Pulse
Comes to You 2009

IBM
Managing the World's Infrastructure

Let's Build a Smarter Planet:
Creating an Energy Efficient Dynamic Infrastructure

Mick Walker

The world is smaller, flatter and hotter.

Reality of a globally integrated business world.

- Economic downturn requires doing more with the same.
- Transience in price and demand for energy worldwide.
- Growing concerns about the effects of climate change.
- Increasingly empowered and interconnected customers.

These issues are all interwoven.

The need for progress is clear.

35%

IT energy expense will increase 35% in the next four years.

It's estimated that data centers consume more energy than the country of Mexico.

170 billion

170 billion kWh wasted yearly due to insufficient power usage information.

Buildings account for 40% of energy consumed of which 30% is wasted.

3 out of 100

From 100 units of energy, on average 3 units used for productive computing.

60% of CAPEX in a data center build is mechanical- electrical-cooling, 75% of OPEX over time is energy related.

The mandate for change is strong.

8 in 10

82% of CEOs view sustainability as impacting brand value.

Analyst are saying IT will be asked to contribute to or lead energy efficiency, asset management and building automation.

50%

50% of mid-size companies are making near term plans to reduce their impact.

50% of clients surveyed reported outages due to power last year.

59

59 countries and jurisdictions have or are pursuing implementation of mandatory cap and trade systems.

Monetisation of energy efficiency will be created by increased tax, utility incentives, and credits which will be sold and traded.

The benefits are real.

70%
energy saved

Care2

Cut energy consumption by 70% with proactive management.

Reduced energy usage by 340 megawatt hours.

$15.3
million saved

Nationwide Insurance

US $15 million cost savings anticipated over three years.

85-90% server utilisation through virtualisation.

80% reduction in environmental costs.

