CHP Efficiency

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AB 1613 Efficiency

- AB 1613 Sets the Minimum Efficiency Requirement at 60%

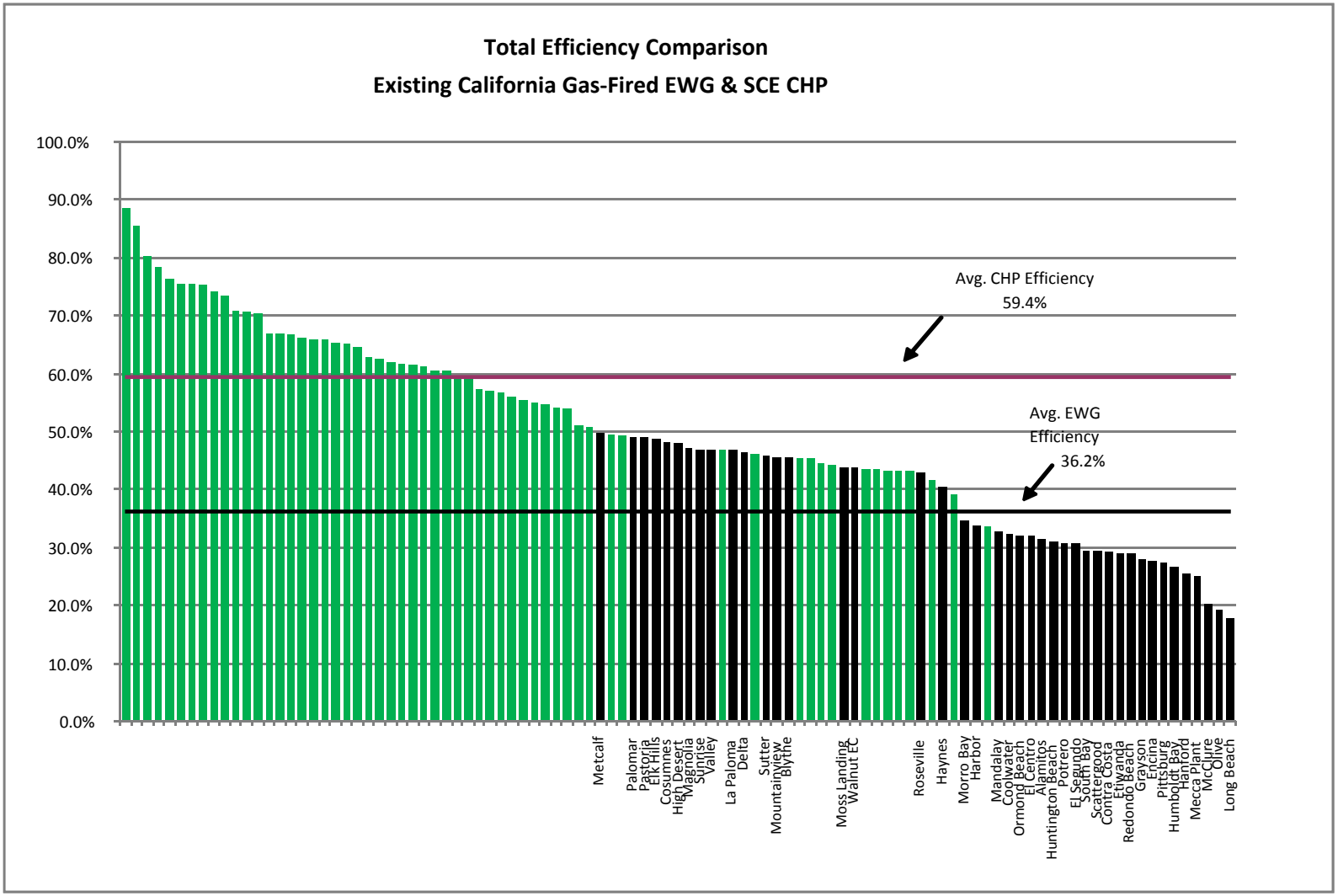
  (e) (1) An eligible customer-generator's combined heat and power system ***shall meet*** *an oxides of nitrogen (NOx) emissions rate standard of 0.07 pounds per megawatthour and* ***a minimum efficiency of 60 percent****. A minimum efficiency of 60 percent shall be measured as useful energy output divided by fuel input. The efficiency determination shall be based on 100-percent load.*

