

# ENERGY STAR Computers Version 8.0

## Desktop Computers Discussion

March 12, 2018



## Today's Objective

Review v8 framework and open discussion (ITI proposal to follow later)

## Agenda:

- Categorization Options/Discussion --- 20 min
- Form Factor Innovation (Scope/Definition discussion)---10 min
- Wrap/Next Steps



# DT Categorization Options

## 1. P – Score

- Current Energy Star v6.1 & v7.0

## 2. Expandability Score

- Current CEC Regulation

## 3. Simplified Expandability Score (subject to changes)

- Proposed by IOUs in 2016

## 4. Chassis Size (will not be reviewed today)

- Japan proposal

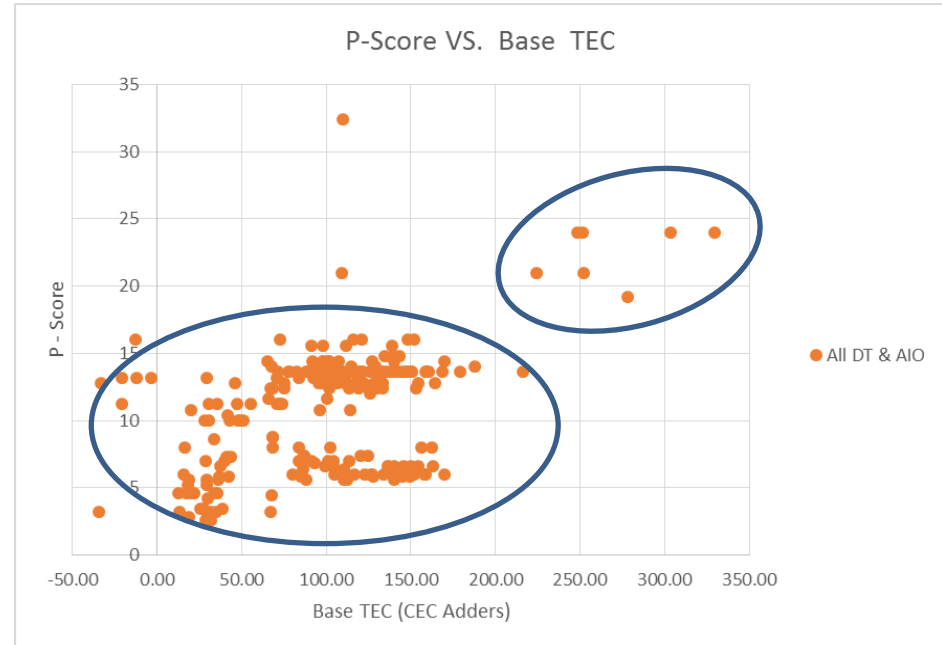
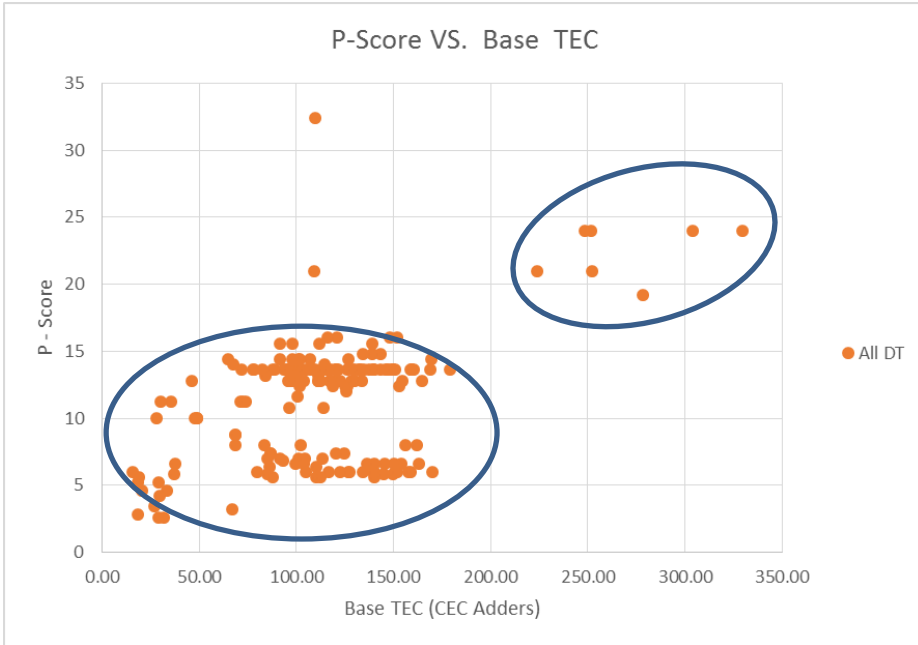
# DT Categories – P score + iGFx/dGFx

