

# LIFE CYCLE ASSESSMENT AT HP

## *SCALING LCA IN THE IT INDUSTRY*

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Hewlett-Packard Company  
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# AGENDA

1. Introduction
2. LCA in HP today
  1. Marketing
  2. Design for Environment
3. A path forward
  1. Labeling discussion
  2. Recommendations



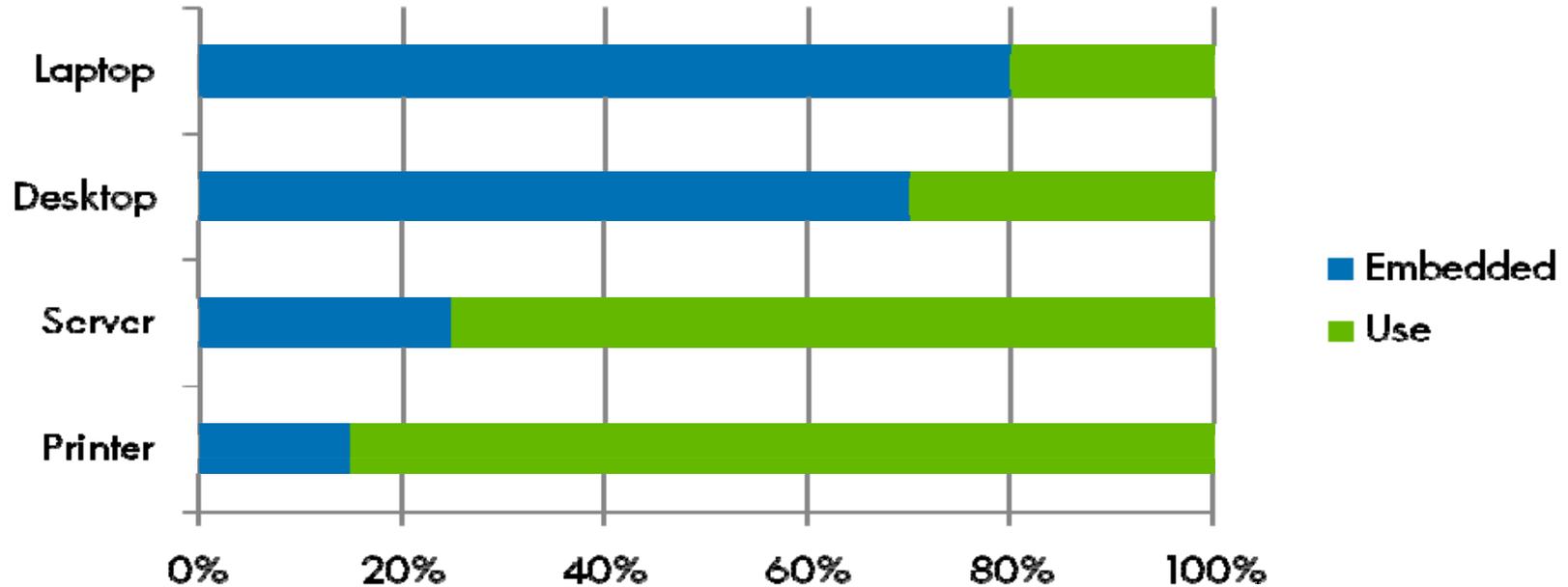
# HEWLETT-PACKARD TODAY

– FY09 net revenue \$114B

- HP Enterprise Business (services, software, storage and servers) ~ \$54B
- Personal Systems Group (computers, handheld devices) ~ \$35B
- Imaging and Printing Group (hardware and supplies) ~ \$24B



# UPSTREAM AND DOWNSTREAM GHG EMISSIONS IN IT PRODUCTS



Orders of magnitude.

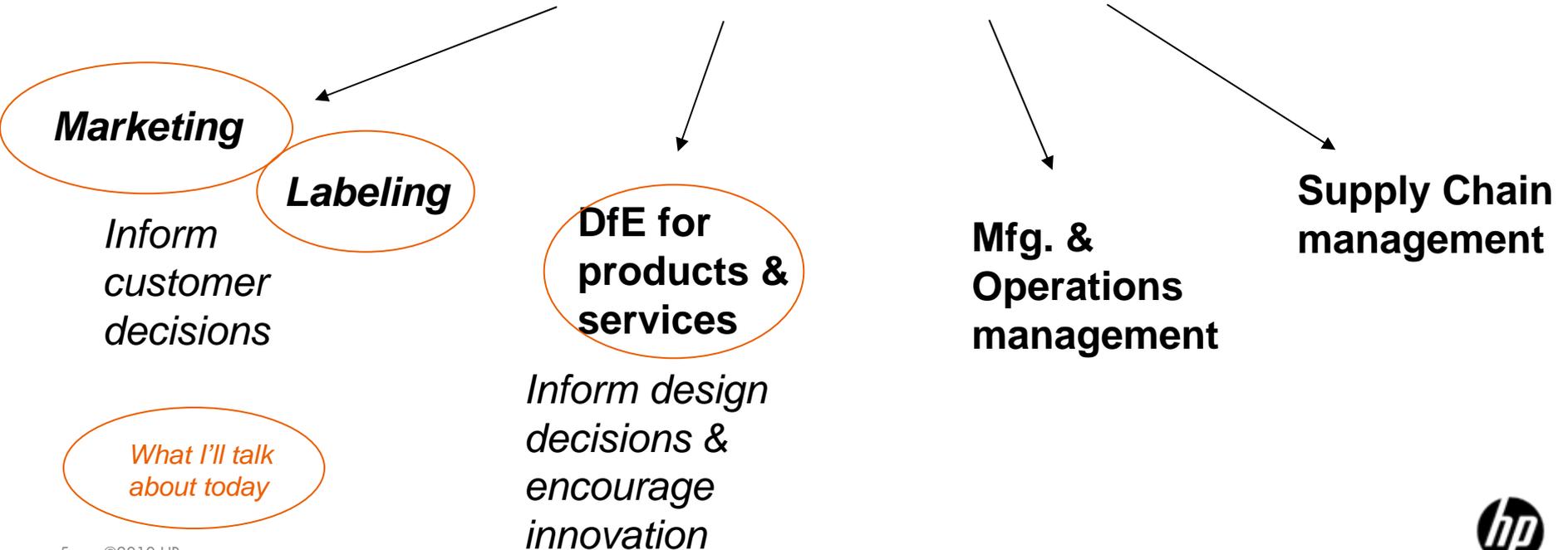
Printer use phase emissions include lifecycle emissions embedded in paper. (EUP Lot 4, base case V1)



# LCA IN INDUSTRY

Identifying improvement levers

LCA is a tool to identify levers for continuous environmental improvement.



