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Analysis from small LOEM"s

Additional submitted attachment is included below.

A Group of United States based Computer Local OEMs that do business in California are submitting an initial response on the impact of the CEC Computer Draft Proposal. All of these companies would be considered Small & Medium sized computer manufacturers.

This group of companies include: CTL, CyperPower, Equus Computer Systems, iBuyPower, Impact Solutions, Maingear, Mapletronics, Microsel, Origin High Performance PCs, Puget Systems, and Tablet Kiosk

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Letter to the CEC from Local OEMs in North America (US-centric companies)

Executive Summary

While Multinational OEMs (MNCs) and Local OEMs (LOEMs) offer similar desktop computer products, they are manufactured under very different operating environments. MNCs typically have the purchasing power to source components from suppliers directly, negotiate higher-volume pricing, and have the ability to scale manufacturing based on highly-standardized product offerings. LOEMs tend to have smaller manufacturing and/or contracting capabilities, may rely on both direct-purchase and distributors for materials, and therefore do not enjoy similar economies of scale. In today's marketplace, LOEM success and viability is largely based on localized customer service and specialized configuration flexibility. The Average Energy Use requirement as proposed in the CEC Staff Report dated March 2015 will negatively impact the ability of LOEMs to compete with MNCs based on their scale and cost advantages, and will severely limit the LOEM's ability to offer customized desktop computer solutions for their traditional customers.

Definitions

For definition purposes, a Local OEM (LOEM) is a country-specific or regional-focused Original Equipment Manufacturer which assembles a fully or partially functioning desktop computer. A Multinational Corporation (MNC) is a computer manufacturer that has facilities, sales channels, and/or other assets in at least one country other than its home country. A MNC has offices and/or factories in different regions & countries and typically coordinates worldwide operations from a centralized corporate office. For purposes of this paper HP, Dell, and Apple are considered North America MNCs. We do not consider Value-Added Resellers as LOEMs.

Topics to be Covered

- LOEM Business Model Overview
- Desktop PC Market Cost Sensitivities
- LOEM Cost Impact of Regulation

LOEM Business Model Overview

By their nature, LOEMs exist to service local and often specialized markets including Education, Retail Point of Sale systems, Healthcare, Enthusiast/Gaming PCs, etc. The types of systems offered will vary significantly based on target market, but LOEMs have a common approach to customer service that sets them apart from MNCs. They provide customized configuration and/or installation services, service what they sell, and generally succeed by providing a very personal experience for their end customers.

One of the most compelling examples of LOEM value add is in the Enthusiast/Gaming or High-End Desktop (HEDT) computer segment. LOEMs enjoy very significant North America HEDT computer market segment share based on their proven ability to service this customer. Systems here range in performance from small form factor PCs with mainstream CPU and integrated processor graphics (<$500), all the way up to 8 core (or more in the future) workstation-class CPUs with three 200 watt graphics cards, 32GB of DRAM and 4 or more Hard Disc Drives (up to $30K or more system average selling price).

Usage models for HEDT computer systems vary, but the common denominator is their performance. Whether the system is being used for video editing, music mixing, digital photography or competitive gaming, the performance of the system delivers tangible results for the user. For example, a wedding photographer could now edit photos and videos in hours versus the days previously required. A high-end PC gamer experiences scenes that are rendered faster and in more detail that their adversary. In both cases, the higher performance hardware has provided a very real competitive advantage.

While it is common for an LOEM to sell pre-configured systems via online outlets such as Tiger Direct, New Egg, Amazon, or Fry's, LOEMs thrive by offering Configure to Order (CTO) services. Here customers define seemingly limitless hardware specifications to hit desired price points, capability, and performance levels. They then rely on an LOEM's system building expertise and support to deliver a 'custom' product to their doorstep quickly and reliably. Custom HEDTs were previously the realm of do-it-yourselfers or 'Mom & Pop' PC specialty stores. LOEMs have simplified and broadened the availability of configure-to-order systems, and in doing so ***they've helped to grow the HEDT computer market by making it more accessible and less intimidating for more users*.**

