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Docket Number:	14-AAER-02
Project Title:	Computer, Computer Monitors, and Electronic Displays
TN #:	204157
Document Title:	ITI/Technet Computer Presentations 1
Description:	Staff Workshop: Computers, Computer Monitors, and Signage Displays - High Performance PCs, Donna Sadowy, AMD, April 15, 2015
Filer:	System
Organization:	CEC/Harinder Singh
Submitter Role:	Commission Staff
Submission Date:	4/13/2015 4:09:26 PM
Docketed Date:	4/13/2015

Comment Received From: Harinder Singh
Submitted On: 4/13/2015
Docket Number: 14-AAER-02

ITI/Technet Computer presentations 1

Additional submitted attachment is included below.

California Energy Commission Staff Workshop: Computers, Computer Monitors, and Signage Displays

High Performance PCs

Donna Sadowy, AMD

April 15, 2015

Contents

- Design Features
- California Customer Base
  - Gaming
- Comparison Staff Report to Energy Star
- Impact CEC Proposal on CA. purchasers
  - Functionality
- Conclusions

Features High Performance PCs

Some combination of:

- Higher performance processors, graphics, etc. (can be similar to workstation)
- Customizable (memory, hard drives, processor, graphics, OS)
- Enhanced security features (central management, encryption)
- Durability
- Expandability/extended life (desktop PC)
- Enhanced management
- Use with larger diameter, high resolution displays, e.g. 5K

California Users of High Performance PCs

- **Consumers**
  - CA. consumers, productivity & entertainment applications
  - CA. students
  - CA. gamers

- **Commercial** (examples)
  - Hollywood, Bay Area - animation, entertainment
  - Silicon Valley & other CA. engineers, architects - 3D modeling, prototyping
  - So. & No. CA. aerospace, defense - simulations
  - CA. small businesses, e.g. real estate, medical offices, interior design
  - CA. universities, hand-on learning
  - CA. corporate space planning, construction
  - CA. business productivity applications

CA. Staff Report – Technical Feasibility

TECHNICAL FEASIBILITY FOR HIGH PERFORMANCE PCs:

High performance desktops &integrated desktops with discrete graphics, as well as notebooks would need to be redesigned to consume up to 77% less energy, i.e. 215 kWh, (Desktop Category D2, G7 graphics) compared to existing Energy Star 6.1 PC specification

- **ENERGY STAR products are today's best in class for energy performance; don't represent greater market**
- **Drastic reduction proposed in base TEC & adders**
- **Far exceeds historical improvements**
- **Jan. 2018 is very aggressive schedule - planning for 2018 products starts in 2016**
- **Staff Report cost effectiveness analysis underestimates costs , missing data**
- **Even in 2018 likely to remove higher performance platforms from market – one size doesn't fit all**
- **Some level discrete graphics adders needed (TBD)**

ENERGY STAR Star v6.1 (effective 6/2/2014)

Base TEC			
Desktop	**TEC (kWh)**	**Notebook**	**TEC (kWh)**
DT 0	69	NB 0	14
DT I1	112	NB I1	22
DT I2	120	NB I2	24
DT I3	135	NB I3	28
DT D1	115	NB D1	16
DT D2	135	NB D2	18

Discrete Graphics Adders							
Desktop	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**
TEC	36	51	64	83	105	115	130
Notebook	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**
TEC	14	20	26	32	42	48	60

California Proposal

Base TEC (kwh) (no Discrete Graphics Adders)		
Effective Date	**Desktop**	**Notebook**
1/1/2017	N/A	30
1/1/2018	50	30

Staff Report – Cost Effectiveness

Addressed in greater detail in industry companion presentations, e.g.

- Processor/chipset cost adder for mobile processors ($40- $110)
- Customers needing large capacity HDD ($50 - $150)
  Solid State Drive cost adder (>>$100)
- Highest efficiency, gold PSU cost adder ($14 -22)

