VXPLORE

Is virtualisation the answer to a greener data centre?

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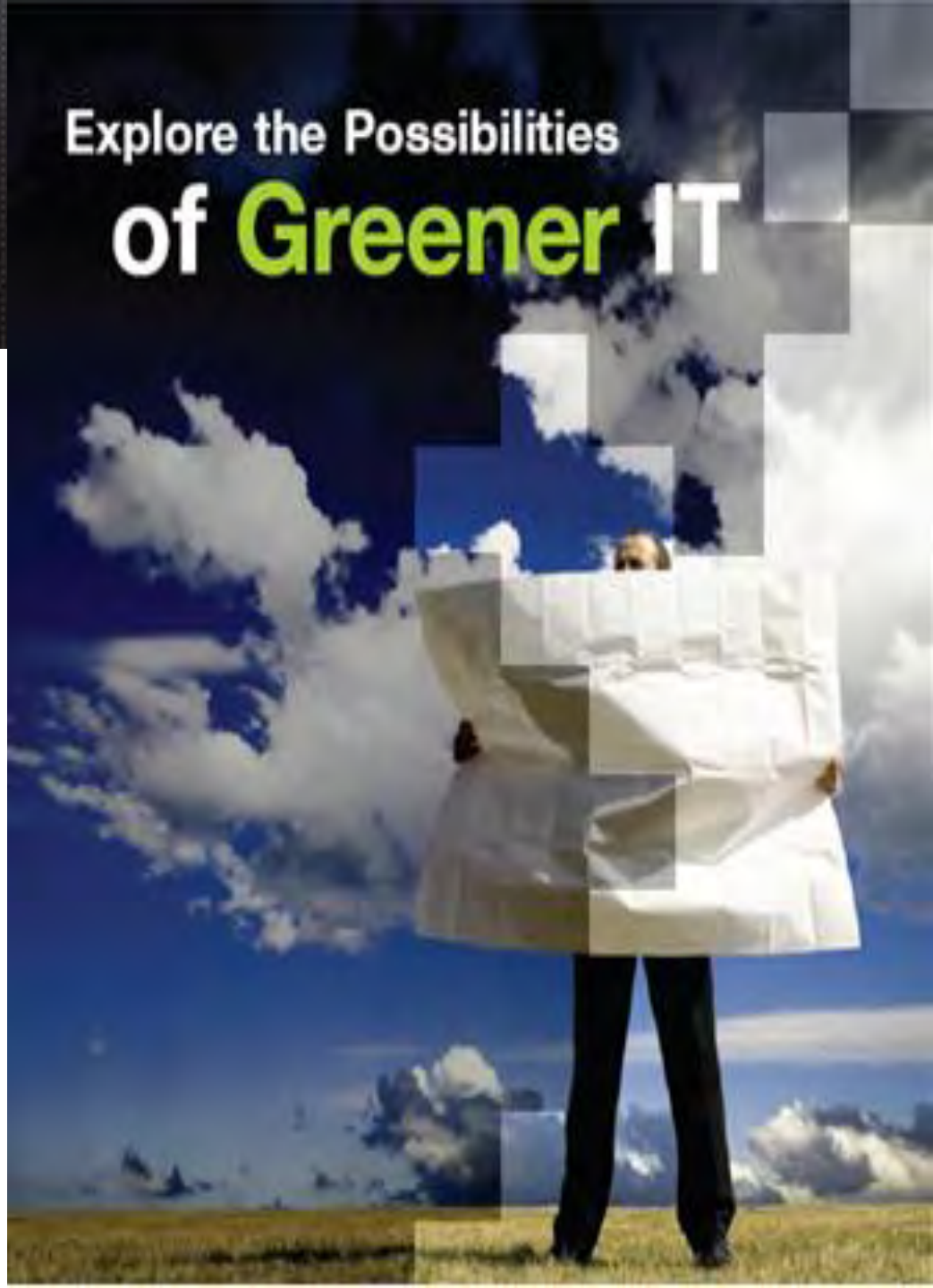

