

Product Full Material Disclosure Update

December 2013



Seagate: Storage Leader

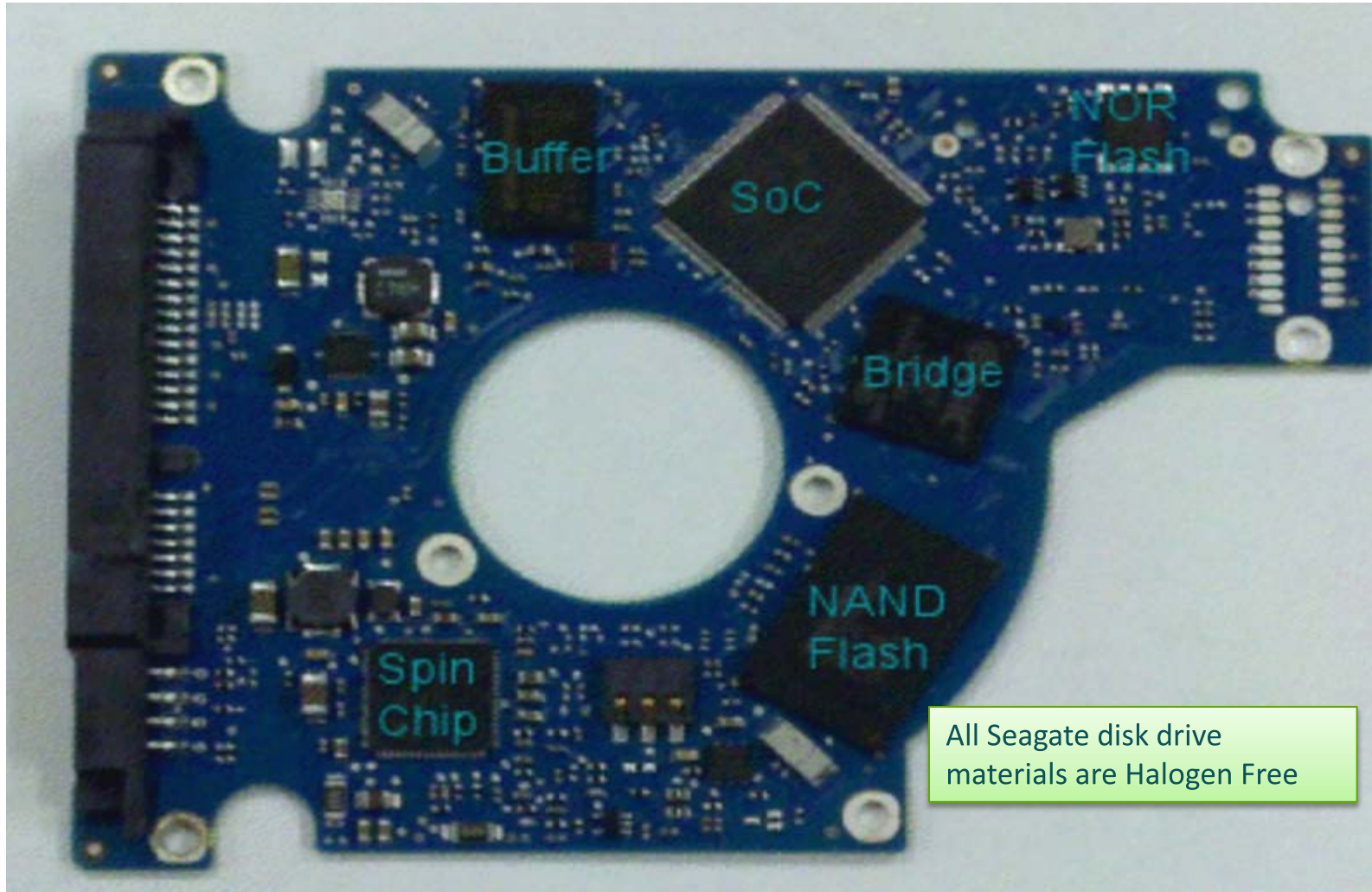
- **Seagate is the world's leading provider of storage devices**
 - Q4FY2013*: 53.9 million drives shipped; revenue of \$3.4 billion
- **Provides storage for enterprise, desktop, mobile computing, consumer electronics and retail markets**
 - Builds hard disk, solid state hybrid and solid state drives
 - 41% overall market share
 - Broadest product offering in the industry—largest customer base
- **Owns and vertically integrates critical technologies: heads and media**
- **Approximately 52,002** employees worldwide**