- Current Energy Star V6/7 category system
  - Processor P-score (# of cores \* Base Frequency)
  - Graphics – Integrated Graphics or Discrete Graphics
  - 6 categories
- The next pages show no real correlation between Base TEC and P-score with 2 different datasets

Category Name	Graphics Capability <sup>iv</sup>	Desktop or Integrated Desktop	
		Performance Score, $P^v$	Base Allowance
0	Any Graphics $dGfx \leq G7$	$P \leq 3$	69.0
I1	Integrated or Switchable Graphics	$3 < P \leq 6$	112.0
I2		$6 < P \leq 7$	120.0
I3		$P > 7$	135.0
D1	Discrete Graphics $dGfx \leq G7$	$3 < P \leq 9$	115.0
D2		$P > 9$	135.0

# P – score vs. Base TEC

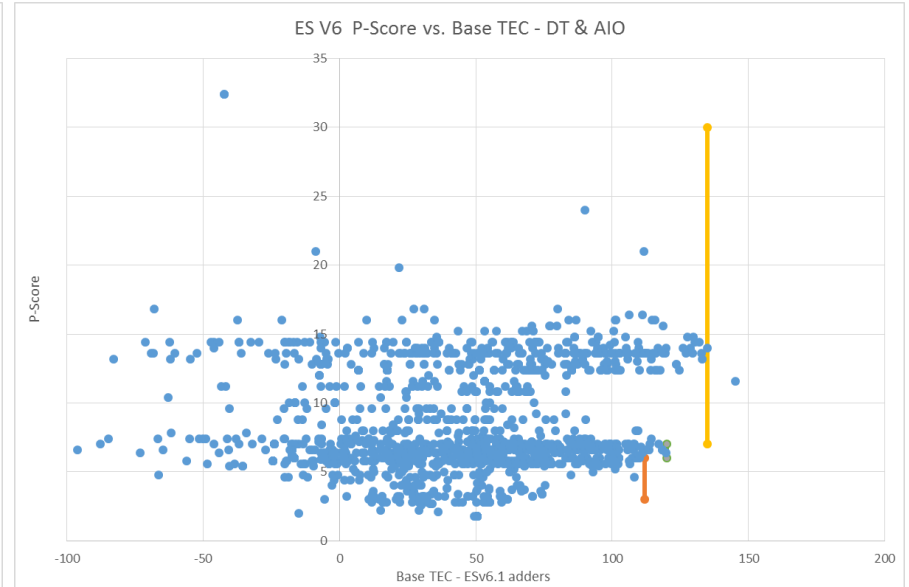
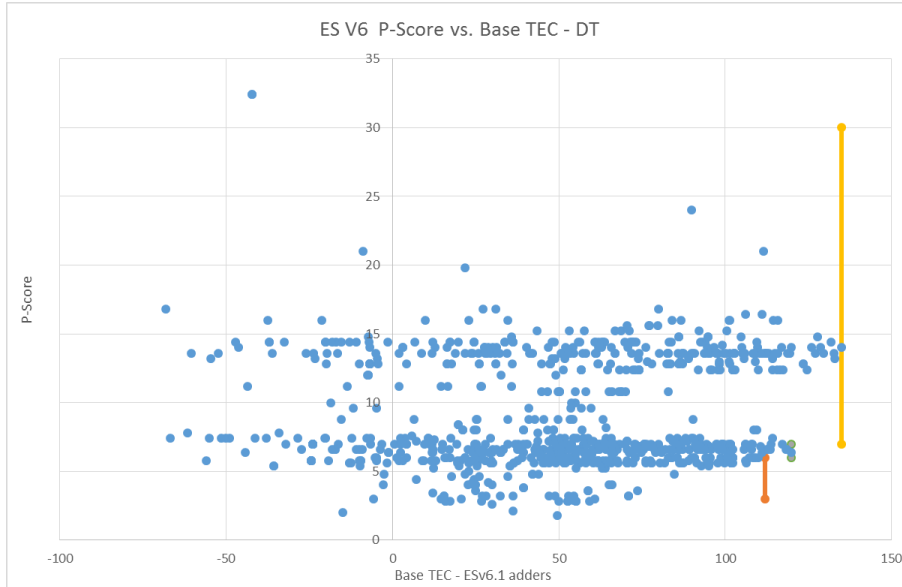
ITI dataset used for CEC



