Green IT Expo 2008

The New Enterprise Data Centre

Efficient IT Delivery Providing Freedom for You to Drive Business Innovation

Helping You Find the Value in Green

Steve Bowden
IBM Systems & Technology Group, UKI

The Nature of the Problem

- **Concern**
  - Rightly so we focus on the Emissions
- **Mis-understanding**
  - But where is the Energy Used/Wasted?
- **Green Wash**
  - Getting down to the basics
  - Purchase cost vs Cost or Ownership

2%

Environmentalism vs Business Sense

- **Lifecycle Cost vs Capital Costs**
  - The Impact of Lifecycle Cost Energy/Operational Costs
  - What defines asset replacement and Technology implementation

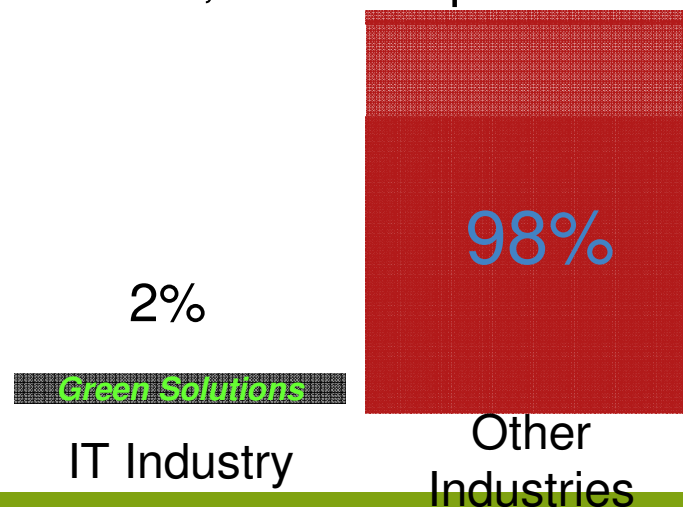- **Regulation vs Good corporate citizen**
  - Carbon reduction Commitments Vs Carbon Neutrality
  - Waste Disposal Costs and Impacts

- **Opportunity vs Exposure**
  - Where to start, centralised, decentralised, or desktop
  - Do we want to save 1% or 10%?

