

# Data Sources Underlying the Computer Electronics Environmental Benefits Calculator - Desktop Computer Data

The full criteria can be found online at <https://www.epeat.net/resources/criteria-2/>

<b>Baseline Assumptions for Conventional Products for Purchasing</b>				
<b>Reduced Toxicity</b>				
<b>Criteria</b>	<b>Attribute</b>	<b>Value</b>	<b>Reference*</b>	<b>Notes</b>
4.1.1.1	Average lead content per unit	0 g		Updated baseline (non EPEAT) equipment data to reflect use of unleaded solder (more representative of current production)
	Average mercury content (not including lamps) per unit	0 g	Dell, 2012; Lenovo, 2012.	Company published product environmental profiles and declarations. Survey of 20 CPU data sheets from 2 manufacturers yielded no reported quantifiable amounts of Hg. Only referenced source of mercury in personal computers is in backlights of LCD monitors and notebooks (Brady et al., 2003; Socolof et al., 2001).
	Average cadmium content per unit	0 g	Brady et al., 2003.	<100 ppm; assume 0 g
	Average hexavalent chromium content per unit	1.3 g	MCC, 1996; CIWMB, 2006.	Calculated using MCC composition data (for computer system) minus reported values for Cr <sup>+6</sup> in CRTs from CIWMB manufacturer reported data. For MCC study, calculation assumes all chromium in desktop is Cr+6.
	Average PBB content per unit	0 g		PBB is no longer manufactured (AEAT, 2001; BSEF, 2000).
	Average PBDE content per unit	0 g	WA State Department of Ecology, 2006; BSEF, 2010.	The manufacture of Penta-PBDE and Octa-PBDE was discontinued in 2004 (WA State Department of Ecology, 2006). Deca-BDE use in electronics was added to the the RoHS restricted substances in the European Union, starting 2008, and several U.S. states have prohibited its use in computers and other products. Further, member companies of the BSEF are voluntarily phasing out the production and use of Deca-BDE in the U.S. market by the end of 2012 (BSEF, 2010).
<b>Material Use</b>				
<b>Criteria</b>	<b>Attribute</b>	<b>Value</b>	<b>Reference*</b>	<b>Notes</b>
4.2.1.1-3	Percent recycled content of plastic (resin) in product	0 %	EPEAT Registry, 2012.	79% of CPUs listed on the EPEAT Registry in 2011 declared 0% post consumer recycled content. It is assumed that a baseline product would not exceed the performance of EPEAT-Registered products.
	Average amount of plastic in product	0.7410 kg	SWICO Recycling, 2016; EPEAT Registry, archived data from 2007-2011.	Average EPEAT product weight x % plastic from SWICO (2010) data.
	Percent renewable/biobased material in product	0 %	EPEAT Registry, 2012.	99% of CPUs listed on the EPEAT Registry in 2011 declared 0% renewable/biobased content. It is assumed that a baseline product would not exceed the performance of EPEAT-Registered products.

4.2.2.1-2	Average amount of molded plastic parts in product	0.7410 kg	SWICO Recycling, 2016; EPEAT Registry, 2012.	Assumption; same as total plastic in product. EPEAT data from 2007 - 2011.
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**Packaging**

Criteria	Attribute	Value	Reference*	Notes
4.8.3.1-2	Percent recycled content of corrugated packaging	0 %		This baseline value is assumed to be 0%, thus providing full credit for recycled content of packaging.
	Average amount of corrugated per unit package	1.579 kg	Dell, 2012; Lenovo, 2012.	Company published product environmental profiles and declarations. Average amount taken from a sample of environmental data sheets. Sample size includes 20 devices from 2009 - 2012 from 2 manufacturers.
	Percent recycled content of plastic/foam packaging	0 %		This baseline value is assumed to be 0%, thus providing full credit for recycled content of packaging.
	Average amount of plastic/foam per unit package	0.265 kg	Dell, 2012; Lenovo, 2012.	Company published product environmental profiles and declarations. Average amount taken from a sample of environmental data sheets. Sample size includes 20 devices from 2009 - 2012 from 2 manufacturers.
	Percent recycled content of other packaging	0 %		This baseline value is assumed to be 0%, thus providing full credit for recycled content of packaging.
	Average amount of other packaging per unit package	0 kg	Dell, 2012; Lenovo, 2012.	Company published product environmental profiles and declarations. Average amount taken from a sample of environmental data sheets. Sample size includes 20 devices from 2009 - 2012 from 2 manufacturers.
4.8.5.1	Packaging avoided per unit by packaging reuse	0 kg		This baseline value is assumed to be 0, thus providing full credit for packaging reuse.

