Seminar Presentation
Green Software

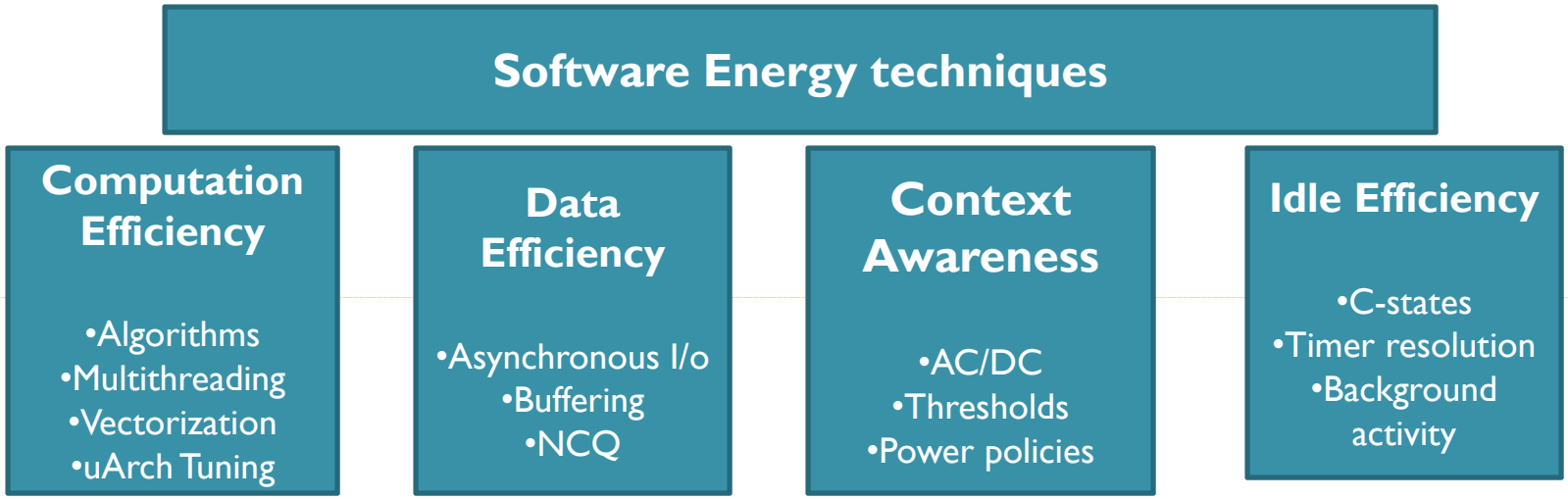
by Group-2 **Oct2013**

Rahul Basu – EEPITM -01-16
Prakash Naik- EEPITM-01-14
John David – EEPITM -01-06
Anil C Menon -EPGP-04C-011

Green software - Introduction

- A green IT infrastructure is incomplete without green software. Software plays important role in overall platform energy efficiency.
- A single ill-behaving power-unfriendly software component on system can thwart all of the power management benefits built into the hardware platform.
- Software behavior can have a significant effect on platform power consumption and battery life. Few important techniques to improve the software efficiency:
  - Performance features by emphasizing computational efficiency
  - Being frugal with data movement to improve data efficiency
  - Implement intelligent application by exploiting context awareness
  - Consider the impact of software idle to improve idle efficiency/

Energy-saving software techniques



Green software Process Management

- Data –driven sustainability thinking and decisions
- Understanding the IT carbon footprint
  - ✓ Accurately measure the current IT CO2 footprint.
  - ✓ Measure the effects of changes made to IT and business process
- Improvements in IT Energy efficiency by adapting to Green software techniques.
  - ✓ Server Consolidation – One of the primary ways Intel IT is reducing its carbon footprint is through server consolidation. According to Moore's law doubling of a chip performance in every 18 months, but the energy consumed by the chip doesn't double. This means that newer servers, laptops use less power to produce more computations.
  - ✓ Virtualization strategy – As per virtualization strategy, the server usage leading to decrease in carbon footprint by 2,500 metric tons.
  - ✓ Client computing devices – Achieved 70% energy saving per user by deploying low-power laptops instead of desktops

