Measuring environmental benefits of Green Business practices

Like all things GB…

- Think of the database as a shell to house what is to come
- Collective knowledge and continual improvement build a robust program
- Metrics were not newly developed in most cases. They were existing ones, based on several assumptions
- We will point out assumptions as best we can today, but they are all available on the list serve
- We need you to help improve and beef up existing metrics in the spirit of continual improvement!!

Purchase copy, computer and fax paper with minimum 50% post consumer waste (recommended 100%).

- Savings: GHG reductions
- Inputs: Reams of paper purchased/yr, PCW content

Calculation

Total GHG reduced = no. of paper reams X 5 lbs/ream X GHG reduction (lbs CO2/lbs paper)

Assumption/Conversion:

GHG factors are 6.2 (100%), 2.91 (50%), 1.6 (30%) from EPA's Recon

Install toilets with maximum flush volume of 1.6 gpf (gallon per flush) or less.

- Savings: gal of water, GHG reductions
- Inputs: # of male & female employees, # visitors, # customers, flush volume

Calculation

Gal of water saved = no. of male employees x 1 flush/day x (52 weeks/yr X 5 work days/week - 12 holidays/year) X (3.5-toilet flush volume)

Assumption/Conversion:

- *3.5 gal/flush assumed for non low flow toilets.*
- *Males use toilets 25% of time and urinals 75% of the time (US Navy).*
- *Visitors utilize bathroom facilities .5 times a day, and retail customers utilize bathroom facilities .2 per day (LEED standards).*
- *It takes 1 KWH to pump 89 gal water. (SFPUC)*
- *GHG reduction is kwh/yr X 0.6389 lbs CO2/kwh (ICLEI Software)*

Install low flow aerators or flow reducing valves with flow rates not to exceed .5 gpm for hand-washing sinks, 1.5 gpm for kitchen and lavatory sink faucets…

- Savings: gal water saved, GHG reductions
- Inputs: All faucets have aerators, aerator flow rate

Calculation

gal/yr = no. of employees X (2.2 gpm - flow rate of aerator) X (2.25 minutes/day) X (52 weeks/yr X 5 work days/week - 12 holidays/year)

Assumptions/Conversions:

- *Standard aerator has 2.2 gpm volume (Federal Standard).*
- *Employees use faucets on average 45 seconds for 3 times a day = 2.25 min/day (LEED – EB)*

Replace all T-12 fluorescent lighting with energy-efficient T-8 or T-5 fixtures with electronic ballasts or other equivalent efficacy lighting.

- Savings: kwh/yr, GHG reductions
- Inputs: # T-12s replaced with T-8s

Calculation

kwh/Yr = # of lamps X 22.88 kwh/lamp/yr

Assumptions/Conversions:

Energy Savings per T-8 conversion = 22.88 kwh/lamp/yr
(http://eega.cpuc.ca.gov/deer/)

Use power management software programs that save energy by automatically turning off idle monitors and printers.

- Savings: KWH savings, GHG reductions
- Inputs: # monitors

Calculation

- kwh/yr = no. of monitors X 455 kwh/unit/yr;
- GHG reduction in lbs/yr = kwh/yr X 0.6389 lbs/kwh

Assumptions/Conversions:

- 455 kwh/unit/year savings through power management (Energy Star ®)

Replace standard fluorescent lights with low mercury fluorescent lights.

- Savings: mercury reduced
- Inputs: # of low Hg T-8s in use

Calculation

Total mgs of mercury reduced = No. of lamps x 1.7 mgs mercury/lamp

Assumption/Conversion:

Low mercury lamps save at least 1.7 mgs mercury/lamp. Low Hg T8s have less than 5 mgs of Hg/lamp and conventional T8s have over 10 mgs.

Use safer alternatives to potentially harmful products.

- Savings: Hazmat reduced
- Inputs: Square footage of property/facility

Calculation

Gallons of hazardous materials reduced = square footage X (0.6 gal/1000 sq ft) / 1000

Assumption/Conversion:

Assume original quantity = 2 gal of product/ 1,000 SF unless otherwise stated by sites.