* For fourth fiscal quarter ended June 28, 2013

** Includes interns and agency temps

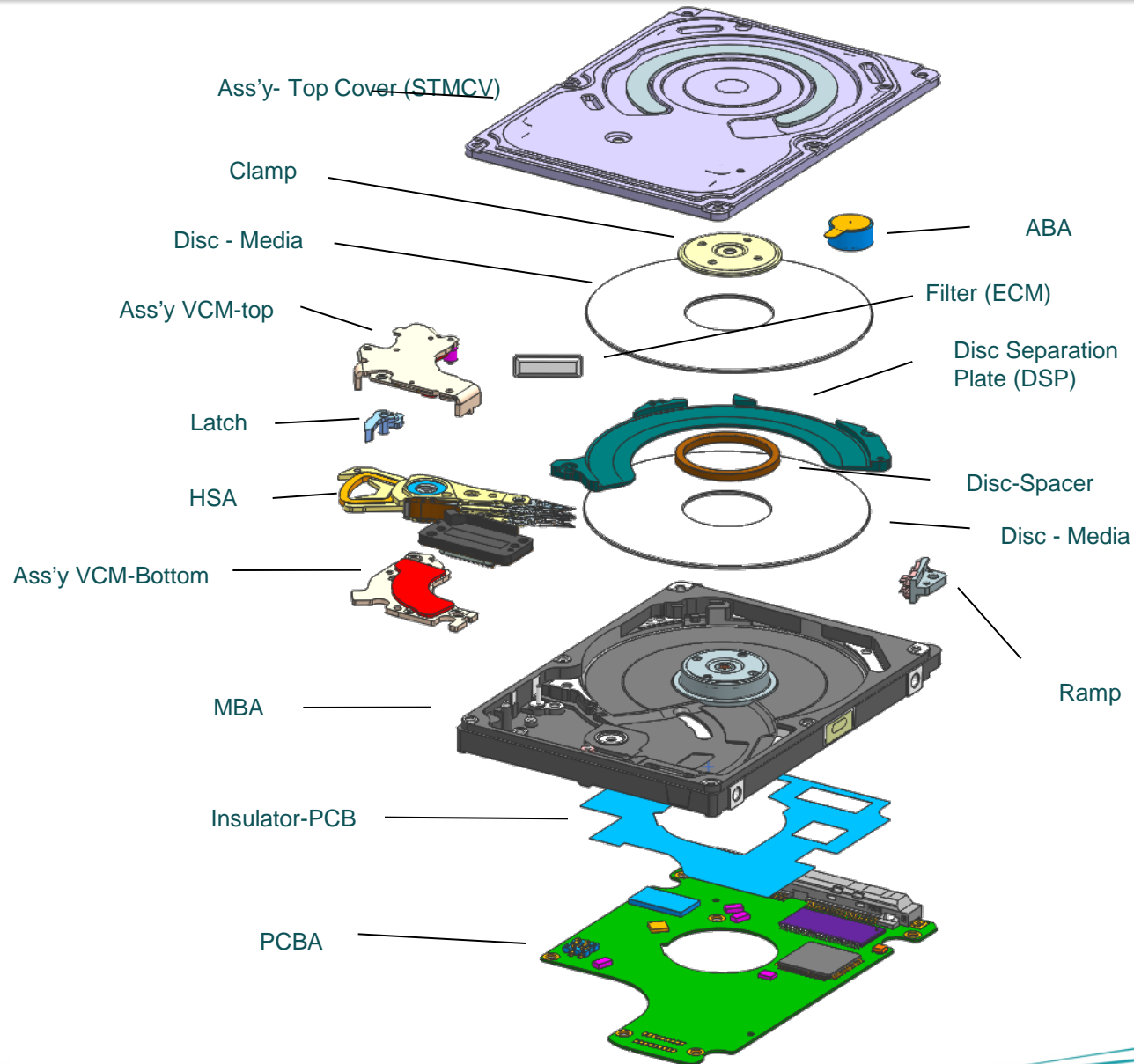
Drive Breakdown

PCBA – Flash - Hybrid

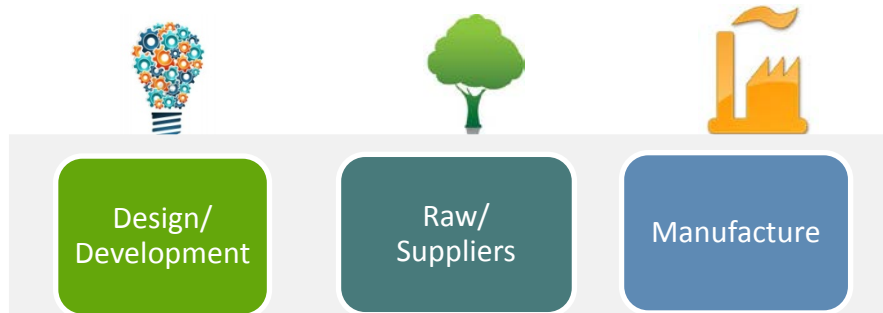


All Seagate disk drive materials are Halogen Free

Drive Breakdown



Substance restrictions: compliance with specifications and data/documentation requirements



Compliance to all applicable regulatory and customer requirements

- RoHS, REACH, RoHS 2, China RoHS, Regional restrictions (Canada, etc.)
- Halogen-free, phthalate-free, and myriad other voluntary restrictions

