processes and in relations with suppliers.

- Integrate sustainable development in Purchasing approaches
- Sustainable purchasing performance indicators
- Supplier evaluation
- The company's supplier commitments

Integrate sustainable development in Purchasing approaches

Sustainable development is integrated in Purchasing approaches in three main ways:

- **"responsible purchasing actions" or the integration in family purchasing policies:** through the choice of "green" products where relevant, product LCA (life-cycle analysis), TCO (Total Cost of Ownership), definition of strategic directions aimed at promoting responsible conduct by operationals and suppliers, etc;
- **buyers' commitment:** by integrating sustainable purchasing in all the company's purchasing standards, the development of regular awareness campaigns about the issues at stake and the provision of appropriate training courses, buyers develop awareness of sustainable purchasing and the rollout of best practices;
- **relations with suppliers:** through the evaluation of how and to what extent sustainable development issues are taken into account in suppliers' management systems, the deployment of audits, satisfaction surveys, the integration of contractual clauses, etc.

By participating in a work group, all members of the **purchasing** network undertake to comply with the **rules** applicable internally and with regard to suppliers and service providers.

Code of conduct

These rules are described in the working group code of conduct.

- Download the Code of conduct (pdf-42KB)

SUSTAINABLE PURCHASING PERFORMANCE

Specific indicators incorporated into the company's EMS

VEOLIA

Dr. Jay S. Golden, Director

Sustainable purchasing performance indicators

In order to improve the way these company objectives and actions plans are managed with regard to these issues, specific sustainable purchasing performance indicators have been implemented. The results are published in the performance section of the company's Annual and Sustainable Development Report.

Supplier evaluation

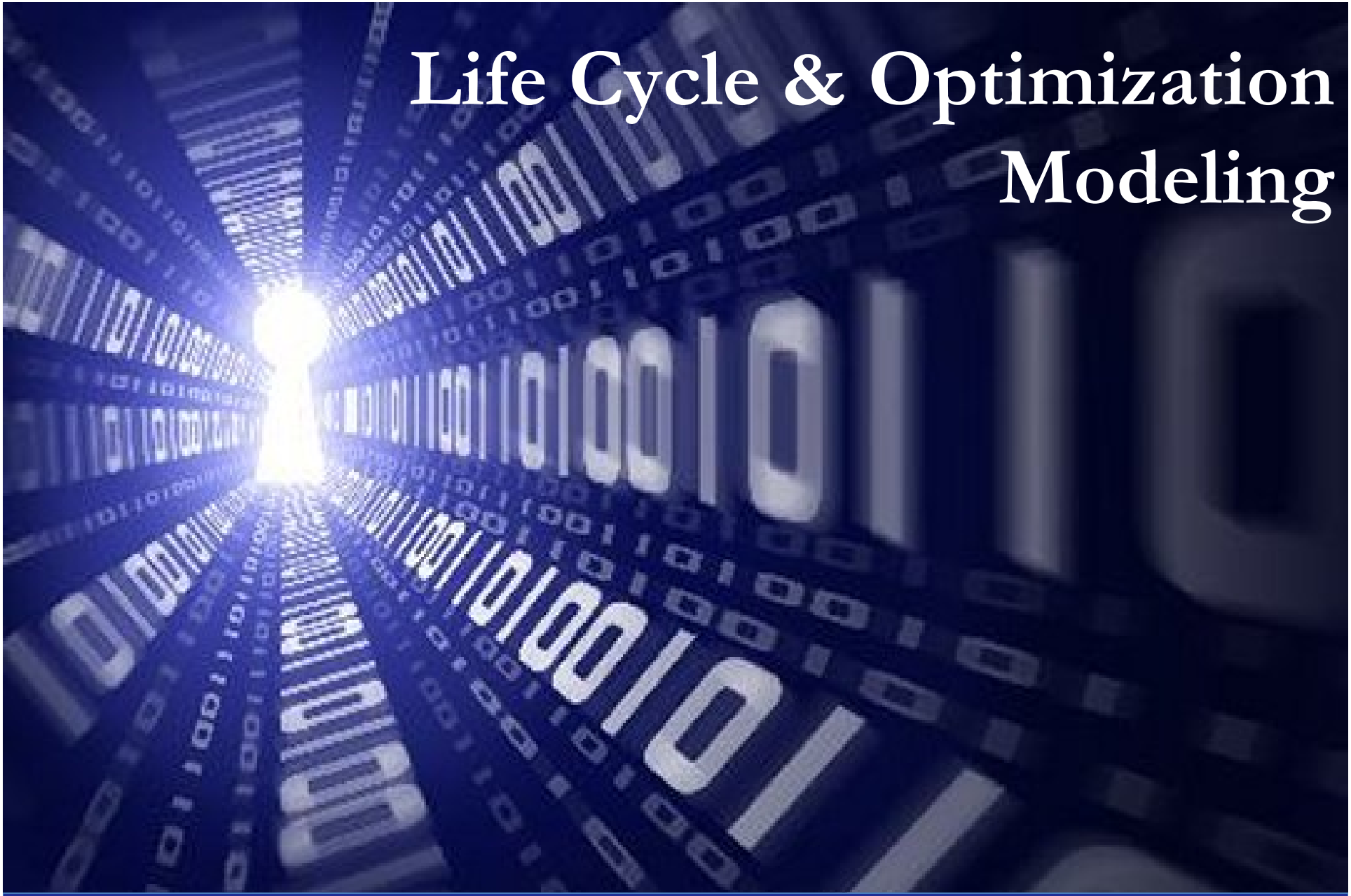
The company is focuses on measuring the extent to which its suppliers take **social and environmental factors** into account. Purchasing has therefore rolled out a CSR (Corporate Social Responsibility) evaluation system for its suppliers, in cooperation with Ecovadis. The aim is to:

- measure its suppliers' CSR performance,
- cover the majority of expenditure and categories of risk purchases,
- implement action plans incorporating these audits, if necessary, and support suppliers in their improvement approaches.

The company's supplier commitments

To meet the expectations of its internal and external customers, the company's Purchasing Department expects its suppliers to comply with the following commitments:

- comply with the Veolia Environnement purchasing procedures,
- promote respect for ethical rules regarding labor law, the principles of diversity and equal opportunity, and the company's Health and Safety policy,
- develop an environmental management system,
- contribute to the ongoing improvement to products and services,
- maintain good commercial relations, based on transparency and information sharing.



Life Cycle & Optimization Modeling

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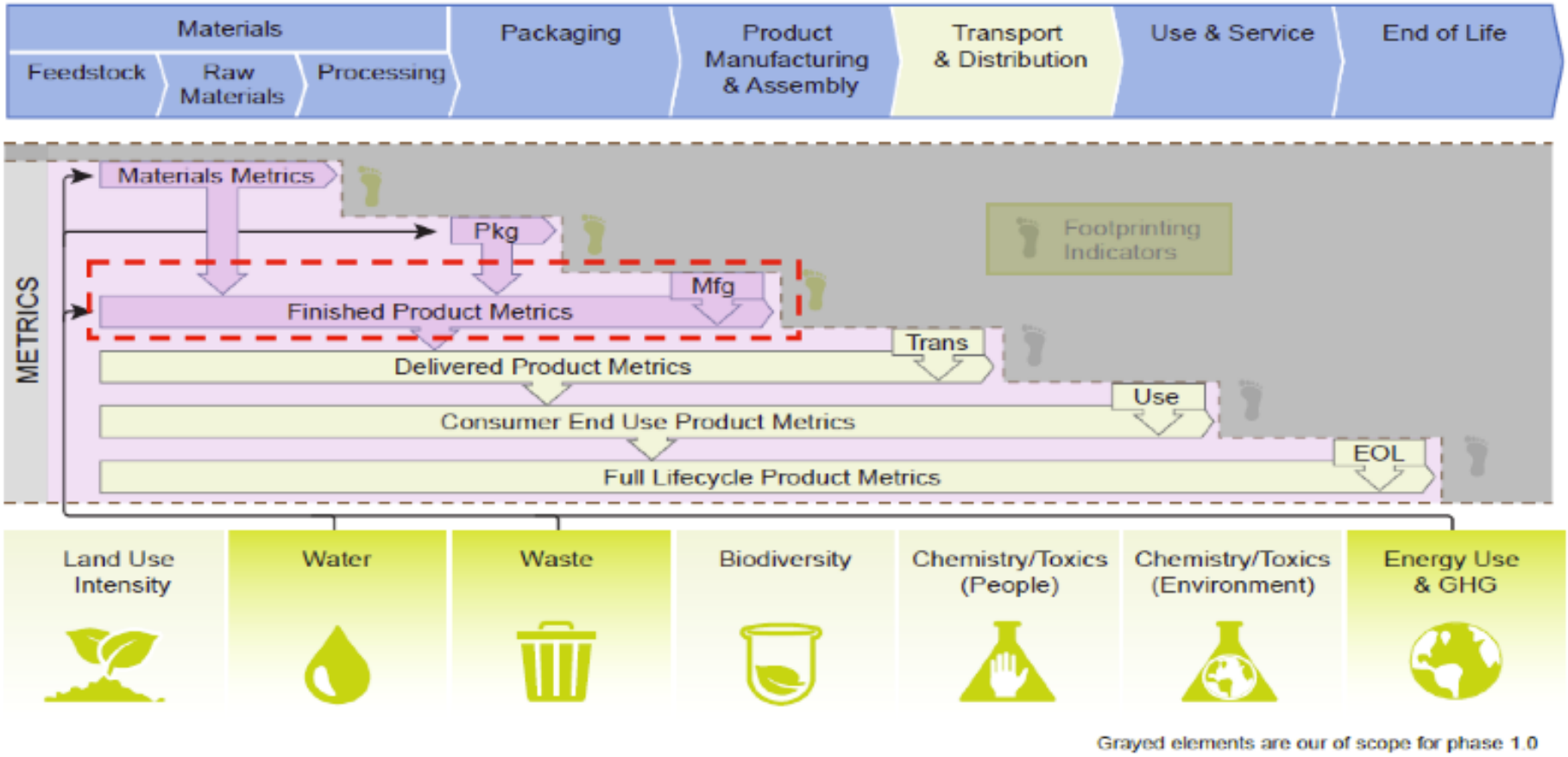
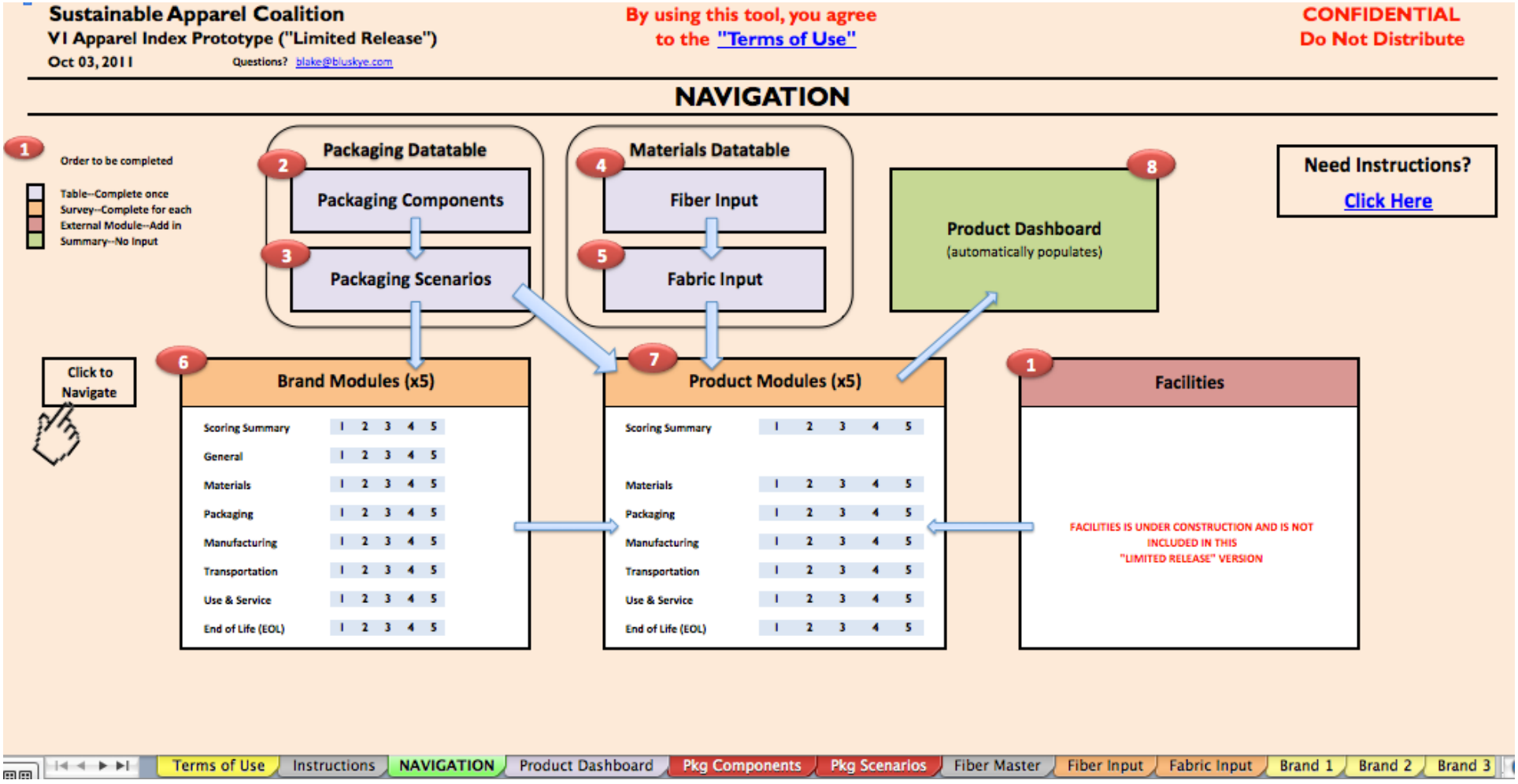
Industry & Govt. LCA Programs



