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Comment Received From: Harinder Singh
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ITI/Technet Computer presentations

Additional submitted attachment is included below.

PC’s Cost Effectiveness/Technical Barriers

Technologically feasible and Cost Effective

- Energy Savings and cost effectiveness analysis in draft report are based upon non-public calculations, apparent multiple false assumptions and misunderstandings of PC industry economics, power management of PCs and proper test methodology.
  - CEC methodology for getting from IOU studies to conclusions and draft proposals is not presented or made public
    - IOU's supplemental report does not show any cost effective systems meeting CEC proposed limits
  - Industry is asking CEC to share more information.
- Energy reduction potential of worst machines apparently being applied to best machines
  - Assumes all systems can achieve percentage gain of going from low efficiency PSU to high efficiency PSU
    - All Energy Star compliant systems already have high efficiency PSU's
  - Assumes potential gains from power supply efficiency and processor power management can be applied to Energy Star qualified products
    - All Energy Star qualified products already have these features enabled
- Absolutely no provision made for end user performance and feature needs
  - Security (TPM, VPRO …)
  - Discrete Graphics
    - Hybrid graphics capabilities add ~$5 to DT cards and have limited OS support

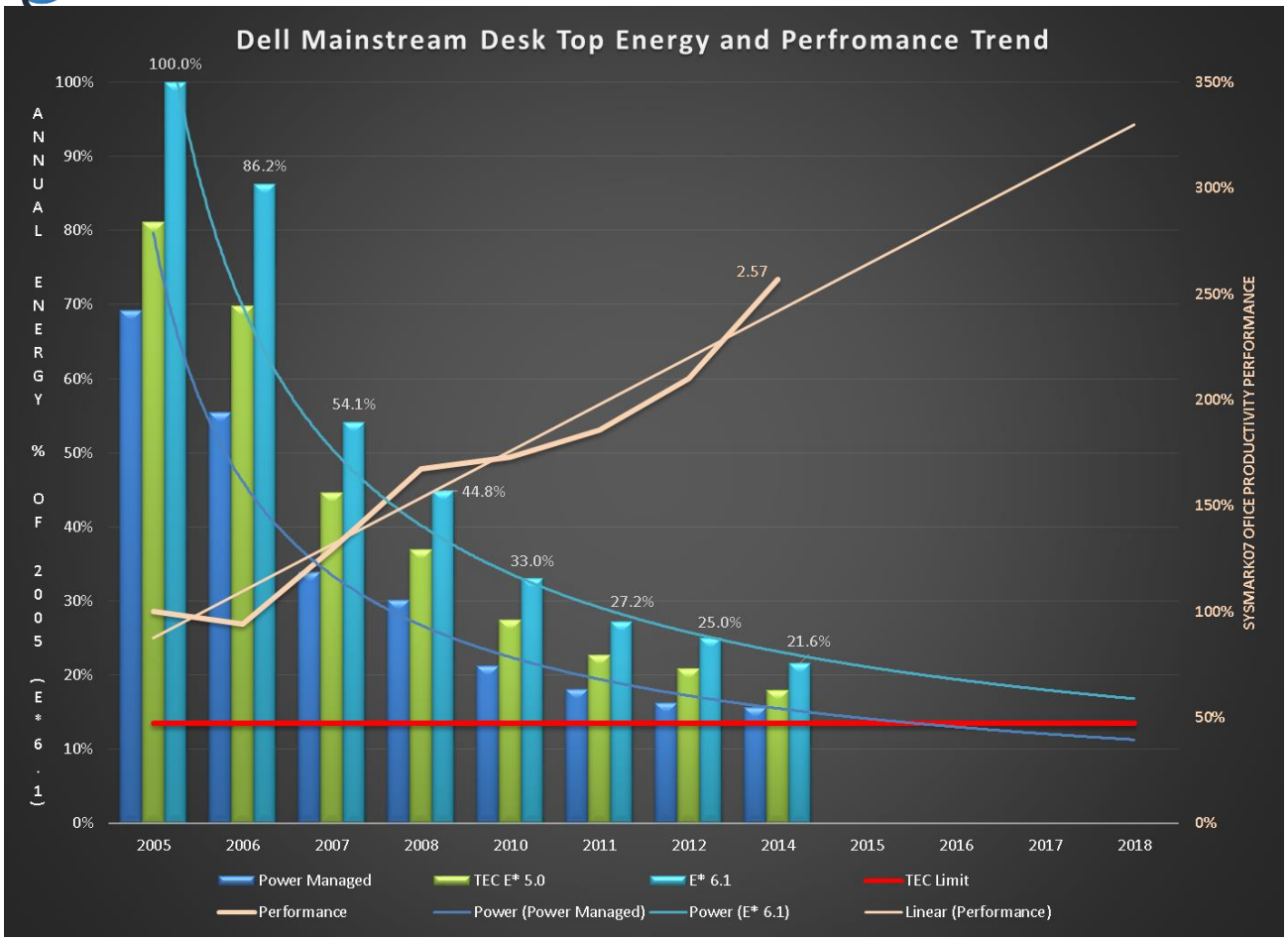
Component Swap Methodology Issues

- California IOU's supplemental technical report to CEC cost estimate issues:
  - No correlation established between IOU test data and PCs in the hands of end users in California
    - Clean OS install Wipes out OEM power management enhancements in OS and drivers
  - Without proper "Aging" a clean OS install will give high and erroneous idle power data for first 2 to 6 hours depending on the OS and system
    - Relationship of test results and real world energy use is unknown