# KEY MESSAGE

Scaling LCA in the electronics sector requires collaboration

- If we want to make big improvements, we need to **scale** LCA
- In order to **scale** LCA, we need to work together to increase our-
  - Wisdom to know when to use LCA (and when to use something else)
  - Ability to use LCA effectively and transparently
- *This requires a collaborative effort between OEM's, Academia, LCA Consultants, GO's, and NGO's*



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# MARKETING & LCA

## – What

- ISO 14040/44 “Comparative Assertion” LCA

## – Why

- Credibly show a potential customer the benefit of choosing one product or service over another

## – How

- Hire external LCA analysts, industry experts
- Peer reviewed to be in keeping with ISO 140.
- Regionally appropriate

## – Improvement lever: Customer choice



# MARKETING & LCA

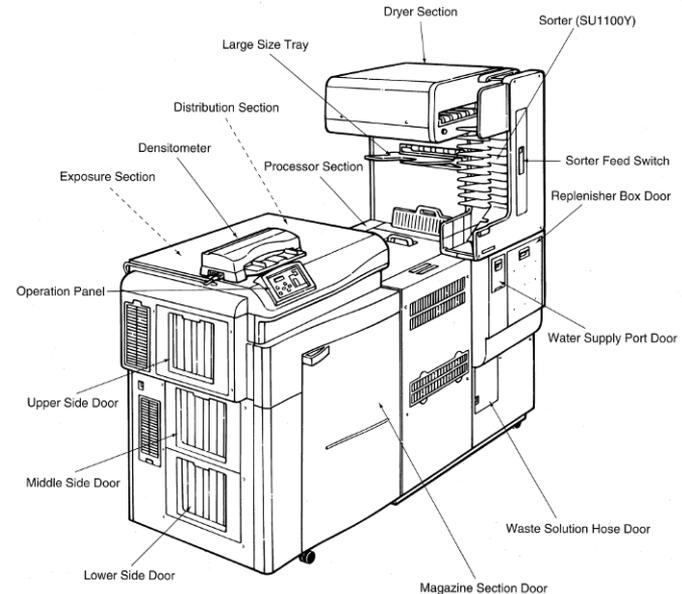
Example: HP Inkjet Photo Minilab vs. Silver Halide Minilab

– Printing of 4x6 Photos

On an HP Minilab ML1000D Minilab...



...and a comparable silver halide printer from a major manufacturer



# MARKETING & LCA

## – Benefits:

- Gained new insights and identified new improvement opportunities
- LCA and ISO 14040/44 method gives critical structure for substantiating complicated marketing claims

## – Barriers to scaling this approach:

- Expensive & slow
- Difficult to get data from vendors
- Conflict between dynamic real-world and static results
  - Marketing doesn't want the numbers to change
- Hard to communicate the results
- Methodology & data not transparent enough



# SCALING LCA: CHALLENGES AT HP

- Largest IT supply chain
- Daily shipments:
  - Over 1 million print cartridges
  - 40,000 printers
  - 145,000 PC systems
  - 7,500 servers
- Supply chain depth: 6-7 tiers
- Over 10,000 active SKUs, with high refresh rate



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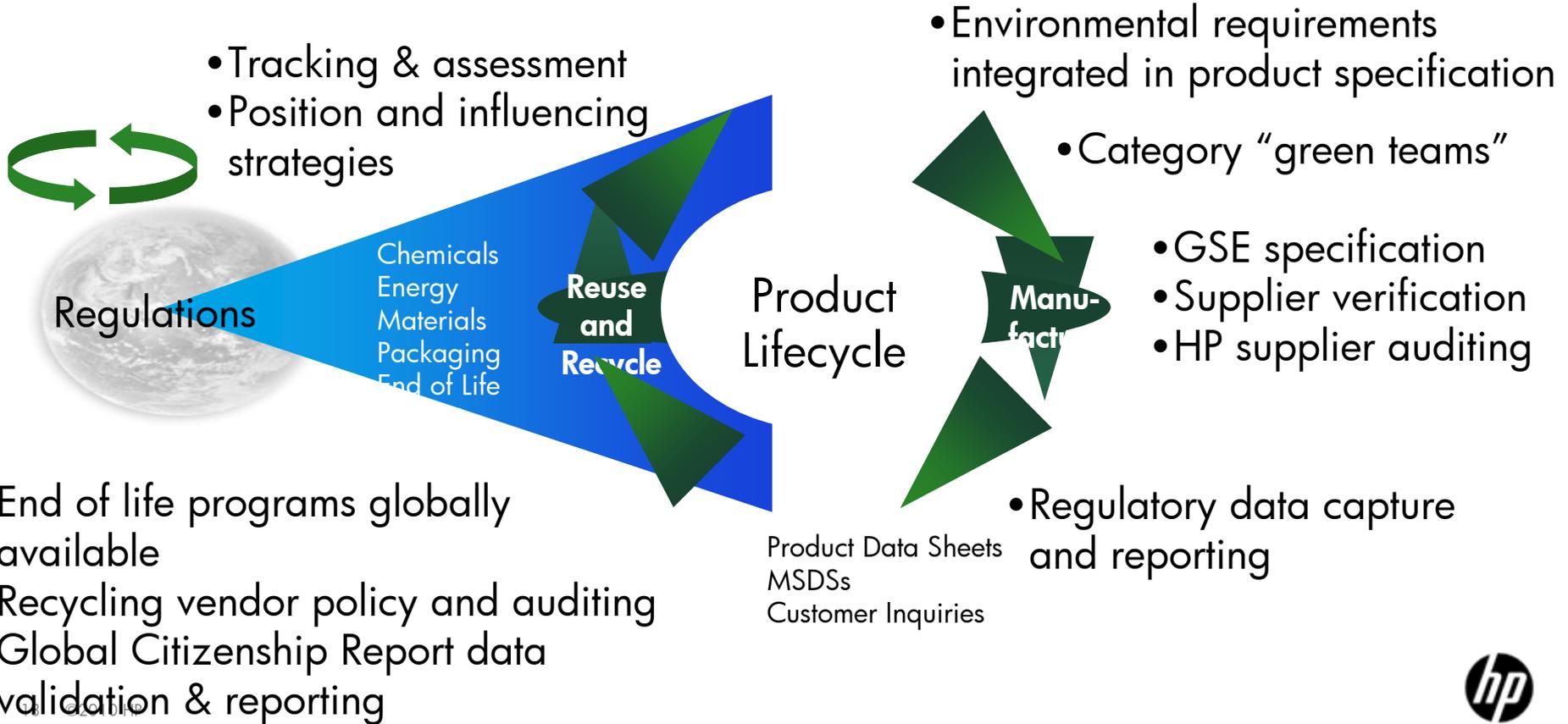
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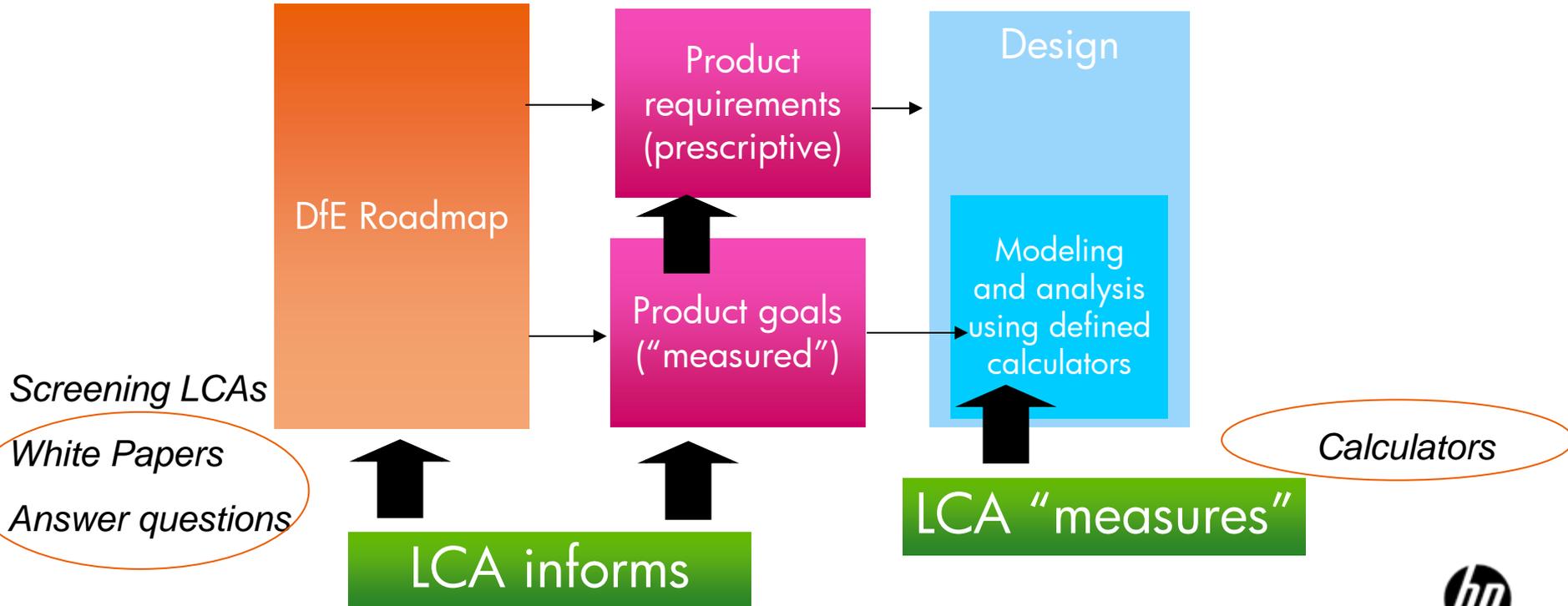
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# HP PRODUCT STEWARDSHIP LIFE CYCLE APPROACH