- Statute does not permit modification of minimum efficiency requirement

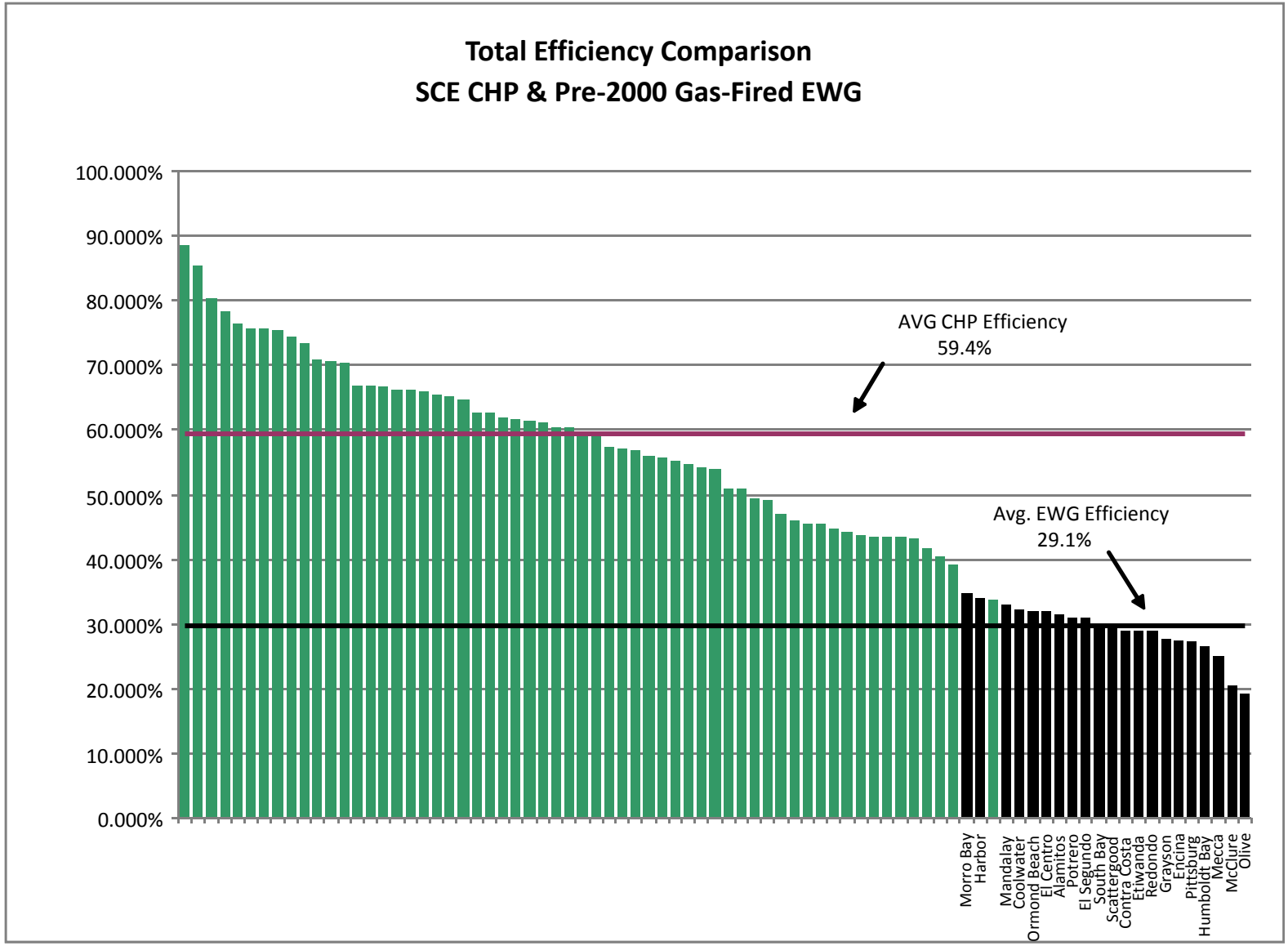
Comparing Alternatives

- Total efficiency of current CHP fleet exceeds total efficiency of current gas-fired EWG fleet in SCE territory by ~23%
- Benefit increases to 30% when comparing CHP and EWG of comparable vintage

