

Storage Networking Industry Association Emerald Program Overview

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SNIA Emerald[™] Training

SNIA Emerald Power Efficiency Measurement Specification, for use in EPA ENERGY STAR®

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Growing awareness of environmental impact of IT equipment

- Rising energy cost for power and cooling large part of cost of owner ship
- Data centers can not add additional power or cooling
- Increased regulatory and societal pressures to lower energy footprints





How much data center Energy Usage is due to Storage?

- It depends...on Design and Workload (I/O profiles)!
- Published studies range from <10% >40%
- "Rule-of-Thumb" for energy: 60% servers, 20% networking, and 20%
 Storage (but no consistent definition of 'Storage')

Proportion of Energy used by Storage is increasing, because of...

- Facilities improvements (PUE, DCiE)
- Virtualization especially of Servers, O.S., Applications



The Players in Green IT



- I.T. owners / Data Center operators ("Customers")
- Vendors of I.T. hardware, software, systems, services
 - Engineers/Developers/Architects including Cloud vendors!
- Energy Utilities and Regulators
- Sovernments: local, regional, national, supra-national
 - US-EPA Energy*Star programs
 - Euro. Comm. Code of Conduct on Data Centre Energy Effic.
- Green Grid metrics <u>www.thegreengrid.org</u>
 - Focus on Power, Energy, and Cooling used for IT
- ◆ →SNIA org expertise on enterprise STORAGE
- Other interested parties (e.g. Uptime Institute, ASHREA)
- ISO/IEC/INCITS Energy Efficient Data Center







SNIA Green Storage Initiative (GSI)

- Market green storage
- Research, Educate, Leverage SNIA resources, provide direction

SNIA Green Technical Working Group

- Technical body working on green storage
- Draft specification, white papers and tutorials

SNIA Emerald[™] Program

- Access to storage power efficiency
- Help drive green storage decisions both vendors and customers
- Easy identifiable logo





Standard measurement of power efficiency of storage systems

- Measurement of multiple storage categories / classifications
 - > Disk, Tape, Solid State / size of system (More to come in taxonomy section)
 - > Compare trade offs between the categories / classifications
- Measuring performance of storage and compare to the power required to do the work
 - Measuring ratio of useful work to the energy required
- Work of Storage
 - Store data (Ready Idle)
 - > Data is not moving on or off the storage system
 - Move data on and off the system
 - > Random access to the data on the storage system (IOPS)
 - > Sequential access to the data on the storage system (MiBS)





Primary metrics ratios of power performance / watt

- Random access to the data per unit of power
 - > Input Output per Second per Watt (IOPS/W)
- Sequential access off the data per unit of power
 - Megabytes per Second per Watt (MiBs/W)
- Storage Capacity per unit of power
 - > Gigabyte per Watt (GB/W)

Secondary metrics

- Capacity Optimization verification
 - Six techniques that reduce the number of storage devices to store the same amount of data thus reducing the power required to store the data