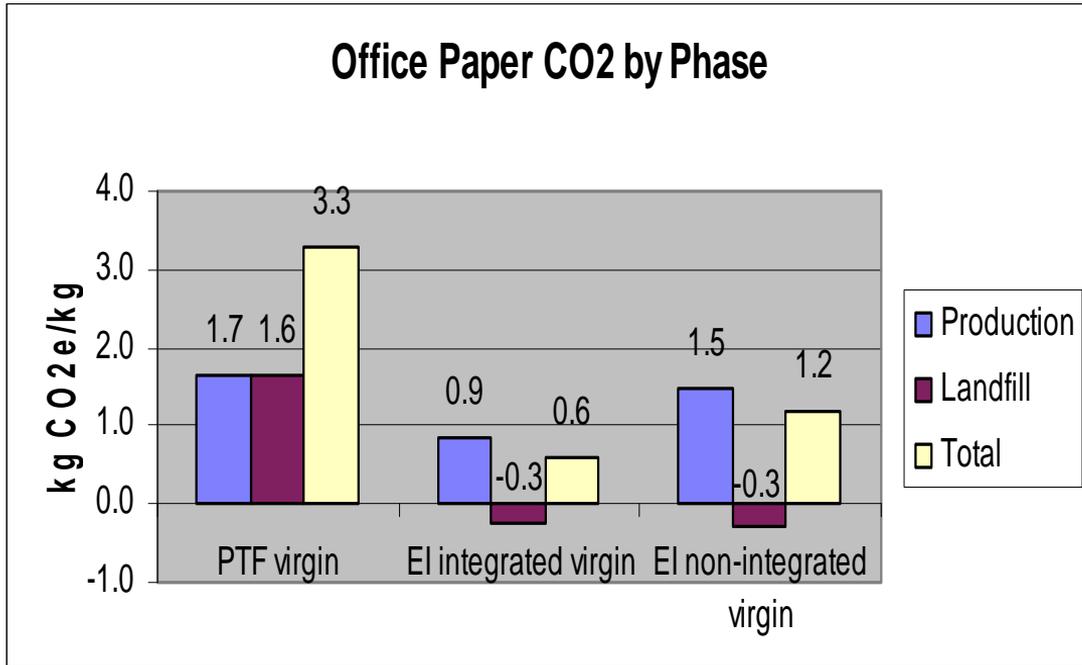


# HOW LCA CAN FIT INTO DESIGN FOR ENVIRONMENT



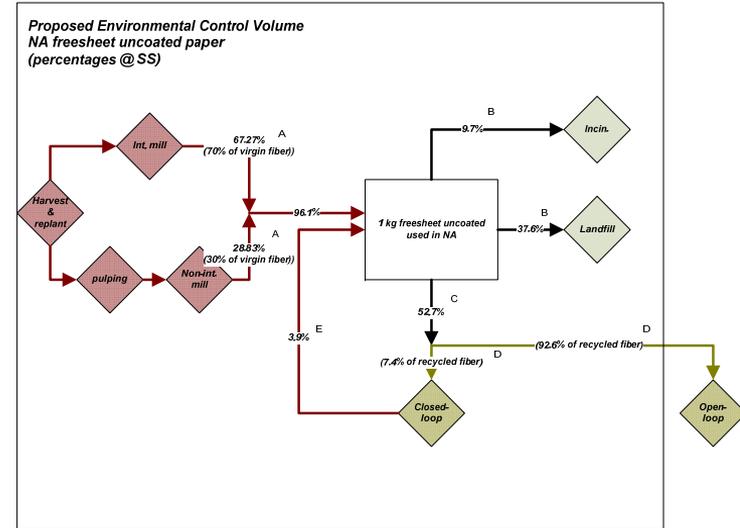
# DfE & LCA- WHITE PAPERS

What's the carbon footprint of paper? Studies available today vary widely



PTF: The Paper Task Force 1995, 2002

EI: Ecoinvent- integrated and non-integrated mill virgin paper; 100 year time horizon, using the IPCC 2007 method. It is assumed that the PTF figure is also for a 100 year timeframe.