Grayed elements are our of scope for phase 1.0


Sustainable Apparel Coalition
VI Apparel Index Prototype ("Limited Release")
Oct 03, 2011
Questions? blake@bluskye.com
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CONFIDENTIAL
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NAVIGATION
1
Order to be completed
Table--Complete once
Survey--Complete for each
External Module--Add in
Summary--No Input
2
Packaging Datatable
Packaging Components
3
Packaging Scenarios
4
Materials Datatable
Fiber Input
5
Fabric Input
8
Product Dashboard
(automatically populates)
Need Instructions?
Click Here
Click to Navigate
6
Brand Modules (x5)
7
Product Modules (x5)
1
Facilities
Scoring Summary
General
Materials
Packaging
Manufacturing
Transportation
Use & Service
End of Life (EOL)
1 2 3 4 5
FACILITIES IS UNDER CONSTRUCTION AND IS NOT INCLUDED IN THIS "LIMITED RELEASE" VERSION
Terms of Use
Instructions
NAVIGATION
Product Dashboard
Pkg Components
Pkg Scenarios
Fiber Master
Fiber Input
Fabric Input
Brand 1
Brand 2
Brand 3

Laundry Detergent Life Cycle Model

Home & Personal Care Working Group

SUSTAINABILITY CONSORTIUM

LAUNDRY DETERGENT LIFE CYCLE MODEL

Functional Unit
One large load of laundry washed and dried

Reference Flow
One recommended single dose

Geographic Scope
United States and Canada (distribution, use, and disposal), Europe (with energy use according to U.S. grid mix)

Inputs from the Ecosphere

Outputs to the Ecosphere

HOTSPOTS AND MAIN IMPACT INFLUENCERS

Chemical Manufacturing and Processing
Source of feedstock, type of ingredient, production efficiency