**Baseline Assumptions for Use and End-of-Life**

Criteria	Attribute	Value	Reference*	Notes
USE	Percentage of units with power management features enabled	0 %	ENERGY STAR, 2014.	
USE	Average lifetime of unit	54 months	FEC, 2012.	This baseline value is for the initial user.
EOL	Average weight of product	13.0 kg	SWICO Recycling, 2016.	Based on survey of over 400,000 computers in European waste stream.
EOL	Average hazardous waste content in unit	1.482 kg	Calculated.	Sum of printed wire boards and insulation resin (plastic) on wire and cable. See rows below. Assumes printed wire boards and cables contain lead.
EOL	Average weight of printed wire boards	1.0790 kg	SWICO Recycling, 2016.	Average SWICO's weight x % content of PWBs.
EOL	Average weight of resin (plastic) in wire and cable	0.4030 kg	SWICO Recycling, 2016.	Average SWICO's weight x % content for cables. Assumes the weight of cables is the weight of the resin.

EOL	% material collected for recycling that is recycled	100 %		Assumption
EOL	% material collected for recycling that is reused	0 %		Assumption

## EPEAT Default Assumptions for Purchasing, Use, and End-Of-Life

### Reduced Toxicity

Criteria	Attribute	Value	Reference*	Notes
4.1.1.1	RoHS Compliance	n/a		Applies to all tiers--bronze, silver, and gold -- unless otherwise noted. The calculator assumes "RoHS compliance" results in the elimination of restricted substances, since the quality and precision of available data does not easily allow extrapolation to individual "homogeneous" materials, which is the unit of measure for the maximum concentrations defined by RoHS.
	Lead content	0 g		Applies to solder and wire & cable applications; CRT glass is exempt from RoHS.
	Cadmium content	0 mg		
	Hexavalent chromium content	0 mg		
	PBB content	0 mg		
	PBDE content per unit	0 mg		

### Material Use

Criteria	Attribute	Value	Reference*	Notes
4.2.1.1	Recycled plastic (resin) content, manufacturer's declaration	varies %	Varies by EPEAT tier.	
	Amount of recycled resin in product	declared % x baseline resin content in kg		
4.2.1.2	10% recycled plastic (resin) content	10% x baseline resin content in kg	% defined by EPEAT standard.	
4.2.1.3	25% recycled plastic (resin) content	25% x baseline resin content in kg	% defined by EPEAT standard.	
	Recycled content of packaging, corrugated, manufacturer's declaration	varies %	Varies by EPEAT tier.	
	Recycled content of packaging, plastic/foam, manufacturer's declaration	varies %	Varies by EPEAT tier.	

4.8.3.1	Recycled content of packaging, other, manufacturer's declaration	varies %	Varies by EPEAT tier.	
	Amount of recycled content in packaging, corrugated	declared % x amt corrugated in kg		
	Amount of recycled content in packaging, plastic/foam	declared % x amt plastic/foam in kg		
	Amount of recycled content in packaging, other	declared % x amt other in kg		
4.8.3.2	CPG recycled content of packaging, corrugated	0 %	% defined by EPEAT standard.	
	Amount of recycled corrugated in packaging to meet CPG	25% x amt corrugated in kg		
4.8.5.1	Packaging reused	5 times	Defined by EPEAT standard	
	Packaging avoided per unit by packaging reuse	5 x amt pkg in kg		

### Federal Electronics Challenge

Criteria	Attribute	Value	Reference*	Notes
EOL	Reuse ratio	1 for 1		Reuse assumes a 1 for 1 trade (i.e., for every unit reused, one unit is not produced.)

### EPEAT Registration Tier Assumptions for Purchasing

#### Reduced Toxicity

Criteria	Attribute	Bronze	Silver	Gold	Notes
4.1.1.1-R	Compliance with provisions of European RoHS Directive	yes	yes	yes	Required criteria; all registered products must meet. The calculator assumes "RoHS compliance" results in the elimination of restricted substances, since the quality and precision of available data does not easily allow extrapolation to individual "homogeneous" materials, which is the unit of measure for the maximum concentrations defined by RoHS.
4.1.3.1-R	Reporting on amount of mercury used in light sources, Number of lamps with Hg	NA	NA	NA	
	Reporting on amount of mercury used in light sources, maximum average Hg content per lamp	NA	NA	NA	

4.1.3.2-O	Low threshold for amount of mercury used in light sources (Max average of 3 mg Hg/lamp)	NA	NA	NA	
4.1.3.3-O	Elimination of intentionally added mercury used in light sources	NA	NA	NA	

### Material Use

Criteria	Attribute	Bronze	Silver	Gold	Notes
4.2.1.1-R	Manufacturer's declared percent recycled content for product	0%	0%	5%	
4.2.1.2-O	Minimum content of postconsumer recycled plastic (>=10%)	no	no	no	Criterion must be consistent with declared values in above rows.
4.2.1.3-O	Higher content of postconsumer recycled plastic (>=25%)	no	no	no	Criterion must be consistent with declared values in above rows.
4.2.2.1-R	Declaration of renewable/biobased plastic content				<i>Not used in versions 3.0 or 4.0.</i>
4.2.2.2-O	Minimum content of renewable/biobased plastic (>=10%)				<i>Not used in versions 3.0 or 4.0.</i>
4.2.3.1-R	Declared product weight (kg)				<i>Not used in versions 3.0 or 4.0.</i>