Desktop PC Market Price Sensitivity

While LOEMs do enjoy the rewards of building and offering PCs selling for thousands of dollars, tough competitive realities exist. While the typical HEDT computer buyer will build their own PC or utilize a LOEM specializing in boutique performance solutions, the vast majority of PC buyers are on a more limited budget. Hundreds of LOEMs cater to the $499-$999 DT PC crowd, but in these price categories one can buy off-the-shelf PC solutions from a big box retailer like Best Buy, or go direct to HP, Lenovo, Acer, Asustek or Dell. MNC standardization reduces flexibility and variation, which can lead to lower pricing. ***To compete with MNC's, LOEMs must differentiate themselves and their products.*** Even in the $499-$999 space, it is common for the LOEM to offer a stand-alone graphics card, performance sound card, or a higher-capacity main memory tailored to their customer's specific needs. The successful LOEM wins business by adding real value while staying as close as possible to MNC pricing.

Today's reality is that 'Mom & Pop' PC store numbers have dwindled, and while successful LOEMs have tended to grow their volume, the sheer number of LOEMs has declined. Some analysts predict that in 10 years or less, only MNCs will survive to service the North American market. While we do not subscribe to this thinking, we do acknowledge that consolidation has already taken a toll on small local or regional players. The current PC market environment is in a precarious situation where MNC economies of scale are somewhat balanced by LOEM flexibility and customer service. Product regulation that does not consider this need for flexibility will be detrimental to LOEM competitiveness, ultimately leading to further consolidation, reduced industry innovation, and greatly limited end user choice. Consolidation and reduced competitiveness on the part of California-based LOEMs could in turn lead to reduced employment opportunities for residents of the state.

Compliance Cost Analysis for a LOEM

The CEC Staff Report dated March 2015 relies on hardware assumptions that do not comprehend the realities of the LOEM business model. The following analysis will demonstrate that a "flexible" LOEM CTO environment by definition operates under considerably different assumptions.

For reference, here is Staff Report Table 2 (as shown in the March 2015 CEC analysis):

Table 2: Unit Energy Savings and Cost-Effectiveness

Product Type	Average Energy Use – Baseline (kWh/yr)	Average Energy Use – Compliant (kWh/yr)	Design Life (yr)	Life Cycle Savings (kWh/yr)	Life Cycle Savings ($)[39]	Incremental Cost ($)	Net Benefit (ratio benefit: cost)
Desktop	143.2	56.8	5	432	$69.12	$2.00	$67.12 34.56: 1

In this analysis, the proposed net benefit to the consumer would be a **savings of $67.12** over the 5 year life of the PC. We will use this data as a baseline to compare the CEC calculations with current and future state LOEM projections.

TABLE 1 below expands the first two columns from the above CEC Staff Report to show the assumptions used for our Desktop PC analysis.

TABLE 1 – LOEM System Tests

	CEC Baseline System - Expanded					**CEC Compliant System - Expanded**				
	Short Idle	Long Idle	Sleep	Off	Average Energy Use (kWh/yr)	Short Idle	Long Idle	Sleep	Off	**Average Energy Use (kWh/yr)**
CEC Staff Report	31.7	31.2	2.5	1	**143.2**	12	11.6	2	1	**56.8**
										LOEM Desktop PC Systems
Best Case System	Meets proposed regulation with components available now, without regard to component price					15.5	15.0	1.5	0.6	**70.4**
Build to Comply System 1	Requires new motherboard and PSU designs; Hybrid drive (1TB HDD/8GB SSD); Optical drive removed					12.3	11.8	1.5	0.6	**56.4**
Build to Comply System 2	Requires new motherboard and PSU designs; 1TB SSD; Optical drive included					12.2	11.7	1.5	0.6	**55.7**

TABLE 2 – LOEM Cost Analysis

	Average Energy Use – Baseline (kWh/yr)	Average Energy Use – Compliant (kWh/yr)	Design Life (yr)	Life Cycle Savings (kWh/yr)	Life Cycle Saving ($)	**Incremental System Cost**	**Net Consumer Benefit**
CEC staff Report	143.2	56.8	5	432	$69.12	**$2**	***+$67.12***
LOEM Desktop PC Cost Data vs CEC							
Best Case System	143.2	70.4	5	364	$58.24	**$157**	***-$98.76***
Build to Comply System 1	143.2	56.4	5	434.2	$69.47	**$207**	***-$137.53***
Build to Comply System 2	143.2	55.7	5	437.8	$70.06	**$477**	***-$406.94***