50%
energy savings

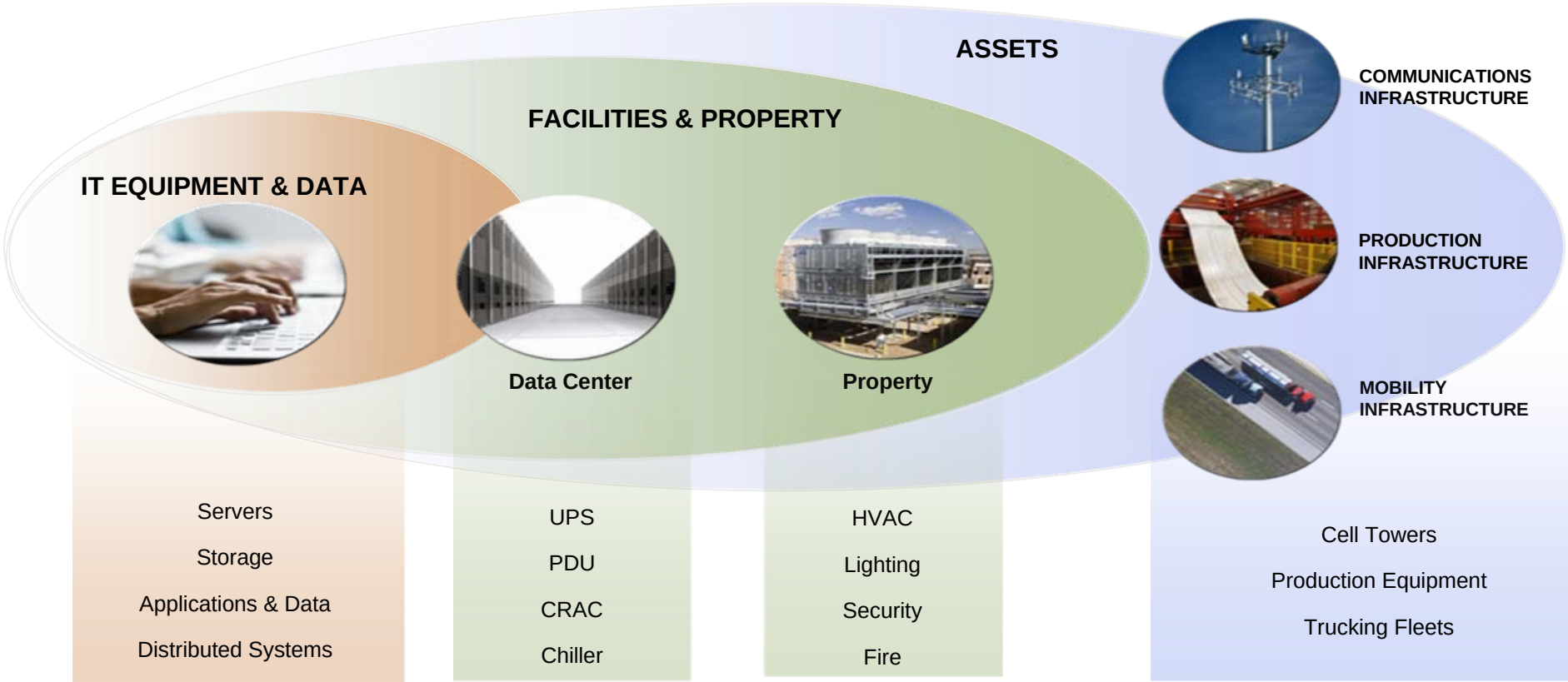
IBM Boulder

50% annual energy savings from free cooling used 75% of the calendar year

LEED silver certified design
(Leadership in Energy & Environment Design)

65% materials recycled and 33% new products from recycled materials

Organisations need to take a holistic view of infrastructure across…



The Time is Right for a Dynamic Infrastructure

- Enables visibility, control, and automation across all business and IT assets
- Transforms assets into higher value services
- Highly optimised to achieve more with less
- Addresses the information challenge
- Leverages flexible sourcing like clouds
- Manages and mitigates risks

….delivers superior business and IT services with agility and speed

Building a green infrastructure requires new focus.

IT Equipment

- Energy efficient hardware
- virtualisation and consolidation
- Innovative cooling technologies
- Active energy management
- Tiered storage

Data Center

- Accurate thermal and energy usage assessments
- Extend life of existing infrastructure
- Rationalize data center infrastructures across company
- Design flexibility into new data center infrastructure

Energy Management

- Measure, collect, benchmark
- Monitor, trend, manage
- Tracking, verify, readiness for compliance

Building a green infrastructure requires new focus beyond the DC.

Data and applications

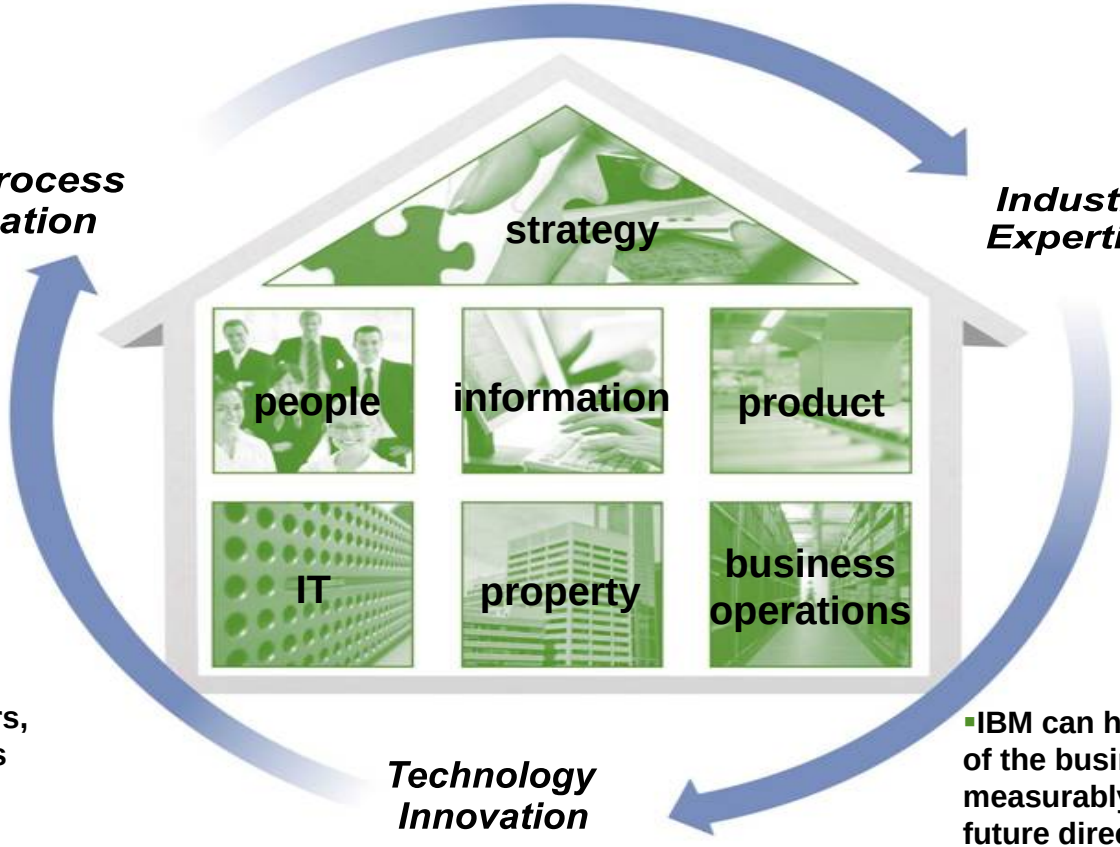
- Lifecycle management, retention, archiving of data
- Optimisation of application servers
- Application performance monitoring
- Chargeback and usage accounting for energy
- Consolidation and rationalisation