Alignment to standards

- IPC 1752 materials reporting format
 - Open, industry data standard
 - IPC 1753 is a new lab report data standard. Seagate led this effort.

'FMD' – Full Materials Disclosure

- Manage compliance to changing regulations and customer specifications restricting toxic substances

Stability

- Supplier reporting requirements and formats seldom change

Security

- Supplier data are kept confidential

Supplier responsibility

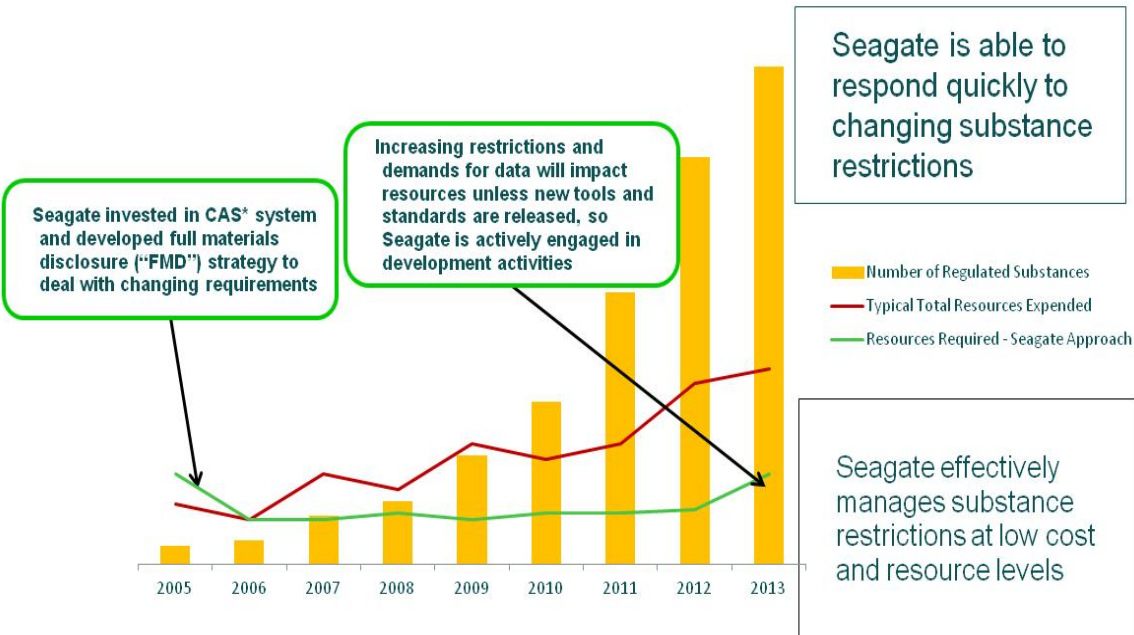
- Suppliers must participate and must provide all required data