### Energy

Criteria	Attribute	Bronze	Silver	Gold	Notes
4.5.1.1-R	ENERGY STAR®	yes	yes	yes	Required criteria; all registered products must meet.
4.5.1.2-O	ENERGY STAR® Early Adopter				<i>Not used in versions 3.0 or 4.0.</i>

### Packaging

Criteria	Attribute	Bronze	Silver	Gold	Notes
	Declaration of recycled content in packaging, % recycled content for corrugated/paper fiber packaging	24%	35%	55%	Values shown are based on EPEAT registry, not specific level required in IEEE standard. For corrugated, bronze level does not meet 25% minimum, other levels do.

4.8.3.1-R	Declaration of recycled content in packaging, % recycled content for plastic/foam/resin packaging	0%	0%	10%	
	Declaration of recycled content in packaging, % recycled content for other packaging	0%	0%	0%	
4.8.3.2-O	Minimum postconsumer content guidelines (CPG) (Recycled content of corrugated packaging >=25%)	no	yes	yes	Criterion must be consistent with declared values in above rows.
4.8.5.1-O	Reusable packaging	no	no	yes	

### Distribution of Products Used in Government

Criteria	Product Type	Distribution	Reference	Notes
USE	CPU	30.3%	FEC, 2012.	Products reported in use during FY2011.
USE	CRT	0.1%	FEC, 2012.	Products reported in use during FY2011.
USE	LCD	47.0%	FEC, 2012.	Products reported in use during FY2011.
USE	Notebook	22.7%	FEC, 2012.	Products reported in use during FY2011.
USE		<b>100%</b>		

### Energy Information

Criteria	Attribute	Value	Reference*	Notes
USE	Electricity cost	\$0.103 /kWh	ENERGY STAR, 2014.	National average: US Department of Energy, Annual Energy Outlook 2013 (Early Release edition), (converted from 2011 to 2012 dollars)
USE	Discount rate	4 %	ENERGY STAR, 2014.	A real discount rate of 4 percent is assumed, which is roughly equivalent to the nominal discount rate of 7 percent (4 percent real discount rate + 3 percent inflation rate).
USE	% of units turned off at night	36 %	ENERGY STAR, 2014.	Assumption, used in ENERGY STAR power management calculators.
USE	% power managed	8 %	ENERGY STAR, 2014.	Assumption, used in ENERGY STAR power management calculators.
USE	Time in "active" or "idle" mode	1173 hours/ year	Calculated.	Calculated using assumptions shown 2013 ENERGY STAR power management calculators.
USE	Time in "sleep" mode	733 hours/ year	Calculated.	Calculated using assumptions shown 2013 ENERGY STAR power management calculators.
USE	Time in "off" mode	6854 hours/ year	Calculated.	Calculated using assumptions shown 2013 ENERGY STAR power management calculators.

### Baseline Units

Criteria	Attribute	Value	Reference*	Notes
USE	Average power in "active" or "idle" mode	48.1 watts	ENERGY STAR, 2014.	
USE	Average power in "sleep" mode	2.3 watts	ENERGY STAR, 2014.	

USE	Average power in "off" mode	1.0 watts	ENERGY STAR, 2014.	
USE	Weighted average UEC	286.3 kWh/yr	Calculated.	Calculated using assumptions shown 2013 ENERGY STAR power management calculators.
<b>ENERGY STAR 5.* Qualified Units</b>				
<b>Criteria</b>	<b>Attribute</b>	<b>Value</b>	<b>Reference*</b>	<b>Notes</b>
USE	Average power in "active" or "idle" mode	46.2 watts	ENERGY STAR, 2013.	
USE	Average power in "sleep" mode	2.5 watts	ENERGY STAR, 2013.	
USE	Average power in "off" mode	1.5 watts	ENERGY STAR, 2013.	
USE	Weighted average UEC	276.4 kWh/yr	Calculated.	Calculated using assumptions shown 2013 ENERGY STAR power management calculators.
<b>ENERGY STAR 6.* Qualified Units</b>				
<b>Criteria</b>	<b>Attribute</b>	<b>Value</b>	<b>Reference*</b>	<b>Notes</b>
USE	Average power in "active" or "idle" mode	27.1 watts	ENERGY STAR, 2014.	
USE	Average power in "sleep" mode	1.8 watts	ENERGY STAR, 2014.	
USE	Average power in "off" mode	0.8 watts	ENERGY STAR, 2014.	
USE	Weighted average UEC	162.2 kWh/y	Calculated.	Calculated using assumptions shown 2013 ENERGY STAR power management calculators.

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