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Risk Mitigation Through Green IT

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Why Green IT is Important

- 1. The energy consumed by servers in the US (and associated air -conditioning) is equivalent to the annual output of about 20 new coal-fired power plants, or nearly 1000 train cars loaded with coal ***each day.***
- >> ***Notes:*** Not all electricity is generated with coal. The number is for 2006 and actual value is 868
- 2. The energy consumed by servers each year in the US (and associated air -conditioning) is equivalent that used by about 10 million average cars (25 miles per gallon).
  >> ***Note:*** You can double this number if you assume Prius'.
- 3. The energy used by a single rack of the emerging generation of servers (20kW plus air-conditioning) each year (and associated air-conditioning) is equivalent to that required to drive an average car (25 miles per gallon) coast-to-coast about 300 times.
  >> ***Note:*** You can double this number if you assume Prius'.
- *Source: Evan Mills, Lawrence Berkeley National Laboratory*

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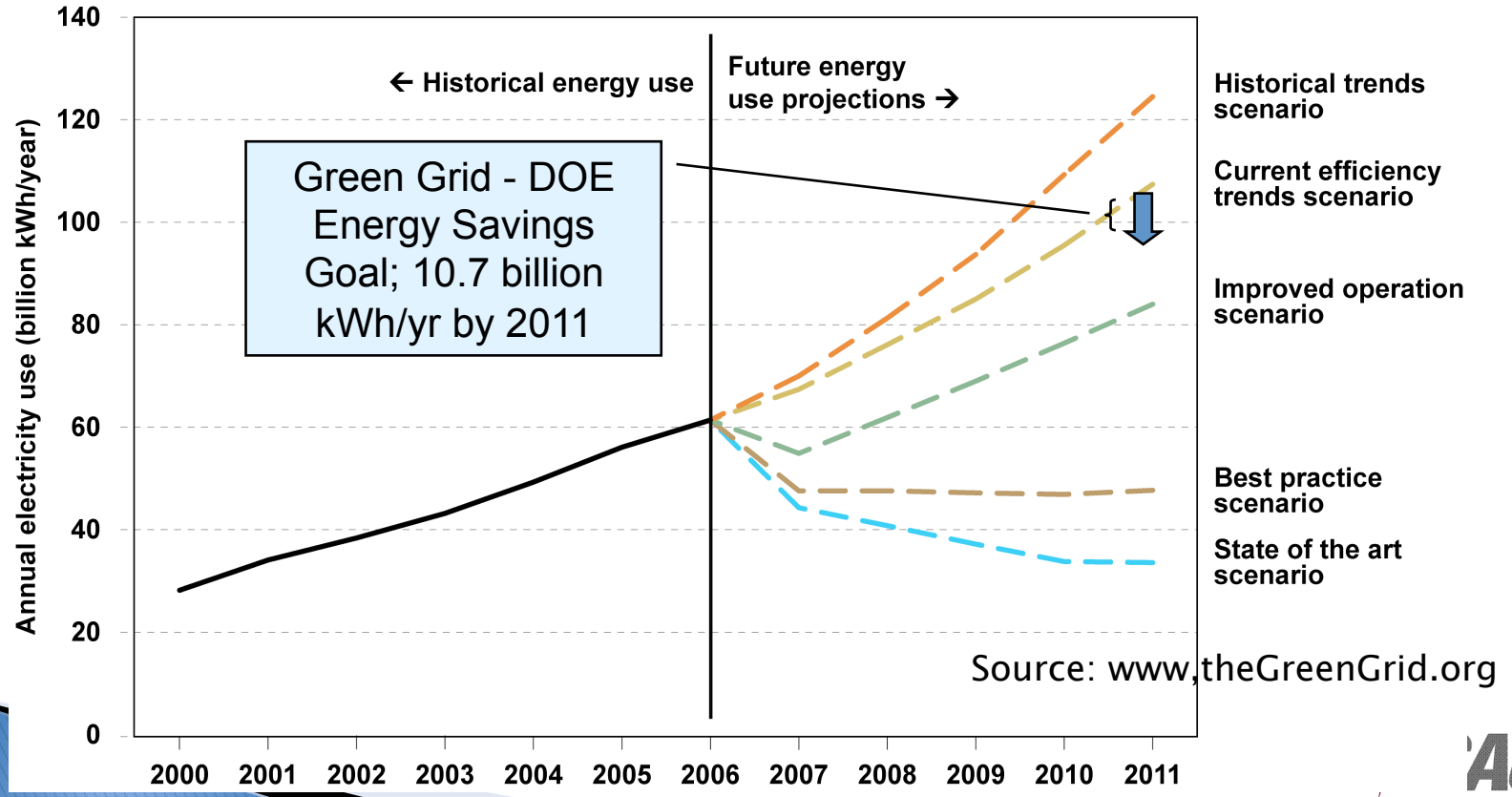
Projection - Catalyst for Green IT:
DOE-Green Grid Goal for Energy Savings