Machine Drying
Machine efficiency, residual water in clothes, drying time

Machine Washing
Water temperature, machine efficiency, water per load

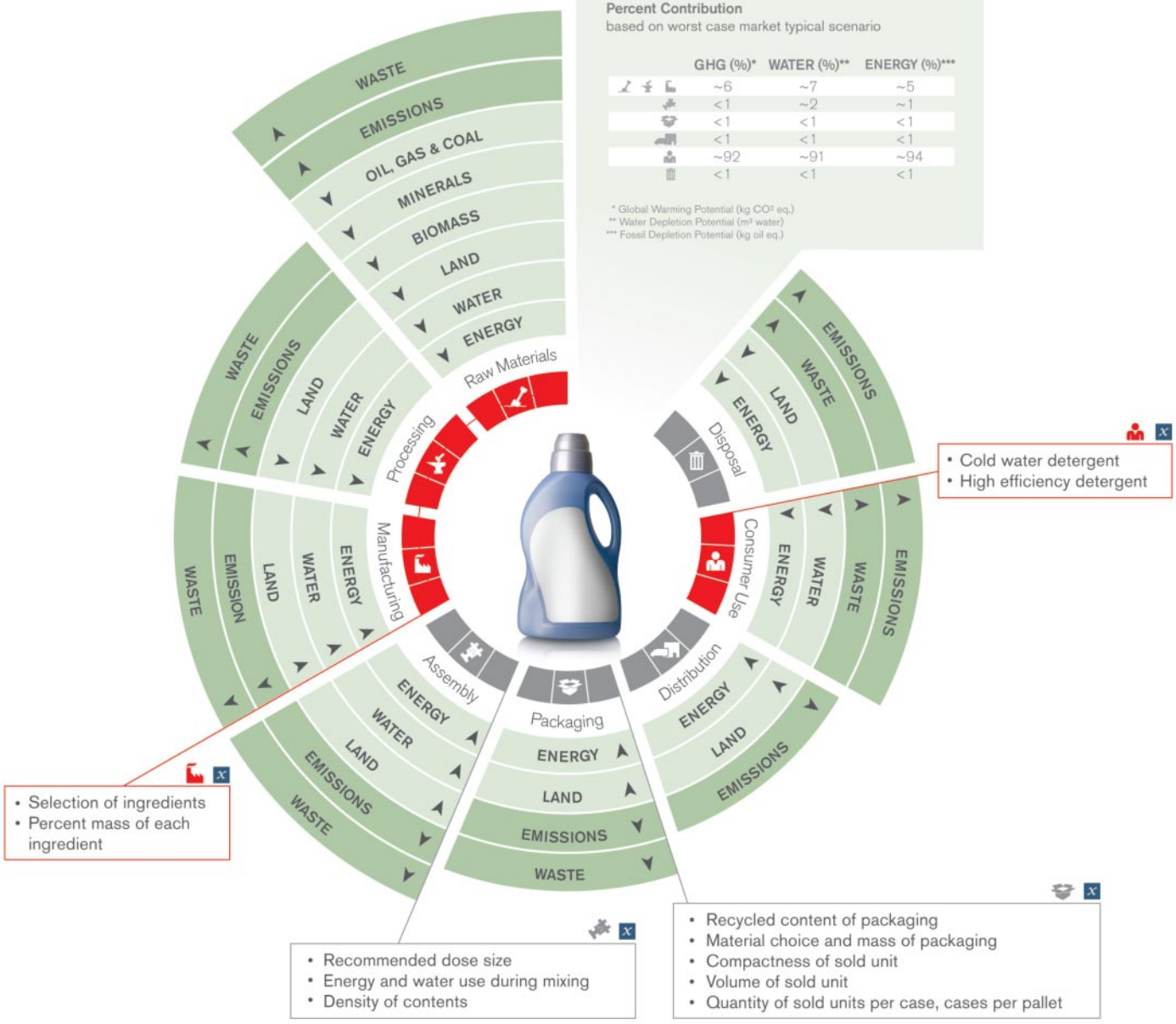
DRIVERS

Parameters that can be changed in the computational tool

MARKET STATISTICS

Global Retail Value (RSP US $ Millions)	49,271.60
% of Global Retail Industry	1%
% of Non-Durable Goods	1.5%
% of Global Home and Personal Care Industry	10%
% of Home Care Industry	40%

Source of Sales Data: Euromonitor's GMID - Global Market Information Database. All data are world totals for the year 2009.



Percent Contribution
based on worst case market typical scenario

	GHG (%)*	WATER (%)**	ENERGY (%)***
	~6	~7	~5
	<1	~2	~1
	<1	<1	<1
	<1	<1	<1
	~92	~91	~94
	<1	<1	<1

* Global Warming Potential (kg CO^2 eq.)
** Water Depletion Potential (m^3 water)
*** Fossil Depletion Potential (kg oil eq.)

Example product declaration

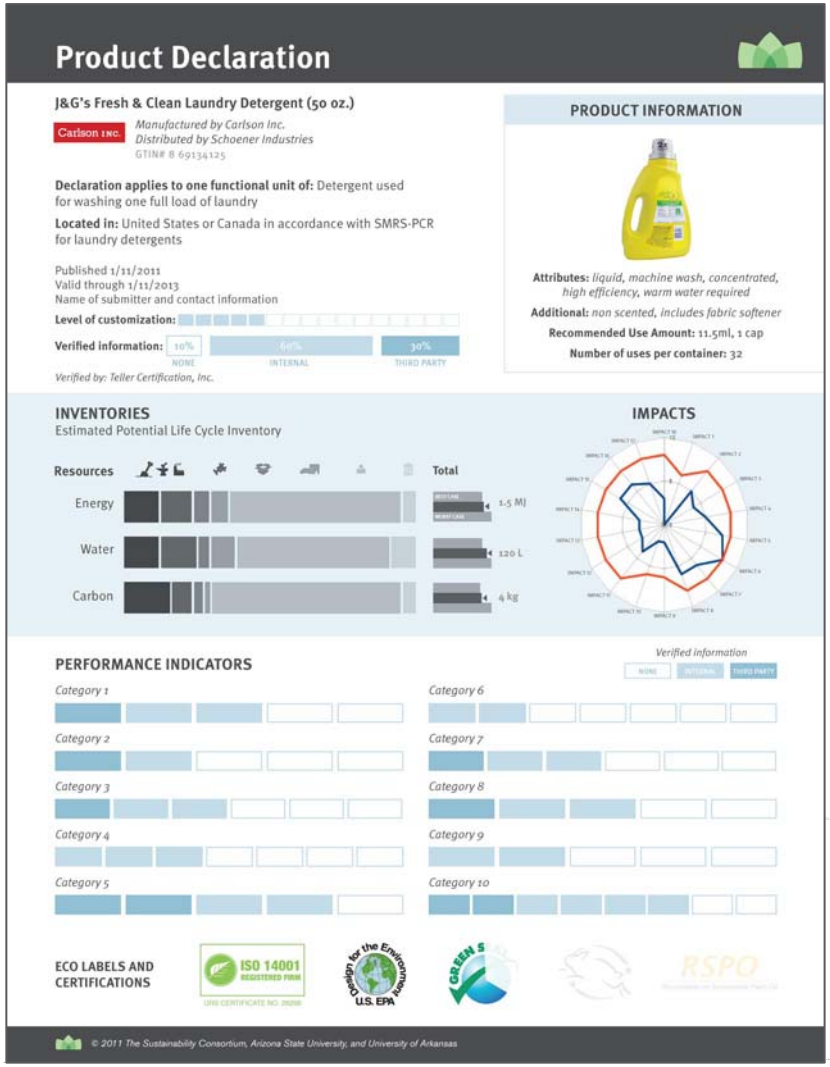
Brand owner and manufacturer information.