Total Efficiency: Existing Fleet



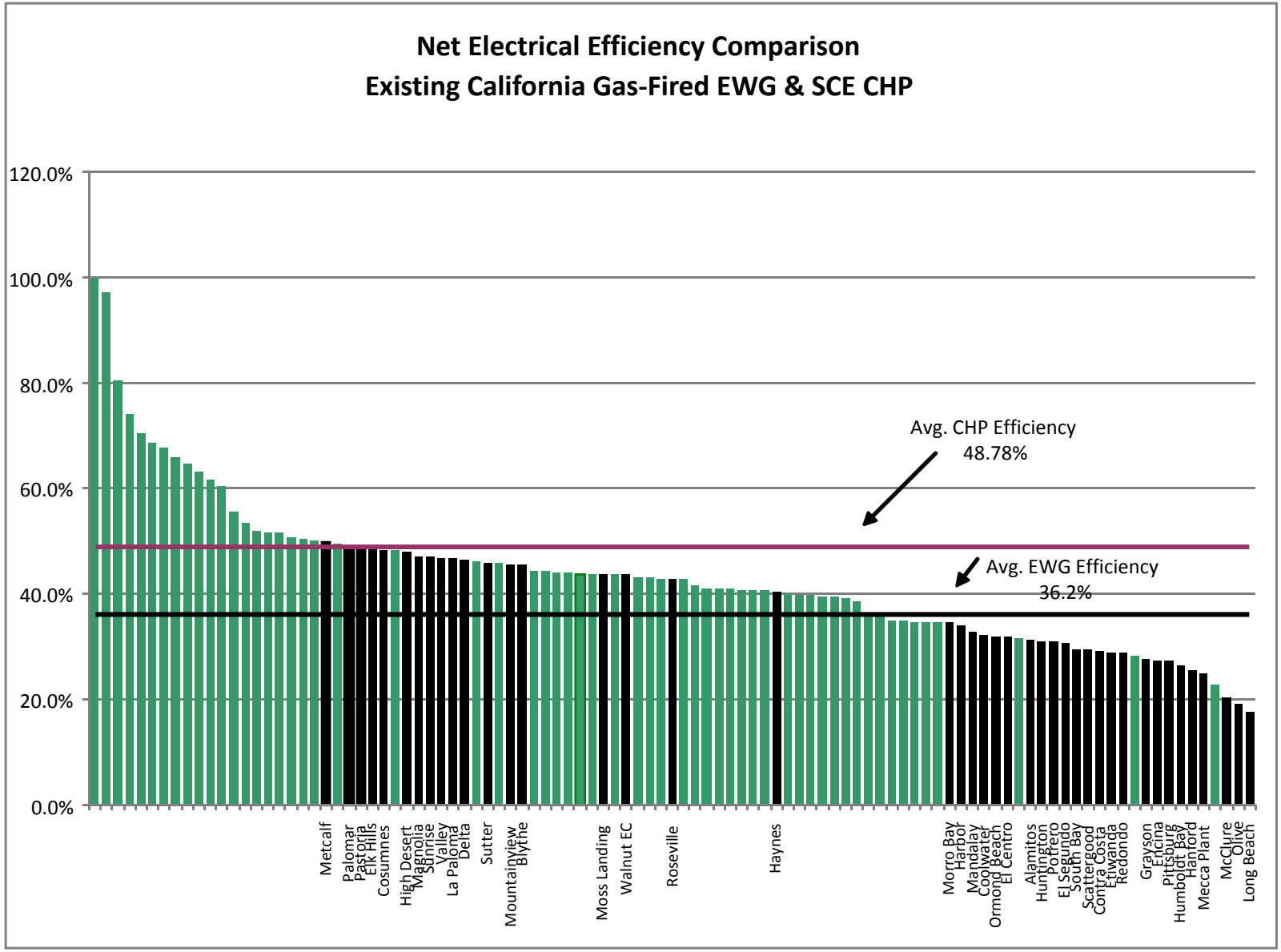
Total Efficiency: Comparable Vintage



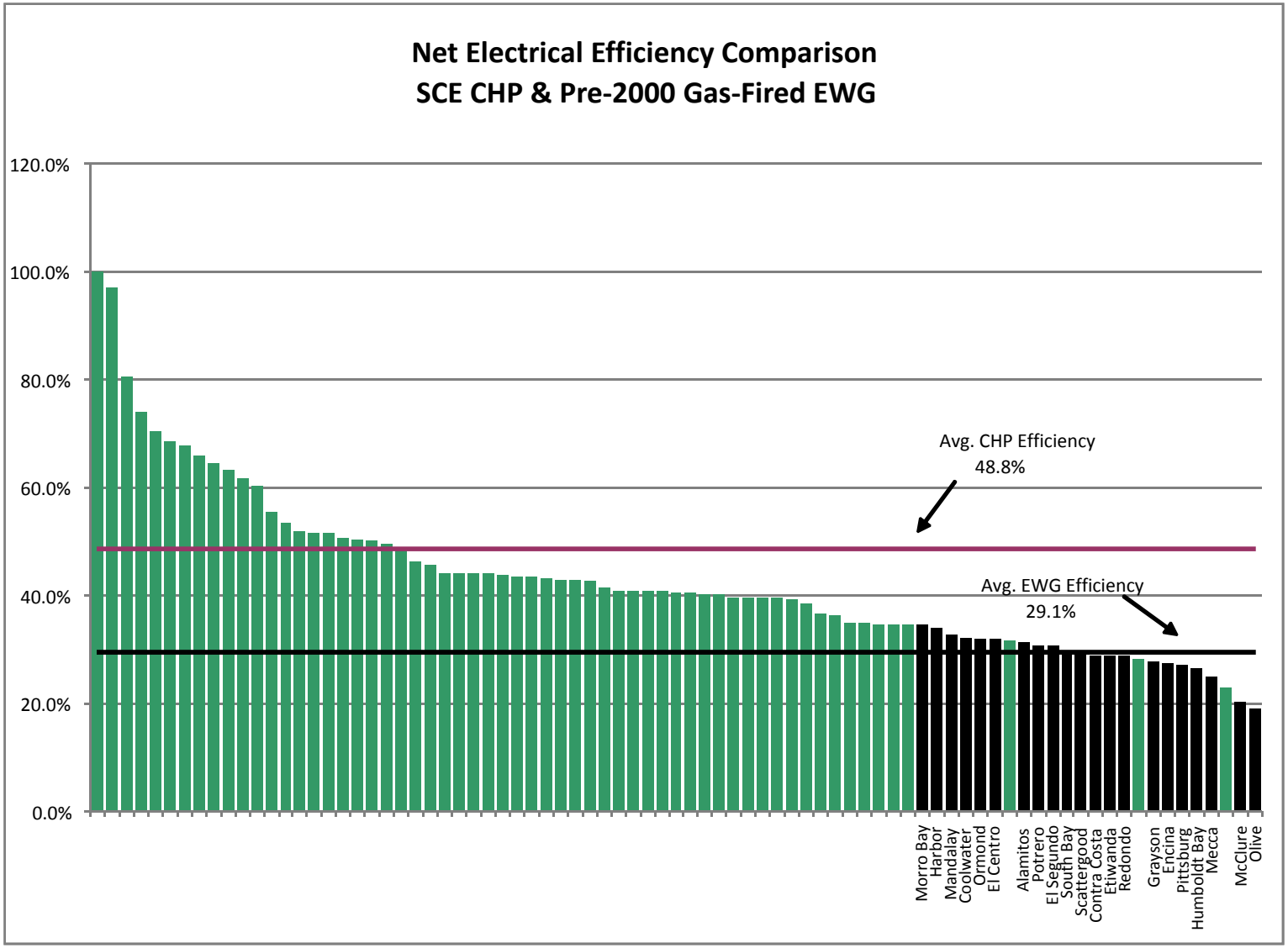
Comparing Alternatives

- Existing CHP exceeds net electrical efficiency of current EWG fleet in SCE territory by 12.5%
- Benefit increases to 19% when comparing CHP and EWG of comparable vintage

Net Electrical Efficiency: Existing Fleet



Net Electrical Efficiency: Comparable Vintage



Current Technology

New CHP Beats Most Efficient California Combined Cycle Plant

Description	Saturn 20	Taurus 60	Mars 100	LM2500+	LM6000PD
Capacity (MW)	1.2	5.5	10.2	25.0	40.0
Electric Heat Rate (BTU/kWh - HHV)	16,047	12,312	12,001	9,945	9,220
Electrical Efficiency	21.3%	27.7%	28.4%	34.3%	37.0%
Total CHP Efficiency (HHV)	**66.3%**	**69.8%**	**68.4%**	**70.7%**	**72.1%**
Power/Heat Ratio	0.47	0.66	0.71	0.94	1.06
Net Heat Rate	**7,013**	**5,839**	**6,007**	**5,427**	**5,180**
Net Electrical Efficiency	**48.7%**	**58.4%**	**56.8%**	**62.9%**	**65.9%**