# DfE & LCA- ANSWERING QUESTIONS

- Actual “grass roots” questions:
  - What is the environmentally optimum packaging cushions for a printer (container shipped) and a laptop (air shipped)...EPS, recycled EPS, or molded pulp?
  - What is the environmentally optimum material for a reusable shipping bag...RPET, PLA, HDPE, or PP?
- More questions than people to answer
  - Working with grad student class projects



# DfE & LCA- CALCULATORS

Environmental Metrics Pilot Program in Imaging & Printing Group

- Goal: ***Provide product teams with an 80/20 business decision support tool*** that allows them to understand the environmental aspects of their design decisions
  - Starting with carbon footprint
- Scope determined by materiality as per EuP Lot 4 Study
  - Included (cradle to gate): hardware, cartridges, paper, use-phase electricity
  - Not included at this time: ink, toner, logistics, packaging
- Process LCA approach
  - Secondary data, primarily from the ecoinvent database



# HP IPG'S ENVIRONMENTAL METRICS PROGRAM

- Enter in material & mass data for:
  - Printer
  - Cartridges
  - Any other consumables
- Enter in system parameters:
  - Page volume
  - Lifetime
  - Power consumption
  - Cartridge yields
  - Duplex

Assembly Name	Type	System	Analyst	Date	Notes
Arapaho Printed Circuit Assem.	PCA	Arapaho CLJ CP	Lynette Misc.	11-AUG-09	
Black Supply	Black Supply	Input File Upload	Kenneth Olsen	21-JUL-09	
CLJ CP3525	Printer	Arapaho CLJ Pri...	John N Lodol	10-AUG-09	
Color Supply	Color Supply	Input File Upload	Kenneth Olsen	21-JUL-09	
Daimler Low (CJP 8500)	Printer	Daimler Example	Kenneth Olsen	24-JUN-09	Prelimin...

Metals	Weight (g)
Aluminum	13.39
Stainless steel	90.74
Steel	2624.97
Copper	2.136
Iron	0.9
Misc. Metals	36.6

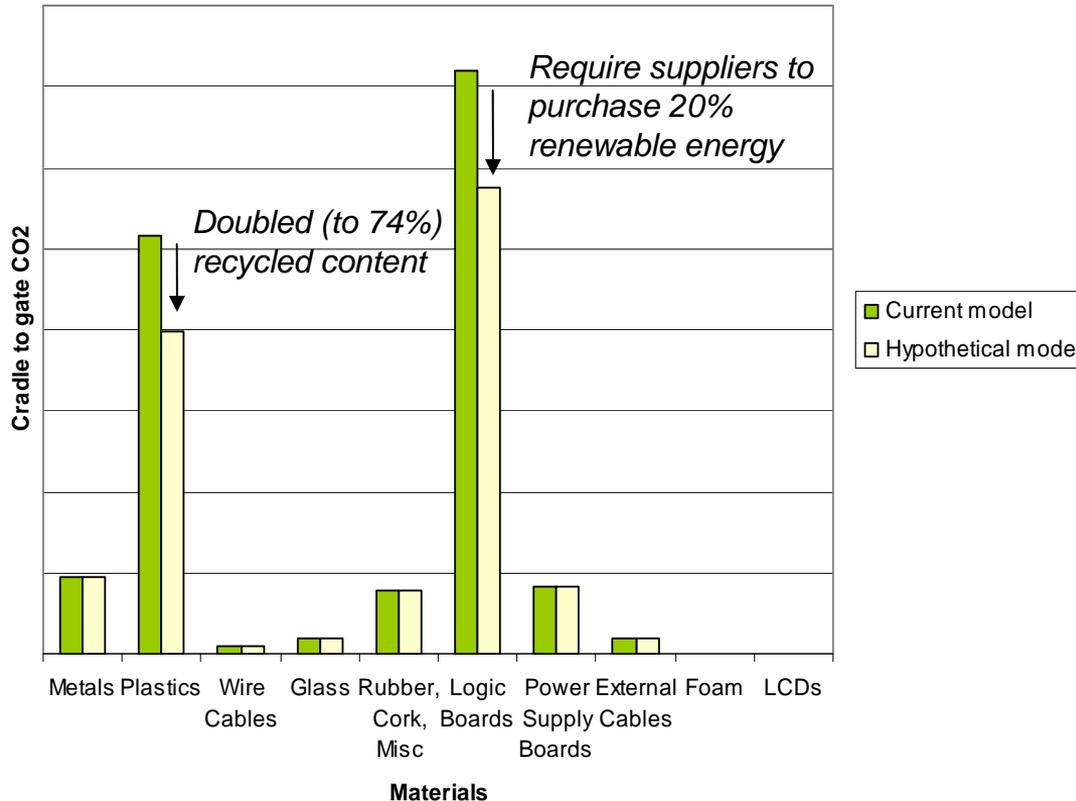
Miscellaneous	Weight (g)
Internal Wire or Cables	94.28
Glass (non CRT)	700
Rubber, cork, and misc. materials	136.48
Batteries	2.8
Cables (External)	0
External Power Supply	442.5
Single wall corrugated board	0
Batteries	2.8
Polyurethane Foam	0