Change 3 products --> e.g., change to non-aerosol, and select less toxic ingredients for three products. The resulting benefit is: 0.6 lbs/year of haz mat per 1000 sq ft = 2 gal/1000 sq ft x 25% x 8.34 lbs/gal x 15% (based on 25% reduction in product use, 8.34 lbs per gallon average product weight, and 15% original product haz mat content.)

WASTE DIVERSION CALCULATIONS

Scenario 1 – If business does not pay garbage bill

		Per day per employee		Working days				
No of Employees	Times	generation	Times	per year	Divided	1 ton	Equals	Tons / year
50	X	1.9	X	250	/	2000	=	11.875

Recycling Assumptions	Pecentage	Annual Generation (tons/yr)	Modification Factor (to be input by auditor)	Modified Generation (tons/yr)	CO2 CONVERSION (mtce/ton of material)	CO2 Diversion (million tons/yr)
All paper	77%	9.14375	0.7	6.40	-0.8011	-5.127540688
Bottles and cans	6%	0.7125	0.7	0.50	-0.8011	-0.399548625
Compostables	10%	1.1875	0.7	0.83	-0.2025	-0.168328125
Residual (LANDFILL)	7%	0.83125		4.14	0.1	0.4144375
Totals	100%	11.875		11.88		
					TOTAL CO2 Diversion	-5.280979938

GB input

ENVIRONMENTAL INNOVATIONS

WASTE DIVERSION CALCULATIONS

Scenario 2 – If business pays garbage bill

Commodity (drop down options)	Container Size (A)	yards/gallons (see below)	Number of Containers (B)	Frequency of pick up/ wk (C)	Compacted? (y/n) (3:1) (D)	Volume to Weight Conversion Factor,lbs/cu yard (E)	Tons per year (of commodity)	CO2 CONVERSION (mtce/ton of material)
Mixed or co-mingled recycling (all commodities in same container, including, paper, glass, plastic, metal, cardboard)		MUST BE CONVERTED TO CUBIC YARDS, EVEN IF REPORTED IN GALLONS			If D is Yes, Use 3; If D is No, use 1	335	Tons is [A (cu yards) X B X C X E X D]/2000	-0.8011
Mixed Paper						484		-0.2884227
Bottles and Cans (PET, HDPE, Aluminium, Glass)						281.5		-0.0276065
Cardboard						100 (IF unbaled) or 1100 (IF Baled)		-0.2283719
Mixed Organics (food waste and yard waste)						710		-0.2025
Food Waste						1070		-0.1425
Yard Waste						350		1
plastic film						22.55	[redacted]	1
Garbage						150		0.99465
glass					NO COMPACTOR OPTION	1000		-0.0100374
scrap metal						225		-0.011745
wood pallets	HOW MANY WOOD PALLETS?					35 LBS/PALLET	[redacted]	1

Solvent Regulations

- In many parts of the state there are more strict solvent regulations
- Printers must use low VOC solvents: <100g/L in Southern California
- Auto Repair shops can no longer use solvent parts washer in the Bay Area, they must use an aqueous parts washer
- None of these are mandated in the Monterey Bay Area- therefore we are incentivizing these actions through the GBP. You will notice this on the metrics for these sectors.

Printer Metric

Use low VOC solvents for both blanket and roller cleaning solvents. Low VOC is <100 g/L.

- Savings: VOC emissions, toxics reductions
- Inputs: lbs/gallon VOC prior to GBP, lbs/gallon VOC after GBP, gallons of solvent used/year

Calculation

VOC emissions reduced = x lbs/gallon prior-x lbs/gallon after * gallons/year (may need to convert g/L to lbs/gallon)

Assumptions/Conversions:

Data is readily available on MSDSs. Assumes printer is telling you the right consumption.