Evaluating and measuring software impact to platform power

- Various tools are available to provide a high-level estimate of power consumed
- The more accurate and invasive method to measure power is to use data acquisition (DAQ) tools.
- The Fluke NetDAQ is one of a class of DAQ that can be used to measure platform consumption.
- Software tools:
  - Windows 7 PowerCfg
  - PowerInformer
  - Energy checker

India's Ecological Footprint (Global Footprint Network & CII)

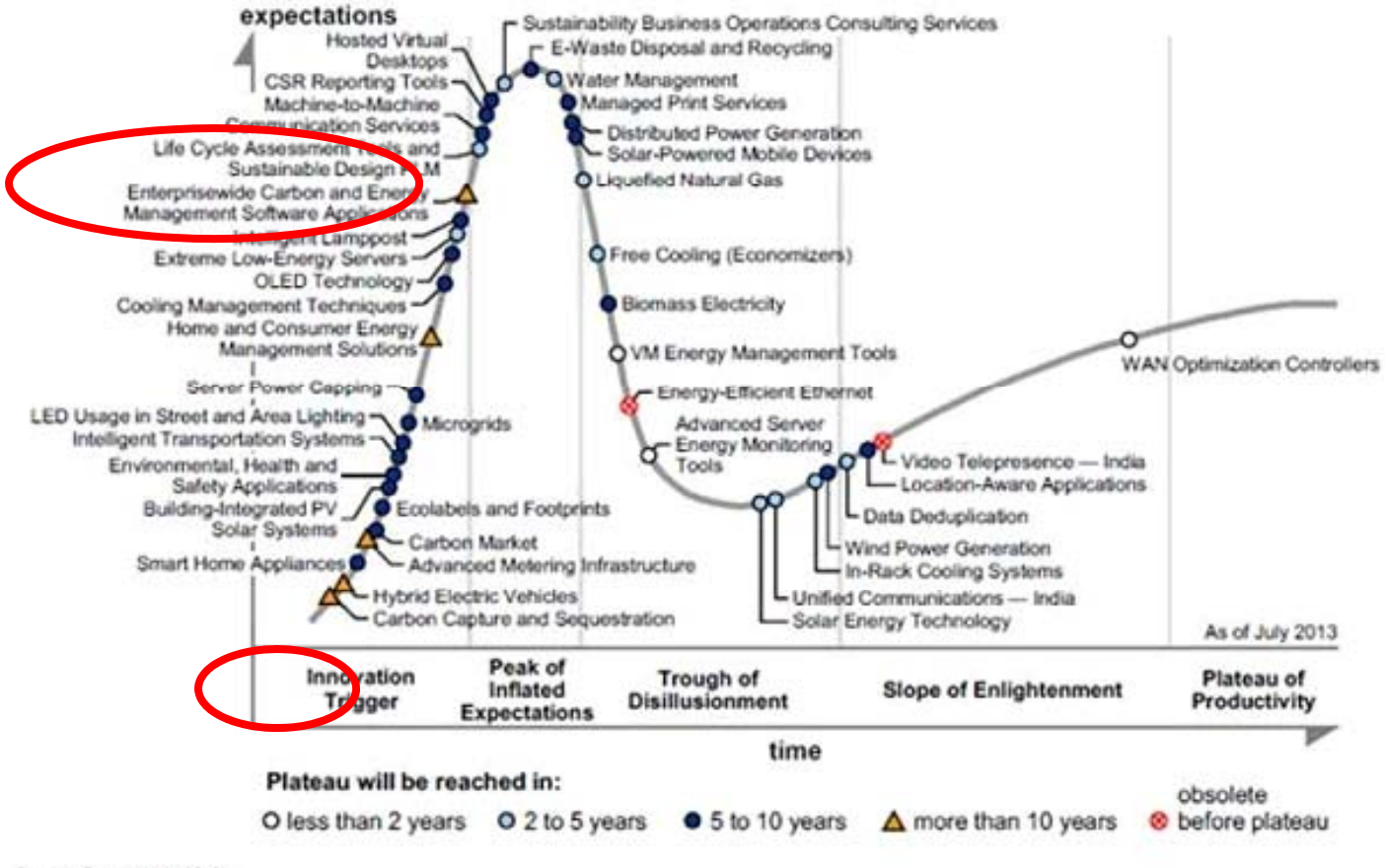
- India has the world's 3rd largest ecological footprint, after the USA and China.
- Indians are using almost two times the natural resources within the country that it can sustain (or twice its 'bio-capacity').
- The capacity of nature to sustain Indians has declined sharply by almost half, in the last four decades or so.
- While overall the EF of the country is very high, per capita it is still extremely low, ranking 125th amongst 152 countries. (high population lowers the average)
- India has the highest Water Footprint (WF) in the world, accounting for 13% of total global usage, given that we have 17% of the world's population