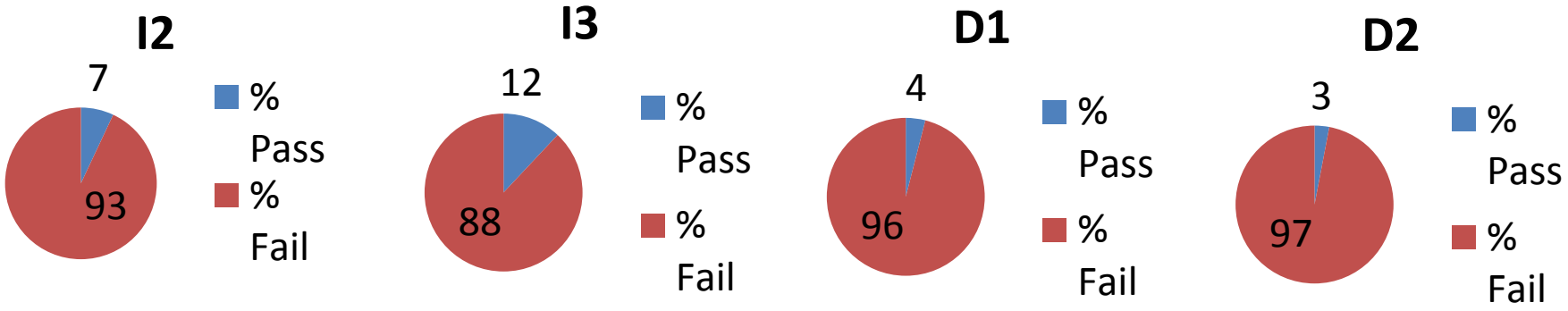
Estimate of $2.00 cost adder for Staff Report proposal greatly underestimates expected costs to CA. consumers

- Industry will provide CEC additional analysis regarding high performance PCs and cost effectiveness in written comments
- Actual primary data is better than secondary data

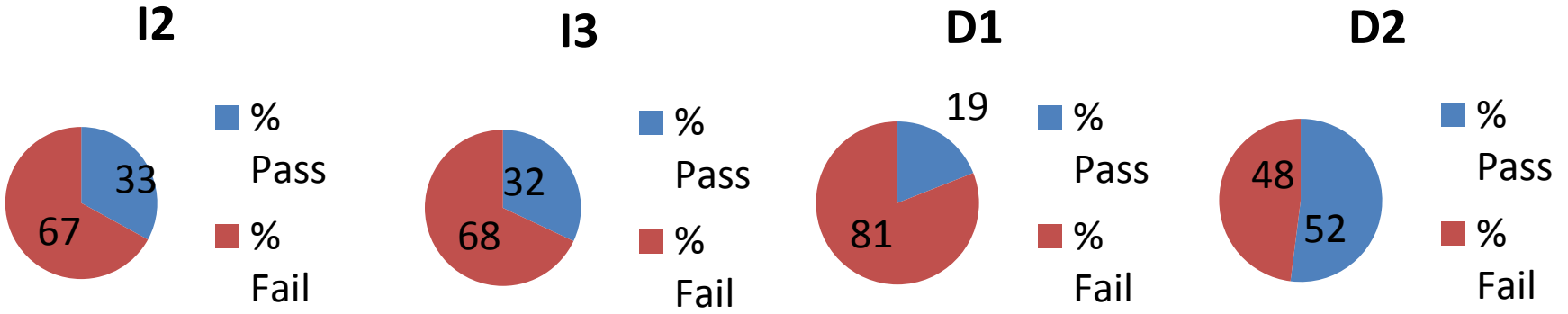
Performance PCs and Staff Report Proposal

Pass/Fail Rates **of Category I2, I3, D1, D2 PCs in ENERGY STAR 6.1 QPL**

Desktops



Integrated Desktops



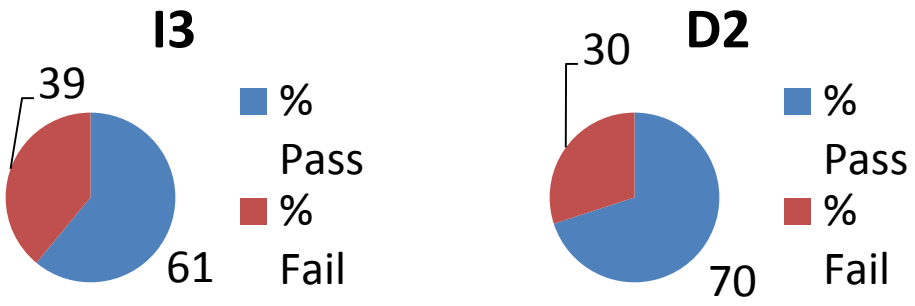
KEY:
QPL = Qualified Products list, ENERGY STAR 6.1, April 2015. Definition ENERGY STAR 6.1 categories::
http://www.energystar.gov/products/spec/computers_specification_version_6_1_pd

ENERGY STAR is best in class voluntary recognition program

Performance PCs and CEC Proposal (cont.)