Session Aims

- Impact of IT on the environment
- Expanding IT global infrastructure
- Overview of Virtual Infrastructure
- Virtualisation Technologies
- The Green Benefits
- Questions

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Impact of IT on the Environment

- It is estimated that the CO2 emissions of the IT industry alone exceeds the carbon output of the entire aviation industry
- IT emissions account for 4% of the world's carbon emissions, and 10% of the UK energy bill
- By 2011 up to 33% of a corporation's IT Budget will be spent on energy
- 86% of ICT departments do not know what their carbon foot print is
- 80% of IT departments do not know what their electricity consumption is

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Impact of IT on the Environment

- In 1996 there were 45 million people using the internet, by 2010 this will be 1.6 billion
- YouTube consumes as much bandwidth today as the entire internet did in 2000
- IDC predicts a six fold annual Information growth from 2006 to 2010, to 988 exabytes (988 billion gigabytes)
- 85% of all computer information will be in your corporate networks

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The Expanding IT Global Infrastructure

- The number of PC's built is growing at 10% per annum (150 million units per annum)
- 80% of the lifetime costs of a PC/server are created in its manufacture
- Over a billion PCs already in use
- The global computer hardware industry will be worth $500billion per annum by 2010 (growing at 6% per annum)
- Energy costs are higher now than they have been for 50 years and predicted to go higher still (some predictions have oil at $200 a barrel by 2012)

The Expanding IT Global Infrastructure

- Internet applications
- Customer interaction systems
- CRM/Finance/ERP/Marketing/Operational systems
- Laptop/PC office based end user computing
- Legacy systems support
- Higher expectations on business Continuity
  - Raised importance on Disaster recovery
- EMAIL
  - 183 billion email sent a day
  - 2 million per second.

Overview of Virtual Infrastructure

- Storage virtualisation
- Network virtualisation
- I/O virtualisation
- Server virtualisation
- Virtual Desktop Infrastructure (VDI)
- Application virtualisation
- Data centre virtualisation

