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June Deep Dive Mtg, ITI/Technet Displays Presentation -- Dell Corp

submitted in behalf of ITI and Technet

Additional submitted attachment is included below.

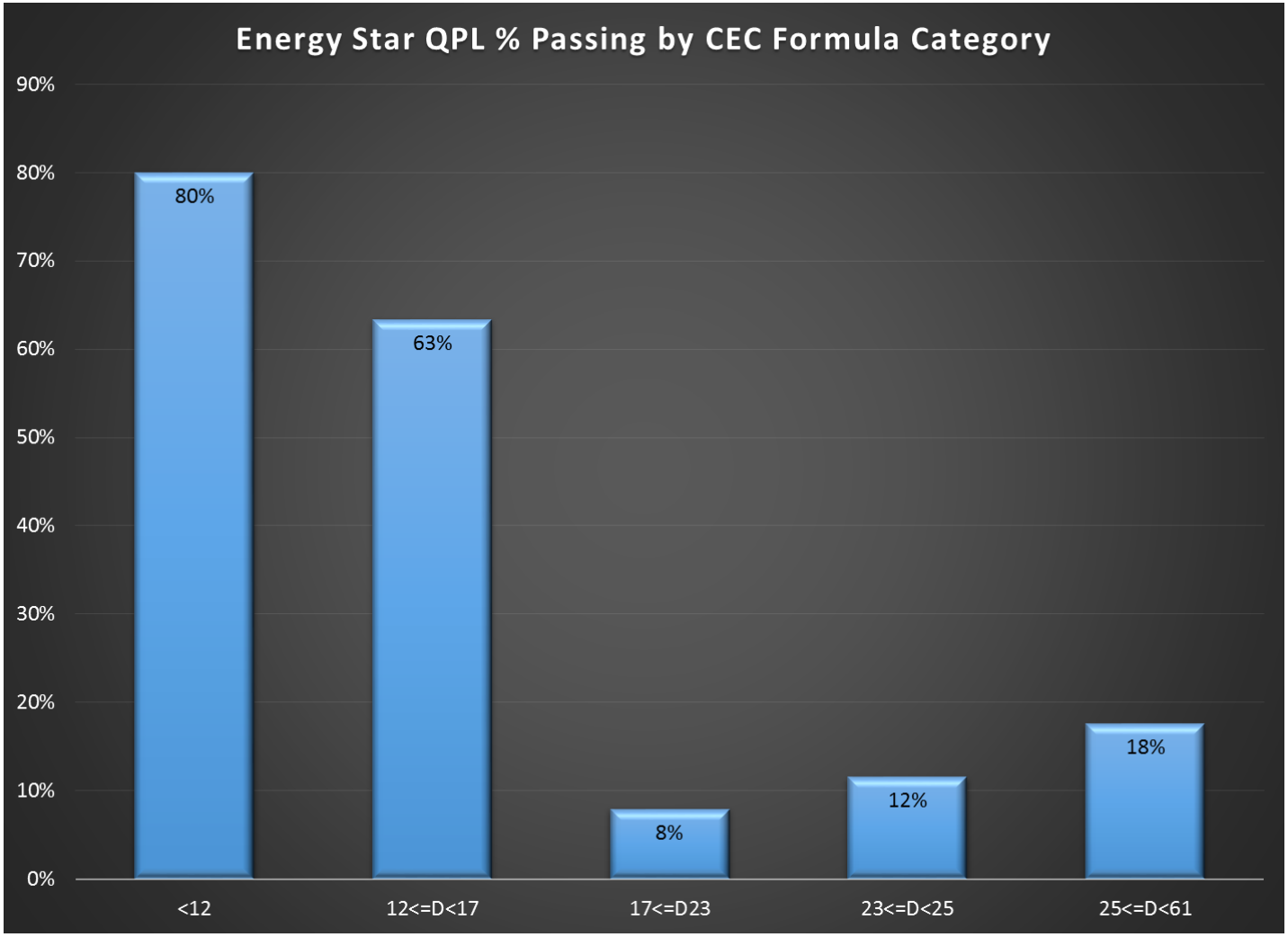
Displays Cost Effectiveness/ Technical

CEC Deep Dive

CEC technical Feasibility and Cost Effectiveness

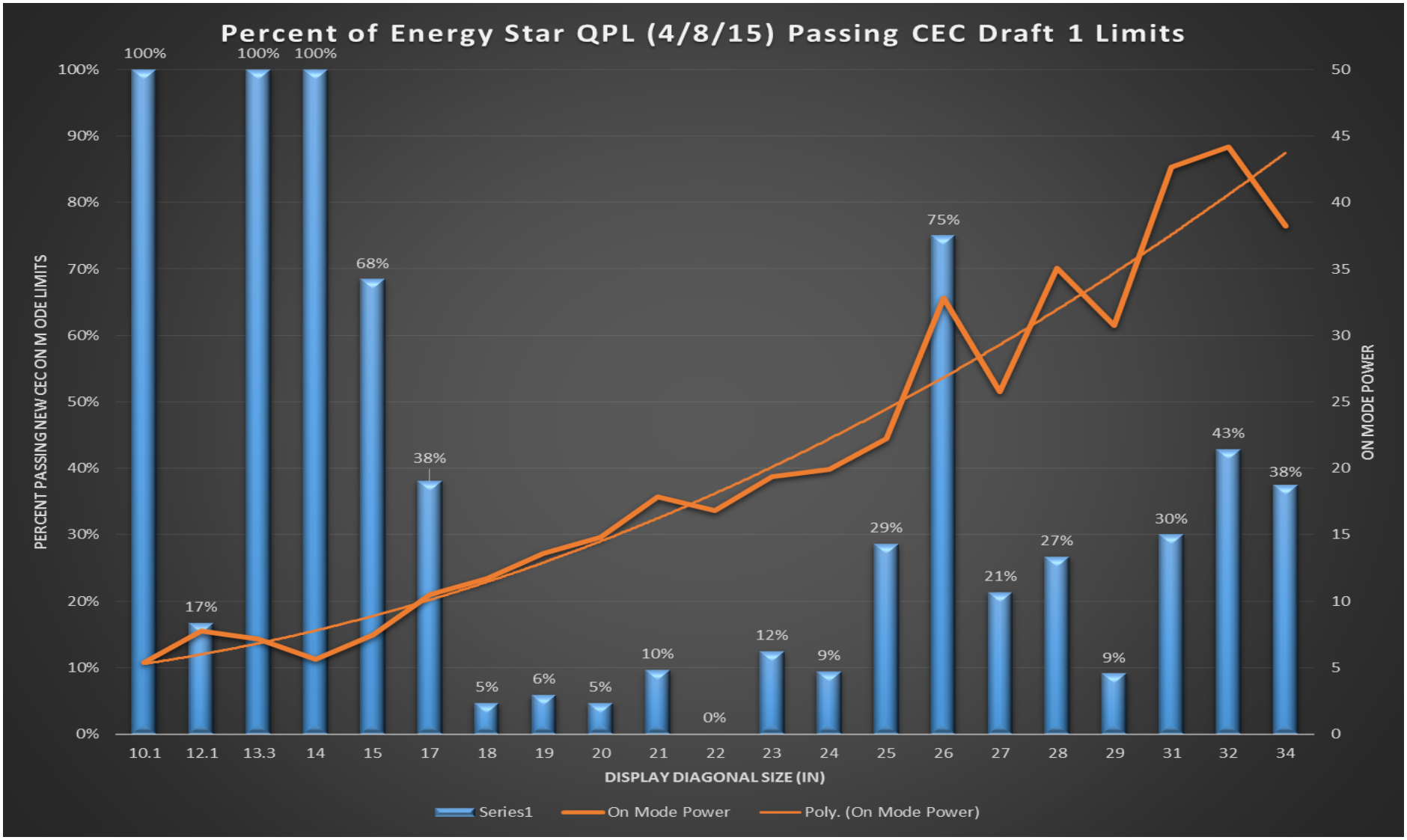
- Key Customer requirements are completely un accounted for in CEC limits or in many of the IOU comparisons
  - Color Gamut large driver of Power consumption but not in analysis
    - CEC regulation will eliminated high color gamut displays from the California market
      - Video editing among industries where color Gamut is essential
  - Viewing Angle
    - Wider Viewing Angles require brighter backlights to hit same front of screen brightness
  - Optional Features (Later in presentation)
- CEC analysis of USB powered display incorrect for comparison to AC mains powered displays
- Requirement of best available technology problematic for volume production
  - May be manufacturer selective
  - Cost Premium will grow if excessive demand

