

DOCKETED

Docket Number:	14-AAER-02
Project Title:	Computer, Computer Monitors, and Electronic Displays
TN #:	206281
Document Title:	ITI & Technet 9/29 F2F Presentation: Hard Disk Drives
Description:	N/A
Filer:	System
Organization:	Chris Hankin, Information Technology Industry Council
Submitter Role:	Public
Submission Date:	10/5/2015 6:52:03 AM
Docketed Date:	10/5/2015

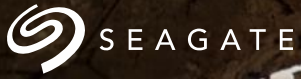
Comment Received From: Chris Hankin, Information Technology Industry Council

Submitted On: 10/5/2015

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ITI & Technet 9/29 F2F Presentation: Hard Disk Drives

Additional submitted attachment is included below.



Meeting with CEC

D. Baral/T. Lenny

Sept 29, 2015

New CEC Initiative

To reduce total energy consumption, CEC has an initiative to reduce Idle power usage by hard drives for desktop and laptop to less than <1W by 2018

Idle and inactive mode weightage has been defined in Energy Star 6.1 as:

Mode Weighting (Conventional)	Idle %	Short Idle 5-10 min after user inactivity*	Long Idle 15-20 min after user inactivity*	Sleep	Off
Notebooks, slates/tablets, 2 in 1, < 17.4" pAIO	40%	30%	10%	35%	25%
Desktop, integrated desktop, pAIO, Thin Clients	50%	35%	15%	5%	45%

* During this period, OS may do background tasks and access the HDD

Idle Power Reduction in HDD

Current Status

Estimation of Idle Power based on Energy star 6.1 guideline

2.5" Drive Idle Power Usage:

	Idle	Standby	Sleep
Single platter	0.6 to 0.9 W	0.2 to 0.3 W	0.2 to 0.3 W
Multi platter	0.8 to 1.3 W	0.3 to 0.9 W	0.3 to 0.9 W

Assuming 40% idle, 35% sleep and 25% off, single platter idle power ~ **0.5 W**

Assuming 40% idle, 35% sleep and 25% off, multi platter idle power ~ **0.9 W**

Time to Ready from Idle, Standby, Sleep and Off states need user acceptance

Idle Power Reduction in HDD

Current Status

Estimation of Idle Power based on Energy star 6.1 guideline

3.5" Drive Idle Power Usage:

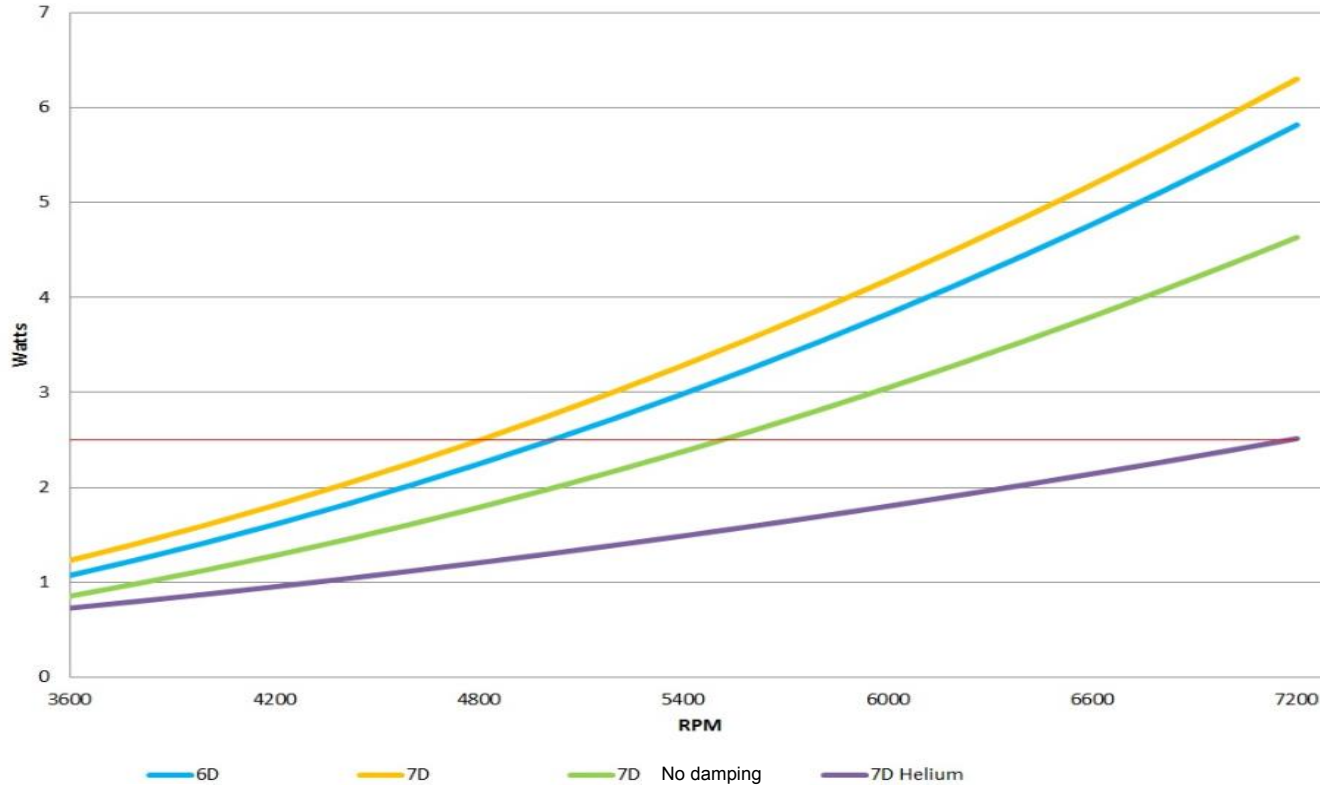
	Idle	Standby	Sleep
Single platter	2.5 to 3.5 W	0.4 to 1.2 W	0.4 to 1.2 W
Multi platter	4.0 to 7.6 W	0.5 to 1.6 W	0.5 to 1.6 W

Assuming 40% idle, 35% sleep and 25% off, single platter idle power ~ **1.8 W**

Assuming 40% idle, 35% sleep and 25% off, multi platter idle power ~ **3.6 W**

Time to Ready from Idle, Standby, Sleep and Off states need user acceptance

Calculated Power Vs. RPM for 3.5" Drives (Disc pack)



Idle Power Reduction

- ❑ Add large NAND flash to HDD and reduce HDD ON time – HDD is in power off state most of the times

- ❑ Side Effect
 - Added drive cost from NAND flash and related circuits
 - HDD spin up time related poor user experience
 - Impact of poor user experience can be minimized if OS provides hint to identify best time for data transfer between HDD and NAND flash