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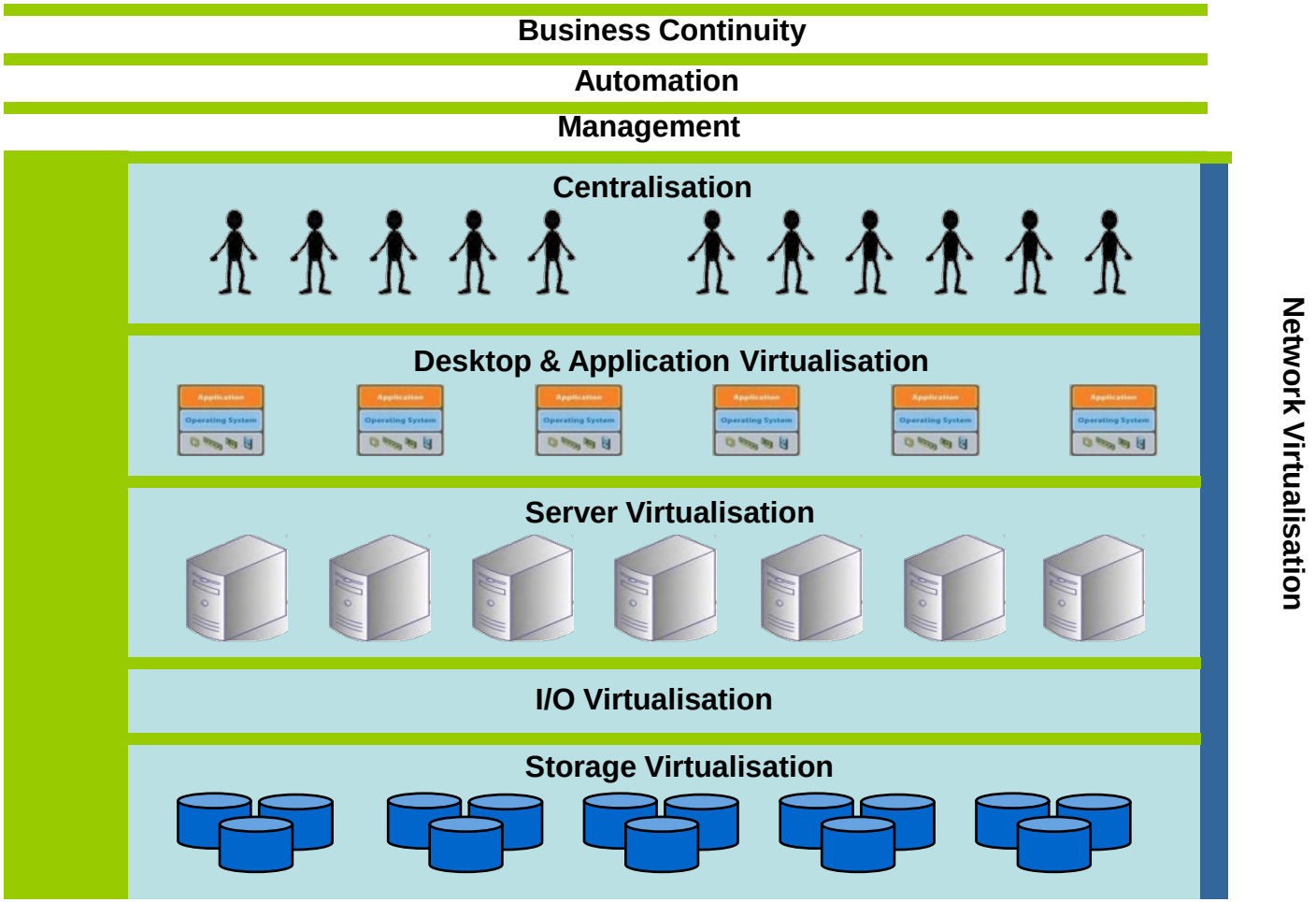
Overview of Virtual Infrastructure



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Virtualisation Technologies - Storage Virtualisation

- Allows many physical resources to be seen as one
- Heterogeneous management of multi-vendor storage devices
- Easy to implement thin provisioning allows just in time resource allocation.
- Vast improvements in Data Migration
  - Moving data off of an over-utilised storage device
  - Moving data onto a faster storage device as needs require
  - Implementing an information lifecycle policy
  - Migrating data off of older storage devices (either being scraped or off-lease)

Virtualisation Technologies – Green Impact of Storage

- Consolidation of storage resource can therefore yield some of the biggest efficiencies in an organisation's IT infrastructure
- in 2006, 48% more data storage capacity was sold in the UK than in 2005
- Currently 25% of allocated physical capacities in business environments are actually ever consumed by users
- Consolidation of data centres and reduction of space needed
- Dramatically reduced cooling energy needed

Virtualisation Technologies – I/O Virtualisation

- Reduces server I/O Cabling requirements by 70%
- Cuts connectivity capital cost by up to 50%
- Reduces I/O Management costs by up to 80%
- Allows virtual resources to appear exactly as their physical counterparts
- Permits deployment of virtual NIC's & HBA's on the fly
- Delivers 10GB/s of bandwidth to each server
- Delivers fast LAN-free server to server communications

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Virtualisation Technologies - Green Impact of Server

- Provision a new server in minutes
  - No new hardware required
- Reduce the amount of servers that need to be manufactured – cradle to grave cost of a server
- Do not have to double up on the same level of hardware in the DR site
- You are refreshing 20% of the hardware moving forward
- Consolidation ratio maybe 20:1 today but with increasing CPU power could be 100:1 in the future

Virtualisation Technologies – Desktop Virtualisation (VDI)