2011 goal is 10% energy savings overall in U.S. data center

- 10.7 billion kWh
- Equivalent to electricity consumed by 1 million typical U.S. households
- Reduces greenhouse gas emissions by 6.5 million metrics tons of CO_2 per year



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Complexity of Managing IT Energy Efficiency:

- "While we initially chose VMware virtual infrastructure to address development hardware problems by reducing hardware costs and decreasing server deployment time, we soon discovered additional benefits to adopting the technology, including server portability, protection, and availability."

(in a presentation at a Forrester Conference 2008, Keith Leahy, Vice President, Merrill Lynch)

Cobit Guidelines Recapped

Organizations should satisfy the quality, fiduciary and security requirements for their information, as for all assets. Management should

- also optimize the use of available IT resources, including applications, information, infrastructure and people.
- To discharge these responsibilities, as well as to achieve its objectives, management should understand the status of its enterprise architecture for IT and decide what governance and control it should provide.

The COBIT control framework contributes to these needs by

- Identifying the major IT resources to be leveraged
- Defining the management control objectives to be considered

- *Source: cobit 4.1 exec summary*

20 comments on Green IT

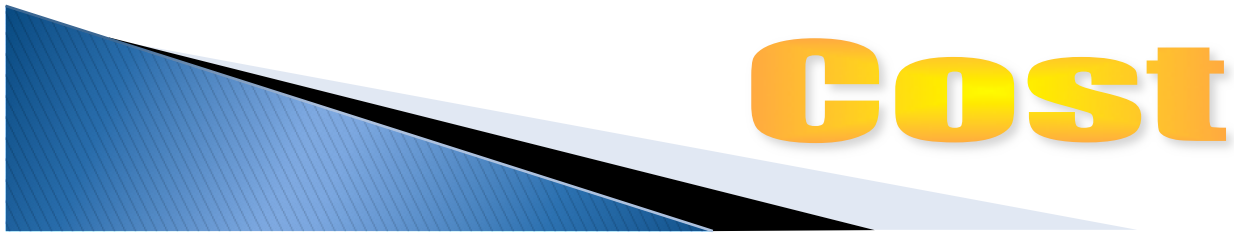
Organized in Five Buckets

1. Cost
2. Capacity
3. Enabling Good Engineering
4. Compliance
5. E-waste & End of life

20 comments about Green IT (1-5)

1. Utility prices are expected to go up: how much is uncertain
2. **Are IT costs optimized?** Most US data centers can lower their utility bills by 25% – 50% (TUI)

   If the datacenter were 100% efficient, all power supplied would reach the IT loads. This would represent Power Usage Effectiveness (PUE) of 1.0. Currently average is closer to 2.0
3. Anticipate higher storage requirements from videoconferencing
4. Measure IT's performance in the context of industry competitors – see Green Grid & DOE documentation
5. Cost containment may dictate a top down approach.



Site Costs per $2,500 Server by Tier

Costs (USA)	Tier II		Tier III		Tier IV	
CapEx per Server (56% Site Utilization)	$8,300		$14,000		$15,400	
Annual Expense						
Power/Cool	$450	35%	$850	46%	$900	40%
Cptr Rm Space	100	7	100	4	100	4
Total Dep'n (Fixed)	550	42	950	50	1,000	44
Electricity (Variable)	420	32	420	23	470	33
Site Operations(F)	350	26	500	27	550	23
Total per Server	$1,320	100	$1,870	100	$2,020	100
GHG per server	4 tons		4 tons		4 tons	