Facilities / Property

- Instrumentation of all assets for power, temperature, layout, and problem identification
- Intelligent building management systems

IBM Energy & Environment Framework

people



Customers, employees, regulators, investors, and other stakeholders expect action on energy, the environment, and sustainability

- IBM can help you look across all aspect of the business or organisation to measurably improve results and inform future direction and investments

IBM's Holistic Approach for Energy Efficient Dynamic Infrastructure

IBM Energy Efficiency Offerings

IBM offers a distinctive and comprehensive array of Energy Efficiency offerings complemented by innovative technology and deep industry knowledge that help create a Smarter Planet

Diagnose

Build

Compute Resources

Virtualisation

Measure and Manage

Cooling

IT Asset Disposal

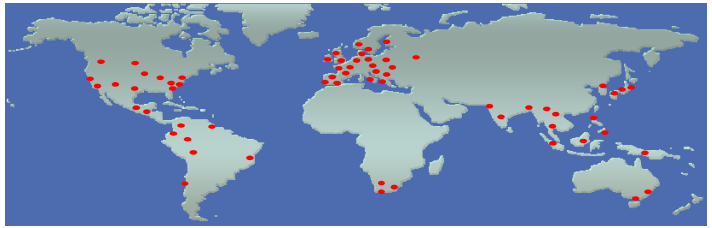
“Going Green” - IBM is transforming our own business

IBM will double compute capacity without increasing energy consumption or impact

IBM Internal Transformation

- IT investments saved $4.1B over the past 5 years from consolidation of data centers, networks and applications
- Projected annual savings of 5B KWH
- IBM actions will result in the avoidance of 2.5M tons of CO2 per year, which equates to 1M automobiles not driven for 1 year
- 80% expected energy savings from consolidating and virtualsing 3,900 servers to 30 IBM System z™ mainframes

	1997	Today
CIOs	128	1
Host data centers	155	7
Web hosting centers	80	5
Network	31	1
Applications	15,000	4,700



IBM Data Center Transformation

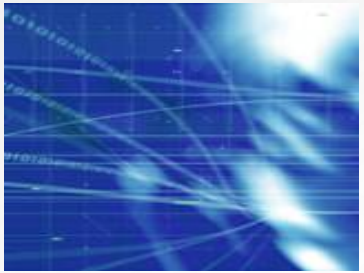
- IBM’s largest green data center in NA in Boulder is 300,000 square feet. It uses free cooling for 75% of the calendar year and 1 M kilowatt hours/year of wind-powered electricity
- 13 new business resilience centers planned in 10 countries – “we’ll outfit these centers with green technologies to reduce our CO2 emissions and manage energy costs”