- VDI gives you the benefits of server-based computing without the limitations of shared services technologies or the difficulties of application integration
- The client machine used to access the virtual desktop image on the server only needs to run a remote display protocol (e.g. RDP)
- Manage desktops centrally, simplifying desktop installations, backups and maintenance
- Provide individual isolated virtual desktops to end users that look and feel like their normal desktop
- With VDI, users access their complete desktop environment in a virtual machine located in a secure data centre

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Virtualisation Technologies - Impact of Desktop

- VDI has potentially the largest environmental impact of all
- To realize true green potential desktop virtualisation needs to be combined with thin client deployment
- Thin client devices can now run consuming only **3.5 watts** of electricity and only have 100 parts
- Average PC today will consume **100+** watts of power
- Average business has 10 x the number of desktops than they do of servers

Virtualisation Technologies – Automation

- Reduced to virtual workloads where operations are completed by workflow approval and physical interaction is completely removed.
- Operations that took weeks to complete can occur in minutes.
- Operational Efficiencies
- Alignment with ISO 20000 & ITIL

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Virtualisation Technologies – Business Continuity

- Simplification of continuity processes
- Reliability through standardisation and automation
- Cost effective
  - Disaster Recovery
  - High Availability

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Virtualisation Technologies – The Benefits

- 40% to 50% reductions (15% to 25% more than server virtualisation) in TCO
- Scalability
- Flexibility
- Reliability
- Much faster ROI

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Green Benefits – Real World Reductions

Example 1: Small Datacentre

Power Reductions

This calculation is based on 49 physical servers migrating into the virtual environment.

- DL380 power consumption per hour = **465 Watts** (approx.)
- These servers will be using **22,785 Watts** per hour (22.8 KW p/h)
- Over a year these servers will consume **199,728 KW** of electricity.

Assuming a charge of 11.43 pence per KW hour, powering these servers will cost **£22,828.91**.

An additional Watt is then required to provide cooling for every consumed Watt (Industry Recommendation). Total cost will then be **£45,657.82** per annum to run these 49 servers.

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Green Benefits – Real World Reductions

Power Reductions

If we compare this to a proposed infrastructure of 6 IBM X3850 servers:

- X3850 power consumption per hour = 829 Watts (Approx.)
- These servers will be using **4,920 Watts** per hour (4.9 KW p/h)
- Over a year these servers will consume **43,099 KW** of electricity.

Assuming a charge of 11.43 pence per KW hour, powering these servers will cost **£4,926.21**

An additional Watt is then required to provide cooling for every consumed Watt (Industry Recommendation). Total cost will then be **£9,852.42** per annum to run these 49 servers.

This creates an overall saving of **£35,805.40** per annum.

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Green Benefits – Real World Reductions

Typical gas-fired power stations produce 440g of CO2 per KWH, oil-fired power stations produce 650g of CO2 per KWH and coal-fired power stations produce 950g of CO2 per KWH.

Using an average of 650g of CO2 per KWH, we can see that the 49 physical servers we have referred to in example 1 would have the following carbon footprint:

199,728 KWH x 650g = 129,823,200g of CO2, 129.8 tons of CO2 per annum.

The new virtual environment would have a carbon footprint of:

43,099 KWH p 650g = 28,014,350g of CO2, or 28 tons of CO2 per annum.

An overall saving of 101,8 tons of CO2 per annum. This equates to 28 Ford Mondeo's 1.8 Diesel Cars

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Green Benefits – Real World Reductions

Power Reductions

This calculation is based on 453 physical servers migrating into the virtual environment.

- DL380 power consumption per hour = **465 Watts** (approx.)
- These servers will be using **210,645 Watts** / hour (210 KW p/h)
- Over a year the servers will consume **1,845,250 KW** of electricity.

Assuming a charge of 15.40 cents (estimated charge) per KW hour, powering these servers will cost **€284,160.80**.

An additional Watt is then required to provide cooling for every consumed Watt (Industry Recommendation). Total cost will then be **€568,321.60** per annum.