Source: Uptime Institute

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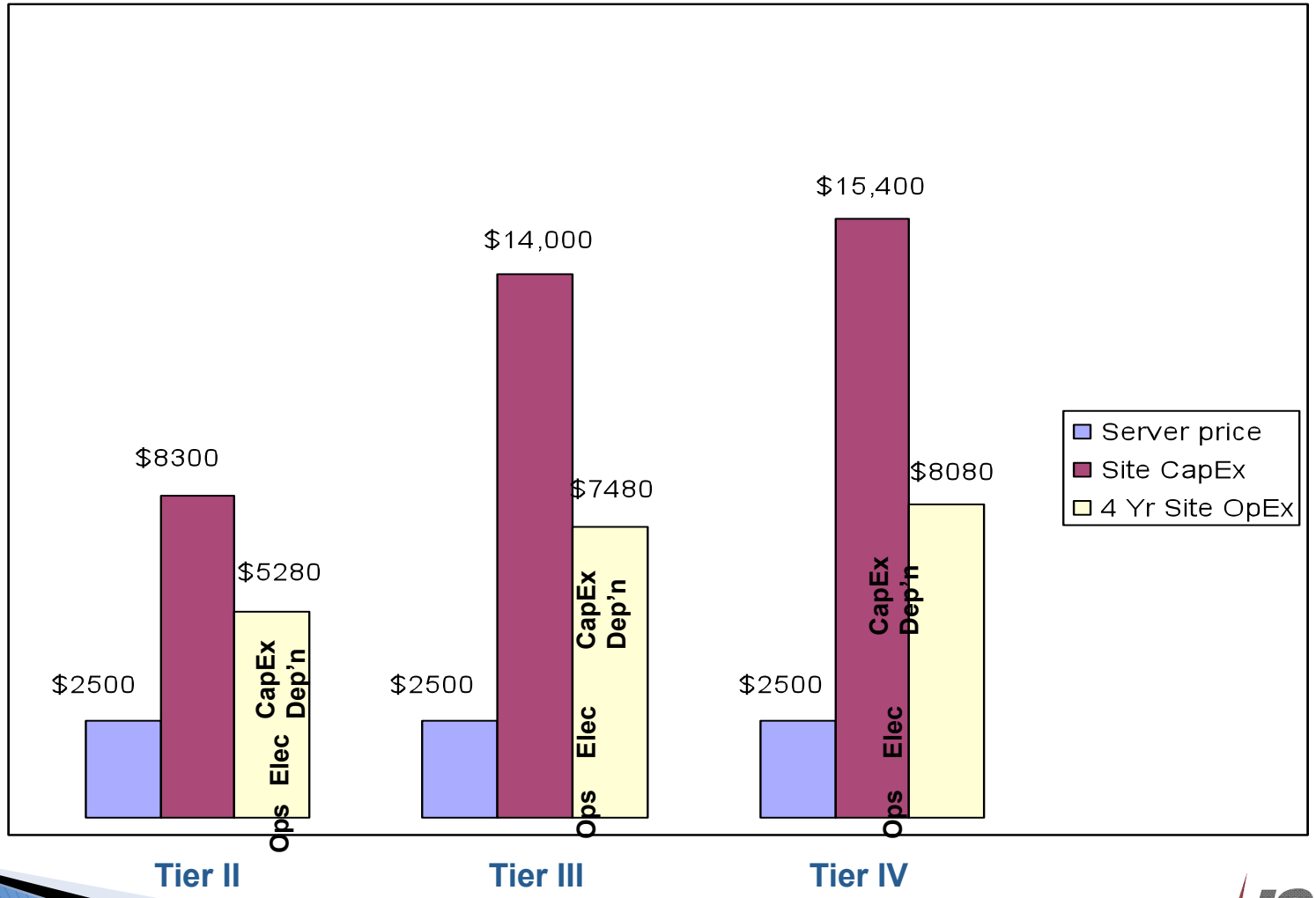
Site Costs Per $2,500 Server By Tier



Source: Uptime Institute

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20 Comments about Green IT (6 – 8)

- 6. Are new projects likely to be delivered on time and within budget?

  How many business processes will migrate from BAM to web over the next 5 years? Is that reflected in capacity requirements?
- 7. Energy availability now outweighs IT asset usage as a priority Utilities in CA are paid to be your EE allies.