Proposed Regulation Will Place LOEMs at a Competitive Disadvantage

The incremental cost ($2) identified in the CEC Staff Report does not adequately consider LOEM supply chain and business model realities. The difference between the $2 CEC estimate and current and forecasted LOEM incremental compliance costs is enormous – approaching $500 to achieve similar performance and capability versus the CEC system. If the regulation is enacted as proposed, it will severely disadvantage LOEMs as follows:

1) **Reduced Flexibility**: The availability (or lack thereof) of compliant building block components will limit the LOEM competitive advantage of providing flexible configurations to meet specialized customer needs.
2) **Higher Costs**: Lower-volume LOEMs selling CTO computers will operate at an even further cost disadvantage relative to the more standardized offerings of their MNC counterparts.

Proposal

The LOEMs sponsoring this paper would like to ask that the CEC take into account the three following proposals in the next proposal revision.

1) **Categorization**: Both desktop and notebook computers have a need for categorization that is similar to what ENERGY STAR* currently has with respect to a TEC calculation. The categories need to have different TEC allowances so that more complex and higher performance computers are not judged the same as simple and smaller computers.
2) **Mandatory vs. Voluntary:** Since this is a mandatory requirement for all computers sold into California, the regulation should be less stringent than the voluntary ENERGY STAR* program, which allows only 25% to pass the TEC limits. Mandatory requirements should allow 75% of current shipping systems to meet the TEC limits while still removing the bottom 25% of power consuming computers. This will still allow California to reduce the power footprint of all future computers.
3) **High-End Computers:** For reasons discussed earlier, LOEMs have successfully differentiated themselves from MNCs in the lower-volume but lucrative high-end (AKA Extreme) computer market segment. If the proposed TEC limit is imposed on these type of computers, it will stifle the ability of LOEMs to manufacture and sell these innovative and creative computing solutions. This will reduce the ability of California LOEMs to operate and compete in the global economy. We would like to request an exemption on these high-end computers because of the segment's low volume and low overall energy footprint.

Summary

The Average Energy Use requirement as proposed in the CEC Staff Report dated March 2015 will negatively impact the ability of LOEMs to compete with MNC scale and cost advantages, and will severely limit the LOEM's ability to offer customized desktop computer solutions for their traditional customers. In today's marketplace, LOEM success and viability is largely based on localized customer service and specialized configuration flexibility. This will mean California jobs will be lost at these Small / Medium size businesses and a loss of competitive and specialized solutions for consumers and business in California that is vital to a growing economy in California. With the goal of improving LOEM Average Energy Use performance while simultaneously maintaining a fair and competitive marketplace for US-centric LOEMs, we propose that (1) computers must have a category system; (2) mandatory levels need to be more relaxed than voluntary level; (3) and high-end (Extreme) computers should be exempted from the regulation so as not to stifle innovation and creativity in the LOEM heavy market segment.

APPENDIX A – System Configurations and Detail Cost Analysis

Summary:

The following analysis looks at three different scenarios to determine the incremental cost to comply with the proposed CEC regulations. The first scenario is a "Best Case" Computer using components that can be purchased today. The next two scenarios are future "Build to Comply" computers that assume that new components can be made to lower the overall TEC power consumption. These "Build to Comply" computers also use some very expensive components to help reduce the short idle power even more. However these expensive components show that reducing just a few more watts of power increases the overall cost of the computer exponentially.

The basic ENERGY STAR* system defined in this analysis has a BOM cost of $503. The cost of the "Best Case" computer increases to $660, which is an increase of 31% to the consumer. The "Build to Comply" computers increase the total cost of the computer to $710 to $980, almost doubling the original cost of the computer. This price increase for a LOEM customer will increasingly limit the competitive nature of LOEMs when compared to MNCs. Furthermore, all of these scenarios' final cost of implementation in response to the proposed CEC regulation far exceeds the energy savings over the product life cycle.

Detail Analysis:

To complete the net benefit analysis in the main section of this paper, the Compliant or Best Case System has to be defined as well as the cost of current desktop system. The comparison is then made between the current system and the three configurations that a LOEM could build using both power and cost analysis. All pricing based on internet retail pricing from October 2015. These prices will not reflect LOEM pricing but is indicative of end user pricing. All power data mentioned below is "Short Idle" AC power measurements per ENERGY STAR* for Computers ver 6.1 definition.