- **The Impact of Budget centres**
  - CAPEX vs OPEX

98%

2%

Green Solutions
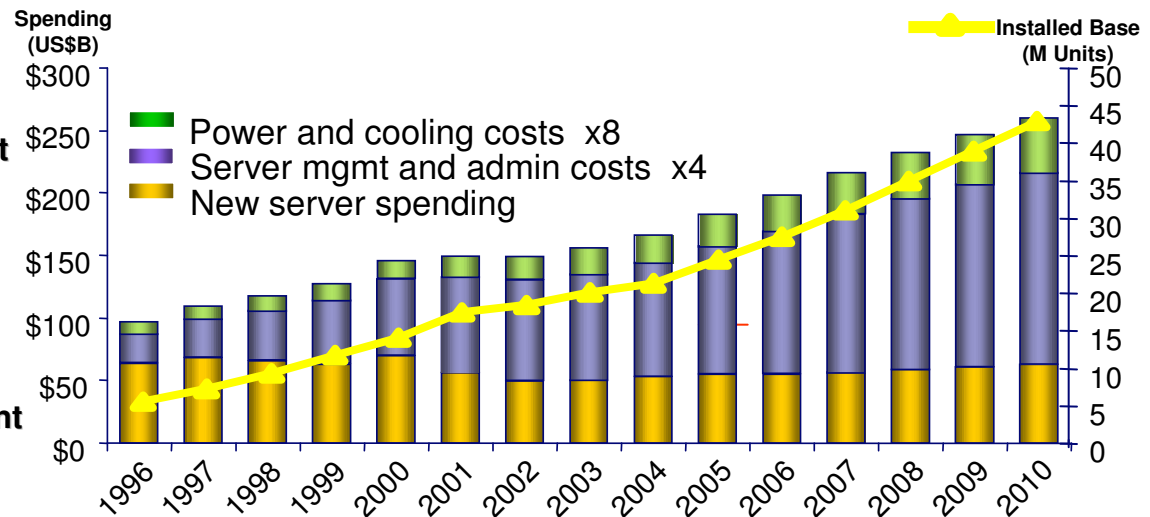
IT Industry

Other Industries
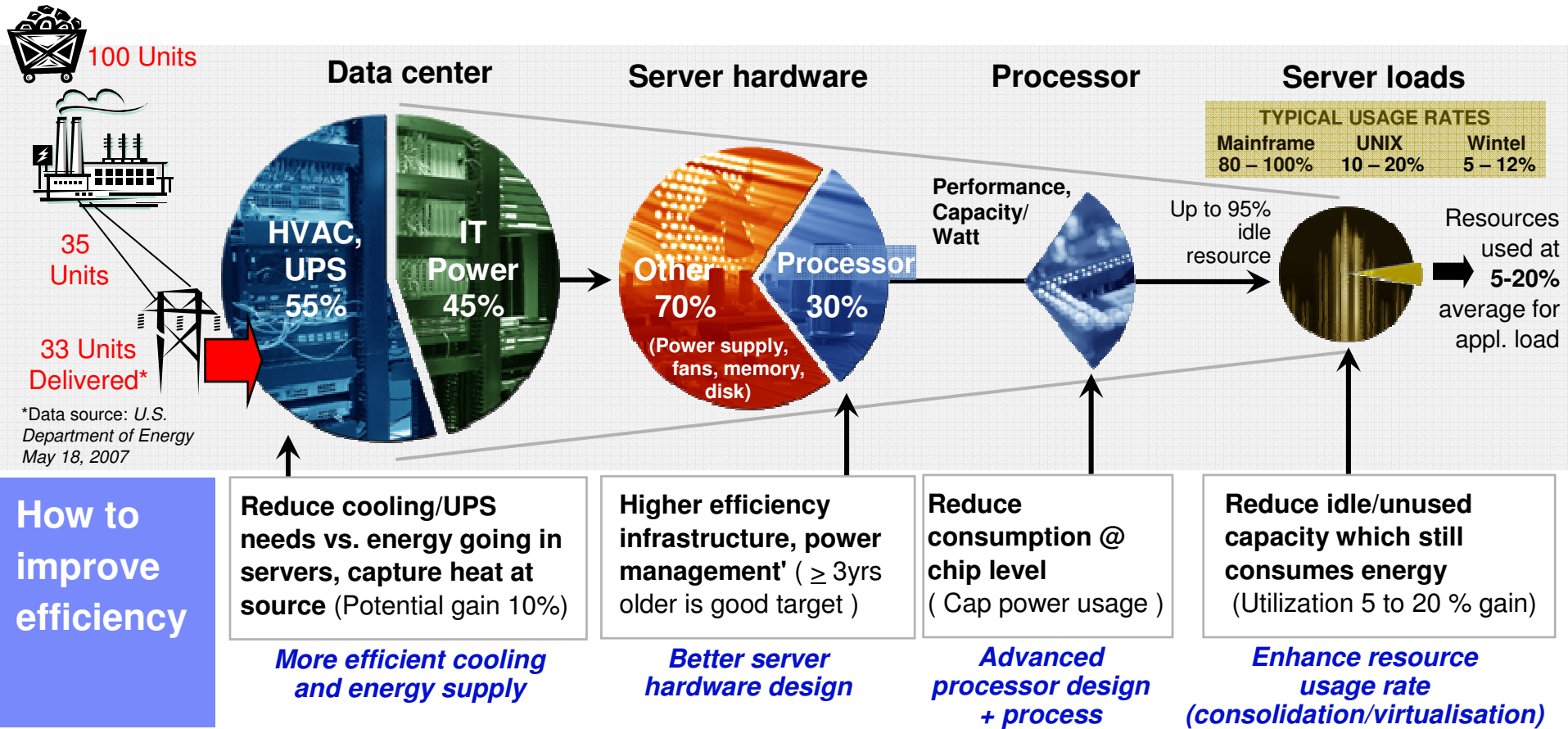
IBM

Data centers are at a tipping point

- Left unchecked, the cost to power and cool servers in the future may well equal the cost of acquisition.

- If IDC 2010 forecast holds, the cost to power and cool servers in the data center will increase by 54%.

- IT executives now rank power and cooling in the top 5 among current concerns.