Level of customization and verification. a.k.a. 'truthiness'.

Life cycle inventory results. Energy, Water, Waste and Carbon.

Performance indicators results by different categories.

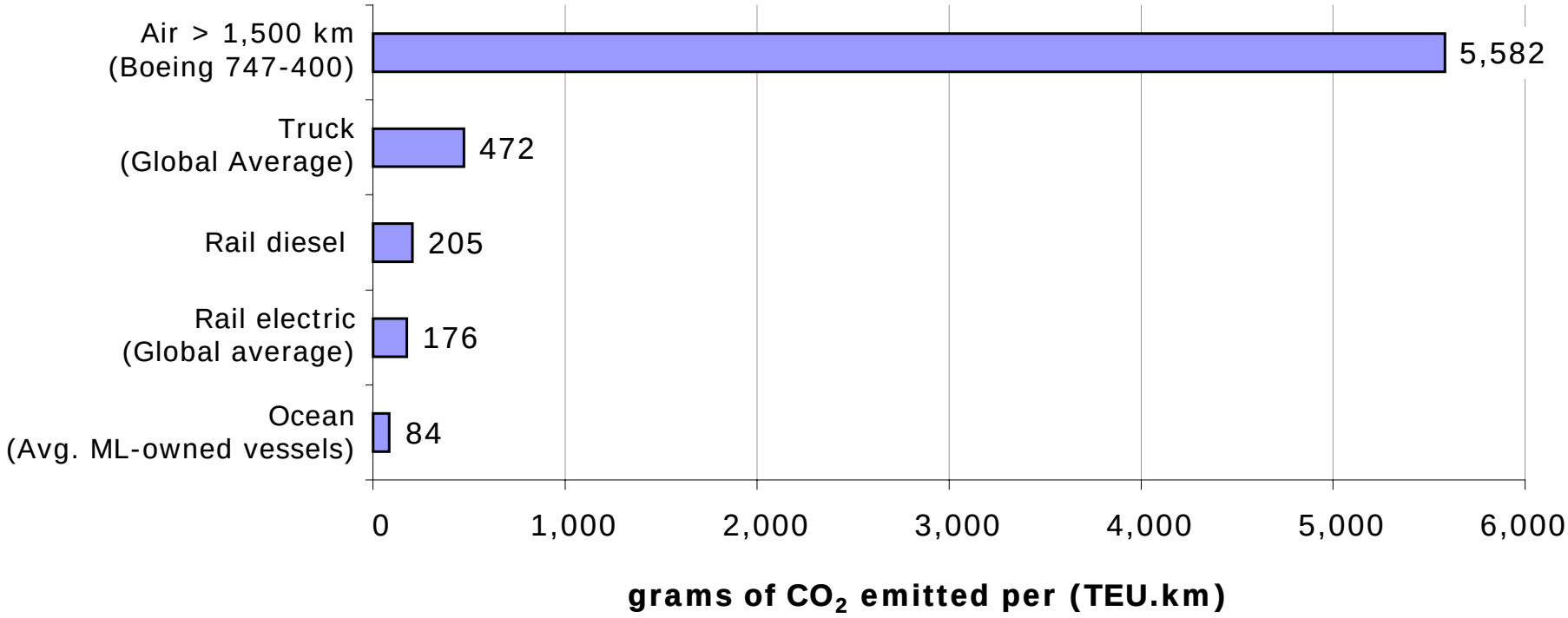
3rd party criteria: Certifications and ISO T1 Ecolabels.



Product details and attributes.

Potential life cycle impacts. LCIA midpoints.

CO_2 Emissions by Mode of Transportation



- CO_2 - NO_x
- SO_x - VOC
- Particulates

Noise

Visual Impact

INPUTS
- Resource use
- Fuel oil
- Lube oil
- Water/Air
- Ballast water
- Paints
- Chemicals
- Food/paper
- Spare parts