## Two clusters – but weak correlation overall

# P – score vs. Base TEC

## ES v6.1 QPL



ENERGY STAR QPL shows poor correlation

# DT Categories – Expandability Score (CEC)

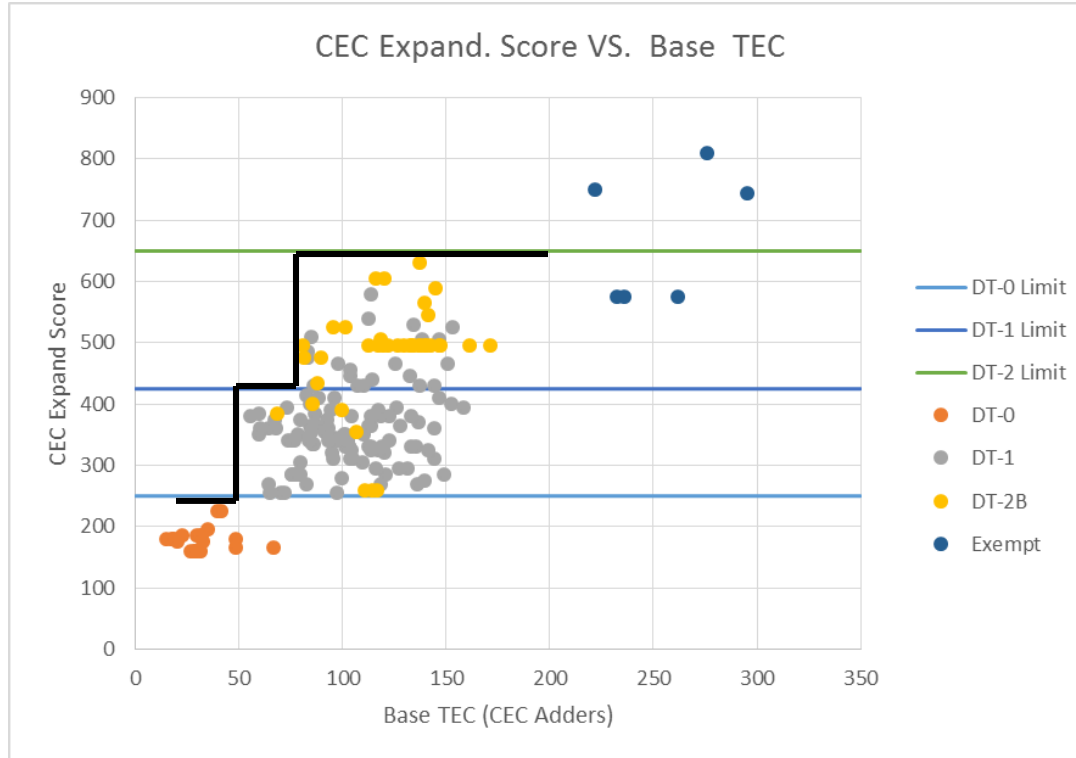
- Currently used by the CEC regulation

- Each interface on the computer gets a unique Expandability Score
  - Scoring somewhat correlates to power per port (1 watt = 1 point)
- Pros
  - Good correlation to Base TEC data (ITI 2016 CEC database)
  - Logically makes sense as a motherboard is larger and has more interfaces the power allowance increases
  - Has attributes that help define High End Desktop vs mini PCs
- Cons
  - Learning curve
  - Lots of interfaces that will be modified over time