Pass/Fail Rates **of Category I3, D2 Notebook PCs in ENERGY STAR 6.1 QPL**

Notebooks



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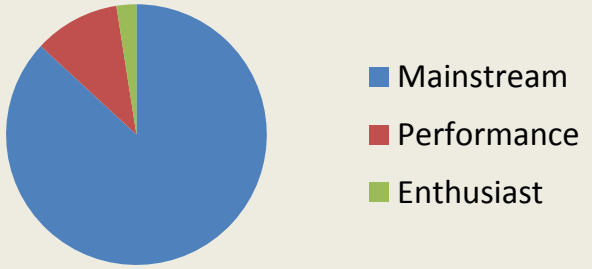
Computer Gaming

Staff Report notes use integrated graphics by "casual" video gamers; in Oct '14 Steam graphics profile made up 18.7% systems, and also increased use from 2012.

80% users in this profile use discrete graphics.

- Number U.S. PC gamers estimated at > 100 million
- U.S. PC gaming hardware and software market, 2013:
  - *Mainstream hardware >$5 billion (Add in board or integrated)*
  - *Performance hardware >$5 billion (Add in board)*
  - *Enthusiast hardware >$6 billion (Add in board)*
  - *PC Gaming Software (No. America) >$3 billion*

PC Gaming Market - Breakdown by Performance

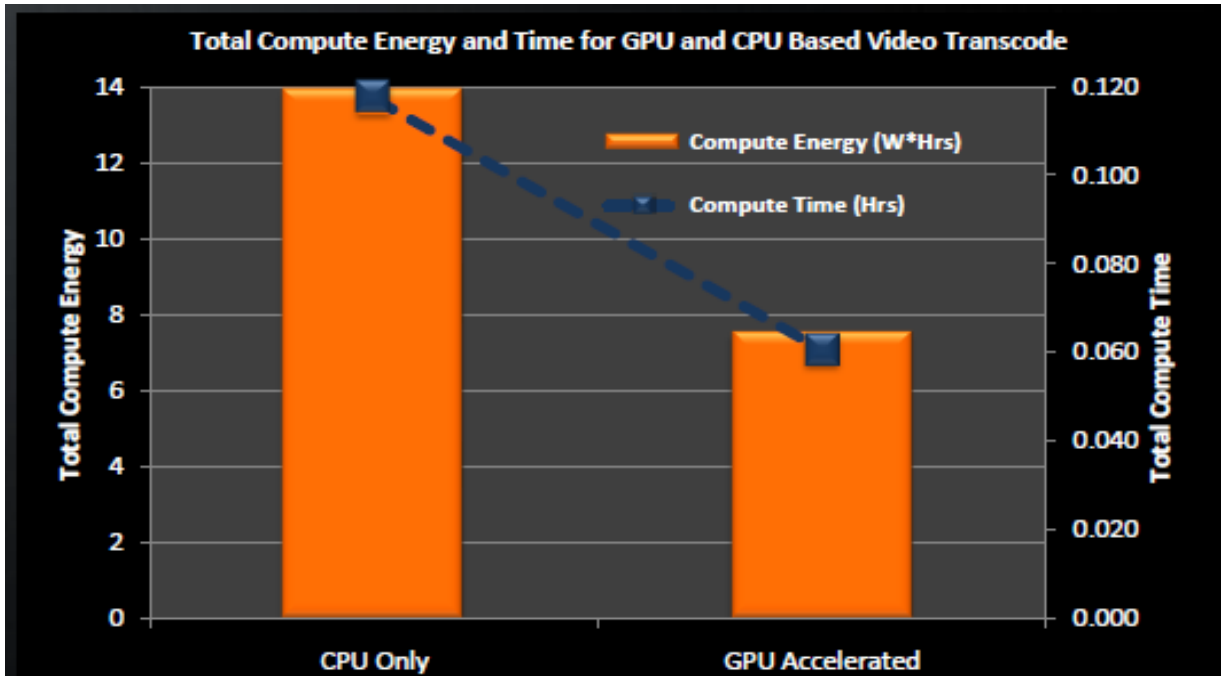


- Manufacturer Ecosystem:
  - Gaming PC box builders, as well as total system builders and brand OEMs
  - CPUs, APUs, discrete GPUs, other components, add in boards, disk drives, power supplies, peripherals like keyboard, mice, steering wheels, and joy stick, audio systems, displays.
  - Gaming software; game software available at retail, digital software or software networking services.

Source: CEC Staff Report, Jon Peddie Research http://jonpeddie.com/publications/pc_gaming_hardware_market_report/ , Tom's Hardware, NPD

Performance and Energy Impacts

- Performance and/or energy benefits are enabled for some tasks by accelerated GPU computing and other acceleration technology
- Video transcode tasks can take longer to complete with an entry - mainstream laptop, vs. a performance desktop.
- Graphics can allow for faster performance and better energy efficiency for common tasks, such as content creation for YouTube, home movies, H.264/MPEG 4



Application: H.264 HD transcoding , AMD performance/mainstream discrete GPU vs. AMD mainstream CPU processor. Testing performed by AMD.

