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Key points

- **Demand will drive data centre needs:** estm. 7.7 Zetabytes per annum by 2017
  - Need to comprehend availability, end user activity, criticality, data integrity and data storage

- **(Maki) Report proposals may result in KPI development delays**
  - Potential conflict with ISO/IEC development in definition and tools
  - Divergent use of industry (including user) resources

- **EU Data Centre Code of Conduct (DC CoC) and The Green Grid (TGG) define best known practices to holistically approach resource efficiency across existing data centres**
  - Expertise in data centres ranging from manufacturers to service providers and users
  - Allows optimization per industry, while also supporting resource efficiency even across critical infrastructures

- **ISO/IEC JTC1 SC39, is developing International Standards on Data Centre Resource Efficiency KPI’s**
  - International contribution from country experts across the EU, Asia, and North America
  - The KPI’s under review include PUE, CUE, WUE, REF (renewable energy), ERE (energy reuse), and IT server efficiency.
  - Technical Reports(TR) harmonizes the approach to resource efficiency across the data centres.

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1 Cisco Global Cloud Index Report, 2013
Recommendations

- Harmonize DC resource efficiency KPI development to international standards development (ISO/IEC JTC 1 SC39)
- Establish application methods via The Green Grid
  - Encourage systematic monitoring and assessment to drive resource efficiency improvements
  - Encourage resource efficiency technology development, integration, and adoption through EU Data Centre CoC
- Proliferate best practices through increase adoption of EU Data Centre CoC
  - Adoption of emerging standards
  - Incorporation of TGG maturity model
  - Increased examples in resource efficiency case studies and methodologies
    - maximize output per data centre resource envelope.
- Do NOT aggregate performance indicators
- Advise against product level regulations in the data centre
  - impacts the efficiency of data centres and creates more bottlenecks.
Comments on Report Recommendations

- **KPI option 1: Renewable energy coefficient standard is already being investigated**
  ISO/IEC SC39 is reviewing the option to develop a renewable energy factor. Challenge is to standardize the process to allow for regional differences.

- **KPI option 2: Agreed with the need for at least 3 separate metrics, DCeP, Renewable Energy Factor and KPI for energy reuse. Development timeline is underestimated.**
  Timeline is much further out. Standardization on measurement protocols, and testing methods for the KPI’s will likely take 3-4 years. Recommend using TGG and EU CoC to prove the protocols and methods, while standardization proceeds.

- **KPI option 3: The data center lifecycle “Footprint” combines a number of varying factors that have yet been enumerated.**
  For example the lifecycle of a data center building is 15-20+ years, whereas the IT equipment varies based on the type of data centre and equipment under consideration: e.g. 1-2 Socket servers are transitioning every 3 to 5 years (HPC may be more like 10 years), networking may change every 7 years, online data storage 5-7 yrs, and archives 10+... Recommend: Confirm and focus on the majority mode of carbon expenditures. Current estimates range from 80-90% of the energy consumed by IT equipment is in the use phase.
Backup
Data centres and ITC equipment are part of interconnected network.
Bottlenecks impacts more than just 1 product/system.

Carbon Footprint


Use phase > 80% of carbon footprint
The Green Grid

Driving IT Efficiency Through Collaboration

The Green Grid Mission:
To become the global authority on resource efficiency in information technology and data centers.
The Green Grid is governed by 9 Board Member Companies

~200 Member Entities Worldwide
Summary of NTT case study

• Business continuity - compute and power policy:
  • 80% increase in service availability during grid failure
  • Dynamically provision power to critical compute functions
• Net efficiency with minor performance impact:
  • 27% reduction in server energy consumption.
  • 17% reduction in data center energy consumption
In response to Japan’s power grid situation after the 2011 Earthquake, NTT Data Center operations were able to:

- Extend data centre run time capacity during backup generation from 36hrs to 65hrs
- Balanced extended operating time vs. service response level
- Realized up to 17% energy savings in the data center.

**Generator Operating Time**

- 140W Limit
- Typical

**Survive**

Automatically reduce power to extend operations during power or cooling events

How was this done?

- **Server Power Management:**
  - Power Capping
  - Energy proportional computing
- **Server Level Policy manager:**
  - Monitor power, thermal, and workload conditions
  - Automated engine manages compute and power resources
- **Rack Level Policy Manager**
  - Rack capacity
  - Inter-rack workload balance