Energy Star QPL % Passing by CEC formula segmentation



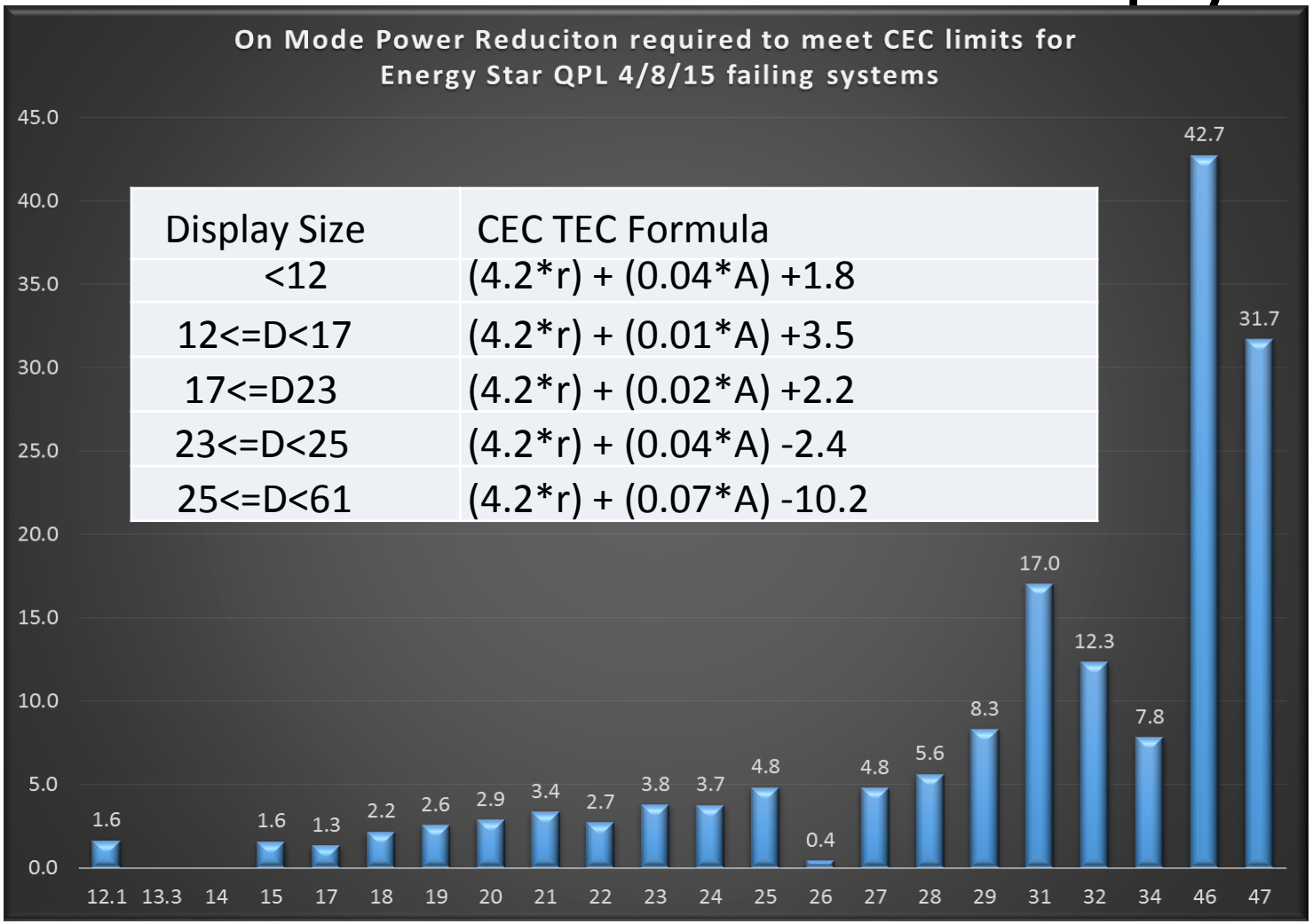
- 17-23 in displays much more severely impacted by adjusted CEC proposed limits
  - Same technologies and suppliers used across most size ranges

View of CEC proposal affect on Energy Star QPL



- Energy Star QPL 4-8-15 vs adjusted CEC On mode limits

Power Reduction to Comply



- CEC analysis states only about 14 percent of the current models meet the staff's proposed standards. However, monitors would only need to reduce their power consumption by 3 to 5 watts to comply

Limitation of power improvement for LCD Panel

- Typical Mainstream Monitor power consumption
  - Panel 70% of overall monitor power
  - System 30% of overall monitor power
- Power consumption on Panel Side
  - LED efficiency improvement ~5% every year
    - Eg for 23” Less than 1W improvement /year (currently)
      - Not all manufacturers transition at the same time
    - Logic Power consumption stabilized, not much further improvement possible
- Power vs Different Panel Technology
  - TN vs VA vs IPS (TN 100% ; VA/IPS 115%) – using TN as reference
    - Vertical Alignment , In Plane Switching provide faster response and better viewing angle
- Comparing Power vs. Color Space (Gamut)
  - 72 % NTSC vs sRGB vs Adobe RGB (100% vs 130% vs 200%)

System Power

- Accounts only 30% of overall Power consumption
- More features and connectivity → more power needed
  - Meeting new standards
    - USB 2.0 vs USB 3.0 vs USB 3.1
    - DP1.1 vs DP1.2 vs DP1.3
    - HDMI 1.4 vs HDMI 2.0 etc

	USB Type	Output Voltage/ Current	Power (w)	Typical Monitor Qty
1	USB 2.0	5V / 0.5A	2.5	2-4 Ports
2	USB 3.0	5V / 0.9A	4.5	2-4 Ports
3	USB 3.1	5V / 0.9A	4.5	
4	USB C	5V / 3A (1.5A)	15 (7.5)	
5	USB C-PD	Up to 100W		

- Special features eg : Speakers, Touch and color and luminance uniformity(need to compensate luminance to achieve uniformity)

TechNet

ITI

THANK YOU