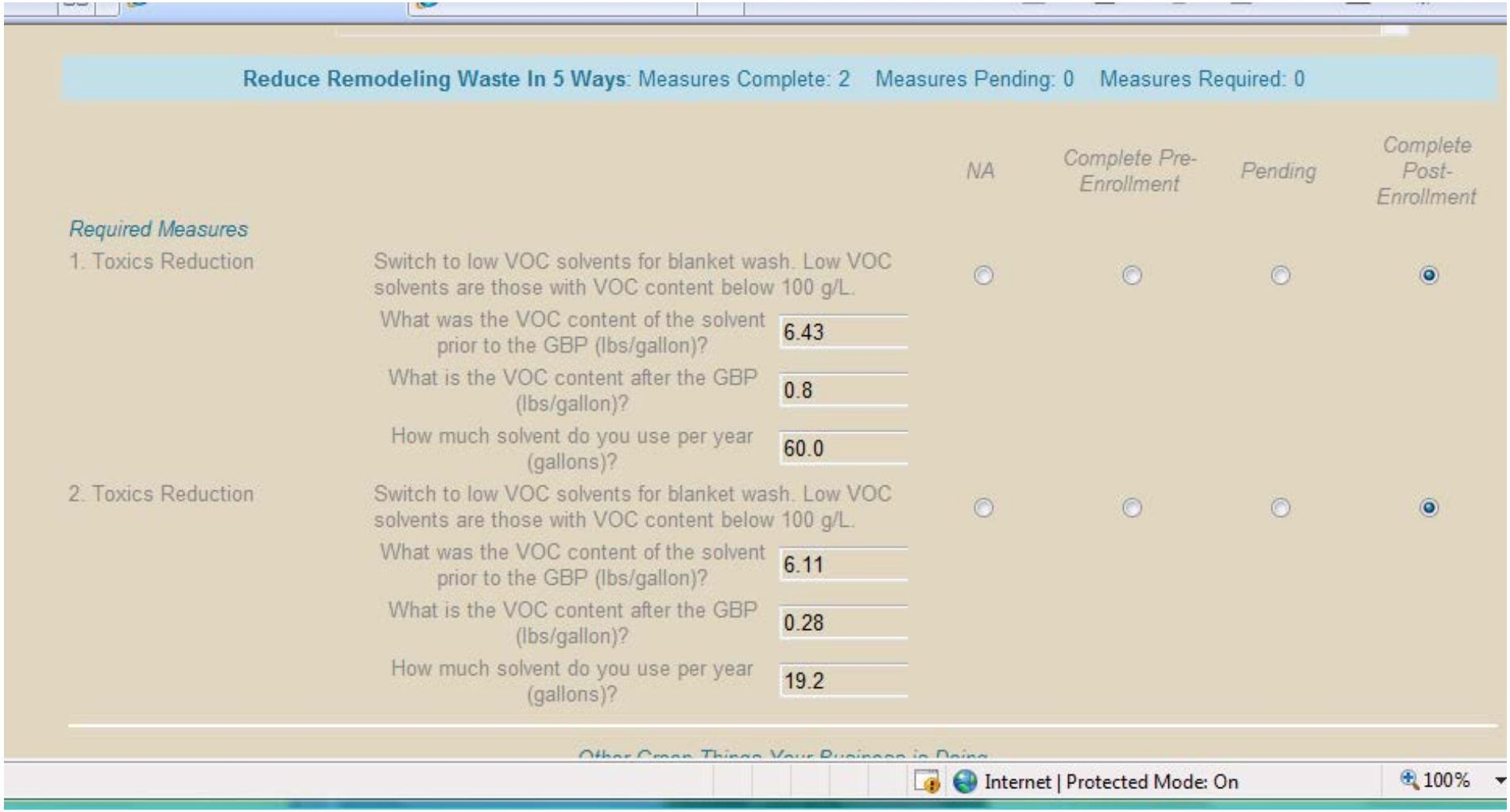
ENVIRONMENTAL INNOVATIONS

Calculated reductions

Here are Angelo's calculated reductions in air pollution (VOCs):

- Roller solvent: 6.43 lbs/gallon prior to GBP to 0.8 lbs/gallon after the GBP. That's a reduction of 5.63 lbs/gallon and he uses approximately 60 gallons/year.
- That's a reduction of 337 lbs/year of VOCs from his roller solvent.
- The same calculation for his blanket wash was 112 lbs/year.
- ***Total reduction is 449 lbs of VOCs reduced per year from one small shop in Santa Cruz.***