    - Some cases will yield very stable but high power idle due to .net deferred compile
- Ability to achieve power levels by component swap on one or two machines inadequate to predict mass production capabilities
  - Sample Size is statistically insignificant
  - Desk Top energy reduction potential based upon Low power/performance processors, high efficiency power supplies and energy efficient and or 2.5in hard disk drives
    - Even IOUS studies did not achieve CEC proposed Limits
    - Energy Star data set already has at least 2 of these three and passing yield is poor for most categories
  - Component supply capabilities and price changes associated with volume shift from many parts/suppliers to few parts/suppliers are not accounted for in the analysis
  - Performance of systems / CPU's not appropriately accounted for
  - PSU right sizing analysis completely missing minimum PSU requirements determination
    - Customers who upgrade could create non functional systems

BOM Cost approach Analysis Issues

- BOM cost approach for Power supply efficiency is theoretical model not properly validated
  - BOM cost are not the only costs establishing the price ultimately charged to end users.
    - BOM costs at PSU manufacturer
    - Then need to add labor costs for additional testing and yield loss for higher efficiencies
    - Then add markup to this sum to establish OEM cost
    - ODM/OEM adds markup to establish end user cost
  - Industry through ITI has provided actual OEM cost data for different PSU efficiency levels and sizes used in PC products.
    - ITI provided consolidation and blinding of cost data to avoid anti trust issues
    - **CEC gives 100% weighting to un validated model and 0% weighting to actual industry cost data**
  - Component costing models projecting reduced price deltas
    - HDD prices in the future are not correlated to price per Megabyte trends
      - Price delta between standard and high efficiency PSU's have zero established correlation to price per megabit trends
      - HDD prices remain relatively flat and capacities increase over time