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Green Benefits – Real World Reductions

Power Reductions

If we compare this to a proposed infrastructure of 44 HP DL585 servers:

- DL585 power consumption per hour = 820 Watts (Approx.)
- These servers will be using **36,080 Watts** per hour (36 KW p/h)
- Over a year these servers will consume **316,060 KW** of electricity.

Assuming a charge of 15.40 cents per KW hour, powering these servers will cost **€48,673.24**

An additional Watt is then required to provide cooling for every consumed Watt (Industry Recommendation). Total cost will then be **€97,346.48** per annum to run these servers.

This creates an overall saving of **€470.975.12** per annum.

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Green Benefits – Real World Reductions

Typical gas-fired power stations produce 440g of CO2 per KWH, oil-fired power stations produce 650g of CO2 per KWH and coal-fired power stations produce 950g of CO2 per KWH.

Using an average of 650g of CO2 per KWH, we can see that the 453 physical servers we have referred to in example 2 would have the following carbon footprint:

3,648,690 KWH x 650g = 2,371,824,000g of CO2 or **2371 tons** of CO2 per annum.

The new virtual environment would have a carbon footprint of:

632,120 KWH p 650g = 410,878,000g of CO2, or **410 tons** of CO2 per annum.

An overall saving of **1961** tons of CO2 per annum. This equates to 528 Ford Mondeo's 1.8 Diesel Cars

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Green Benefits – Summary of the Benefits

Utility consumption and costs

- Datacentre
- Servers
- Desktops

Carbon Footprint

- Power Sources
- Reductions -
  - Data Centres
  - Servers
  - Desktops

Computer Efficiency

- Datacentre design improvements
- Automation - Auto power down / up

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Summary

- Impact of IT on the environment
- Expanding IT global infrastructure
- The architectural advantage of Virtualisation
- Virtualisation Technologies
- The Green Benefits

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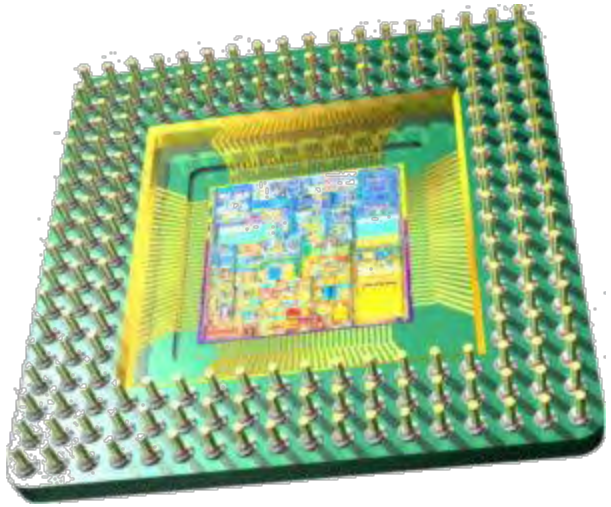
Virtualisation –
A world without Boundaries

Virtualisation Technology is the most significant shift in the delivery of Information Systems to business since the inception of the microprocessor!



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Questions?

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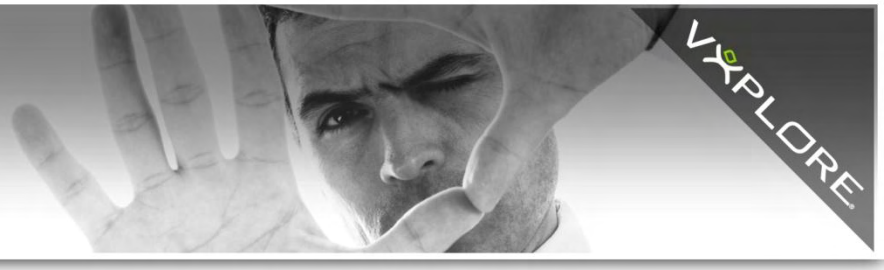

Thank You

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