2000 – Raw processing "horsepower" is the primary goal, while the infrastructure to support it is assumed ready

2006 – Raw processing "horsepower" is a given, but the infrastructure to support deployment is a limiting factor
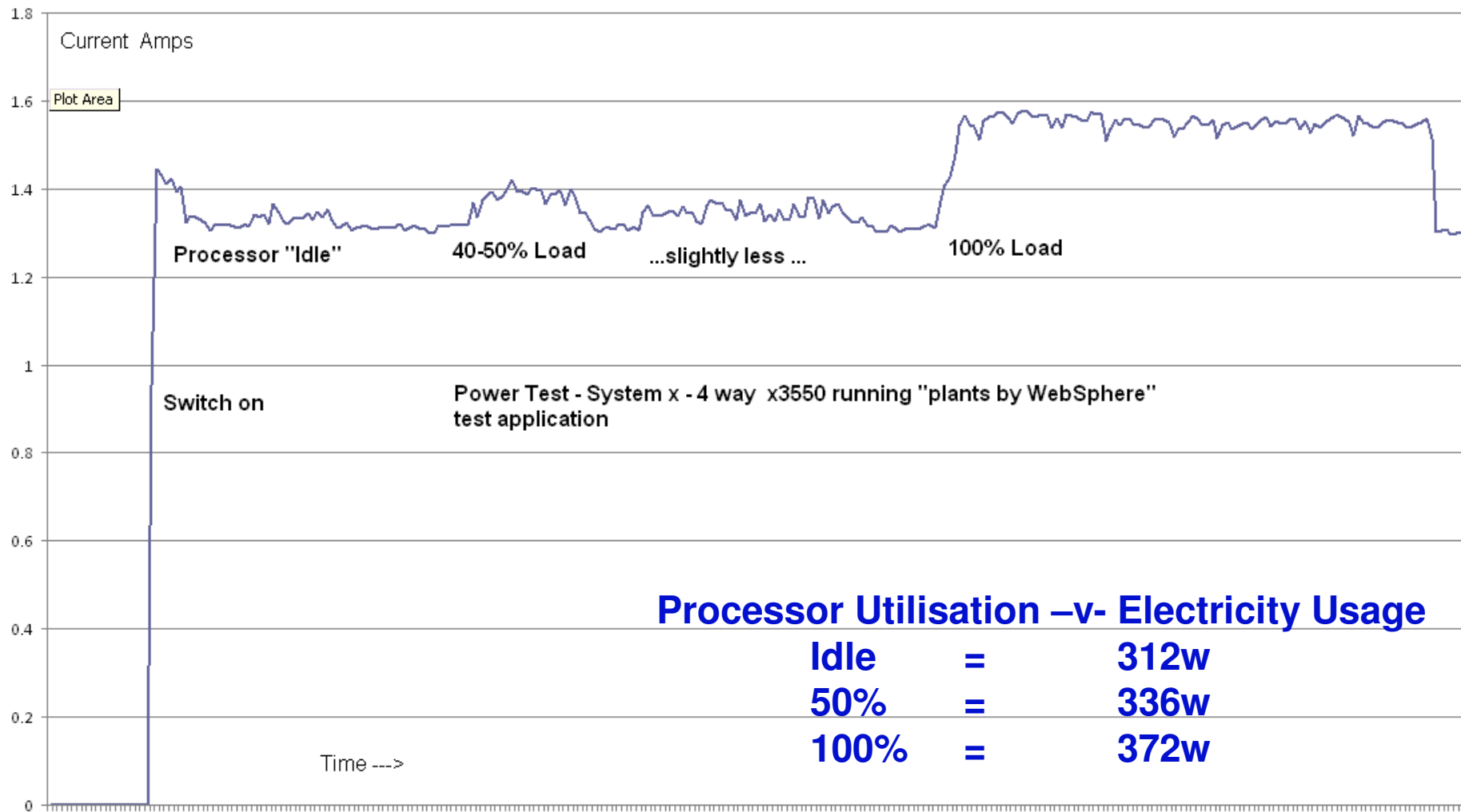
Spending (US$B)

Installed Base (M Units)

■ Power and cooling costs x8
■ Server mgmt and admin costs x4
■ New server spending

Energy has become significant part of the TCO, how is it consumed?

100 Units

35 Units

33 Units Delivered*

Data source: U.S. Department of Energy May 18, 2007

Data center	Server hardware	Processor	Server loads

TYPICAL USAGE RATES

Mainframe 80 – 100%	UNIX 10 – 20%	Wintel 5 – 12%

HVAC, UPS 55%   **IT Power 45%**

Other 70% (Power supply, fans, memory, disk)   **Processor 30%**

Performance, Capacity/ Watt

Up to 95% idle resource

Resources used at **5-20%** average for appl. load

How to improve efficiency

Reduce cooling/UPS needs vs. energy going in servers, capture heat at source (Potential gain 10%)

Higher efficiency infrastructure, power management' ($\geq$ 3yrs older is good target)

Reduce consumption @ chip level (Cap power usage)