Chief Observations of Gartner-2013

- India's spending on green IT and sustainability initiatives will reach **$29.2 billion** in 201
  17.6 percent increase from $24.8 billion that was spent in 2012
- Spending on Green IT & Sustainability Initiatives will double to $70 billion in 2015
- As per Ganesh Ramamoorthy, Research Director, Gartner:
  - **policy initiatives and regulatory measures from the Indian government** will be the key drive
    for implementation of following key green technological innovations
    - advanced metering infrastructure
    - carbon capture and sequestration
    - intelligent transportation system
    - solar energy technology
  - the **unique challenges faced by India**, such as an unreliable power infrastructure, a growing urban-
    rural divide and increasing population migration to urban areas, will provide businesses with the
    opportunity to innovate and test new cost-effective approaches and green technology solutions that r
    then be adapted in other developing, or even developed nations
- Gartner has included six new technology areas
  - hybrid electric vehicles
  - microgrids
  - machine-to-machine communication services
  - liquefied natural gas
  - biomass electricity
  - wind power generation
- e-waste handling (recycling and disposal) is the peak of the Hype Cycle

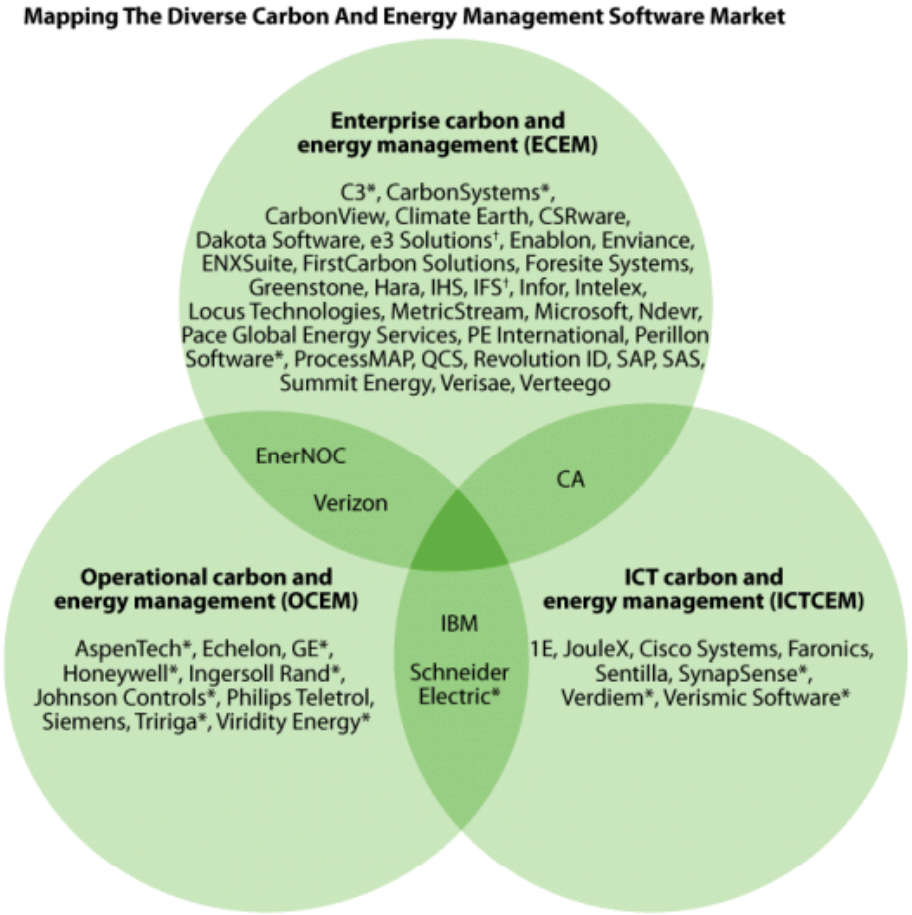
Hype Cycle for Green IT & Sustainability in India 2013