Closed loop resourcing

- The same resources manage both supplier data AND customer reporting

Low cost, best-practice compliance

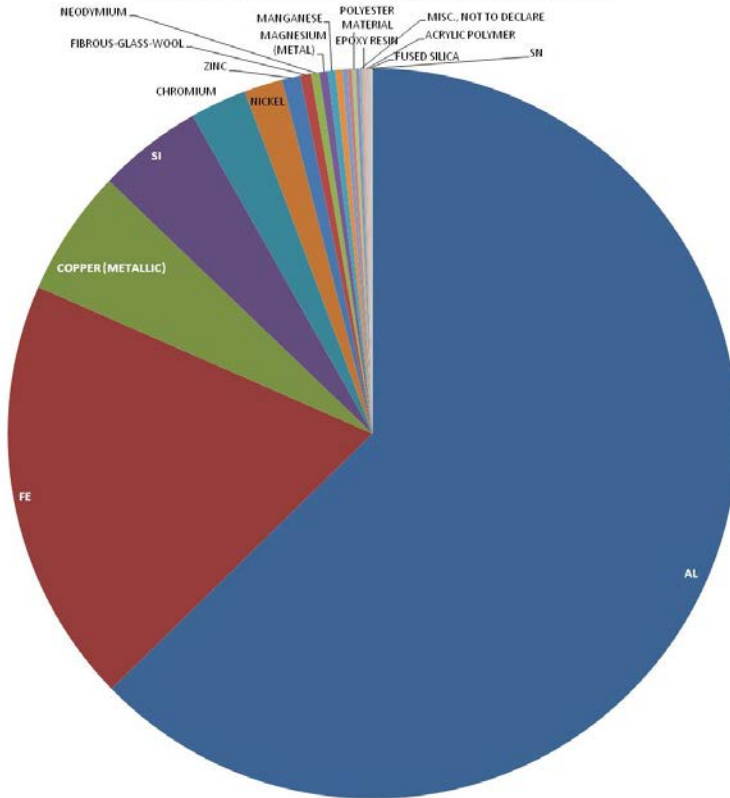
- Best compliance, fastest response, lowest cost



*CAS – Compliance Assurance System, Seagate's materials content compliance database

Using data compiled from supplier FMD, Seagate can assemble a bill of substances for our products

Composition of a typical Seagate desktop disk drive



Substance	CAS Number	Cumulative Concentration
AL	7429-90-5	61.9451
FE	7439-89-6	80.5984
COPPER (METALLIC)	7440-50-8	86.12
SI	7440-21-3	90.705
CHROMIUM	7440-47-3	93.1778
NICKEL	7440-02-0	94.862
ZINC	7440-66-6	95.6614
FIBROUS-GLASS-WOOL	65997-17-3	96.141
NEODYMIUM	7440-00-8	96.5053
MAGNESIUM	7439-95-4	96.8692
MANGANESE	7439-96-5	97.1983
LCP polymer	147310-94-9	97.5019
POM, Polyoxymethylene copolymer	24969-26-4	97.7305
"DOPO" halogen free flame retardant	35948-25-5	97.9132
POLYESTER MATERIAL	79-14-1	98.086
ACRYLATE URETHANE OLIGOMER	73324-00-2	98.2507
PROPRIETARY SYSTEM		98.3749
EPOXY RESIN	129915-35-1	98.4961
ACRYLIC POLYMER	37325-11-4	98.6128
FUSED SILICA	60676-86-0	98.7214
SN	7440-31-5	98.8116

- Listed phthalates* ("phthalate free") (Homogeneous Material level)
- JIG/IEC 62474 restricted chemicals (over limits)
- REACH SVHCs over 1000 ppm (Article)
- ODCs

The Seagate supplier specification restricts almost 2000 CAS numbers

Life Cycle Analysis enables a holistic view of product impacts



Our LCAs all adhere to ISO 14044 standards and are 3rd party critically reviewed

What?

- Analysis of impacts to the environment over a product's life cycle from raw material inception through end-of-life
- Cradle-to-grave includes raw material extraction, materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling
- May also include interpretation of results, identification of leverage points, and recommendations for improvement