Reduce idle/unused capacity which still consumes energy (Utilization 5 to 20 % gain)

More efficient cooling and energy supply

Better server hardware design

Advanced processor design + process

Enhance resource usage rate (consolidation/virtualisation)

Power consumption versus application load is measurable…

Processor Utilisation –v- Electricity Usage

Idle	**=**	**312w**
50%	**=**	**336w**
100%	**=**	**372w**

Storage Power Landscape

Components of Data Center Power Consumption

Cooling
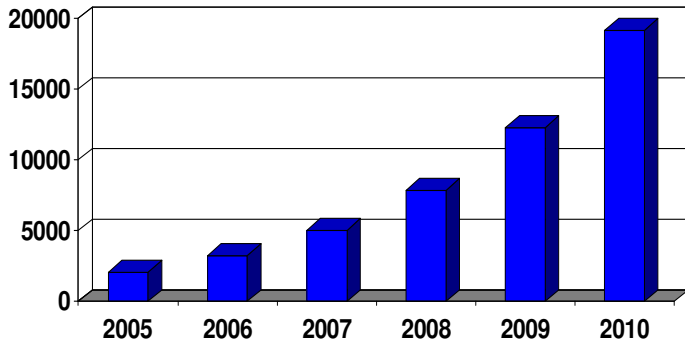Server&Storage
Conversion
Network
Light
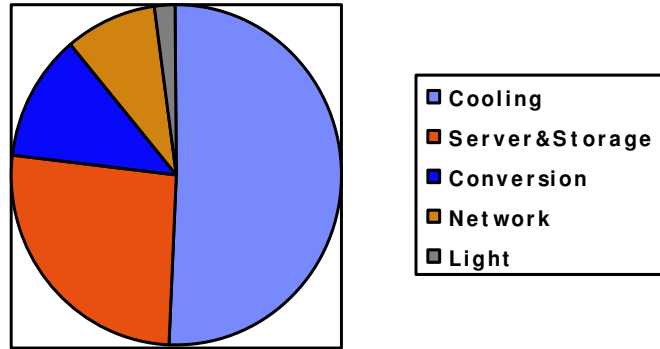
Source: IBM

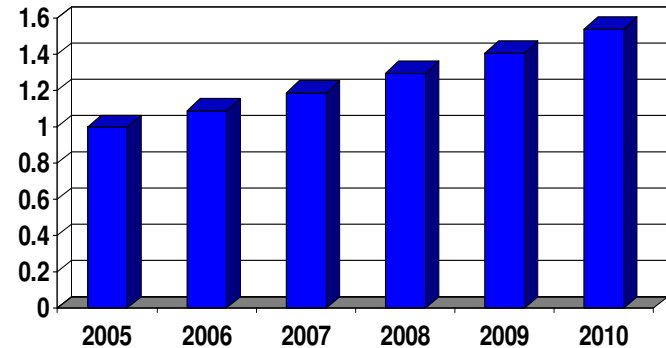## Storage Power Consumption/GB
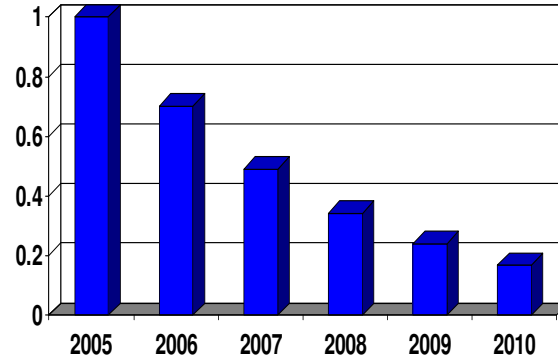
Source: IBM