How it works on the Database



Reduce Remodeling Waste In 5 Ways: Measures Complete: 2 Measures Pending: 0 Measures Required: 0

		NA	Complete Pre-Enrollment	Pending	Complete Post-Enrollment
Required Measures					
1. Toxics Reduction	Switch to low VOC solvents for blanket wash. Low VOC solvents are those with VOC content below 100 g/L.	○	○	○	◉
	What was the VOC content of the solvent prior to the GBP (lbs/gallon)?	6.43			
	What is the VOC content after the GBP (lbs/gallon)?	0.8			
	How much solvent do you use per year (gallons)?	60.0			
2. Toxics Reduction	Switch to low VOC solvents for blanket wash. Low VOC solvents are those with VOC content below 100 g/L.	○	○	○	◉
	What was the VOC content of the solvent prior to the GBP (lbs/gallon)?	6.11			
	What is the VOC content after the GBP (lbs/gallon)?	0.28			
	How much solvent do you use per year (gallons)?	19.2			

Other Green Things Your Business is Doing

Internet | Protected Mode: On 100%

VSF Metric

Use a hydrophobic mop instead of kitty litter.

- Savings: lbs of hazardous waste
- Inputs: # hydrophobic mops used

Calculation

Using a hydrophobic mop saved ~400 lbs of hazardous waste/year.

Assumptions/Conversions:

Use of Hydrophobic mop avoids 400 lbs of contaminated absorbent. Conversion published in the VSF 'floor cleanup' section in Green Biz Measurement DRAFT, July 28th, 2003 [Metrics produced by Bay Area Folks in partnership with EPA and DTSC Vehicle Service And Repair Project, January 2003]

		NA	Complete Pre-Enrollment	Pending	Complete Post-Enrollment
Required Measures					
1. Generic	Assess your office and identify ways to prevent pollution. Review the plan annually for new measures to implement:; Check Material Safety Data Sheets (MSDS) and labels for all cleaning products, building maintenance materials, pesticides, and fertilizers you use. Identify safer alternatives. Avoid products with labels containing Prop. 65 warnings.; Dispose of any hazardous waste at your local hazardous waste program	○	○	○	◉
2. Toxics Reduction	Eliminate use of products containing chlorinated solvents, n-hexane, n-bromo-propane and or parachlorobenzotriflouride PCBTF (e.g., aerosol degreasers, brake cleaners, strippers and newer paints/reducers)	○	○	○	◉
3. Toxics Reduction	Avoid use of chlorinated cleaners such as brake cleaner and avoid aerosol spray cans. Instead use refillable and pressurized spray cans for brake cleaning.	○	○	○	◉
	Are chlorinated solvents used (yes or no)? yes				
4. Recycle/Reuse	Crush used oil filters to extract another 39876 oz. of oil per filter to be recycled OR substitute less toxic propylene glycol for ethylene glycol OR use re-refined oil in all vehicles and machinery.	○	○	○	◉
5. Toxics Reduction	Use a water-based brake washing method.	○	○	○	◉
6. Toxics Reduction	Use aqueous-based cleaning systems that re-circulate and filter cleaning solution.	○	○	○	◉
	How many solvent tanks were replaced with aqueous parts washers? 2				
7. Toxics Reduction	Ensure that cleaning solution is not contaminated by washing parts sprayed with chlorinated cleaners or petroleum distillates.	○	○	○	◉
8. Shop Maintenance	Regularly inspect and clean out separators/clarifiers, at least every six months.	○	◉	○	○
9. Shop Maintenance	Never hose down the shop as a routine cleaning measure.	○	◉	○	○

Other Green Things Your Business is Doing

If you have another item that you believe your business should receive credit for, please let us know and staff will consider it. Please fill in information

Go help them save money, time and increase business!

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Use recycled or remanufactured laser and copier toner cartridges.