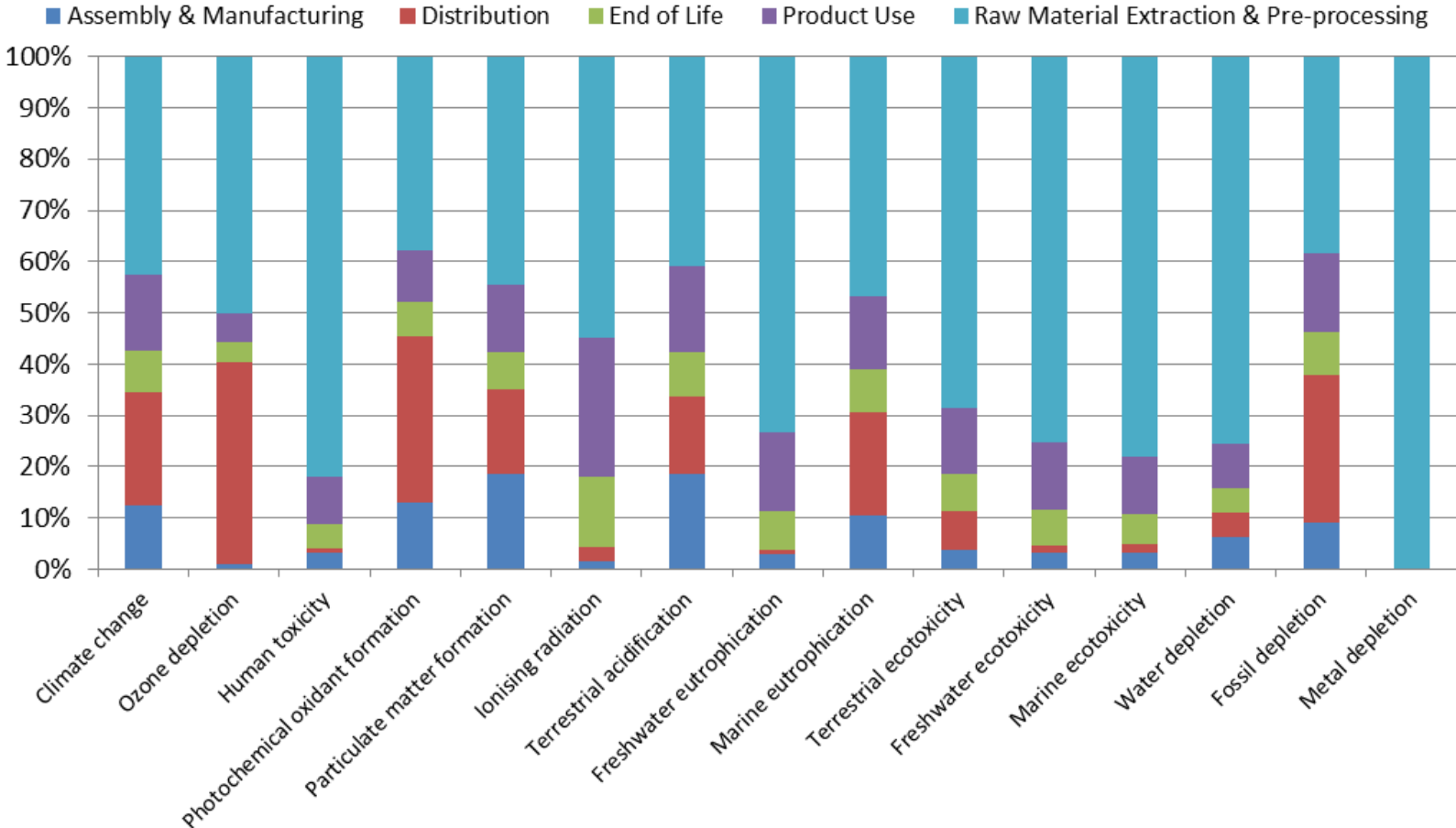
Why? *Informed Decision-making*

- Understand full range of product impacts
- Drive toward sustainability
- Reduce costs
- Prioritize improvement opportunities
- Answer customers
- Identify trade-offs between design alternatives
- Choose suppliers

LCA Impacts Include:
Climate change
Ozone depletion
Human toxicity
Photochemical oxidant formation
Particulate matter formation
Ionizing radiation
Terrestrial acidification
Freshwater eutrophication
Marine eutrophication
Terrestrial ecotoxicity
Freshwater ecotoxicity
Marine ecotoxicity
Water depletion
Metal depletion
Fossil depletion

Example of Seagate Barracuda HDD LCA Impacts

3.5" Desktop HDD*



*LCA performed by WSP Environment and Energy,
3rd party reviewed by Earthshift

We will publish LCA summary data (draft example below)

Barracuda LP HDD

Barracuda LP HDD Product Life Cycle Assessment Summary

Product Description
The Barracuda LP HDD is a hard disk drive designed for providing low power, whisper quiet performance for personal attached storage, small office and home storage appliances, and low power PCs. Barracuda is known for its best-in-class acoustic performance and low power demand.