AIR

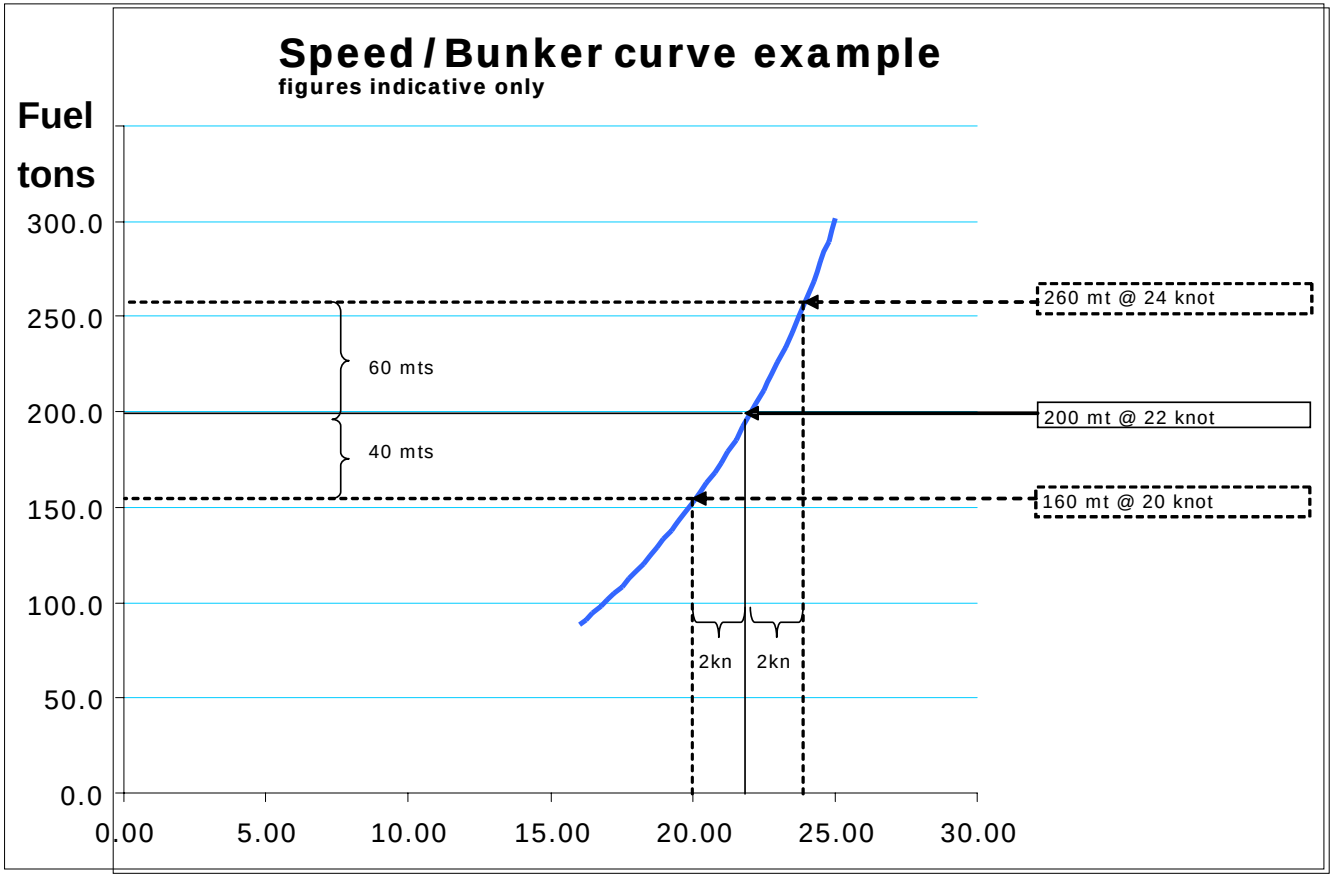
LAND

- Garbage
- Sludge
- Sewage
- Hazardous waste
- Scrap spare parts

WATER

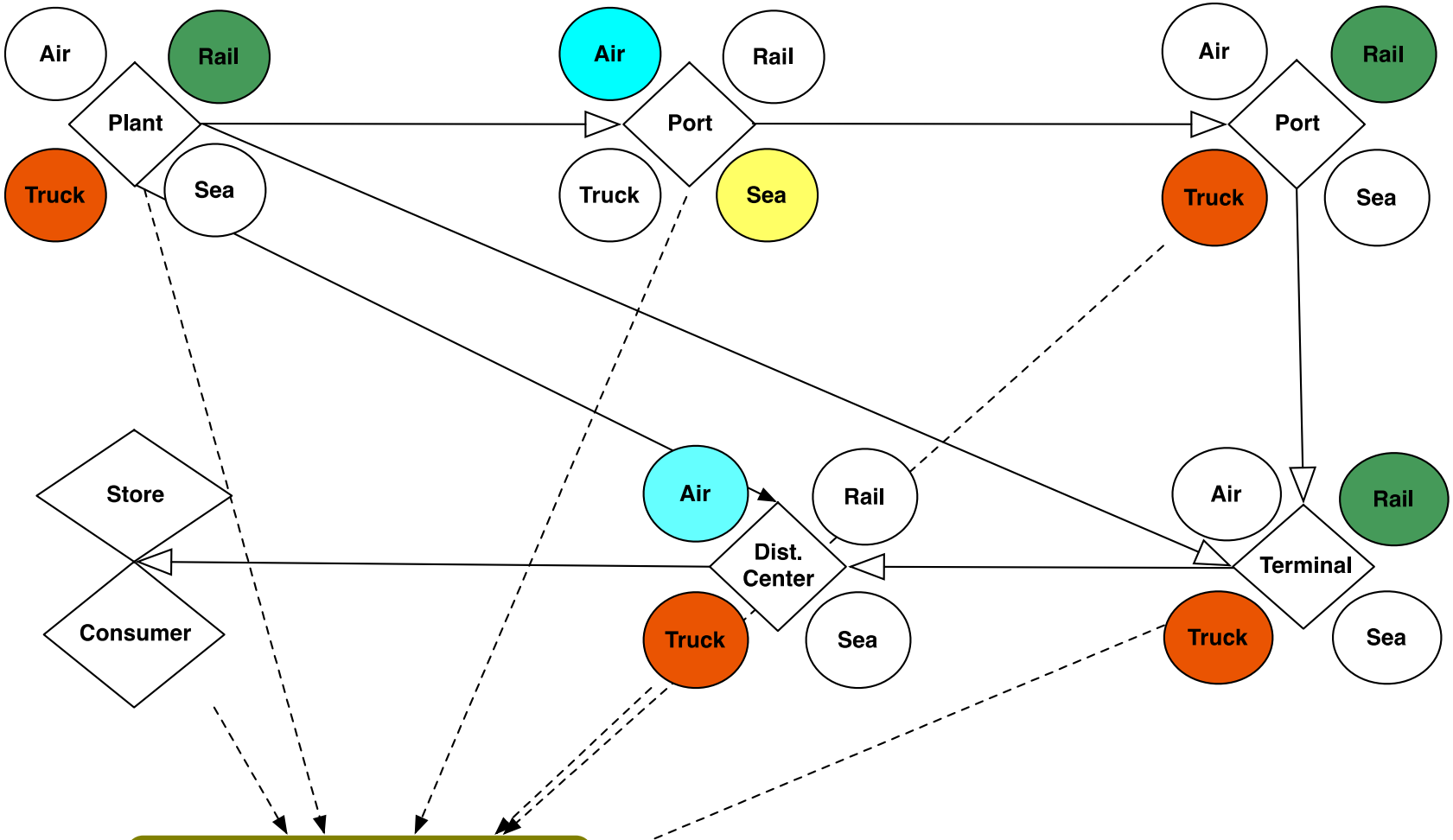
- Ballast water
- Toxic hull paint
- Oil Spills

Constant Speed



Port & Terminal Sustainability

#	Indicators and Metrics	Relevant Agencies													
	Environmental	US DOT	US EPA	Trans Canada	EC	NRTEE	ORTEE	TAC	VTPI	CST	OECD	World Bank	PROSPECTS	EEA	LEED
1	CO2 emissions		■	■	■		■	■			■	■		■	
2	Greenhouse gas emissions	■			■	■				■		■		■	
3	Fossil fuel Consumption				■			■		■	■			■	
4	Use of energy/freight transported	■				■		■	■	■					
5	NOx emissions		■							■	■			■	
6	SOx Emissions		■							■					
7	VOCs emissions		■		■					■				■	
8	CO emissions		■							■					
9	Emissions of other air pollutants	■	■						■		■			■	
10	Main land use/ Urban land use		■				■						■		
11	Waste/Recycling		■	■										■	
12	Environmental Management Systems		■												
13	Noise level/cost		■										■		
14	Green buildings										■		■		■
15	Non-fossil fuel use (Alternative fuel)						■							■	
16	Wetland loss and creation	■	■												
17	Hazardous materials incidents	■	■												
19	Fragmentation of ecosystems and habitats		■												
20	Environmental costs and liabilities			■											
21	Water use/Water quality				■										
22	Electricity use								■						
	Social/Safety-Oriented														
23	Deaths and Injuries						■	■	■	■	■				
24	Accidents											■	■	■	
25	Pollution/public health effects.		■												
26	Residential population exposed to noise	■	■												
27	Environmental justice	■													
28	Residents' participation in transportation and land-use decision making.								■						



Baseline / Aggregate Metrics

Fuel Types
Equipment Types
Default Routes
Performance Function (Slow Steam)
Time/unit
Costs/unit
Lean Logistics Methods
(Postponement, JIT, Cross Docking, VMI)

Harmonization / Utilization

Meet SAC, OIA, TSC, programs
Selection Criteria for Logistics Optimization
Compare Organizations vs. Baselines
Leverage Existing Tools / Data
Focus on Manageable Spatial Boundary

Multi-Modal Transportation & Ports Sustainability Initiative

Led by Duke & Environmental Defense Fund
co-hosted with CSX, Maersk, UPS

CSX Corporate Headquarters

Jacksonville, FL

March 14, 2012

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