Table V-7	Expandability Score Category	Tier 1 TEC Limits	Tier2 TEC Limits
DT / AIO / Thin Clients / Mobile Gaming Systems	ES ≤ 250 (NUC / Mini PC)	50	50
	250 < ES ≤ 425 (mainstream DT)	80	60
	425 < ES ≤ 690 (Larger DT)	100	75
	> 690	TEC Exempt	TEC Exempt

# Base TEC – DT Only

Clear Step  
Function of low  
end of Base TEC





# DT Categories – Expandability Score (CEC)

Interface Type	Interface Score
USB 2.0 or less	5
USB 3.0 or 3.1 Gen 1	10
USB 3.1 Gen 2	15
USB ports or Thunderbolt 3.0 or greater that can provide 100 or more watts of power	100
USB ports or Thunderbolt 3.0 or greater that can provide from 60 or more to less than 100 watts of power	60
USB ports or Thunderbolt 3.0 or greater that can provide from 30 or more to less than 60 watts of power	30
Thunderbolt 3.0 or greater or USB ports that are not otherwise addressed in Table V-1 and that cannot provide 30 or more watts of power	20
Unconnected USB 2.0 motherboard header	10 per header
Unconnected USB 3.0 or 3.1 Gen 1 motherboard header	20 per header
PCI slot other than PCIe x16 (only count mechanical slots)	25
PCIe x16 or higher (only count mechanical slots)	75
Thunderbolt 2.0 or less	20
M.2 (except key M)	10
IDE, SATA, eSATA	15
M.2 key M, SATA express, U.2	25
Integrated liquid cooling	50
Either: 1) CPU and motherboard support for 4 or more channels of system memory and at least 8 GB of installed and compatible system memory; or 2) At least 8 GB of system memory installed on a 256 bit or greater memory interface.	100

## DT Categories – Simplified Expand Score

(IOUs proposed May 2016)

- Proposed by IOUs / NRDC toward end of CEC process
- Basics
  - Simplified Expandability Score (SES) = # of PCIe lanes + 2\*(# of High Speed external data port)
    - # of PCIe lanes = # of motherboard PCIe lanes implemented on expansion slots
    - High Speed External data ports = Max data throughput of  $\geq 10$  GB/s and can deliver at least 5W of power
  - Also had a PSU size requirement

# DT Categories – Simplified Expand Score

(IOUs proposed May 2016)

- Base TEC does increase with each category so rough correlation
  - But not as good as Exp Score
- Category limits were derived from a small sample size
  - Would need to start over with category lines if going with this method
- PSU Size does not correlate to Base TEC data (see scatter plot)
- Is the 5W limit for interfaces  $\geq 10$  GB/s make sense?