Life Cycle Assumptions
This study is based on a single Barracuda 160 GB hard disk drive in operation for 5 years, assuming product distribution and use in the United States, Europe, and Asia. The drive has a spindle speed of 7200 RPM, 8MB of cache, and is configured with 210 bytes per sector.

This Life Cycle Assessment takes into consideration the raw material extraction, manufacturing, transportation, production assembly and distribution, packaging, consumer use and assumed end of life (EOL) systems. Infrastructure impacts, such as the machine tool manufacture or buildings used in production and assembly have been excluded. 38 product components in this study were considered using the Seagate Bill of Materials. Assembly impacts were allocated on a production per unit basis.

SimaPro v12 software and the EcoInvent v2.2 database were used to prepare the LCA. The ReCiPe mid-point hierarchical method was used to determine life cycle impacts for the product.

Relative Results Summary:

Relative impacts by product life cycle stage for a 160 GB Barracuda HDD

■ Raw Material Extraction & Pre-processing ■ Assembly & Manufacturing ■ Distribution ■ Product Use ■ End of Life

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Barracuda LP HDD

Barracuda LP HDD Product Life Cycle Assessment Summary

Calculated Impacts

Mid-point Impact	Unit	Total
Climate change	kg CO2 eq	2.6E+01
Ozone depletion	kg CFC-11 eq	1.2E-06
Human toxicity	kg 1,4-Dioxin eq	1.2E+01
Photochemical oxidant formation	kg NMVOC	6.6E-02
Respiratory inorganic particulates formation	kg PM10 eq	4.4E-02
Ionizing radiation	kg U235 eq	4.1E-01
Terrestrial acidification	kg SO2 eq	1.4E-01
Freshwater eutrophication	kg P eq	1.2E-02
Marine eutrophication	kg N eq	2.0E-02
Terrestrial acid equivalents	kg 1,4-Dioxin eq	2.0E-02
Freshwater acid equivalents	kg 1,4-Dioxin eq	2.1E-01
Marine acid equivalents	kg 1,4-Dioxin eq	2.1E-01
Water depletion	m3	1.2E+01
Mineral depletion	kg Fe eq	6.6E+00
Fossil depletion	kg oil eq	6.6E+00

Focusing on Climate Change and Greenhouse Gas (GHG) emissions, the calculated total life cycle GHG emissions for this drive is 26 kg CO2e with the percentage contribution from each life cycle stage presented in the pie chart below right.

Raw Material Acquisition and Pre-processing
This phase captures the impacts associated with raw material extraction delivered to Seagate's point of assembly and represents 45% of the total product's life cycle. Component manufacturing impacts, largely result from the materials used in each component and the energy intensity of component production.

Assembly and Manufacturing
The environmental impacts resulting from product manufacturing by Seagate for each Barracuda LP hard drive were estimated using activity data from Seagate's GHG emission inventory. The data were allocated to the production a unit manufactured base, incorporating all direct and indirect emissions from both production and facility operation including heating and cooling, vehicle fleets, and fugitive emissions.

Use Phase
Seagate's desktop power management technology optimizes performance to minimize impacts associated with drive power consumption. The estimated lifetime electrical consumption for the drive is 4.62 kWh, equivalent to the amount of energy needed to power a 60 Watt light bulb for 9.2 days. An evaluation determined how the product's climate impacts would change for use in different parts of the world and different usage rates based on different workday durations and are represented in the chart below.

Distribution
The product's life cycle assumes distribution to the United States, Europe, Asia, and shipments to customers from the Seagate assembly site. The total GHG emissions from product distribution is 22% of the total life cycle impact.

End of Life (EOL) & Recycling
Although the LCA data for electronic products' EOL/recycling phase has not been well established, and primary data are not available for this product stream, industry practices were made based primarily on EcoInvent unit processes. These processes represent the manual dismantling and depollution, and the mechanical treatment (shredding) of electronic devices. These processes are considered as globally representative, and applied to the Barracuda drive, although it is acknowledged that this will produce an optimistic result for EOL impacts. Recycling of packaging waste was derived from EPA data on Municipal Solid Waste Generation, Recycling, and Disposal in the United States.

Climate Change Potential (kg CO2e)

■ 4.5 Hr Work Day ■ 7.5 Hr Work Day ■ 10 Hr Work Day

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