Performance and Power trends of typical Business PC

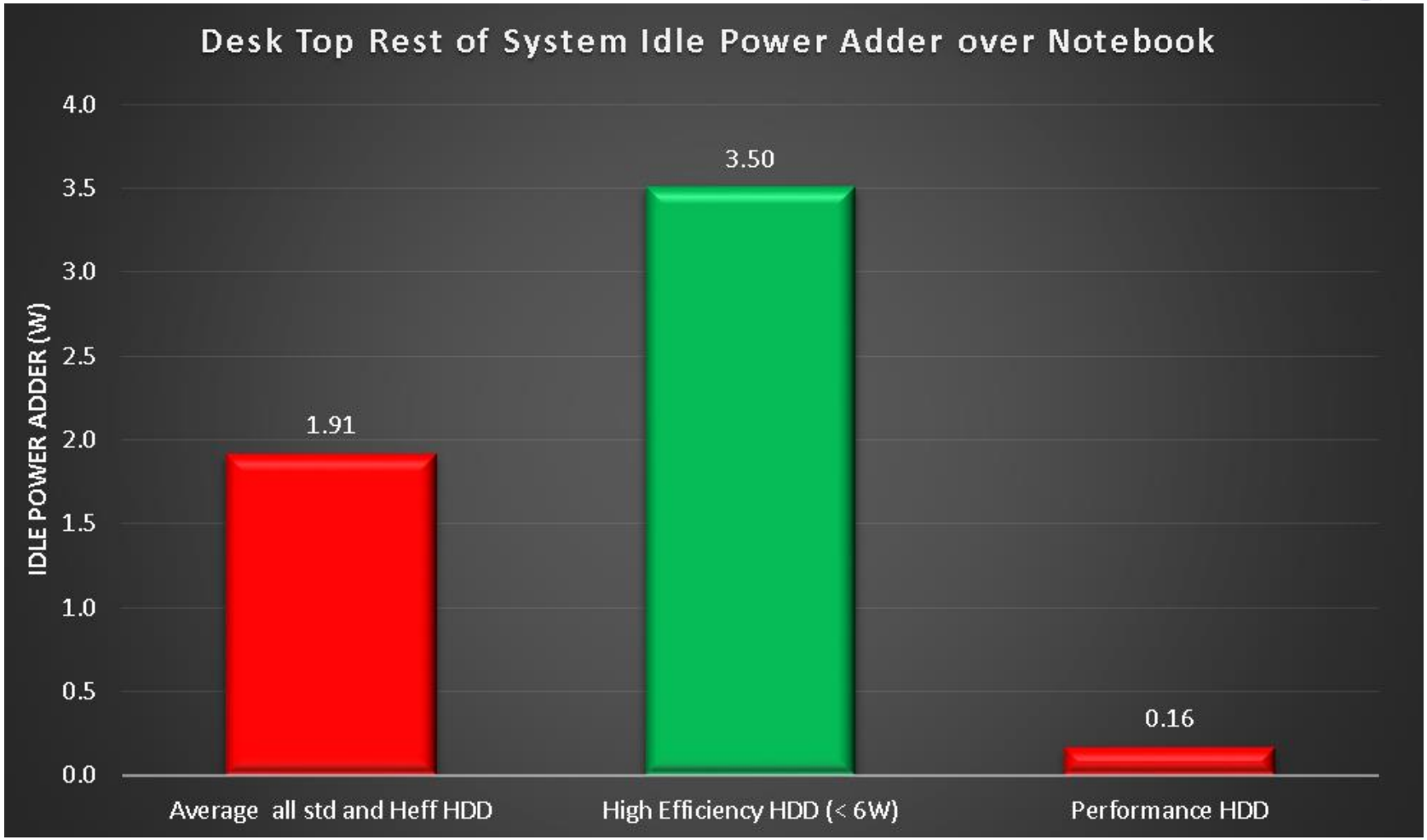


- Typical Desk top Energy and performance trends using different Usage Models
- 2014 Desk Top has a 78.4% reduction in Energy Use and 257% of the performance of a 2005 mainstream system
- Products got smaller, lighter and increased feature sets in same time frame

Note: Analysis based upon mainstream Dell business desk top data from Dell online Energy Calculator with high volume customer configuration.