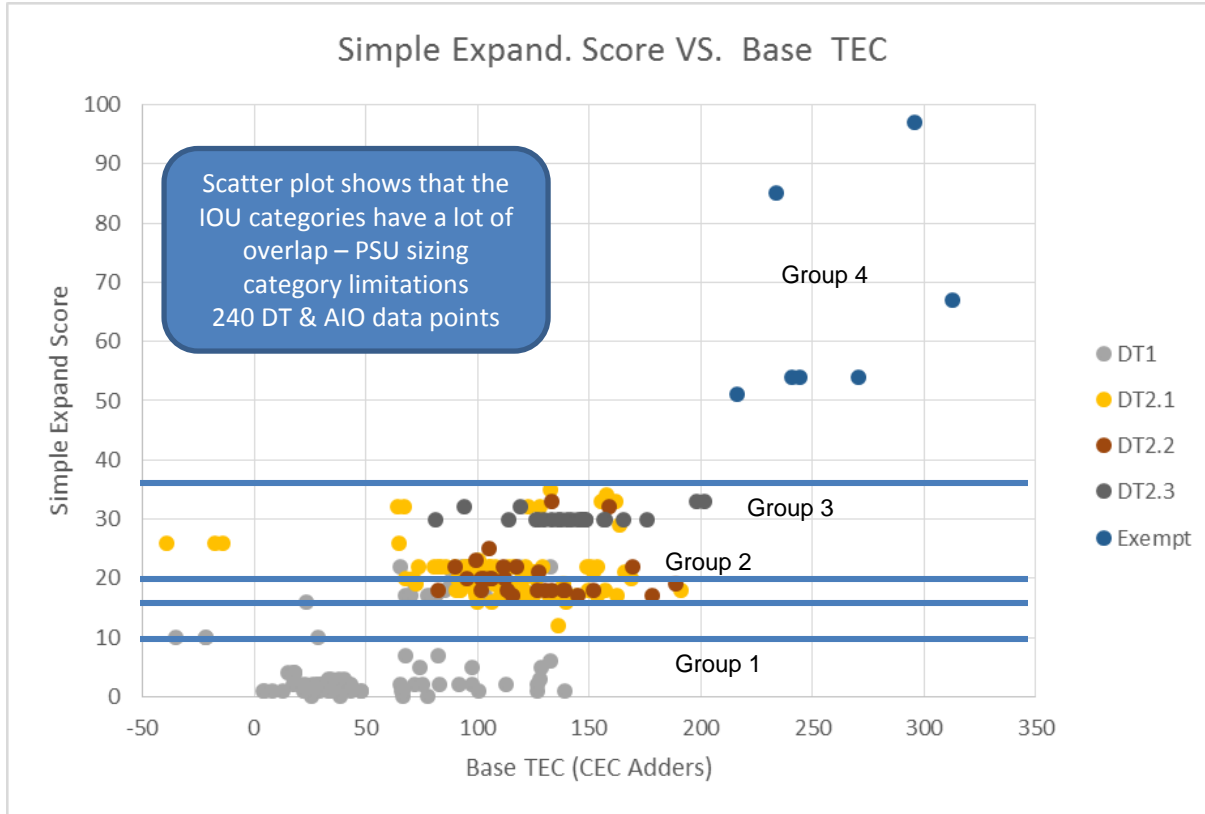
Category	PSU Size	SES	Base TEC (June 2016 ITI- CEC dataset)
DT 1	<225	Any	49.8
DT 2.1	$\geq 225$	$\geq 10$	93.4
DT 2.2	$\geq 375$	$\geq 16$	112.4
DT 2.3	$\geq 575$	$\geq 20$	133.6
DT 3	$\geq 900$	$\geq 36$	242.6

What Expandability Score items move to Simplified Expandability Score?

- Removes
  - USB 2.0 and USB 3.1 Gen1
  - TBT 2.0
  - IDE, SATA, eSATA, SATA express
  - HEDT features
    - Liquid Cooling
    - 4 channels of memory

Interface Type	Interface Score
USB 2.0 or less	5
USB 3.0 or 3.1 Gen 1	10
USB 3.1 Gen 2	15
USB ports or Thunderbolt 3.0 or greater that can provide 100 or more watts of power	100
USB ports or Thunderbolt 3.0 or greater that can provide from 60 or more to less than 100 watts of power	60
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PCI slot other than PCIe x16 (only count mechanical slots)	25
PCIe x16 or higher (only count mechanical slots)	75
Thunderbolt 2.0 or less	20
M.2 (except key M)	10
IDE, SATA, eSATA	15
M.2 key M, SATA express, U.2	25
Integrated liquid cooling	50
Either: 1) CPU and motherboard support for 4 or more channels of system memory and at least 8 GB of installed and compatible system memory; or 2) At least 8 GB of system memory installed on a 256 bit or greater memory interface.	100

# Scatter Plot with IOU Categories & ITI Data



# DT Categories – Simplified Expand Score

(IOUs proposed May 2016)