Printed Circuit Assemblies	Weight (g)
Logic Boards	420.43
Power Supply Boards	0



# HARDWARE CARBON FOOTPRINT BY MATERIAL:

Today and ideas for the tomorrow of consumer inkjet all-in-ones



# HARDWARE CARBON FOOTPRINT BY SUBSYSTEM:

Today and ideas for the tomorrow of consumer inkjet all-in-ones

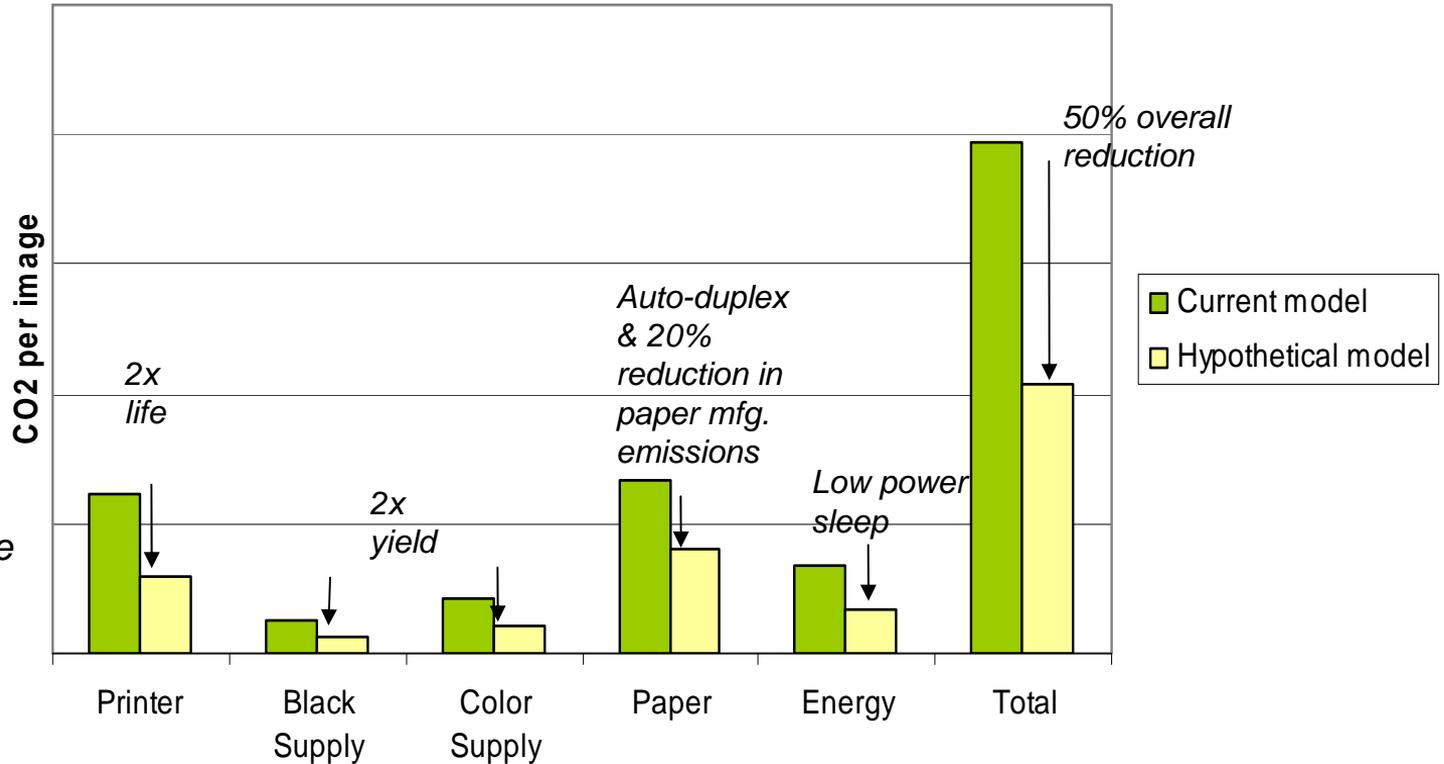


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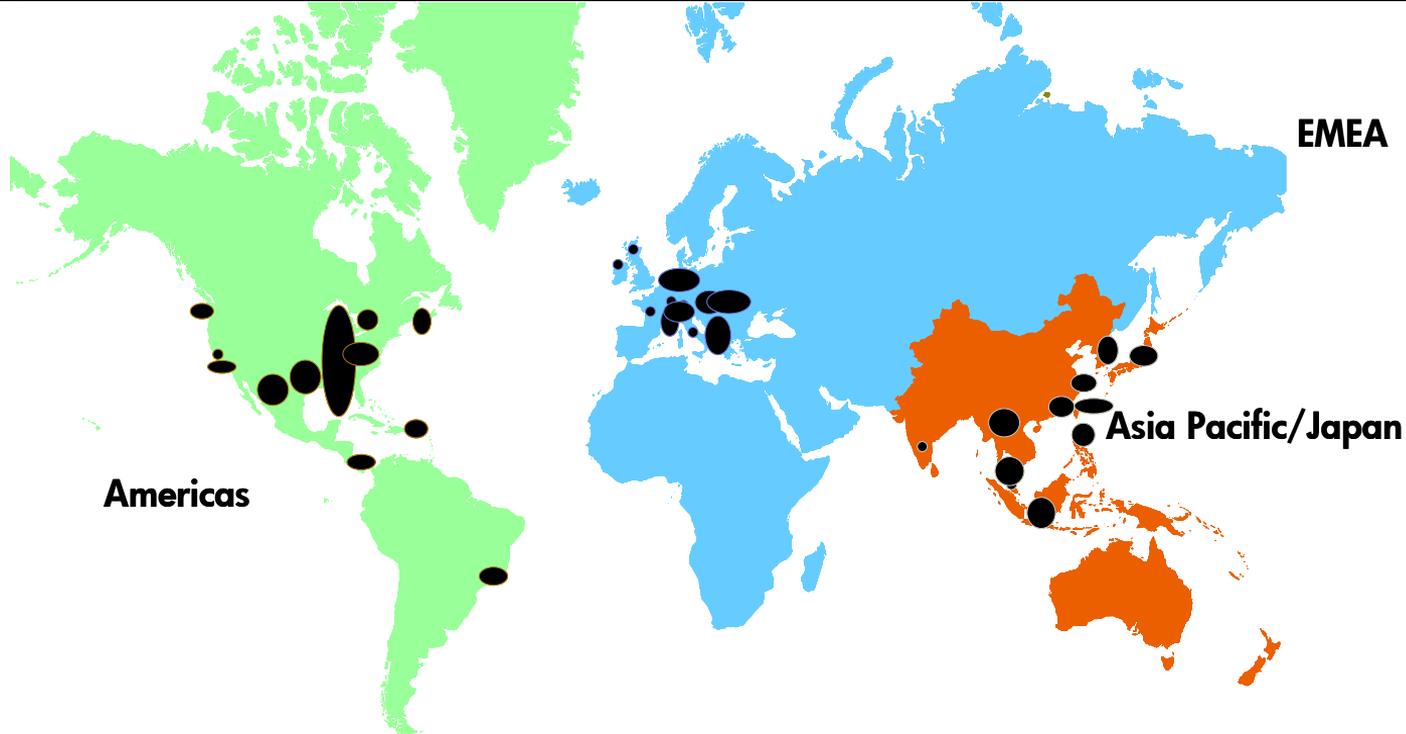
# SUPPLIER MANUFACTURING LOCATIONS