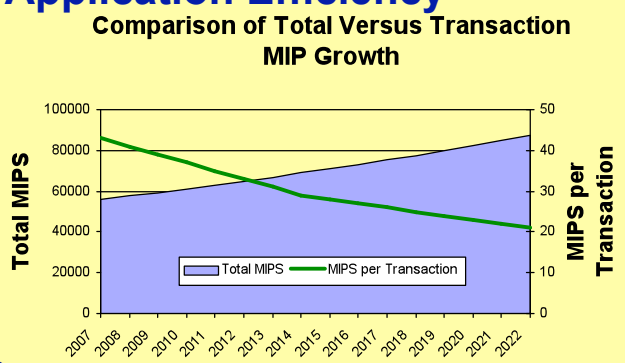
  Early retirement of power hogging desktops and servers may be the better option than keeping them running
- 8. You can model your requirements before buying or building.

  Tools for modeling the electrical costs of datacenters are not widely available and are not commonly used during datacenter design. (see www.futurefacilities.com)

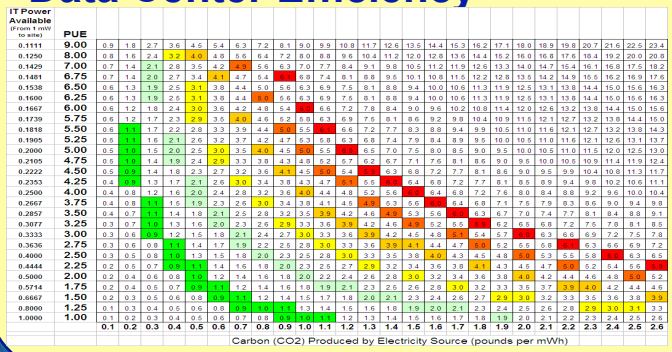
Capacity

Stack Model View of Contributions to Efficiency Programs

Application Efficiency

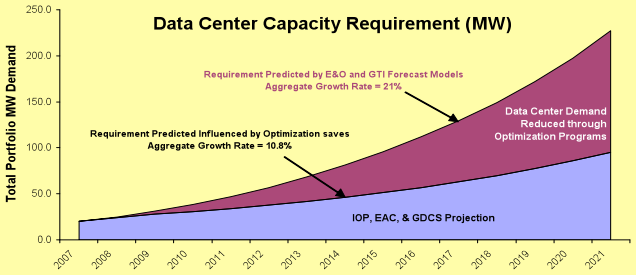


Data Center Efficiency



Each group speaks a different language, uses different metrics, and has very different drivers and rewards

Server Efficiency

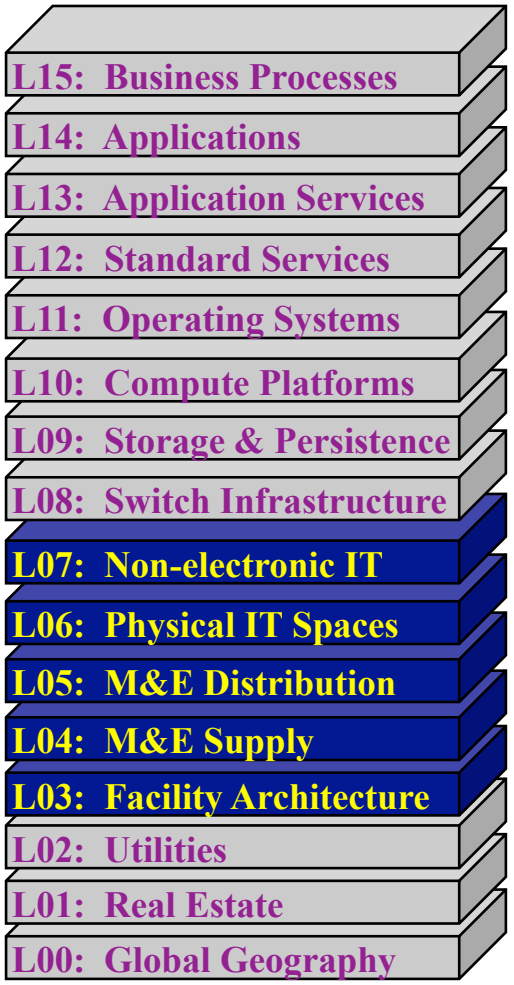


Utility Efficiency

- Load Management
- Base Load Reward
- Distribution Efficiency Development
- Fuel Mix and Regulatory Compliance

