Sustainability & Data Centres
Opportunities & Challenges
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Agenda Topics

• Data Centre Sustainability
  – What it’s not!
  – Embodied Energy/Carbon
  – Future for embodied energy

• In-use energy
  – The power challenge
  – Data centre efficiency
  – IT Under utilisation
  – Challenges & Opportunities
Not Sustainability!

*Images courtesy of IBM*
Embodied Energy/Carbon

Microsoft (USA)
- 700,000 sq. ft.
- 180MW capacity
- $500m build cost

HP Wynyard (UK)
- 360,000 sq. ft.
- 60MW capacity

*Images courtesy of Microsoft & HP
Look into the future

*Images courtesy of Microsoft & IT Knowledge Exchange
In-use Energy

- Estimated energy cost in USA (2011) - $7.4 billion
- Estimated energy cost in Western EU (2007) - £4,480m
- Estimated energy cost in Western EU (2020) - £8,320m
The Power Challenge

There is a problem however!

- Data Centres: ~3.5% of UK grid power
- Power Availability & Cost
- Cooling Capacity
- “90% of business will be impacted by power issues within 5 years” EPA

A ‘Green’ Data Centre is a silly concept, an energy efficient one however is not!
PUE (Power Usage Effectiveness)

\[
\text{PUE} = \frac{(A) \text{ Total facility input energy}}{(B) \text{ Total IT energy}}
\]
Data Centre Efficiency

*Images courtesy of Romonet Ltd
The IT Under-utilisation issue

- **Fossil Fuel**: 35% Heat Exhausted, 65% Electricity Generated
- **Data Centre**: 90% Transmission Losses, 5% Transformer Losses, 5% Data Centre
- **Equipment**: 40% Cooling Losses, 25% Power Infrastructure, 35% IT Equipment
- **Servers**: 65% Network Equipment, 20% Storage Equipment, 15% Servers
- **CPU**: 30% Power Supply, 45% Other Components, 25% CPU
- **CPU Utilisation**: 20% Idle Time Power, 80% CPU Load Power

0.5% of Fossil Fuel Energy
Challenge & Opportunity

**NEW**
- Free cooling / Direct Air
- High efficiency devices
- Airflow containment
- Peak provisioning
- Virtual servers
- Data centre specific Best Practice!

**OLD**
- Split unit A/C
- Random airflow
- Nameplate provisioning
- Underutilised IT
- No power management
- No data centre specific Best Practice!
Sustainability Guidance

- BREAM – About the building (UK)
- LEED – About the building (USA)
- EU Code of Conduct for Data Centres
European Code of Conduct Participants

- Fujitsu
- Microsoft
- Intel
- HP
- Met Office
- VCD IT Groep
- Vodafone
- EvoSwitch
- Memset
- Business & Decision
- PGS Petroleum Geo-Services
- Tcn
- Lamda Hellix Data Centers
- Reed.co.uk
- Telecity Group
- BCS The Chartered Institute for IT
Thank You

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