Data Center Storage Usage External PB Shipped

Source: IDC

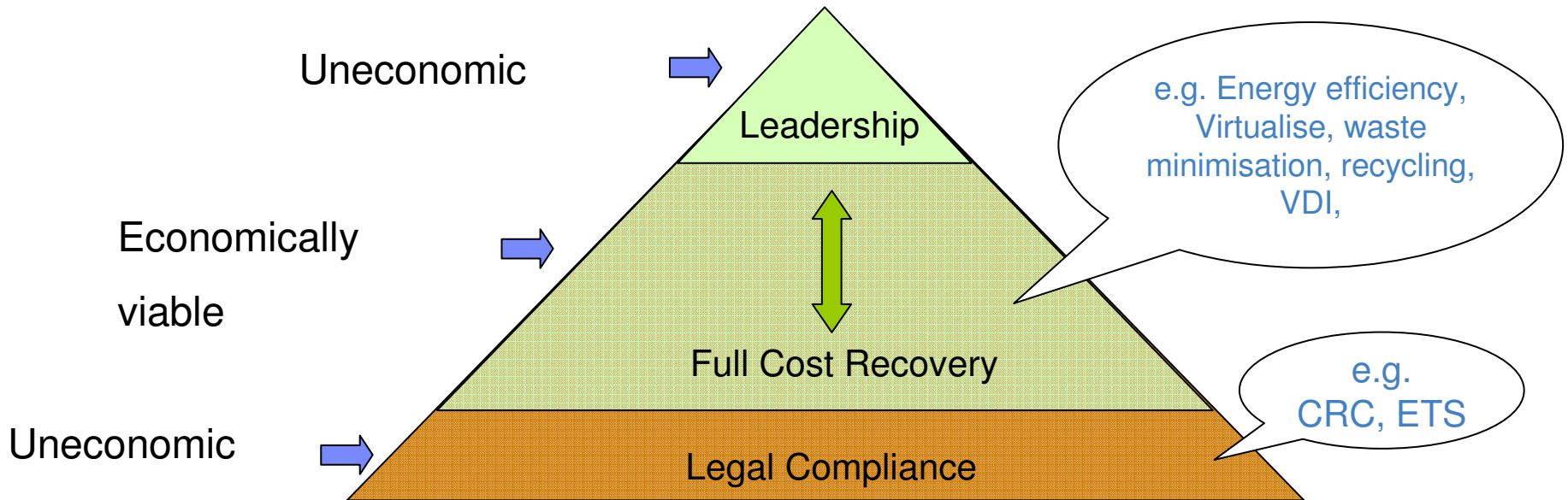## Data Center Storage Power Growth

Source: IBM

Thin Client v PC Desktop Power Consumption and Cost

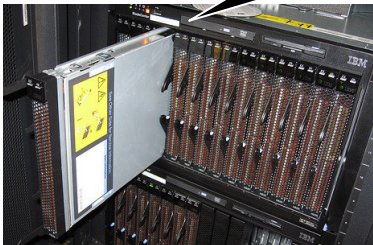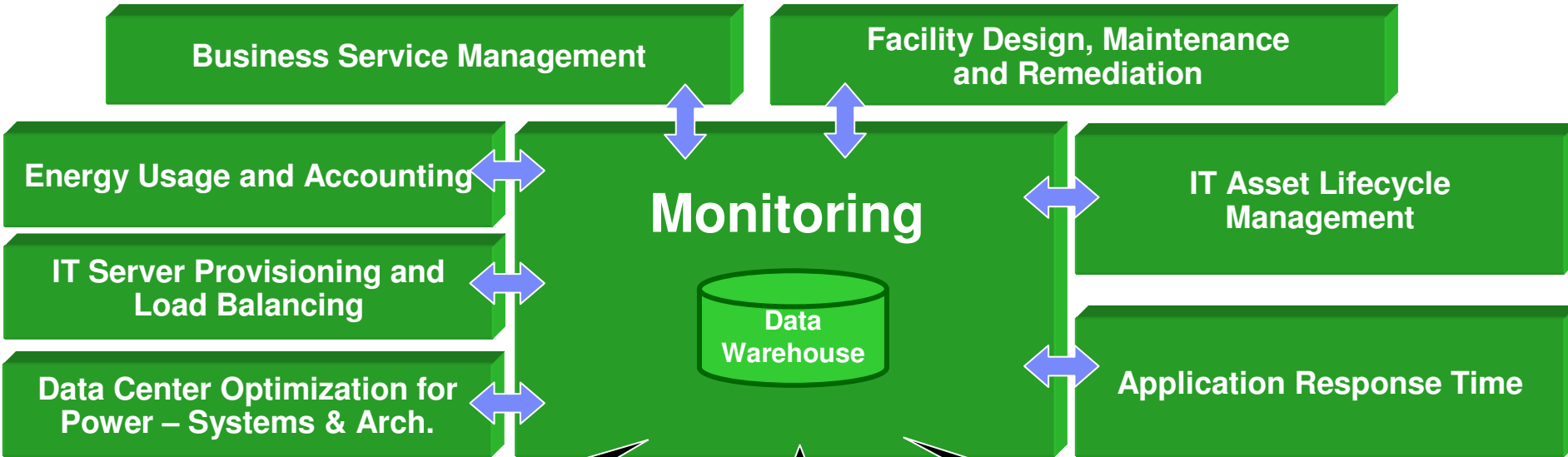|	Thin Client	Thin Client with server pro rata + server cooling [3]	PC
Power consumption [1]	16 W	41 W	85 W
x 8 hours per day	128 Wh	328 Wh	680 Wh
x 220 working days per year	28 kWh	72 kWh	149 kWh
Costs for 1 working station per year [2]	$5.67	$14.54	$30.03
- 10 working stations	$56.70	$145.40	$300.30
- 100 working stations	$567.00	$1,454.00	$3,003.00
- 1,000 working stations	$5,670.00	$14,540.00	$30,030.00
Savings TC compared to PC	81%	51%	