Current ENERGY STAR* System

While the Current ENERGY STAR* system will be lower in Short Idle power than the Baseline system from CEC analysis, not all current systems meet ENERGY STAR* version 6.1 limits. ENERGY STAR limits are not supposed to allow all system to meet since it is a voluntary program and designed to have only 25% of systems meeting the regulation. An average of all current systems in the market get very similar TEC results to the Baseline system the CEC used. Price information all comes from a public website to show what an end user would pay for each of these components to build a system. LOEM final pricing for their customers on fully built computers is very similar to this pricing.

Table: 3 – Current ENERGY STAR System

Component	Detail	Cost	Power (W)
CPU (Power includes VR Loss)	Intel* Core* i5-4570	$205	6.8
Motherboard (Power includes Fan power)	Foxconn* H87MX-D http://www.newegg.com/Product/Product.aspx?Item=N82E16813186235&cm_re=Foxconn_H87MX-D-_-13-186-235-_-Product	$65	7.8
Memory	DDR3-1600, 8GB	$55	
Graphics	Integrated	-	
HDD	Western Digital* Blue 1TB http://www.newegg.com/Product/Product.aspx?Item=N82E16822236339	$53	4.3
ODD	LG* Blu-ray http://www.newegg.com/Product/Product.aspx?Item=N82E16827136276	$50	0.9
Total DC Power			19.8
Power Supply	Seasonic* 80+Bronze 300W http://www.newegg.com/Product/Product.aspx?Item=N82E16817151097	$35	6.5
Basic Chassis		$40	
Totals		$503	26.3

Best Case System

The Best Case System that was created saved power but increased cost in 5 main areas:

- Processor
  - No cost difference here but the Local OEM would have to work with the processor vendor and motherboard vendor to make sure the processor get to the C6/C7 state as often as possible.
- Motherboard
  - Used the higher cost MSI motherboard that is marketed as a green motherboard.
- Hard drive
  - Switched to a 2.5” drive with the same size. The performance does decrease with this drive – slower RPM (7200 vs. 5400 RPM) and slower interface access rate (SATA 6.0 GB/sec vs SATA 3.0 GB/sec).
  - To ensure at least the same performance a Hybrid or SSD would be needed in the system. But to keep a similar size of hard drive, and still save the needed power in Short Idle mode, the cost increases greatly. These options are spelled out in the “Build to Meet” systems. .
- Power Supply
  - A Standard Energy Star system has to use at least an 80 Plus Bronze hard drive, this would have to be moved to an 80 Plus Platinum power supply to achieve equivalent efficiency at such low Idle Power values. A Seasonic* 400 Watt Platinum power supply was chosen since there are not that many Platinum power supplies available at this low of power.
- Optical Drive
  - The current system had a standard Blu-ray drive, to save power a slimline Blu-ray drive was chosen.

Table: 4 – Best Case System

Component	Detail	Cost	Power (W)	Comment
CPU (Power includes VR Loss)	Intel* Core* i5-4570	$205	2.1	Must get CPU down to C7 state
Motherboard (Power includes fan power)	MSI* H97M Eco http://www.newegg.com/Product/Product.aspx?Item=N82E16813130797	$88	6.5	High efficiency design
Memory	DDR3-1600, 8GB	$55		No difference
Graphics	Integrated	-		
HDD	Western Digital Blue 1TB http://www.newegg.com/Product/Product.aspx?Item=N82E16822236221	$80	1.2	Switch to 2.5" drive
ODD	LG* Blu-ray http://www.neweggbusiness.com/product/product.aspx?item=9b-27-136-263	$82	0.3	Switch to Slim-line Blu-Ray Drive
Total DC Power			10.1	
Power Supply	Seasonic* 400W http://www.newegg.com/Product/Product.aspx?Item=N82E16817151086	$110 -	5.4	Platinum with 65% efficiency at low load
Basic Chassis		$40		
Totals		$660	15.5	Calculated Total power value

Build to Comply #1 & #2

If a system was to be built to meet the proposed CEC regulation, some high priced specialized items would have to be chosen. For the Hard Drive and Optical Drive options there are two ways to go with this system, therefore two different system configurations are detailed.