Source: CS technologies

Layers L03 through L07 "Data Center"



Data Center Environments

- **Who**: Operational technologists and Facility managers
- **What**: Provide resiliency physical platform to host the electronic platforms
- **How**: Design and build, and manage secure and complex M&E environments

Source: CS technologies

Developing a Coordinated Approach to Efficiency

Source: CS technologies

20 comments about Green IT (9 – 12)

- 9. Anticipate federal interest in data center energy efficiency

  Be prepared for Energy Star ratings of Data centers
- 10. Prepare for a more (or less) mobile workforce & other city/state emergency measures

  With fuel costs going higher a 4 day work week or more stay -at-home jobs may be inevitable. That affects security compliance issues
- 11. Green Building designs are under development in many cities across the nation

  Considering alternatives to chillers and air conditioners could lower your requirements dramatically. Is the retrofit for outside air a possibility?
- 12. Leverage Corporate Social Responsibility, the new stakeholder

Compliance

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20 Comments about Green IT (13 – 17)

- 13. Are IT risks understood and being managed? Are data center operators too conservative about their chilled environments. Push beyond nameplate ratings. "If it is too cold in here, you have an opportunity." Dale Sartor, Lawrence Berkeley Lab

  Industry experts are revising the recommended and allowable environments based on assertive requests from end users
- 14. Run machines at rates designed

  The tradition of oversizing has now shown to be inefficient Legacy data center management best-practices I are now being re-examined.
- 15. Hot aisle/cold aisle containment is now an accepted practice.
- 16. Direct Current and Outside Air are "new" ideas in data centers.
- 17. Provide organizational structures that facilitate the implementation of strategy and goals

Risk to Opportunity 2007

- In 2003 Sompo Japan Insurance—a $10-billion company —introduced commercial insurance coverage for the incremental costs of green measures (recycled materials, energy efficient products, green roofs) following loss.
- Save 25% on machinery from Lloyds and Travelers
- Minimizing business interruptions is another key need.
- We previously chronicled nearly 80 technologies and practices that can lower greenhouse gas emissions while reducing the direct risk of property damage from mechanical equipment breakdown, professional liability, builders' risk, business interruption, and occupational health and safety. (p.17)

- *Source: (Examples from* CERES report) *Insurer Responses to Climate Change, Evan Mills, Ph.D. LBNL, October 18, 2007*

20 Comments about Green IT (18 – 20)

- 18. E-waste laws change as consumers realize the implications of landfill with toxic materials rises. Usage is determined by lowest overall footprint per asset and a drive toward industry standards for better power supplies
- 19. Procurement

  Climate Savers and others ask for your pledge to buy EE products. See http://www.climatesaverscomputing.org/
- 20. Retirement policies need to be clarified