Product materials, components, and services

Americas – 20%

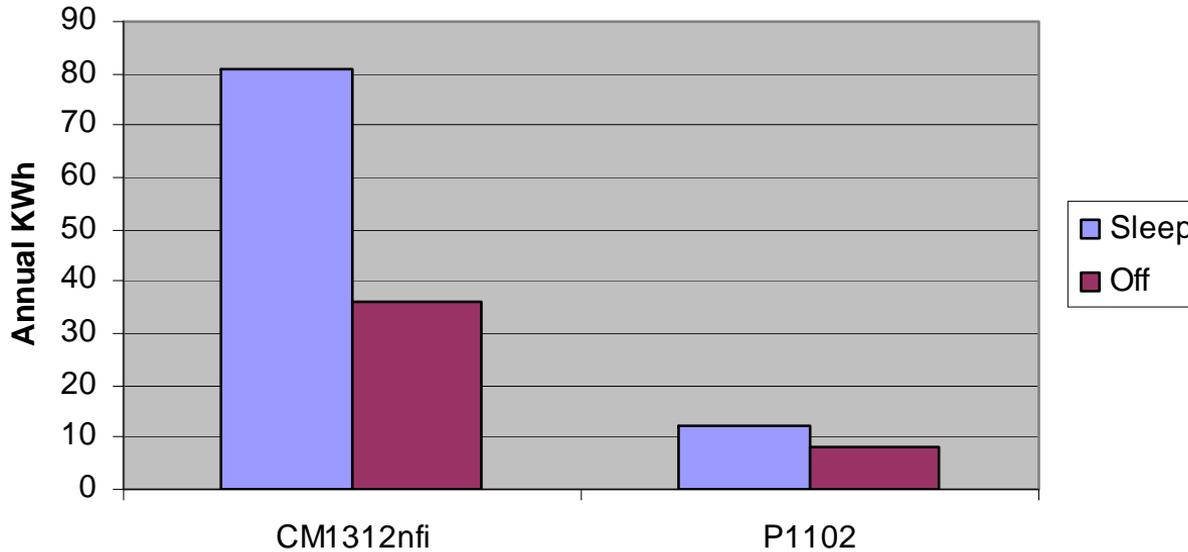
Europe & Middle East – 5%

Asia Pacific & Japan – 75%



# ASSUMPTIONS

- What % of users turn off their printers for nights and weekends versus let them stay in sleep mode?



# DfE & LCA

## – Benefits:

- LCA well suited for informing DfE: identifies tradeoffs, good starting point, common language
- LCA provides benchmarks needed for continuous improvement and to inspire innovation

## – Barriers to scaling this approach:

- When is it worth the overhead of an LCA calculator versus just telling a designer “what to do”?
- Some LCA impacts (global warming potential, energy demand) appear to be well developed, others (human toxicity) not as well. Which areas do we cover the areas with other methods?
- For the impacts that are well developed, what is a meaningful difference for a high volume approach?



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# LABELING & LCA

## Electronic Product Environmental Assessment Tool (EPEAT)

–EPEAT is a environmental procurement tool to assess the environmental impact of commercial electronic products\*

–23 required criteria and 28 optional criteria in 8 categories:

1. Reduction or Elimination of Environmentally Sensitive Materials
2. Materials Selection
3. Design for End of Life
4. Product Longevity/Life Cycle Extension
5. Energy Conservation
6. End of Life Management
7. Corporate Performance
8. Packaging

\* Desktop computers, Notebooks and Video Display Units (Monitors)



# LABELING & LCA

## HP Product LCA and Carbon Footprint Activity Timeline

**Key:**  
Purple = Type 1 eco-label  
Green = PCF label  
Red = Data, methodology & tool  
Blue = PCF standard

Dashed-line box indicates uncertainty



ULe Env Std for HHs

EPEAT 1680.2 (printers)

French ADEME/Loi Grenelle 1 Label

EPEAT 1680.1 (computers)

EPEAT for servers, handhelds?