- Processor
  - Same as Best Case System, would have to work to get the processor into C6/C7 state as often as possible.
- Motherboard
  - To make this system meet the CEC requirements a ***new motherboard would have to be designed*** with lower power consumed in Idle that what exists right now.
    - The power data was derived from what is left in the power budget after all other component power was accounted for.
    - The price data came from a high end motherboard available today. This price could be even higher depending on what a motherboard manufacturer would need to do hit the power level required.
- Hard drive
  - System #1
    - Selected a Hybrid Solid State Drive for this system configuration. With this option the performance would be closer to the original Energy Star system – 1 TB, 5400 RPM, SATA 6.0 GB/sec, and 8 GB of Flash.

        - To avoid user experience issues with HDD spin down a large flash part of the SSHD would be needed. The minimum recommended amount would be 16 GB and 32 GB. At the time of this paper a Western Digital Blue 1TB Hybrid Drive could not be found with at least 16 GB of the recommended flash amount, the 8 GB flash amount is the best available right now.
    - System #2
        - To ensure no performance degradation an SSD would be needed in the system. But to keep a similar size of hard drive a 1 TB SSD is very costly. Below are a few options, the Crucial 1TB SSD was used in the final analysis.
        - Crucial 1TB SSD @ $343
        - Intel SSD 800GB @ $606
          http://www.newegg.com/Product/Product.aspx?Item=9SIA0ZX1PA5342
- Power Supply
    - An 80 Plus Platinum power supply again was used in this system. However the power supply used in the "Best Case System" would not be efficient enough at the lower Idle numbers, to get the total AC power low enough to meet ***a new power supply would be needed***. The price comes from a sample of what some of the best Platinum and Titanium power supplies cost. Because anything new would come in at the high end of this market.
- Optical Drive
    - System #1
        - With this system configuration there was no power budget left for an optical drive so it had to be removed for the system.
        - Removing the optical drive does reduce the system capabilities of this option.
    - System #2
        - Since the SSD was used, there is some room in the overall power budget to bring back the slimline Blu-Ray Drive.

Build to Comply #1

Table: 5 – Build to Comply #1

Component	Detail	Cost	Power (W)	Comment
CPU (Power includes VR Loss)	Intel* Core* i5-4570	$205	2.1	Must get CPU down to C7 state
Motherboard (Power includes fan power)	Future Design	$120	4.8	Future Ultra High efficiency design
Memory	DDR3-1600, 8GB	$55		No difference
Graphics	Integrated	-		
HDD	Western Digital* Blue 1TB Hybrid 8GB NAND http://www.amazon.com/gp/product/B013PM1R9W?psc=1&redirect=true&ref_=oh_aui_detailpage_o00_s00	$105	0.5	Switch to Hybrid 2.5" drive with 16 GB of Flash
ODD	None	--	0	Removed to save power
Total DC Power			7.4	
Power Supply		$135	4.9	Future Platinum with 60% efficiency at low load
Basic Chassis		$40		
Totals		$710	12.3	Calculated Total power value

Build to Comply #2

Table 6: - Build to Comply #2

Component	Detail	Cost	Power (W)	Comment
CPU (Power includes VR Loss)	Intel* Core* i5-4570	$205	2.1	Must get CPU down to C7 state
Motherboard (Power includes fan power)	Future Design	$120	4.8	Future Ultra High efficiency design
Memory	DDR3-1600, 8GB	$55		No difference
Graphics	Integrated	-		
HDD	Crucial* 1TB SSD http://www.newegg.com/Product/Product.aspx?Item=N82E16820148950	$343	0.1	Switch to SSD
ODD	LG* Blu-ray http://www.neweggbusiness.com/product/product.aspx?item=9b-27-136-263	$82	0.3	Switch to Slim-line Blu-Ray Drive
Total DC Power			7.3	
Power Supply		$135	4.9	Future Platinum with 60% efficiency at low load
Basic Chassis		$40		
Totals		$980	12.2	Calculated Total power value

The cost analysis completed by the CEC Staff Report has very different outcome from what a Local OEM would see for the cost of the components to build a desktop computer. The CEC Staff Report shows positive Net Benefit to the consumer. However for prices that a Local OEM will see in their systems the Net Benefit to the consumer is actually negative in a big way. Also notice that to reduce the last few watts of idle power out of a system the total price of the system increases exponentially.