  Recycling strategies can be built into vendor commitments

  Re-use opportunities build strong community relationships

Ewaste & End of Life cycle

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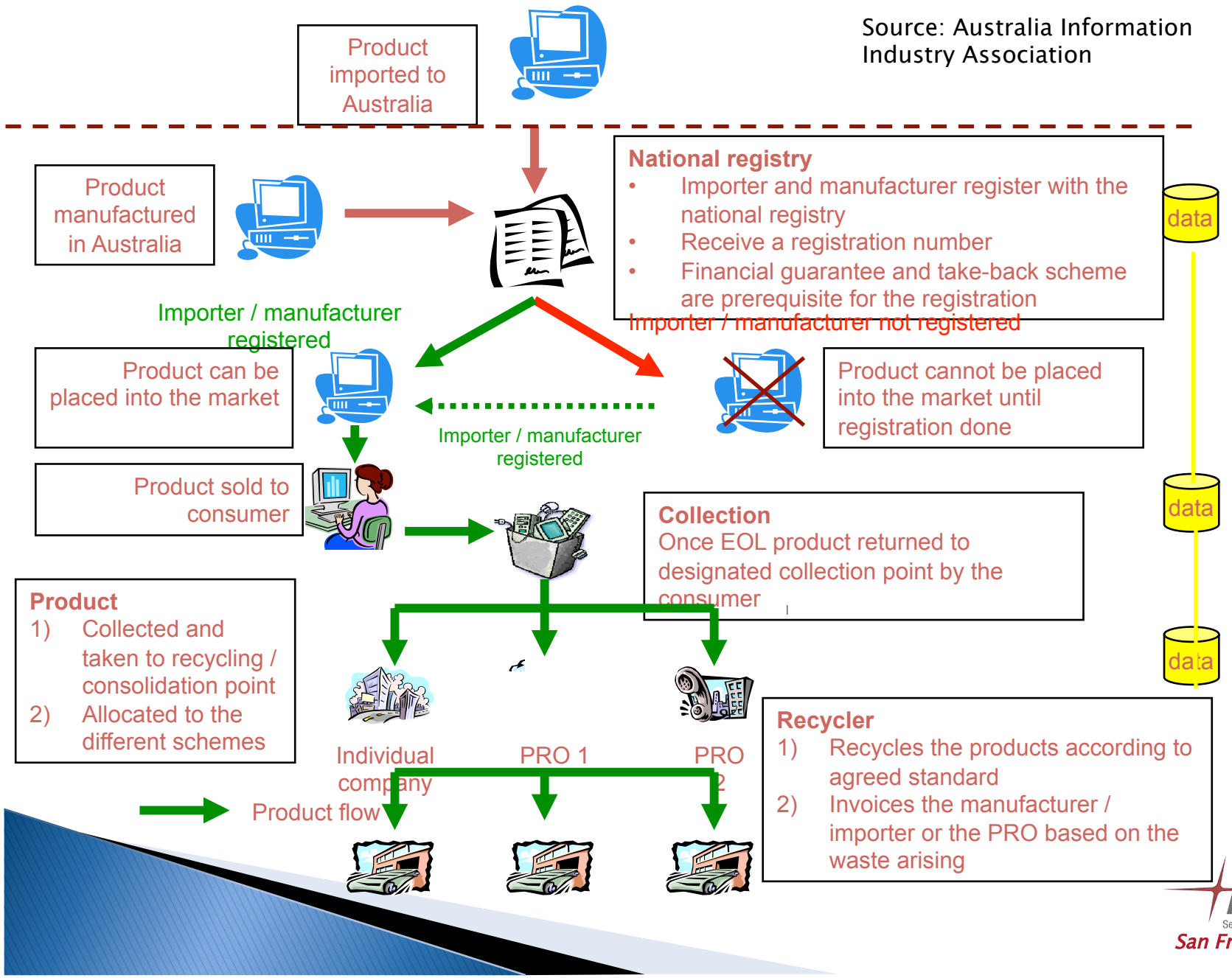
Product flow



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It's time to support e-waste legislation

By Preston Gralla
Published August 12, 2008

Data Centers; Desktops & Laptops; E-waste & Recycling; Servers;

A new Greenpeace report details the havoc that computers and other e-waste wreaks around the world, in this case, in Ghana.

E-waste in the scrap yards is dismantled, often by children, to get at recyclables, with disastrous health consequences. According to Greenpeace's Dr. Kevin Bridgen: "Many of the chemicals released are highly toxic, some may affect children's developing reproductive systems, while others can affect brain development and the nervous system. In Ghana, China and India, workers, many of them children, may be substantially exposed to these hazardous chemicals."

IT pros can try and make sure that whoever handles their e-waste disposes of it properly, but that's not always possible to do. So within the last few weeks, U.S. Rep. Gene Green (D-Texas), the chairman of the House Subcommittee on Environment and Hazardous Materials, introduced a resolution that would ban exporting toxic e-waste to developing nations. For details, see this press release.