Figure 1. Hype Cycle for Green IT and Sustainability in India, 2013



Source: Gartner (July 2013)

Enterprise Carbon & Energy Management Software Applications…*contd (Forrester)*

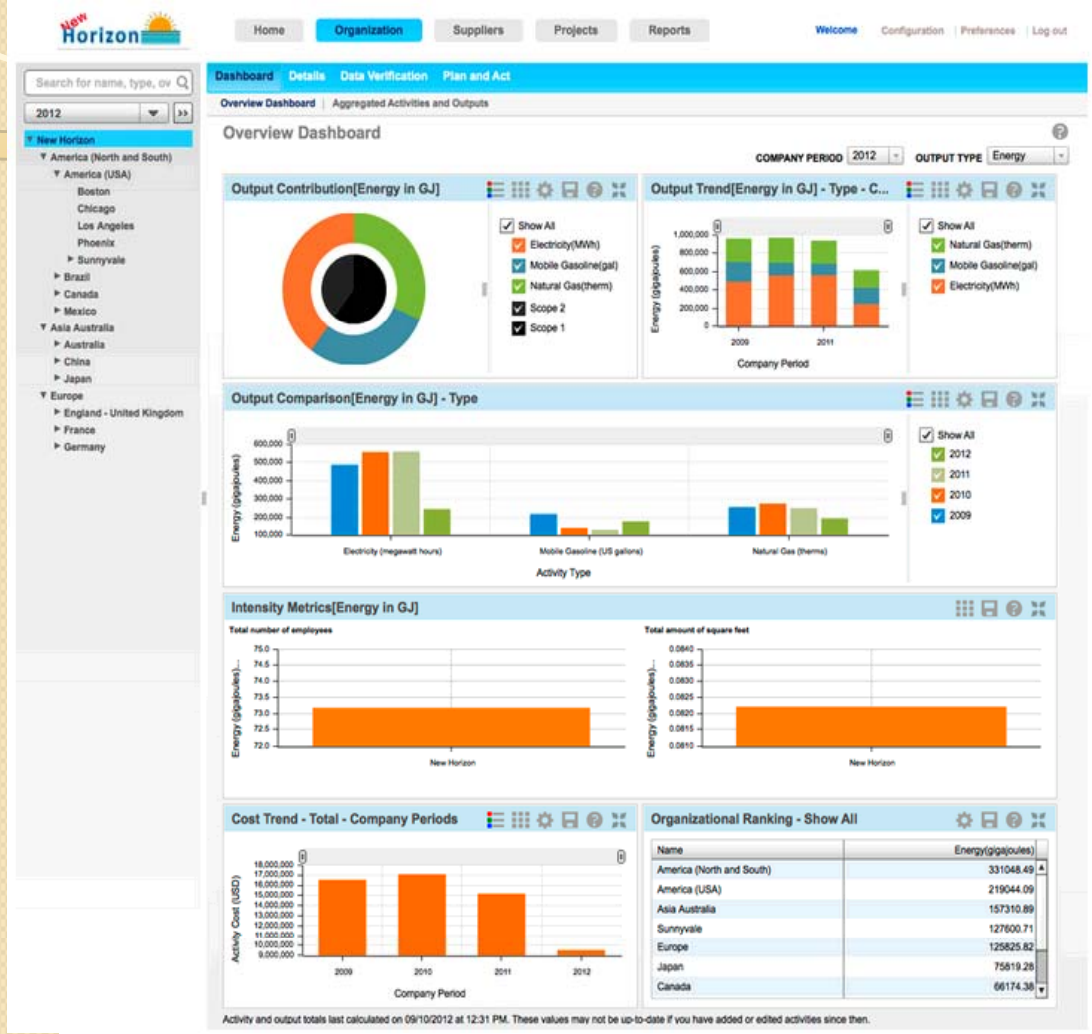


- ECEM software targeting executive/business levels — the most crowded segment today. These solutions are geared to help executive and line-of-business management monitor, analyze, and manage energy consumption, as well as related carbon emissions and energy consumption, across operational or functional silos.
- OCEM software is the domain of large industry players. These are primarily proprietary systems that monitor and control energy-intensive systems like heating, ventilating, and air conditioning (HVAC) in facilities
- ICTCEM software is characterized by data center and PC power management solutions These solutions help IT management to monitor and control energy consumption of ICT assets.