Virtualisation can enable benefits beyond consolidation

Virtualise at all layers of the architecture for maximum benefits

Create many virtual resources within a single physical device

Reach beyond the box — pool and manage many virtual resources as one



Dynamically change and adjust across the infrastructure

Server virtualisation

Storage virtualisation

Network virtualisation

Application virtualisation

Client virtualisation

Virtualisation provides significant efficiencies

Server virtualisation

Storage virtualisation

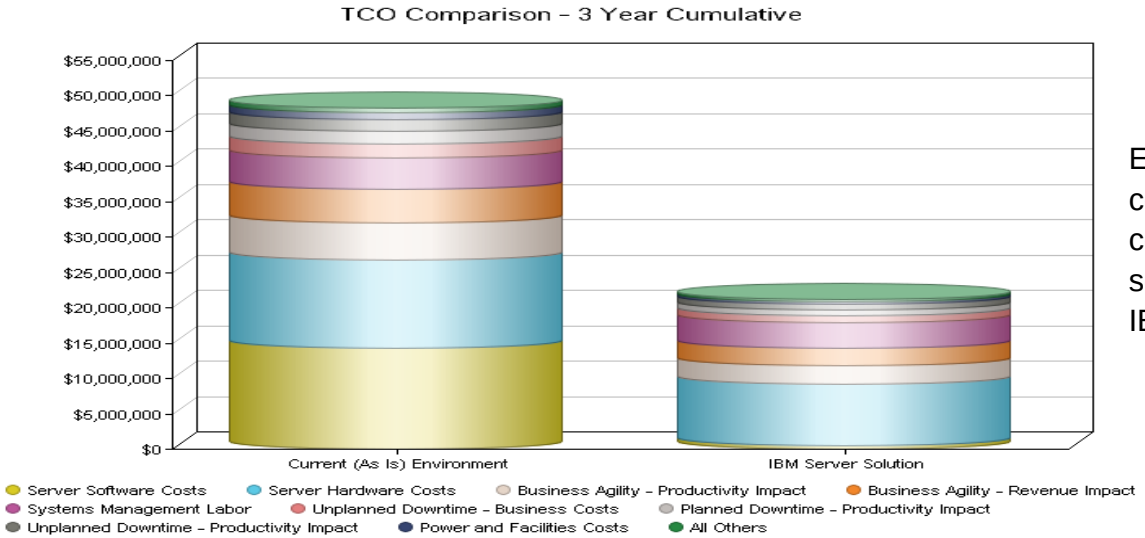
Network virtualisation

Application virtualisation

Client virtualisation

TCO Savings

Energy Savings

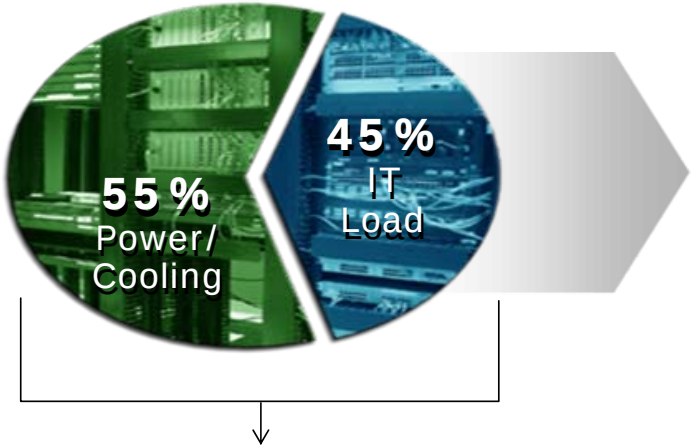


Example of savings from consolidation case study of competitive rack x86 servers to a Virtualized IBM Systems x3950 m2

IBM Solution

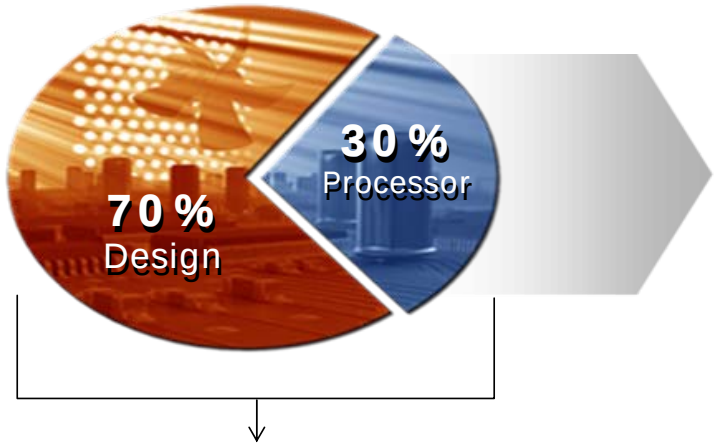
Energy efficiency assessments: Start by finding your inefficiencies