EPEAT's EcoSense?  
TSC Index for Walmart, Best Buy Labels

Japan – PCF label

Taiwan – PCF label

Thailand – PCF label

China – PCF label

Carbon Trust

Korea – PCF label

EO #13514

iNEMI – PCF Framework

PAIA PCF Data & Tool

APPEAR LCA Data & Tool

Earthster - LCA Tool

TSC SMRS - data

PAS 2050

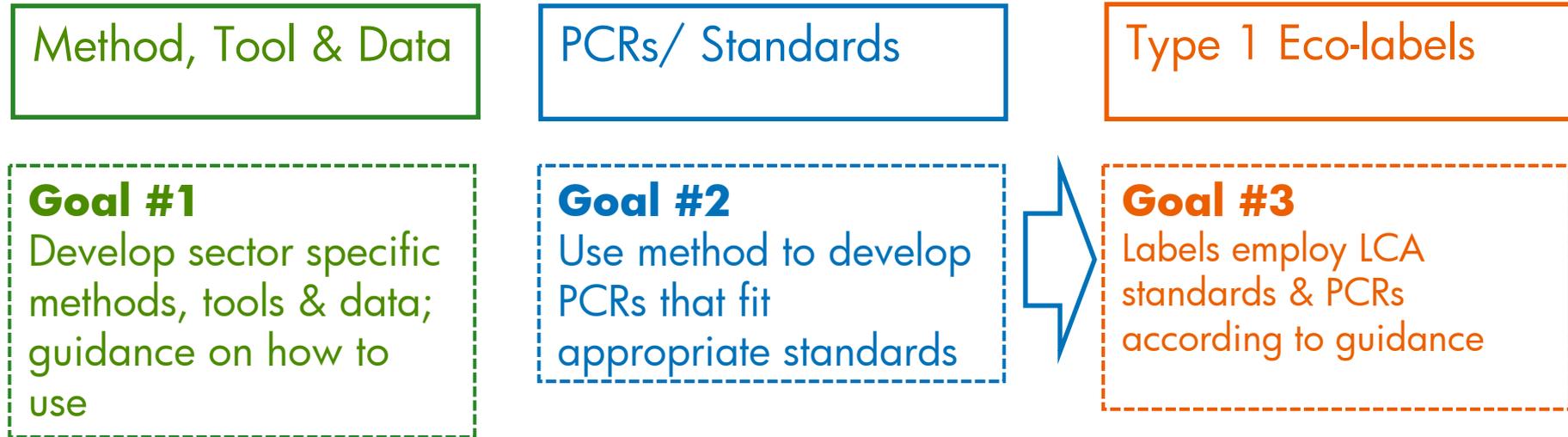
WRI – GHG Reporting Protocol

ISO 14067



# LABELING & LCA

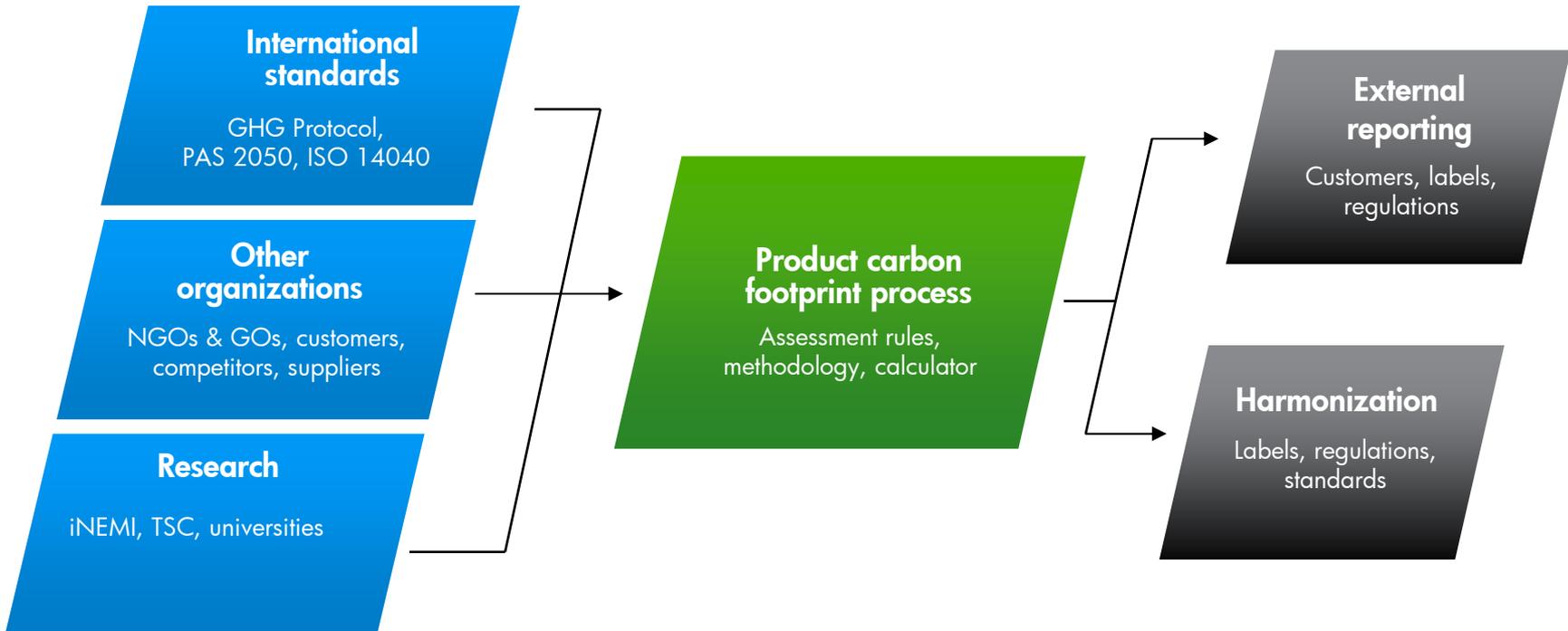
## PROPOSAL FOR TRANSPARENTLY INTEGRATING LCA INTO LABELING



***Result: Consistency. Different labels pointing to the same underlying LCA standards & methods***

# DRIVING PCF

HP is using a collaborative approach to create a credible, industry-wide methodology.



# CREATING AN ACCURATE PCF

Arriving at an accurate, reliable product carbon footprint for complex computing products is a challenge.



- Thousands of components
- Multiple suppliers
- Variability of data
- Components are constantly improved
- Many suppliers don't measure emissions
- Data is often generic, outdated or inaccurate

# DOES PCF LABELING MAKE SENSE?

- “ISO 14024 Type I labels should be retained as lead labels”
  - All relevant environmental and health aspects should be included
- “A static PCF stand-alone label providing a total CO2 footprint on products does not make sense and is not very relevant for consumer decision making.”
  - Source: “Requirements on Consumer Information about Product Carbon Footprint”, commissioned by ANEC, written by Oko-Institut e.V. (February 2010)
- HP: PCF disclosure to business, government customers make sense; for consumers, PCF should be a part of a broader label



# SETTING THE INDUSTRY STANDARD

HP is collaborating to develop a universal product carbon footprint methodology for IT.



- Transparent
- Objective
- Based on scientific methods
- Certified to international standards
- Credible and relevant to customers

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# SMART SCALING TACTICS

- Divide up the model in an effective yet efficient way
- Identify & fill gaps in data
- Define common assumptions
- Identify uncertainty and a roadmap for reducing it
- Determine what should LCA be used to measure (global warming potential, energy demand), and what should it inform on (e.g. human toxicity)
- When you want to scale something, start small & build off success
- Collaborate when there are common interests



# SOLUTIONS TO SCALING

example 1



## Laptop PAIA Overview and Update

Research collaboration:

MIT, CMU, ASU, TSC, UCB  
Carbon Trust, ENERGY STAR  
Dell, HP, Intel, Lenovo, AMD