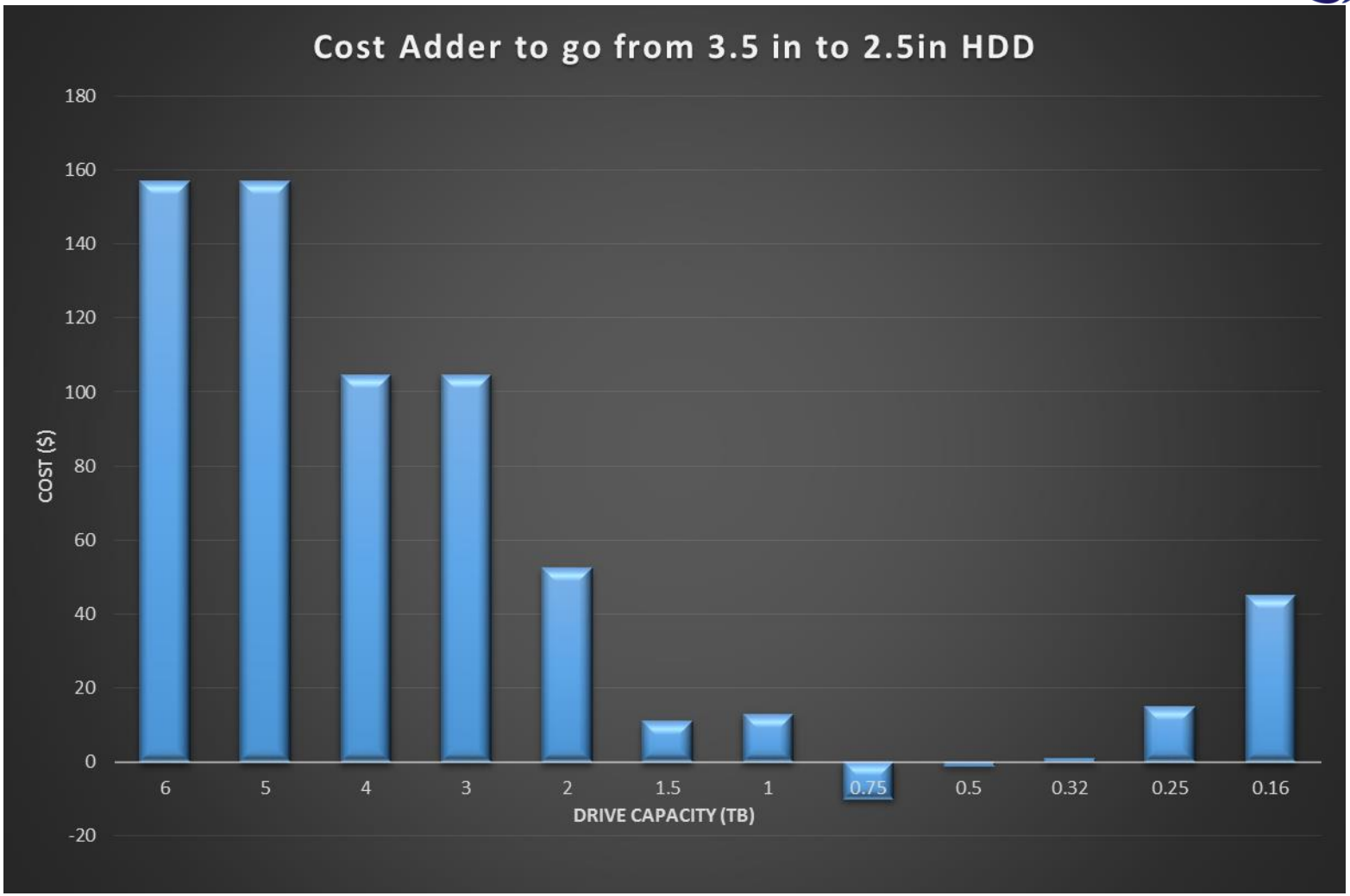
- PC Industry has a long history of performance gains Energy reduction and cost reductions
- Large variation in annual energy cost depending on Usage Model chosen
- Restricting performance will delay replacement cycles and prolong the life of older less efficient PC's in California market

