



# SNIA Emerald™ Power Efficiency Measurement Specification

Version 3.x (1<sup>st</sup> pass outline only)

## SNIA Forward Looking Information Disclosure Statement

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- 1 Overview.....
- 2 Normative References.....
- 3 Scope .....

Updated to cover latest market relevant storage systems that were not included (or excluded) from the previous versions such as:

- Big enterprise systems
- Filers
- Object store
- Non Volatile Solid State Storage
- more ...

Consider reducing differences between Emerald test and EPA test, e.g. power source requirements

4 Definitions, Symbols, Abbreviations, and Conventions.....

5 Taxonomy.....  
 (Old Taxonomy here:)

5.2 Taxonomy Assumptions .....

5.3 Online Category .....

5.4 Near-Online Category .....

5.5 Removable Media Library Category.....

5.6 Virtual Media Library Category .....

5.7 Adjunct Product Category.....

5.8 Interconnect Element Category

A new taxonomy will current storage technologies and is set to include future storage technologies.

- Use Patrick's Working Spread Sheet to start the new taxonomy description
- Will want to establish groupings with attributes
- Will likely be more groupings and more granularity
- Must be able to map old taxonomy (critical for EPA)
- Invite the EPA to collaborate w/ SNIA to identify relevant storage systems that will be eligible for E\* Version 2.0 (so we can concentrate on their measurement methods in v3.x)

Consider modules vs. system for ENERGY STAR qualification.

NAS must be included (As filer? As Object Store?)

When do we bring forth NAS? -- could intro before v3.x as v2.2 (while keeping block frozen as per v2.1.1)

6 Capacity Optimization .....

Currently, Emerald identifies 4 COMS (Compression, Data Dedup, Thin Provision, Snapshots) for existence testing, and parity RAID is a must have

Maybe increase the number of req'd COMs/existence (currently = 1 for OL3 & 4)

Think of ways/ investigate how to test the COMs benefits beyond existence test. But, need keep it simple

- If COM benefits are to be tested, the Emerald spec goal would be to define the active COM configuration design and active COM test methodologies (incl. existing workloads & modified scripts)
- Basic idea is to turn on whatever COMs you want during all tests, and disclose that they are on
- If COMs are activated during idle and active tests, there is no need for the existence tests
- How the EPA adds active COMs into their ENERGY STAR req't's is a tbd. Suggestions:
  - Reflect active COMs in the metrics. A 1<sup>st</sup> step could be just more data gathering
  - Idea: Maybe an aggregate of coms? E.g., achieve a particular % improvement in Capacity/W to get E\* bonus points?
  - Idea: develop duty cycle workload which includes periods of idle

6.1 Introduction .....

6.2 Space Consuming Practices.....

6.3 COMs Characterized.....

7	Test Definition and Execution Rules .....
	Keep old if still relevant; create new for new taxonomies.
	How can we reduce test burden? This includes both Emerald Spec and ENERGY STAR req't's e.g., modeling
8	Metrics .....
	While same basic metrics (Capacity/W, IOPs/W, MBPS/W) will be maintained, thoughts on how they affect the new storage systems must be considered.
8.1	Taxonomy Considerations .....
8.2	Primary Metrics .....
8.3	Power Efficiency Metric for Online and Near-Online Systems .....
8.5	Storage Power Efficiency Metric for Virtual Media Library Systems .....
8.6	Secondary Metrics .....
Annex A.	(informative) Suggested Power and Environmental Meters .....
Annex B.	(normative) Measurement Requirements .....