Note 1 -- average active power
Note 2 -- electricity tariff = 0.15 kWh
Note 3 -- Worst case: 20 User / Server

Source: Fraunhofer Institute

Projects and Activities – Which do you do?

Uneconomic

Leadership

e.g. Energy efficiency, Virtualise, waste minimisation, recycling, VDI,

Economically

viable

Full Cost Recovery

Uneconomic

e.g. CRC, ETS

Legal Compliance

IBM Energy Efficient Datacenter

Business Service Management

Facility Design, Maintenance and Remediation

Energy Usage and Accounting

IT Server Provisioning and Load Balancing

Data Center Optimization for Power – Systems & Arch.

Monitoring

Data Warehouse

IT Asset Lifecycle Management

Application Response Time
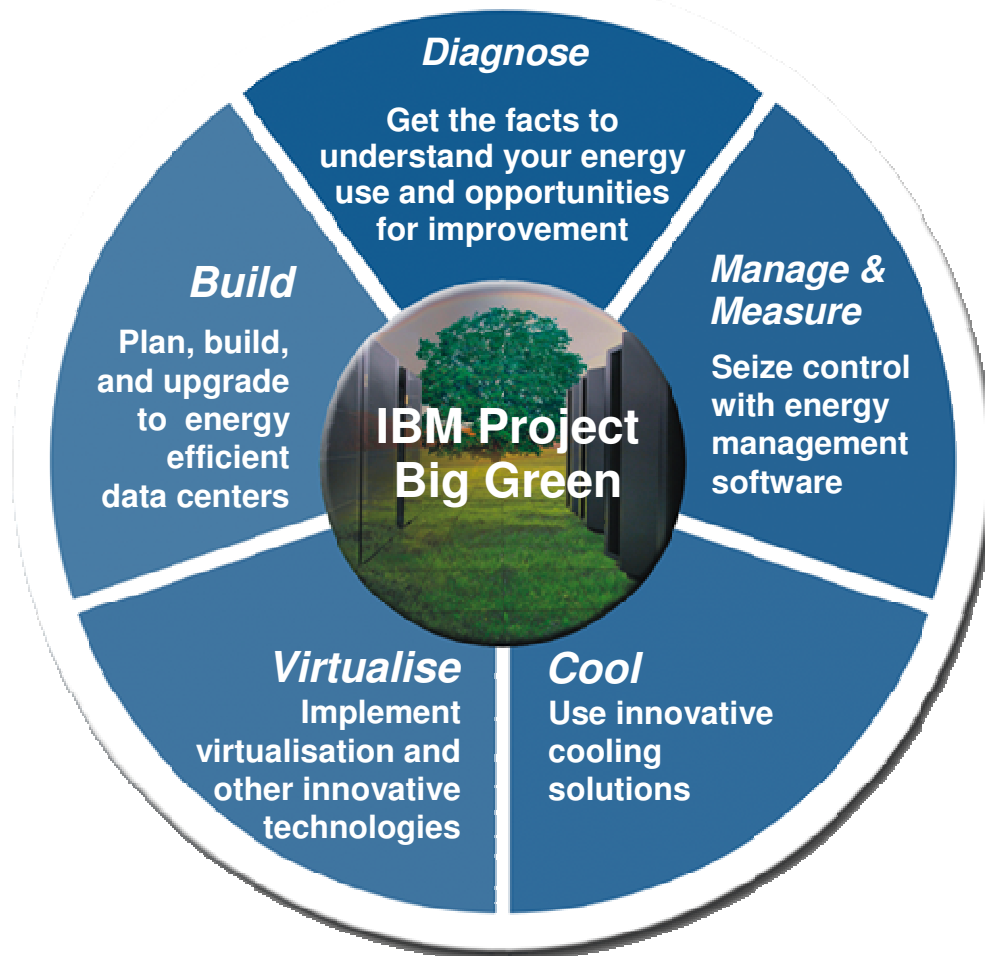

IT Assets
(Servers, storage)