Carnegie Mellon

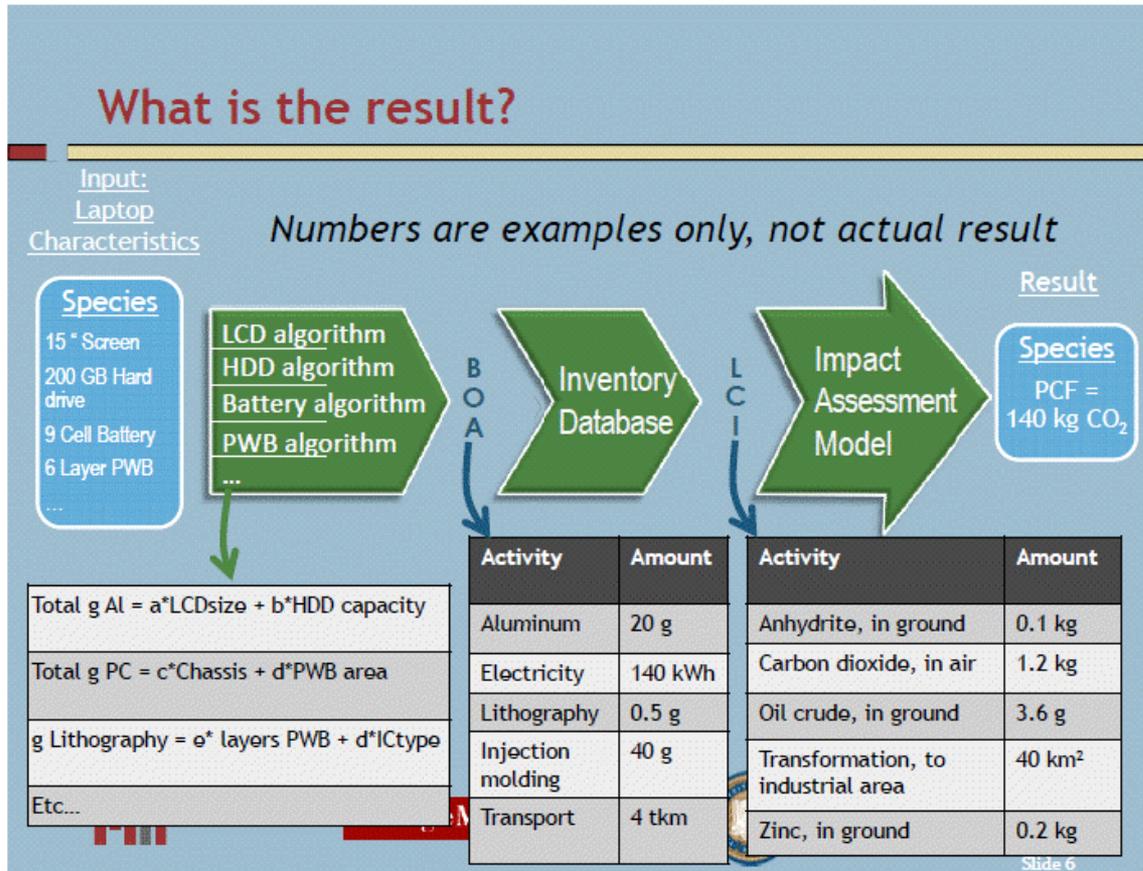


Slide 1



# SOLUTIONS TO SCALING

example 1



# SOLUTIONS TO SCALING

example 2

**The answer = APPEAR Electronics**  
From Electronic Component LCA to Equipment LCA



**APPEAR = Advanced Platform for Product Environmental Assessment and Reporting**

*An initiative of the Electronics sector  
with support of PE INTERNATIONAL and Five Winds International*



# A PATH FORWARD

## SCALING INDUSTRIAL LCA

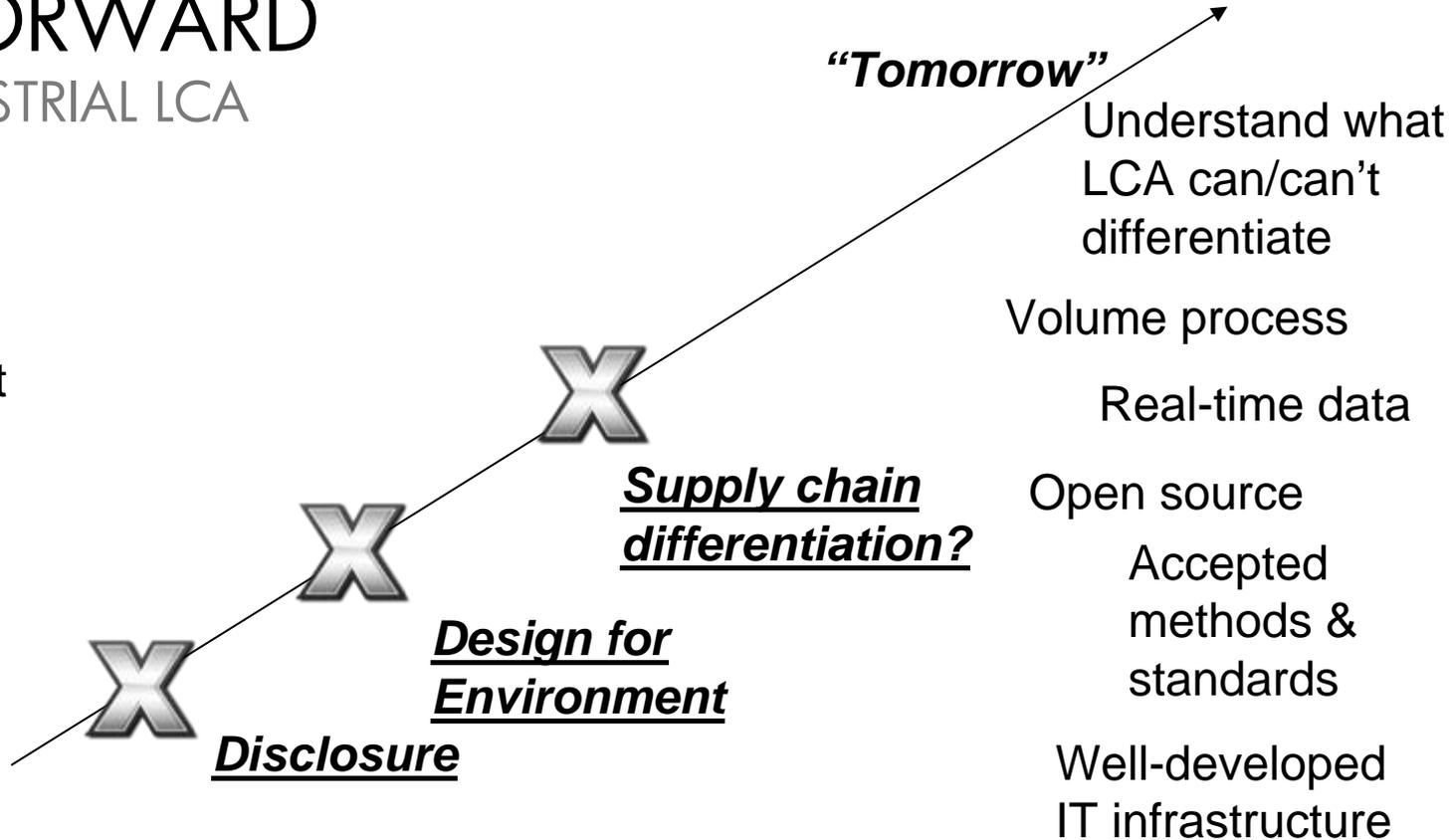
### ***“Today”***

Unsure of what  
LCA can/can't  
differentiate

Single, “hand-  
made” studies

Generic data

Proprietary



# KEY MESSAGE

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- In order to **scale** LCA, we need to work together to increase our-
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# Q&A