## Pros

- Limited number of interfaces
- Future interface agnostic

## Cons

- Not as good of a correlation to Base TEC data as original Expandability Score shows
- PSU size limitations doesn't match scatter plot
- 5W limit for interfaces  $\geq 10$  GB/s
- Does not have features to show a difference with High End Desktop computers
- Another new Category System to confuse the market (P-score, Expand Score, Chassis Size)



## Next Steps

- Based on today's discussion, ITI will come back with the DT computers category proposal

## Form Factor Innovation (Scope/Definitions)

- Computers with Multiple Displays
  - Example: Razor Project Valerie
  - Proposal: Computers with multiple integrated displays can get an adder for each monitor
- Projector Computers
  - An adder for computers with projection technology built in
- Caching Technology
- Always connected states
- Test procedure improvements
- Other HW/SW innovations?





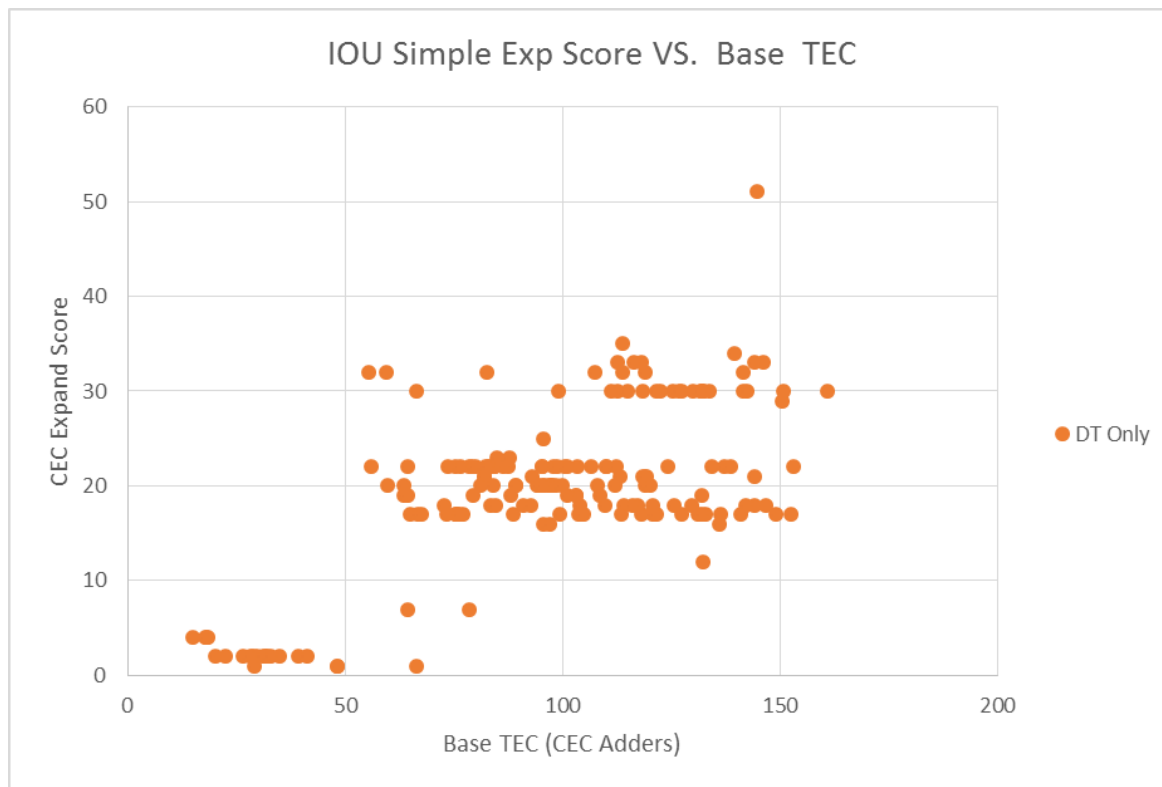