Discrete GPU and Computing

- **In performance PCs, a discrete GPU is a mainstream computing device**
  - Large array of fully programmable shader processors
  - Fixed function hardware for specific applications
- **Applications span consumer and productivity usage models**
  - Multimedia, (Photo, video and audio)
  - Productivity (Display and audio technologies)
  - Simulation (Physics & modeling)

- **For gaming, highest performance discrete graphics enable game play frame rates up to 20x higher than integrated graphics, can affect player experience**
- GPU power in short idle affected by RAM, # transistors, rendering resolution
- **Long history of improved energy efficiency, active and idle power**
  - Long vs. short idle: power management to reduce dGPU long idle now exists
  - Efforts to improve power and efficiency are ongoing

- **Should not be excluded or limited in market because of aggressive limits & timeframes; this would harm CA. businesses & consumers**

Conclusions

- Industry understands drivers behind CEC's proposal
- Performance PCs offer increased functionality to the California market
- Technical feasibility & cost effectiveness concerns with limits and schedule in Staff Report
  - Data from secondary sources is not a good substitute for real-world data
  - CA. is proposing reductions of up to 77% in energy TEC of high performance PCs (desktops/integrated desktops D2/G7) compared to current ENERGY STAR qualified products list
  - One size doesn't fit all, a scaled approach is better; this can be achieved by categorization
  - Some level of energy allowance needed for discrete graphics
  - Industry will provide recommendations for base TEC and adders to CEC
- Danger that many performance PCs and components will be removed from CA. market because of aggressive limits and timeframes; this would harm CA. businesses, consumers and manufacturers
- Sufficient time is requested for analysis, data collection and discussion to respond to Staff Report

Back Up

Performance PCs and CEC Staff Report Limits:

Evaluation of PCs in ENERGY STAR 6.1 Qualified Products List

All Desktop ENERGY STAR 6.1 QPL Listing				
Category	Long Idle Average (Watts)	Short Idle Average (Watts)	Long & Short Idle Average	Average TEC
I2	24.02	25.33	24.68	108.86
I3	22.43	24.09	23.26	102.98
D1	31.03	32.23	31.63	139.04
D2	32.65	34.07	33.36	145.69

All Integrated Desktop ENERGY STAR 6.1 QPL Listing				
Category	Long Idle Average (Watts)	Short Idle Average (Watts)	Idle Average	Average TEC
I2	18.59	34.39	26.49	130.68
I3	19.50	35.31	27.41	134.65
D1	21.41	39.91	30.66	151.31
D2	24.35	47.63	35.99	163.57

All Notebook ENERGY STAR 6.1 QPL Listing				
Category	Long Idle Average (Watts)	Short Idle Average (Watts)	Long & Short Idle Average	Average TEC
I2	5.14	8.55	6.85	30.08
I3	5.85	9.92	7.89	34.07
D1	7.96	12.64	10.30	45.06
D2	12.78	18.60	15.69	62.88

- Energy Star 6.1 Qualified Products List represents most energy efficient performance PCs (I2, I3, D1, D2) on today's market
- As performance increases, feasibility of achieving 50 kWh for desktops/integrated desktops, 30 kWh for notebooks, decreases
- Cost effectiveness, technical feasibility, loss of increased functionality not adequately addressed by CEC Staff Report for high performance PCs

CA Proposal vs Europe Lot 3

- **Europe Lot 3**

Base TEC (kWh)					
Desktop	**7/1/2014**	**1/1//2016**	**Notebook**	**7/1/2014**	**1/1/2016**
Cat A	133	94	Cat A	36	27
Cat B	158	112	Cat B	48.0	36.0
Cat C	188.0	114.0	Cat C	80.5	60.5
Cat D	211.0	150.0			

Desktop	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**
TEC 7/1/2014	34	54	69	100	133	166	225
TEC 1/1/2016	**12**	**20**	**26**	**37**	**47**	**61**	**113**
Notebook	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**
TEC 7/1/2014	12	20	26	37	49	61	113
TEC 1/1/2016	7	11	13	20	27	33	61

- **California Proposal**

Base TEC (kwh) (no Discrete Graphics Adders)		
Effective Date	**Desktop**	**Notebook**
1/1/2017	N/A	30
1/1/2018	50	30

- Lot 3 base TEC numbers higher than ENERGY STAR v6.1; different performance categories recognized
- Discrete graphics energy reductions effective 1/1/2016 are aggressive

TechNet

ITI

THANK YOU