Data Center



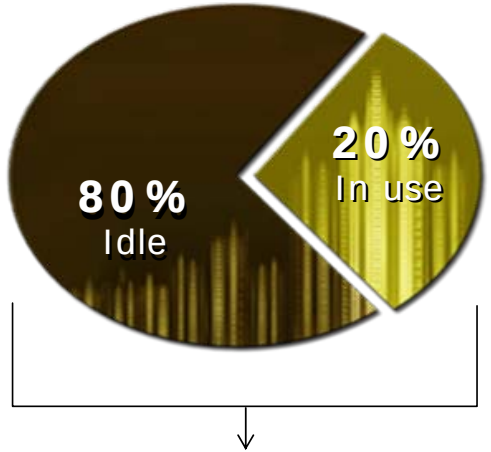
- Data Center Energy Efficiency Assessment
  - Data Center Thermal Analysis Mobile Measurement Tool

IT Resources



- Systems Green Assessment
- IT Systems Energy Efficiency Assessment
- IT Carbon Strategy Study

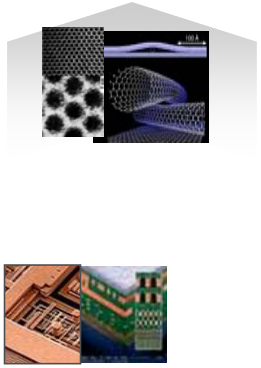
utilisation



- Server Consolidation Efficiency Study
- Storage Optimisation Assessment

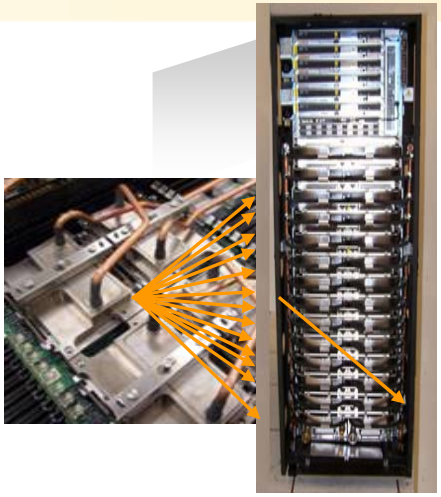
Cooling innovations from molecular to facility

Molecular



Chip level cooling techniques

Processor



80% heat load to water

System

Power off unused slots, variable fan speed based on ambient temperature

Rack

Rear Door Heat eXchanger enhancements

Facility

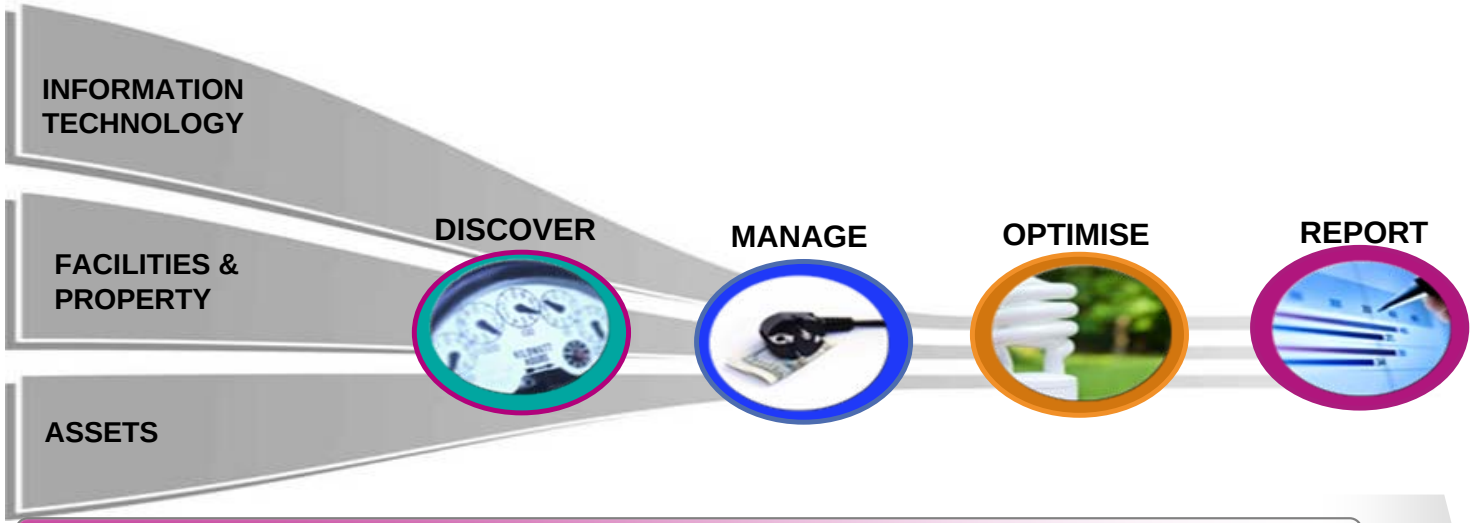
DMTF

SNIA
Advancing storage & information technology

ASHRAE

Leader in the establishment of industry efficiency

Energy Management: A practical approach.