Desk Top Idle Power Adder vs HDD selection



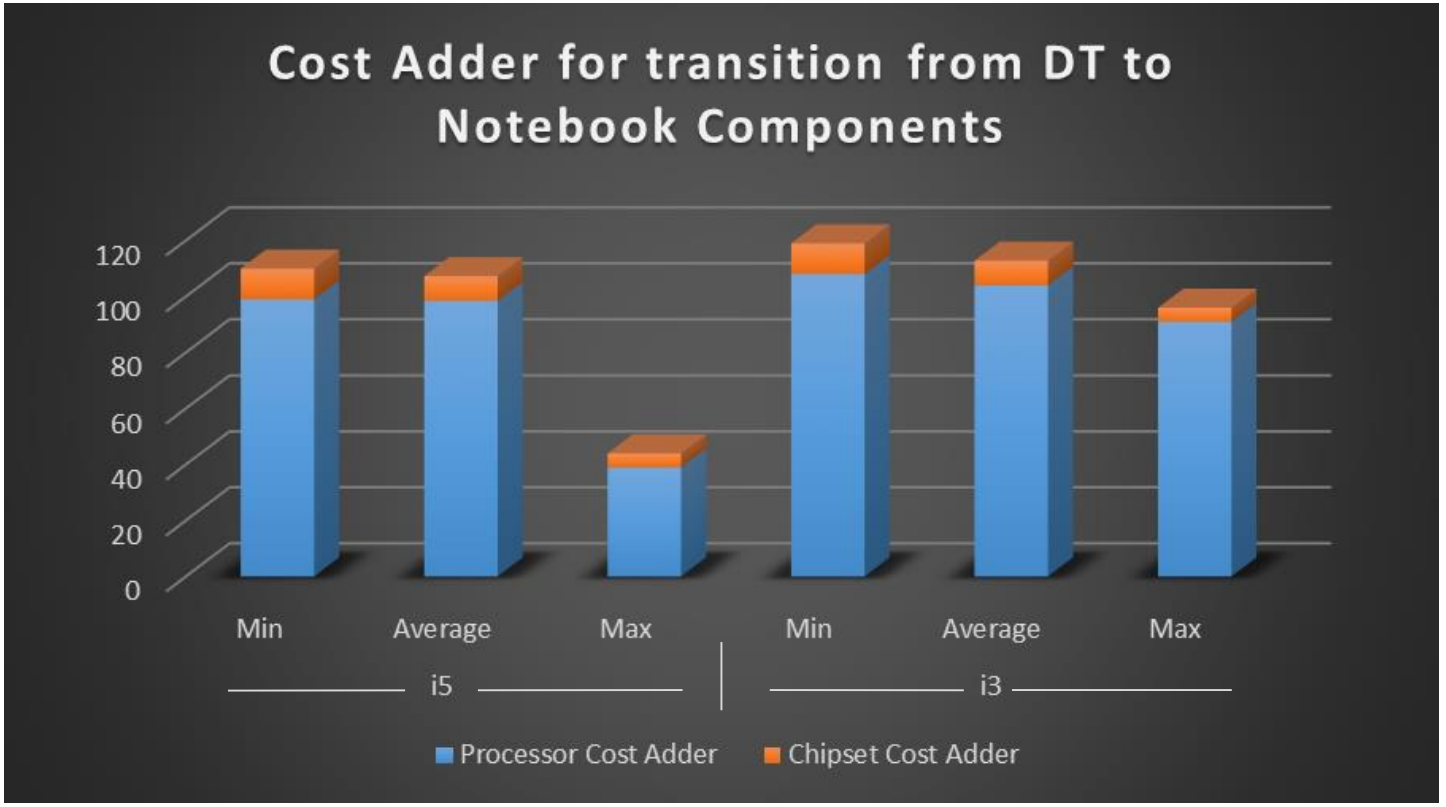
- The only way to allow non-notebook parts is to use High efficiency HDD's
  - Limited supply and reduced performance relative to standard HDD's
- Impossible to build a performance system with 3.5in performance HDD's without Mobile Parts

Cost of changing to 2.5in HDD in desk top systems



- Uses lowest cost advertised on Amazon.com for available HDD's
- Western Digital and Seagate current production drives considered
- Customers needing large Capacity will experience between 50 and 150.00 per unit cost increase

Processor and Chipset Notebook Component Cost Adder (mainstream Systems)



- Based on i5 / i3 processor and chipset prices currently on Intel.com website
- Minimum price Average Price and Maximum price of available listed processor and chipsets are compared

Affects of CEC limits on systems that power manage

	Comparison of Energy Savings for current system and CEC passing system if Power Management is enabled (Dell Energy Calculator model 8hrs/day 250 days/yr active)					
	Current Average Business DT	New System Meeting CEC Limit	Power reduction to Hit Limit	% reduciton in power	Modified System Meeting CEC Limits	
Hibernate (W)	0.44	0.44	0.00	0%	Lifetime (4yrs) Energy Savings of New System (kWh)	Lifetime (4yrs) Energy Cost Savings of new system @ 0.16/kWh ($)
Sleep (W)	1.36	1.36	0.00	0%		
Short Idle (W)	19.80	12.15	7.65	39%		
Long Idle (assume delta of 2.0W)	18.53	10.88	7.65	41%		
SysMark Office Productivity 2007 (W)	23.77	22.82	0.95	4%		
3DMark 06 (W)	49.45	48.96	0.49	1%		
CEC TEC calculation (kWh)	128.22	53.88			297	$47.58
TEC if Power Managed (kWh)	59.74	56.10			15	$2.33
CEC TEC calculation annual Energy Cost @ 0.16/kWh	20.52	8.62				
Power Managed System Annual Energy Cost (kWh)	9.56	8.98				

- Customers implementing Power Management bear cost burden but little of the gains
- Studies have shown over 50% business systems never change PM settings
- Consumer PC users unlikely to change PM settings which ship on by default

Annual Energy Savings of turning on Power Management (kWh)	68.49
Annual Savings per unit of installed base with PM @ 0.16/kWh	10.96
Possible Annual Savings due to PM on installed base (GWhr)	705
Annual Savings on installed base @ 0.16/kWh (M)	112.87

- ~ 97% of CEC proposed gain could be achieved now on existing installed base by enabling power management
- **Power management savings have Zero per unit cost to the end user and $10.96 annual savings per system**
- **California can save 705 GWhr / year beginning now with PM**

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THANK YOU