- Savings: fuel savings, GHG reductions
- Inputs: # of remanf cartridges used

Calculation

Gallons of fuel saved/year = [no. of cartridges X (12 quarts of fuel/cartridge)]/4

Assumption/Conversion:

Approximately three quarts of oil are burned in the production of a single new toner cartridge. A used cartridge can be remanufactured up to four times, depending on type and condition, saving up to three quarts of fuel each time (INFORM; "Why Buy Remanufactured?" Recharger Magazine, December 2000, http://www.rechargermag.com/)

Replace incandescent bulbs with efficient compact fluorescents or other high efficacy lamps (lumens/watt > 50) where appropriate.

- Savings: kwh/yr, GHG reductions
- Inputs: # incandescents replaced

Calculation

kwh/Yr = no. of lamps X 148 kwh/lamp/yr

GHG reduction in lbs/yr is kwh/yr X 0.6389 lbs/kwh

Assumptions/Conversions:

Energy Savings per CFL = 148 kw/lamp/yr (when replacing 75 watt incandescent with 23 watt CFL - could be A-shape or recessed floodlight) (http://eega.cpuc.ca.gov/deer/)

Use a low flow pre-rinse nozzle for dish scraping and pre-cleaning. (Saves both heating and water costs).

- Savings: gal/yr, kwh/yr, GHG reductions
- Inputs: # of nozzles

Calculation

gal/yr is no. of units X 122640 gal/unit/yr

kwh/Yr is no. of units X 15711 kwh/unit/yr

Assumption/Conversion:

Used default setting in FSTC's calculator with exceptions for operating hours per day (4) and old device water flow rate (3.0gal/min). Annual savings number calculated by subtracting new device's annual water consumption from old devices i.e. subtract new nozzle 1.6 gal/min from old nozzle 3.0 gal/min. (http://www.fishnick.com/tools/watercost/)

Use office equipment with energy saving features (e.g. ENERGY STAR®) and ensure that ENERGY STAR® settings are enabled.

- Savings: GHG reductions
- Inputs: # copier/printer units, # LCD monitors

Calculation

- kwh/Yr = no. of units X 327 kwh/unit/yr (for copier/printer) OR 181 kwh/unit/yr (for LCD monitors)
- GHG reduction in lbs/yr = kwh/yr X 0.6389 lbs/kwh

Assumptions/Conversions:

- *Energy Star copier/printer units save 327 kwh/unit/yr (Energy Star ®)*
- *Energy Star LCD monitors save 181 kwh/unit/yr (Energy Star ®)*

Use ENERGY STAR® qualified refrigerators

- Savings: GHG reductions
- Inputs: # refrigerators, # mini bars

Calculation

kwh/yr = no. of units X 1968 kwh/unit/yr (for refrigerators)
kwh/yr is no. of units OR 66 kwh/unit/yr (for mini bars)

Assumptions/Conversions:

- *Savings for refrigerators found by subtracting the difference between avg annual energy consumption in kWh for an Energy Star and conventional 18 cubic foot manual defrost refrigerator with freezer on top.www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing#off*
- *Savings for mini bars found by subtracting the annual energy usage (kWh/year) for the energy efficient 2.7 cubic feet Whirlpool EL03CCXM mini refrigerator from the annual energy usage of a standard 2.7 cubic feet mini refrigerator. http://www.energystar.gov/index.cfm?fuseaction=refrig.display_products_html*

Increase fixture lighting efficiency by installing optical reflectors and/or diffusers.

- Savings: GHG reductions
- Inputs: # of lamp fixtures with reflectors or diffusers

Calculation

kwh/yr = no. of lamp fixtures X 86 kwh/lamp/yr

GHG reductions are kwh/yr X 0.6389 lbs/kwh

Assumptions/Conversions:

Annual Savings per fixture with diffusers/reflectors = 86 kwh/lamp/yr
(http://eega.cpuc.ca.gov/deer/)

Improve exit sign efficiency to less than 5 watts per sign by using LED signs, electroluminescent, photoluminescent or other applicable signs.