Metcalf Energy Center 2008 Efficiency **49.7%**

GE Frame H 54% HHV

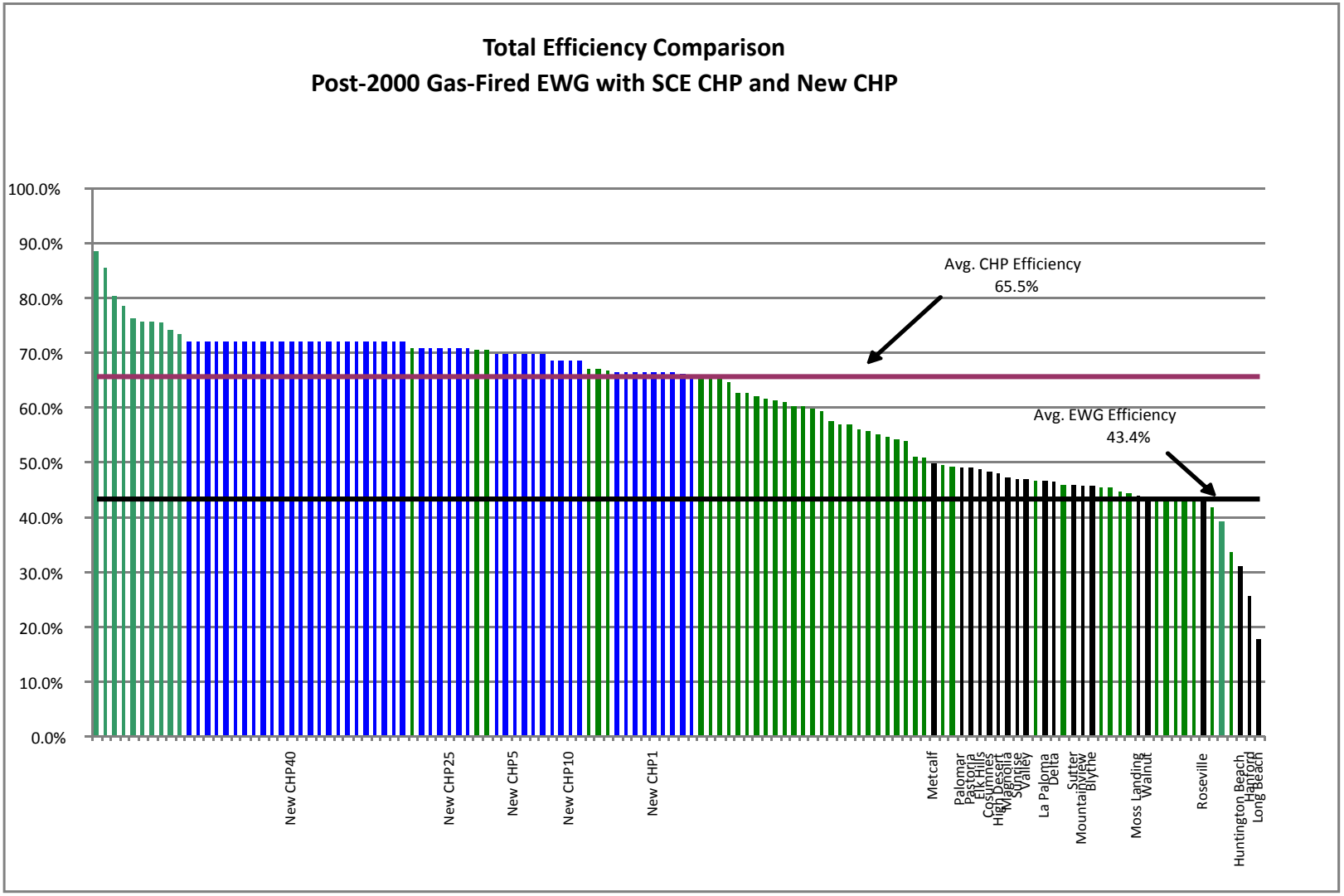
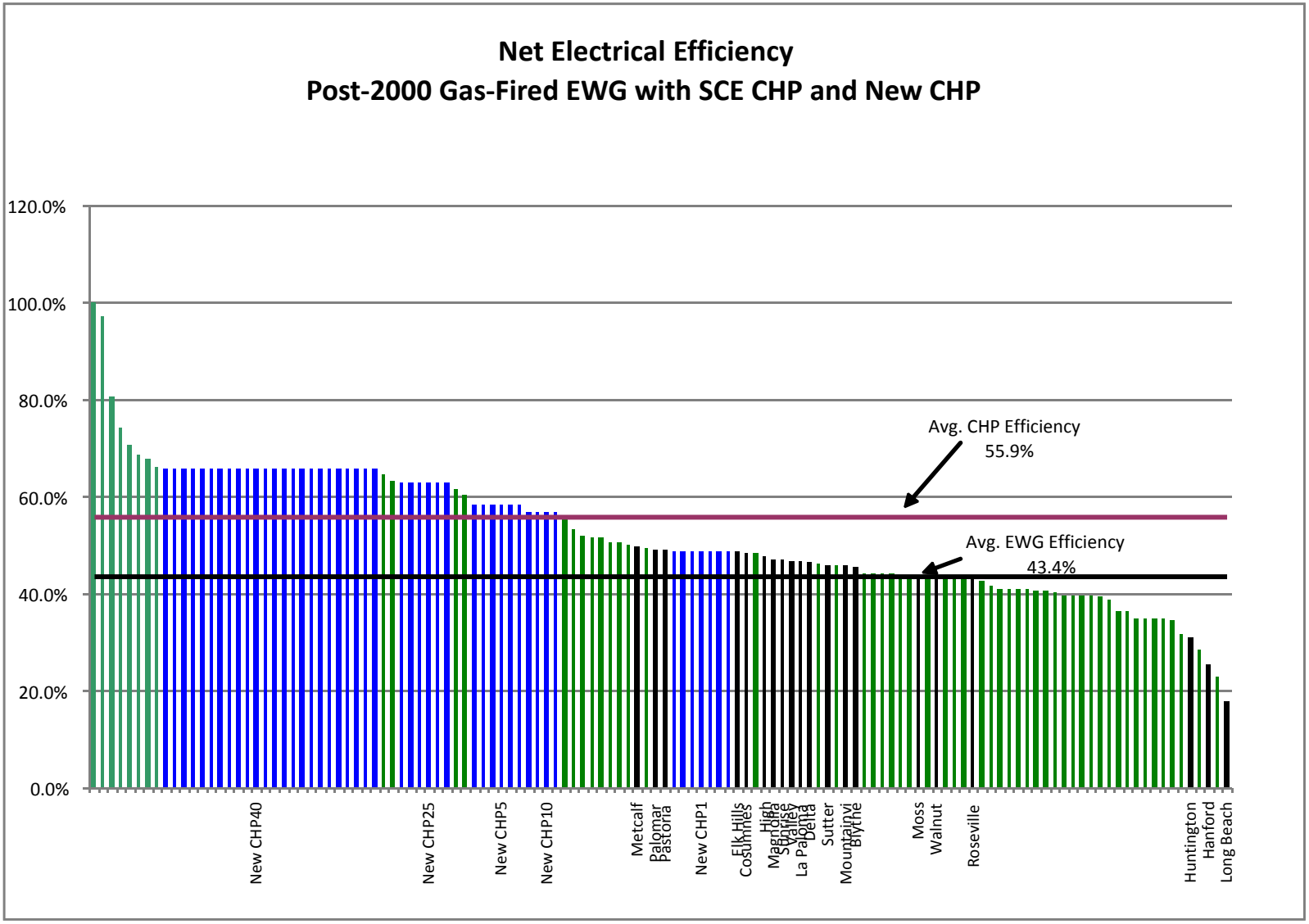
Source for CHP Data : Catalog of CHP Technologies, US EPA & Combined Heat and Power Partnership, December 2008
Gas Turbine Chapter, page 6, Table 1

Source for Metcalf data: FERC Form 923

Comparing Alternatives

- Existing + new CHP exceeds total efficiency of post-2000 EWG fleet by 17%
- Existing + new CHP exceeds net electrical efficiency of post-2000 EWG fleet by ~13%

Total Efficiency: SCE/New CHP



Net Electrical Efficiency: SCE/New CHP