Enterprise Carbon & Energy Management Software Applications…*contd*

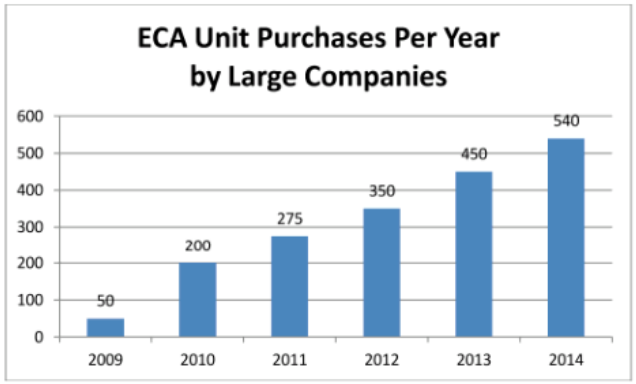
- 3 key drivers to Carbon Management Software:*[Rajan, PwC]*
  - Operational Efficiency
    - Energy efficiency
    - Waste Minimization
    - Package Minimization
    - Water Efficiency
    - Renewables
  - Competitive Positioning
  - Sustainable Growth
- With greater use of BI in Indian SMBs & improved availability of carbon footprint data from reliable sources, Carbon footprint management software will also see a growth
- The Indian carbon footprint management software industry is still in its infancy stage, only when reporting of Carbon footprint is mandated by regulators, greater demand and uptake will be seen

A typical energy management software (Hara)



EMS Solution Categories:

1. Utility bill management and payment
1. Sustainability or EHS
2. Submetering
3. Demand response
4. Control



Life Cycle Assessment & Product Life Cycle Management for Sustainability

- The life cycle approach holds great potential for environmental and broader sustainability work.
- It reduces risks of sub-optimization and problem-shifting from one part of the life cycle to another or from one type of impact to another.
- It brings new insights about how action in one stage of the product life cycle may lead to upstream or downstream effects far away from the point of action, perhaps in vastly distant geographical locations as well.
- India LCA Alliance (ILCAA) is a freely accessible, comprehensive, information and knowledge sharing platform to create awareness and increase understanding on Life Cycle Thinking in India.

Green IT trends in India - examples

- Server virtualization helps TBZ(Tribhovandas Bhimji Zaveri) Jewellers ensure 98% uptime
  - TBZ operates in 15 locations across the country and employs 950 people
  - The company was running around 35 servers, about 20 of which resided in a primary data center in Mumbai
- Data center power & cooling success story from Jindal Steel
  - The company took a unique power-generating approach—power for the data center was taken from water turbines in-house.
  - On the data center cooling front, JSL has incorporated a hot/cold aisle design, along with perforated tiles. Forprecision cooling in the data center, JSL uses air-conditioning units from Voltas, as well as intelligent air-conditioning and control systems from Liebert
- Indian organizations mostly demand green IT ROI within 12 months
- 2011 - NComputing Virtualizes 480 Punjab School Computer Labs for Energy Savings

References

- http://infochangeindia.org/environment/politics-of-biodiversity/indian-industrys-wake-up-call-on-environmental-sustainability.html
- http://www.gartner.com/newsroom/id/2607815
- http://www.greenindiastandards.com/#
- http://computer.financialexpress.com/20120131/feature05.shtml
- http://blogs.forrester.com/daniel_krauss/10-12-21-the_evolution_of_enterprise_carbon_and_energy_management_software
- http://www.ca.com/us/news/press-releases/na/2012/ca-technologies-extends-leadership-of-energy-and-sustainability.aspx
- http://www.indialca.com/
- http://www.hara.com/software-overview/energy/organization
- http://www.groomenergy.com/energy_management_software_vendors.html
- http://www.greenbiz.com/blog/2012/01/10/5-ways-make-sense-energy-management-software-market