# Back-up

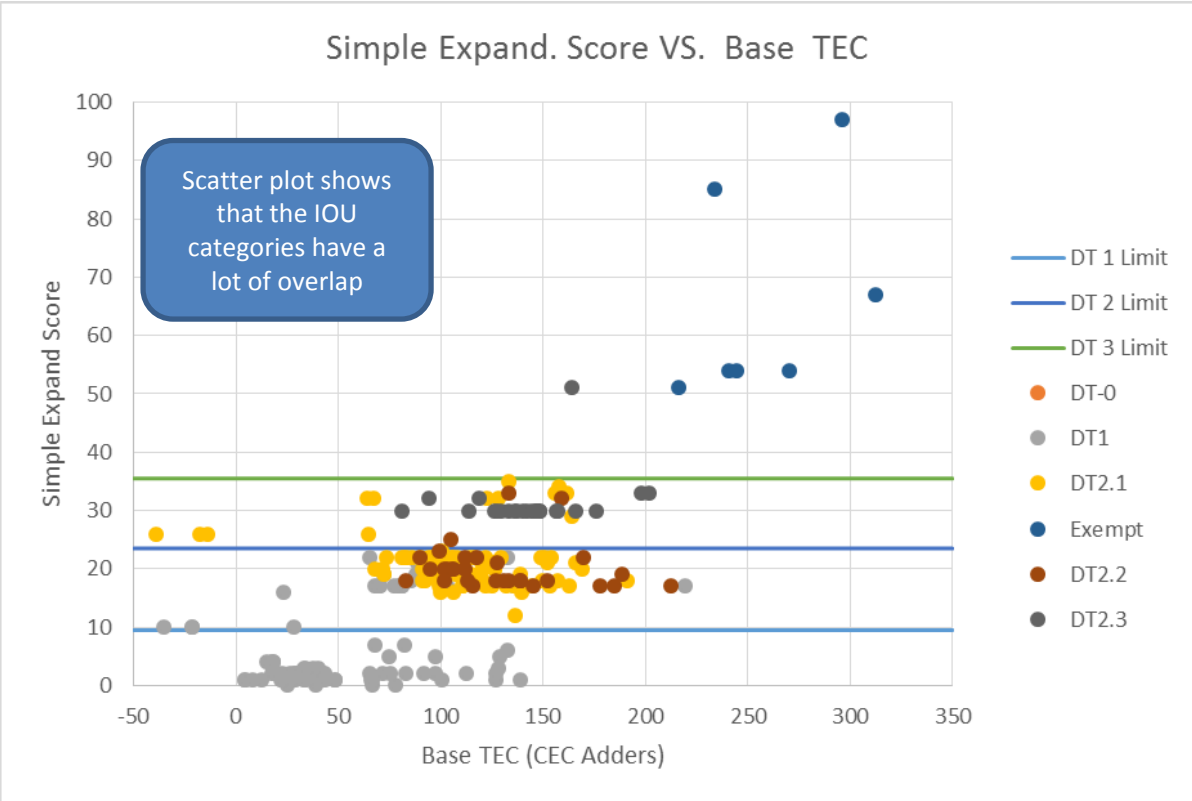
# Scatter Plot (no Exempt systems)

Desktop Only

There is 3 groupings of data, but not as clear with the original Expandability Score



# Scatter Plot with Categories



# Comparing the Base TEC Average

Original SES Proposal	DT & AIO Count	DT Count	AIO Count	AVG Base TEC (CEC Adders)
DT1	95	43	52	49.8
DT2.1	84	80	4	93.4
DT2.2	30	28	2	112.4
DT2.3	28	28	0	133.6
DT3	6	6	0	242.6

SES Modified Category	SES Limit	DT & AIO Count	DT Count	AIO Count	AVG Base TEC (CEC Adders)
DT1	any	67	23	44	43.99
DT2	$\geq 10$	126	116	10	97.0
DT3	$\geq 24$	42	38	4	99.3
Exempt	$\geq 36$	7	7	0	224.7

- Change SES to 3 categories and the Average is very similar between DT2 & DT3.
- Majority of systems might have difference, but there is too many outliers in DT3 that skew the average

CEC Exp Category	DT & AIO Count	DT Count	AIO Count	AVG Base TEC (CEC Adders)
DT0 (<250)	76	21	55	31.1
DT1 (250-425)	105	102	3	101.6
DT2 (425-690)	55	55	0	126.3
Exempt	6	6	0	251.4