

Green Storage Initiative (GSI)

2022 Review and 2023 Plans

Presented by Wayne M. Adams and Chris Lueth

GSI Co-Chairs

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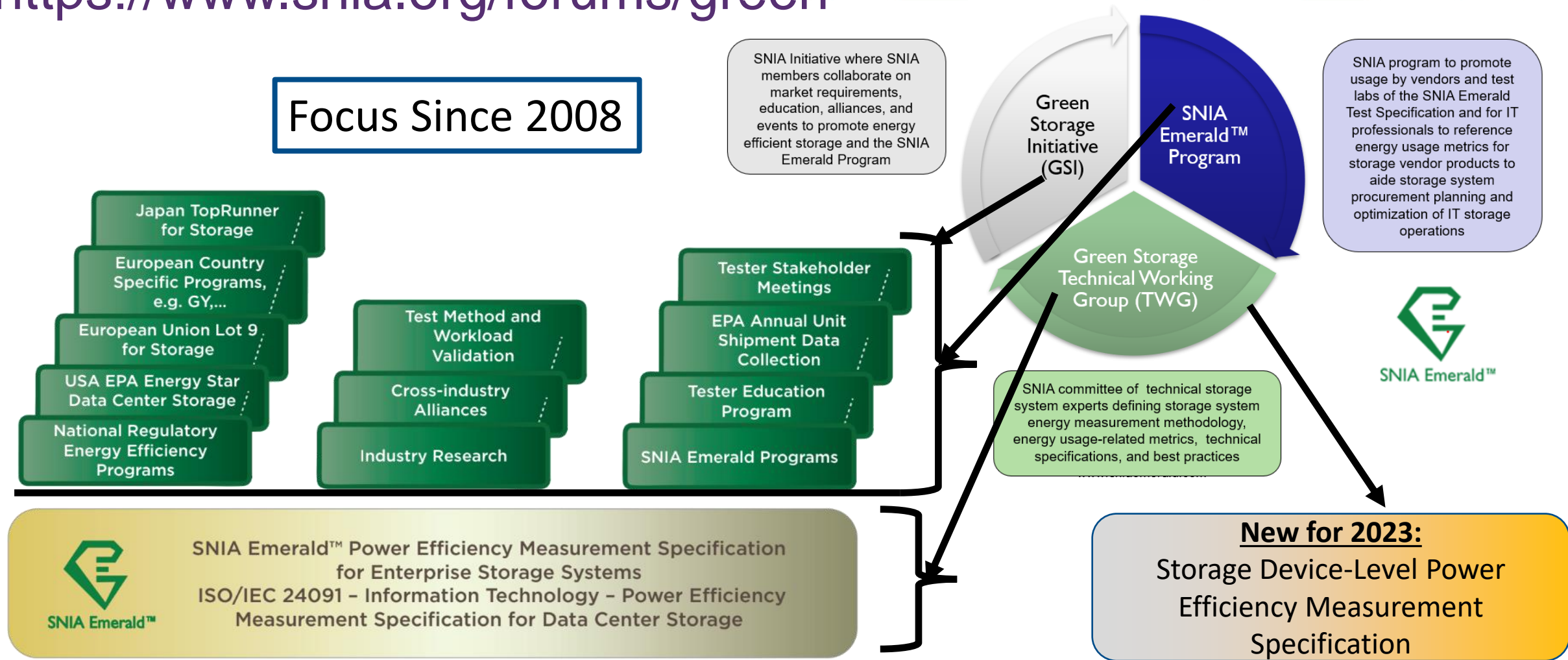
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www.sniaemerald.com

<https://www.snia.org/technology-focus/power-efficiency>

Green Storage Initiative (GSI) Mission

<https://www.snia.org/forums/green>



GSI Work Items (slide 1 of 2)

2022 Accomplishments

- EPA Energy Star Data Center Storage (DCS) v2.0 data analysis
- Initiated SNIA Emerald 5.0 planning for 2023-2024
 - Block IO workload tool replacement
 - vdBench → Calypso Test Suite
 - File IO workload tool replacement
 - SPEC SFS 2014 → SPEC Storage Solution 2020
- TGG Alliance / EU Lot 9 regulations, EU other
- TGG/SNIA storage whitepaper published (and translated Japanese)
 - WP#86 ENERGY EFFICIENT DATA CENTER STORAGE: AN ASSESSMENT OF STORAGE PRODUCT POWER EFFICIENCY
- White paper for Storage Device-Level Power Efficiency Measurement (SDLPEM)

2023 Plans

- EPA DCS 2.1 data analysis
- Explore CO₂ footprint opportunities for GSI engagement
 - E.g. LifeCycleAssessment, ESG, etc
- Continued SNIA Emerald 5.0 development
 - Modernizing tools and workloads a priority
- TGG Alliance / EU Lot 9 regulations
- EPA DCS Unit Shipment Report for 2022
- Industry Stakeholder Meetings
- Tester Community Training for new SNIA Emerald V5.0 tools
- SDLPEM V1.0 Specification
 - Calypso Test Suite