Measure and benchmark energy and thermal metrics

Implement executive energy dashboard

Predict and control energy usage & events

Modify infrastructure to optimise energy

GOALS

- ✓ Cost Reduction & Avoidance
- ✓ Remove Operational Barriers
- ✓ Manage Risk and Streamline Compliance

Get Started with these initiatives

IBM Systems Director Active Energy Manager

- Monitor, measure and control energy usage and reduce costs
- Better utilisation of existing resources with capping for individual systems or groups of systems
- Support for Facility Providers

IBM® Systems Director

Active Energy Manager

Industry Leadership

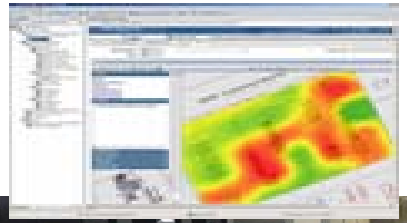
- Comprehensive energy management across IBM Systems (Mainframe, Modular, Power and Storage) as well as non-IBM Systems that addresses client pain points for energy
- Next generation of IBM PowerExecutive that extends the scope and capabilities of energy management across systems and facility providers

Studies show AEM can enable a system to save up to 30% of normal CPU power usage thereby improving energy efficiency and reducing costs.

Energy management:
Measure, manage, optimise energy use

Trending consumption on individual or group level

Establish baseline cost



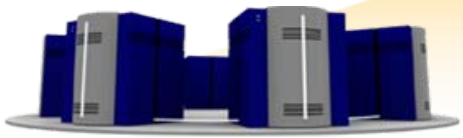
Retrieve temperature and power information

Spatial visualisation

IT Assets

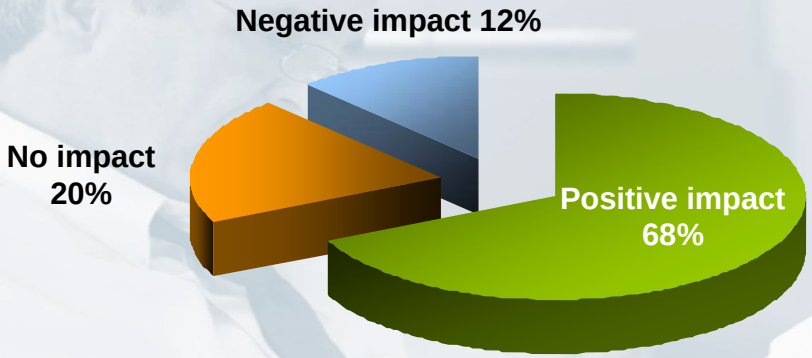
IT Assets Physical and Virtual

3rd Party Servers and Storage



Energy Efficiency is a business imperative

Expectations have Changed



- **80% of CEOs view sustainability as impacting brand value**
- **82% of executives expect some form of climate change regulation within 5 years**
- **31% say they want to reduce their environmental impact**

Market Forces are Real

SUSTAINABLEBusiness.com — **Annual sustainability stock analysts**

Environmental rating for over 2,000 public companies — Innovest STRATEGIC VALUE ADVISORS

Ceres — **Tracks environmental performance of 1,200 companies**

CARBON DISCLOSURE PROJECT

Represents 385 global institutional investors holding more than $57 trillion in assets. Reports the GHG for 1,550 major corporations around the globe

Source: IBM 2008 CEO Study • McKinsey Global Survey • Sept '07; BusinessWeek; IT Managers Driving Green Agenda • '08; IDC Green IT Survey • Sept '07

Getting Started:

For more information on green infrastructure visit: ibm.com/green

See Where You Are and What is Possible

IBM Energy & Environment Benchmark Tool can show you how your Green Infrastructure compares to others in your industry

Get started click here

Learn how to design efficient data centers

Learn how to save up to 50% operational costs from energy savings with IBM's Data Center Family[tm] of modular solutions.

Get started click here

email: mick.walker@uk.ibm.com