- Savings: kWh, GHG reductions
- Inputs:# of LED exit signs

Calculation

kwh/Yr = no. of signs X 0.0273 kw/sign X 365 days/yr X 24 hrs/day

Assumption/Conversion:

Assuming 2 incandescent bulbs at 15 w each (DEER database)

Use lighting controls such as dual technology occupancy sensors, bypass/delay timers, photocells, or time clocks…

- Savings: KWH, GHG reductions
- Inputs: # rooms on photocells, timers, time clocks etc.

Calculation

KWH/yr = no.of sensors X 213.76 kwh/unit/yr (occupancy sensors) OR 106 kwh/unit/yr (photo cells) OR 474.24 kwh/unit/yr (time clocks) OR 387 kwh/unit/year (for shaded vending machines with sensors)

Assumption/Conversion:

kwh/unit/yr for each control obtained from DEER database (http://eega.cpuc.ca.gov/deer/)

Replace single or package A/C unit with one that exceeds Title 24 building standards.

- Savings: KWH, GHG reductions
- Inputs: # of Energy Star ® A/C units

Calculation

kwh/Yr = no. of units X 53 kwh/unit/yr

Assumption/Conversion:

Room_Air_Clearner_Sav_Calc.xls file from http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing#off used ; the difference between avg annual energy consumption in kWh for an Energy Star and conventional CADR 0-50 model, assuming hotels have one small A/C per room.

Reduce dishwasher hot water temperature to lowest temperature allowed by health regulations…

- Savings:
- Inputs: # of electric units, # of gas units

Calculation

kwh/Yr =no. of units X 873 kwh/unit/yr (electric)
OR 384 kwh/unit/yr (gas)

Assumption/Conversion:

Replacement dishwasher is a door-type, electric water heating dishwasher that uses 1.2 gallons/rack or less.(obtained from a 1991 report *-Dishroom and Warewasher Study Stero Single Rack, Low-Temperature, Door Type Warewasher available* http://www.fishnick.com/publications/reportlist/warewashers/

Install a gas booster heater for hot water use (laundry, dishwashing etc.)

- Savings: KWH/yr, GHG reductions
- Inputs: # of gas boosters

Calculation

kwh/Yr = no. of units X 21782 kwh/unit/yr

Assumption/Conversion:

http://www.fishnick.com/publications/reportlist/warewashers/

Use energy efficient cooking equipment.

- Savings: KWH/yr, GHG reductions
- Inputs: # electric steam cookers, # electric combination ovens, electric fryers, # insulated food holding cabinets

Calculation

KWH/yr = number of units X 11068 kwh/unit/yr (steam cookers) 18431 kwh/unit/yr (electric combination ovens) 1024 kwh/unit/yr (electric fryers) 3285 kwh/unit/yr (food holding cabinets)

Assumption/Conversion:

All cooking equipment KWH/yr savings obtained from Fish Nick

http://www.fishnick.com/tools/calculators/holdcab.php

Use unbleached and/or chlorine-free paper products

- Savings: GHG reductions
- Inputs: # reams of paper

Calculation

GHG Reduction = # of paper reams X 5 lbs/ream X 0.11

Assumption/Conversion:

5lbs of PCF paper saves 11 lbs of CO_2 (ED paper calculator)

Purchase Electronic Product Environmental Assessment Tool (EPEAT) registered desktop computers, notebooks & monitors.

- Savings: kwh/yr, GHG reductions
- Inputs: # of LCDs, CPUs and CRTs

Calculation

KWH/yr = No. of units X 2723.3 (CPUs) OR 27233.3 kwh/yr (CRTs) OR X 22733.3 kwh/yr (LCDs)

Assumption/Conversion:

Energy savings obtained from EPEAT.net

Sign up for Commuter Benefits

- Savings: GHG reductions
- Inputs: aggregate of miles commuted by transit

Calculation

lbs CO2/year reduced = [no. of miles/day X (50 weeks/yr X 5 work days/week - 12 holidays/week) X 20.7 lbs $C0_2$ /gal-fuel] /24 miles/gal

Assumption/Conversion:

20.7 lbs $C0_2$/gal-fuel savings obtained from ICLEI

Give or sell restaurant's used cooking oil for use as alternative fuel, such as biodiesel.