Data Center Storage v2.0 Test Reports, based on SNIA Emerald v4

<https://www.energystar.gov/productfinder/product/certified-data-center-storage/results>

☐ NVSS Disk Set Online 3 (1)

☐ NVSS Disk Set Online 4 (19)

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[CLICK FOR PRODUCT DETAILS](#)

Brand Name ⓘ

- ☐ DELL (14)
- ☐ DELL EMC (5)
- ☐ Dell EMC Unity
- ☐ Dell EMC Unity
- ☐ Dell EMC Unity
- ☐ Dell EMC Unity
- ☐ Hewlett Packard

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Storage Controller














- ☐
- Scale-Out Storage (13)

Storage Model Connectivity: Block I/O

57 Test Reports
8 Vendors

EPA Energy Star Program:

- Focus is systems with sellable SKU
- Block IO and File IO
- Vendor voluntary participation
- Results independent certification
- US Gov procurement priority
- Focus does not include composable systems, in-house proprietary designs, or consumer products.

Green Storage TWG ROADMAP- 2023		CY2023												CY 2024			
Approximate and subject to change Update 1-11-23		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Q1	Q2	Q3	
#	Events																
1	SNIA-GTWG F2F Invite EPA to concall							 vF2F			 vF2F				SNIA Member		
2	EPA-SNIA Industry Meetings			EPA call-in to SNIA (SW cadence)					...as needed...						DCS Stakeholder Meeting (virtual)		
3	ENERGY STAR Data Analysis (on file submittals)	Note: currently 12 file submittals									V2.0/2.1 data analysis						
4	ISO version of Emerald 4.0 (tentative)									Submit to ISO					Publish ISO stand		
5	Emerald Measurement Spec v5.0 Vdbench replacement		data collection								Define scope					Spec V (internal	
6	Storage Device Level Power Efficiency Measurement (SDLPEM) On going data collection											Draft Spec					
7	Futures																
	Memory attached persistent storage		Investigate and make recommendations													Consider for v5.0	
	Test methodologies for capacity optimization, data protection, etc. (impact on performance, energy consumption)																
	Energy measurement for large / new distributed systems; consider small scale measurement as system indicator																
	Collaborate w/ other Servers, Switch		SW-defined, Hyperconverged configs														
	Cloud data centers		Data caching, remote VS local, hybrid, etc. How to actually measure the energy efficiency?														
	Object storage		Is market large enough?			Is growing, e.g. S3. Plug-ins available SPEC Storage 2020											
		ESTAR, ITI/ TGG (incl 80PLUS, Digital EU), EU Lot 9, ASHRAE, SPEC-Storage/Power, SNIA-Jpn TopRunner, ISO, Oracle, DMTF															
8	Partner Collaboration/Tracking	----->															

GSI Work Items (slide 2 of 2)

GSI Alliances and Cross Industry Work

Technology and Testing

- SPEC (SFS), Oracle (Vdbench (SPC community)), SPEC (power meters), S-FLOW, 80 Plus Ecova/EPRI (power supply testing)

Policy

- The Green Grid (+Digital Europe) (EU, EU country level pgms)
- SNIA-J (Japan)

Industry Regulatory

- EPA Energy Star (USA)
- TopRunner (Japan) (via SNIA-J)
- EU Lot 9 (via TGG → Digital Europe), Blue Angel, others

International Standards

- SC39 / ITS 39

GSI/GreenTWG Cross-SNIA Group Collaboration

■ SFF TA TWG (future)

- EDSFF: Enterprise and Datacenter Standard Form Factor.

■ SMI/SSM TWG

- Storage Management profiles for power, capacity, I/O
- Profiles requests to support DCIM

■ S3 TWG/CMSI

- Solid state storage taxonomy
- S3 Test Methods/data collection

GSI Membership as of 1/1/2023



Membership Dues 2023

Voting dues = \$12K

Non-voting dues = \$6K

■ GSI Leadership:

- Co-Chair, Wayne M. Adams, Independent Consultant
- Co-Chair, Chris Lueth, NetApp
- SNIA Emerald Program Manager , Dave Thiel , Contractor
- SNIA Emerald Data Analysis, Patrick Stanko, Contractor

GSI Participation

- What is the expected industry impact of this work
 - One architecturally unbiased system test methodology to serve regulatory bodies worldwide
 - Proactively provide a single test methodology worldwide
 - Industry knowledge of storage system power consumption and best practices/configurations to optimize power usage w/o compromising system functionality
- What is the industry segment relevance.
 - Storage System Manufacturers; Storage Device Manufacturers; DCIM SW Vendors
- Why you should join and participate in GSI
 - Membership fees underwrite critical contractor services for program mgt, data analysis, test validation, and industry training; industry awareness of your company's leadership
 - Refresh and renew focus on best practices (whitepapers, planning tools)
 - Avoid being surprised when a new regulation goes live and affects your product portfolio/revenues
- Who to contact for additional information
 - GSI Co-Chair, Wayne M. Adams, waynemadams@gmail.com
 - GSI Co-Chair, Chris Lueth, Chris.Lueth@netapp.com
 - GSI SNIA Emerald Program Manager, David Thiel, emerald@snia.org