For the last year that the EPA has information available, 2005, there were 2.6 million tons of e-waste, the congressman notes. But only 13 percent of e-waste is

Recent Posts by Preston Gralla

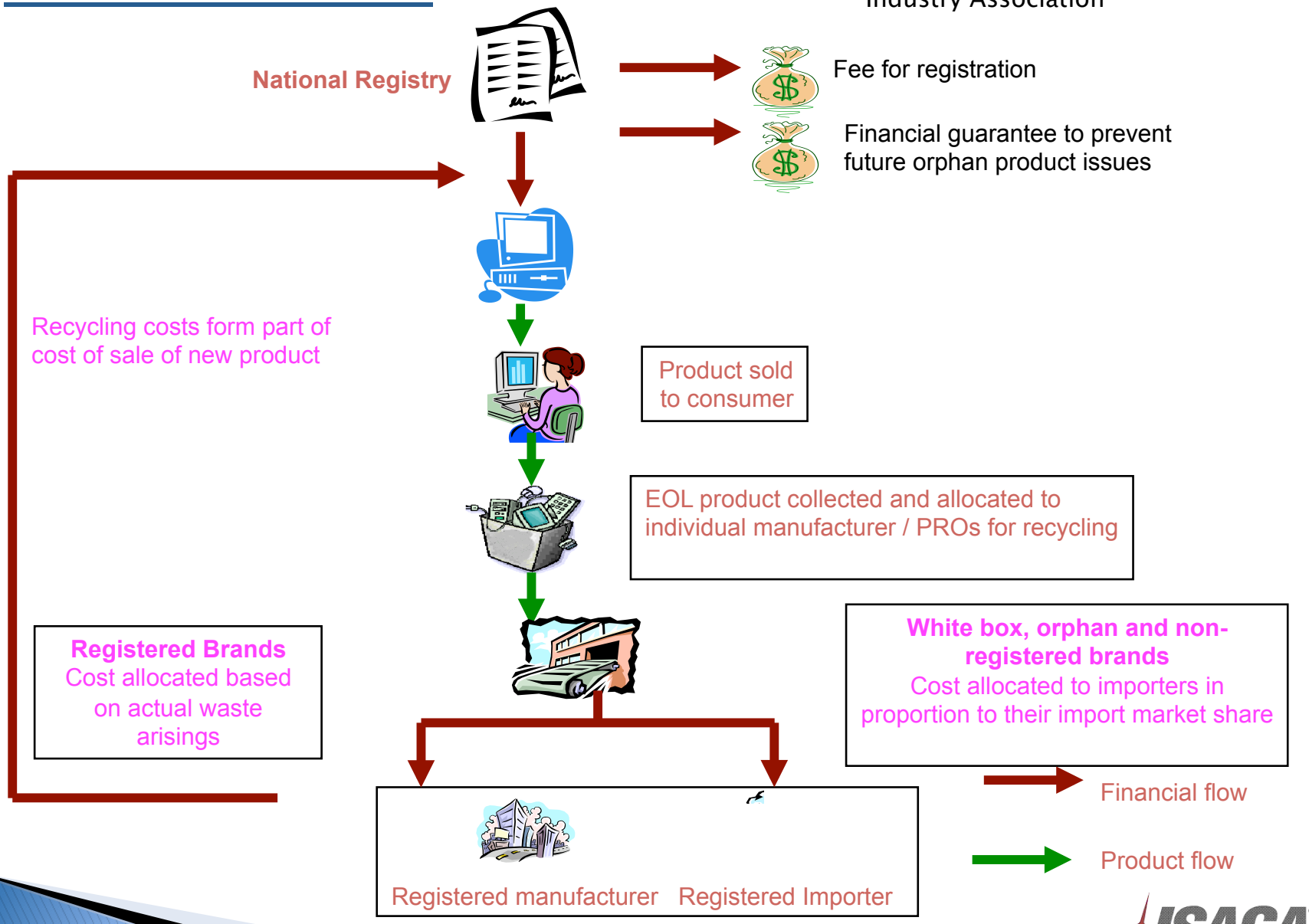
IBM Launches "Green Sigma" consulting service

Published: August 19, 2008

Wanting to green your data center is one thing; actually doing it is another thing entirely. If you're looking for help

Financial flow

Source: Australia Information Industry Association



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Additional Resources

- http://www.thegreengrid.org/home
- http://www.uptimeinstitute.org/
- www.eere.energy.gov/datacenters
- www.energystar.gov/index.cfm?c=prod_development.server_efficiency
- http://hightech.lbl.gov/datacenters.html
- http://hightech.lbl.gov/datacenters-bpg.html
- http://www.ashrae.org/
- http://www.climatesaverscomputing.org

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