Data Center Infrastructure
(UPS, PDUs)

Building Systems
(HVAC, power, lighting, security)

Five building blocks provide the tools to operational savings and business growth

Diagnose
Get the facts to understand your energy use and opportunities for improvement

Build
Plan, build, and upgrade to energy efficient data centers

Manage & Measure
Seize control with energy management software

IBM Project Big Green

Virtualise
Implement virtualisation and other innovative technologies

Cool
Use innovative cooling solutions

Double your IT capacity
- In the same energy footprint

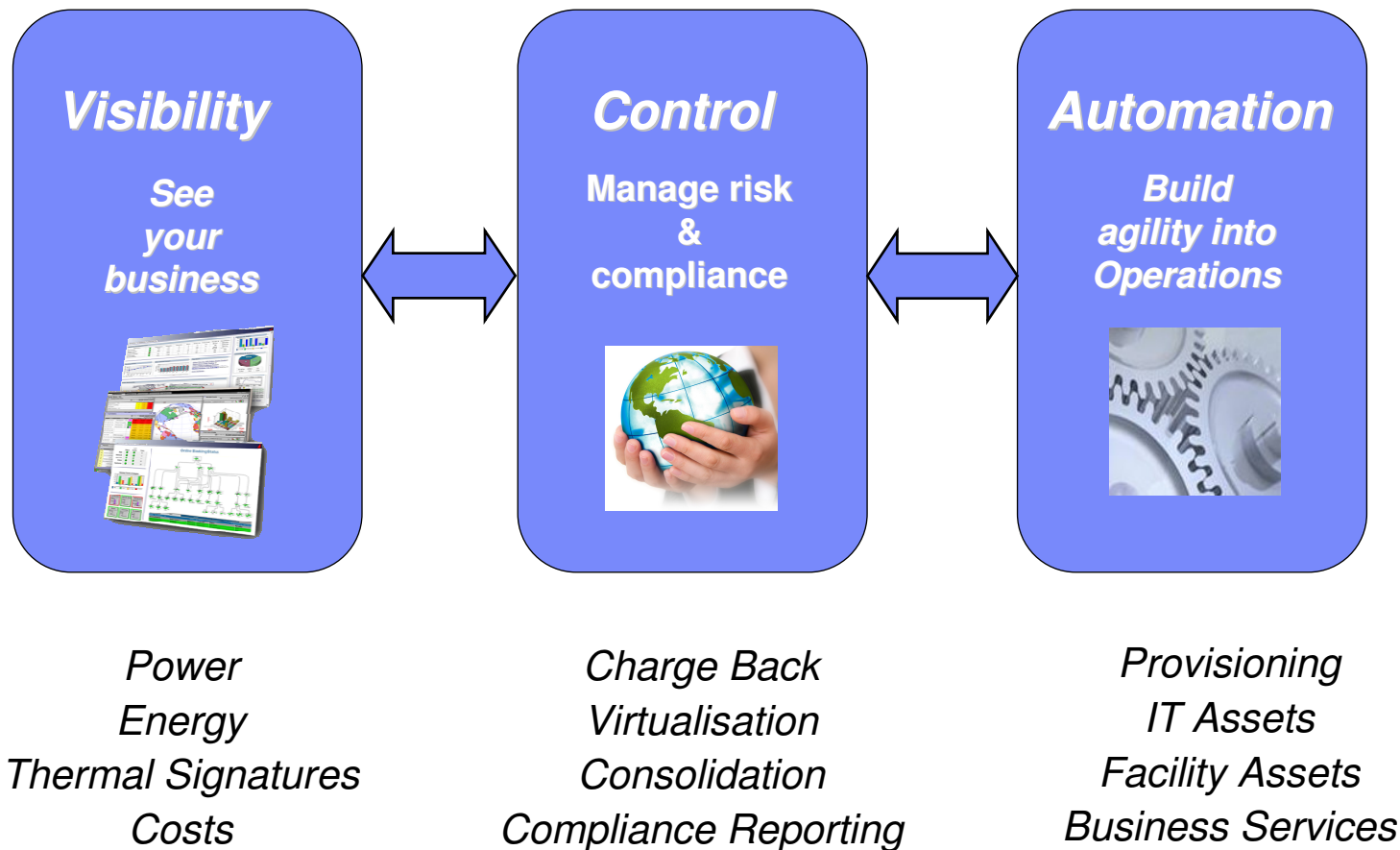*Reduce operational costs*
- 40-50% energy savings

Positive environmental impact
- Tons of CO_2 reduction and avoidance

Going green saves money.