- Savings: gallons of grease recycled
- Inputs: gallons of grease recycled

Calculation

NO CALCULATION, DATA COLLECTION ONLY

VSF Metric

Switch to using non-chlorinated cleaners in refillable, pressurized spray cans, instead of chlorinated cleaners in aerosol cans.

- Savings: VOC emissions
- Inputs: # solvent tanks replaced

Calculation

If “Yes”, then 84.4 lbs VOC/year are reduced

Assumptions/Conversions:

84.4 lbs VOC/year was established in CARB Initial Statement of Reasons (ISOR) for the Proposed ATCM for Emissions of Chlorinated Toxic Air Contaminants for Automotive Maintenance and Repair Activities, Vol2, 2000. Extrapolated from Green Biz Measurement DRAFT, July 28th, 2003.

ISOR may be found here: http://www.arb.ca.gov/regact/amr/amr.htm

VSF Metric

Use an aqueous parts washer instead of a solvent tank.

- Savings: VOC emissions, lbs hazardous waste reduced
- Inputs: # solvent tanks replaced

Calculation

VOC emissions reduced = 0.6 lbs/day * 365 * # of solvent tanks replaced

lbs of hazardous waste reduced = 600 lbs/year/unit replaced

Assumptions/Conversions:

0.6 lb/day VOC per unit was established by BAAQMD Staff report, on regulation 8, Rule 16, 2002 found here: http://www.baaqmd.gov/pln/ruledev/8-16/2002/0816_sr_sept2002.pdf

Assumes 30 gallon solvent tank changed 4 times per year, compared to 30 gallon aqueous unit changed once per year = *600 lbs/year/unit replaced*

Printer Metric

Use automated registration or ink key settings for make-ready on your press.

- Savings: lbs of paper
- Inputs: # of sheets saved per job in make-ready process, avg. M-weight of paper used in the press, jobs done per year.

Calculation

Jobs/year * #sheets/job * M wt. (lbs) = lbs/year of paper saved

Assumptions/Conversions:

Assumes printer is telling you the right consumption, the right amount of sheets saved per job.

ENVIRONMENTAL INNOVATIONS

Printer Metric

Recommend the highest possible recycled-content paper to clients.

- Savings: lbs of paper/year
- Inputs: % of print jobs done on recycled paper, avg. % of post-consumer content of paper used, lbs. of paper used per year.

Calculation

[% of print jobs w/pcw content-10%(industry avg)*AVG%pcw* lbs of paper used/year

Assumptions/Conversions:

Assumes the industry average for pcw paper is 10% (Environmental Paper Network, 2007), so the savings are those above 10% pcw. Assumes the printer is giving the right averages for recycled content jobs and pcw content.

VSF Metric

Seal floor drains and run a dry shop, drastically reducing wet mopping or hosing.

- Savings: water and metals load
- Inputs: miles saved per month

Calculation

saves 5280 gallons of water per year

Metals reduction

Zn – 3 mg/l or 60 grams /year

Pb – 0.8 mg/l or 16 gram/year

Cu – 0.8 mg/l or 16 grams/year

Assumptions/Conversions:

Water: Alameda County Source Reduction and Recycling Board Grants Program: Final Report, p.6

Metals: Averages reductions in metal concentrations from implementation of floor clean up BMPs, as measured by the East Bay MUD Auto Row Broadway Project, and West County Water District

ENVIRONMENTAL INNOVATIONS

VSF Metric

Promote rideshare and alternative transportation to single passenger vehicles.

- Savings: lbs of GHG/year
- Inputs: miles saved per month

Calculation

miles saved/month * 12 months * [21.5/19.7].

Assumptions/Conversions:

1) 21.5 miles per gallon and 2) 19.7 lbs of CO2 are generated/gallon of fuel (EPA Report EPA 420-F-00-013, Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks, 2000.

Go help them save money, time and increase business!

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