Data Center Optimisation for Energy efficiency
An Integrated Approach to controlling Energy Costs

Visibility

See your business

↔

Control

Manage risk & compliance

↔

Automation

Build agility into Operations

Power
Energy
Thermal Signatures
Costs

Charge Back
Virtualisation
Consolidation
Compliance Reporting

Provisioning
IT Assets
Facility Assets
Business Services

Cool Blue: IBM Active Energy Manager

Measure/Trend Power Consumption
- Determine the power (watts) is being consumed now
- Why assume label power?
- Power meter (internal) or PDU with watt meter (external)

Cap or Allocate Power Correctly
- Power consumed is a function of the HW options, OS, Apps and App footprint application and the application data footprint
- Allocate power based on past history using power measurements:
  - to match the need of each server
 - to match the P/T limits of the Data Centre

Reduce power consumed
- CPUs can reduce power in periods of low utilization
- Save power costs

- A view of power consumption across the Data Centre using your applications and workloads!
- Reducing your power/thermal requirements
- Reducing power consumption during periods of low utilisation

Active Energy Manager will provide

Optimise Assets by Your Energy Usage

- **Optimise energy utilisation of assets and extend asset life.**

- **Visualise data center thermal dynamics and identify problem areas**

- **Alert source for Facility and DC "operators" of upcoming energy problems**

- **Enable workflows that allow you to create role based automation of asset lifecycles**
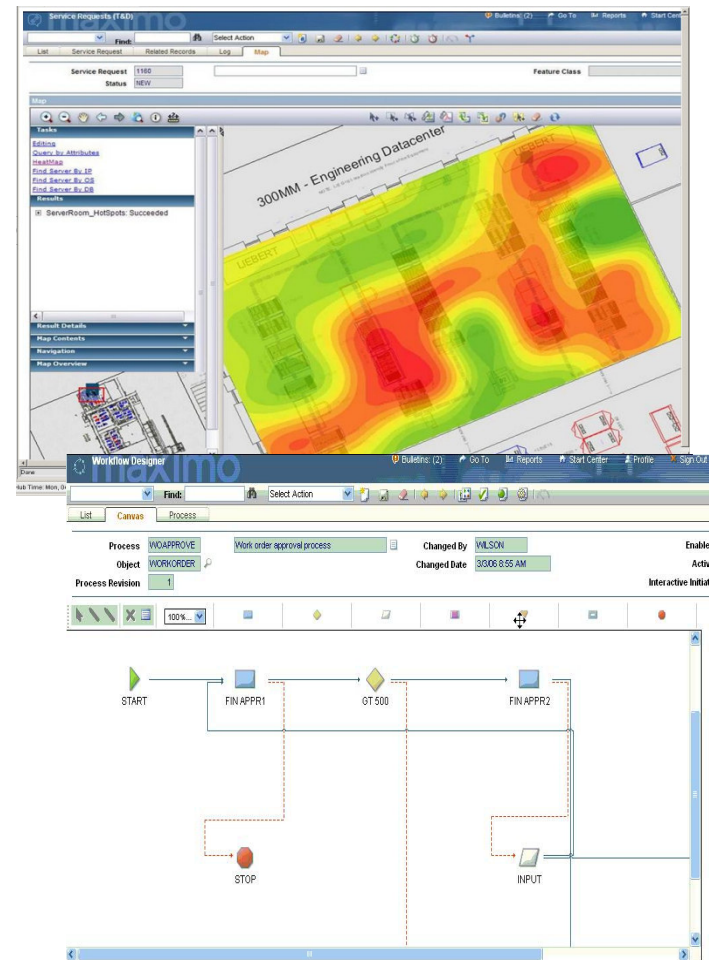
Energy Efficient Data Centre Summary

➢ *Consolidate* **- Datacentre and distributed computing environments**

➢ *Virtualise* **- Maximise server, storage and network utilisation**

➢ *Measure* **- Holistic integration between IT and Facilities assets and energy**

➢ *Visualise* **- Role-based operational and business impact dashboards**

➢ *Control* **- Active energy management within business service context**

➢ *Automate* **- Dynamically adapting environment based on optimised service, energy and demand**

➢ Exploit **- Innovative use of technology across the business to reduce energy and carbon in other areas**

email: Steve_Bowden@uk.ibm.com