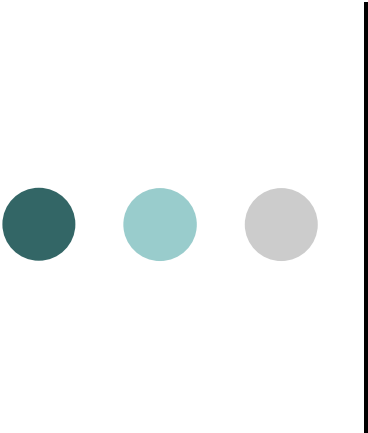
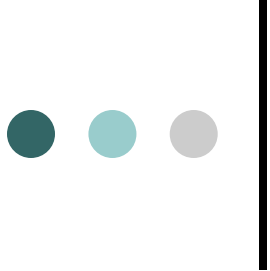


DOCKET**08-WHCE-1**DATE April 13 2009RECD. April 14 2009

CHP Efficiency

Don Schoenbeck, RCS
Energy Producers and Users Coalition
Cogeneration Association of California
Energy Commission AB 1613 Workshop
April 13, 2009



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.*

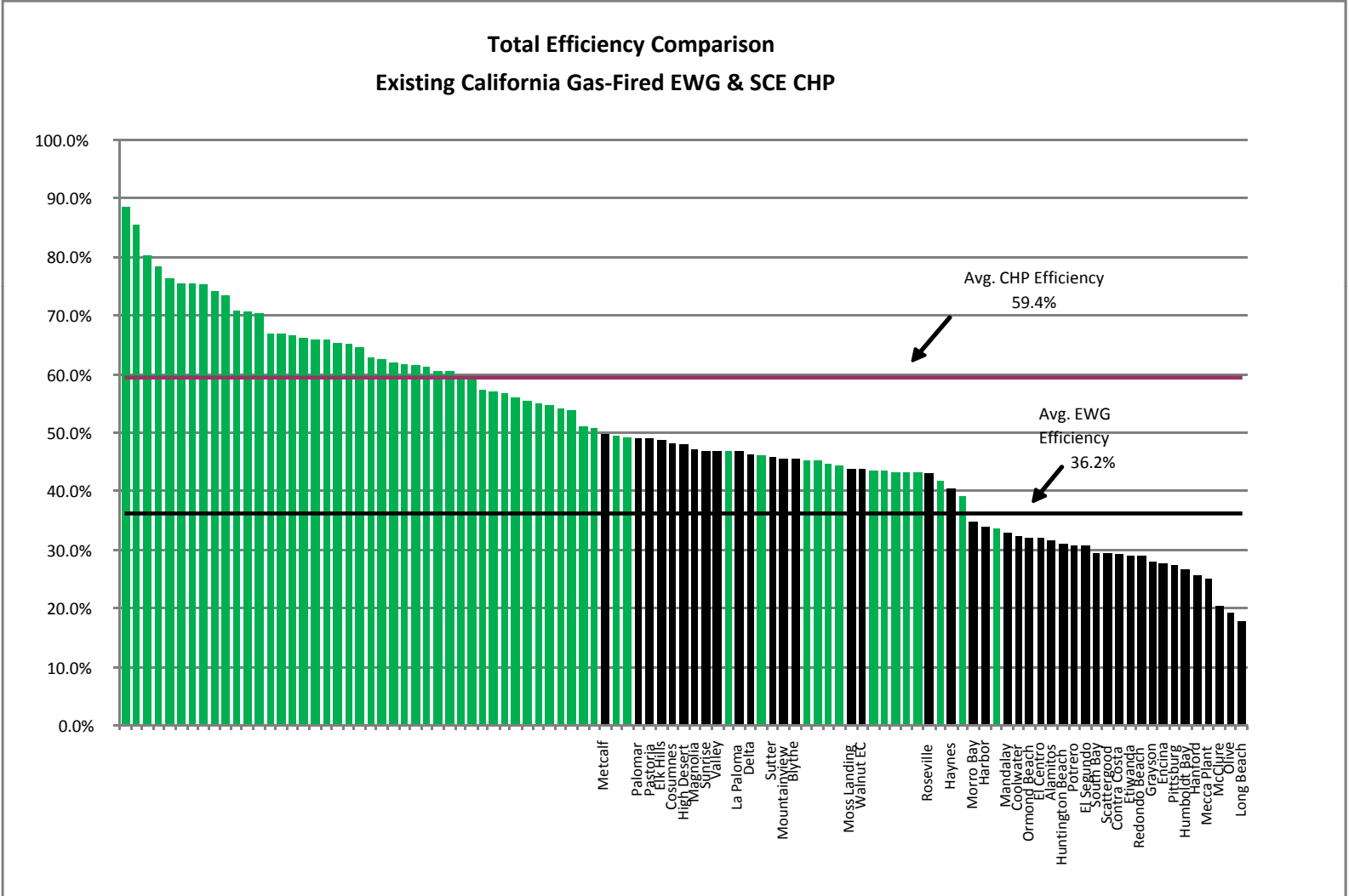
- Statute does not permit modification of minimum efficiency requirement



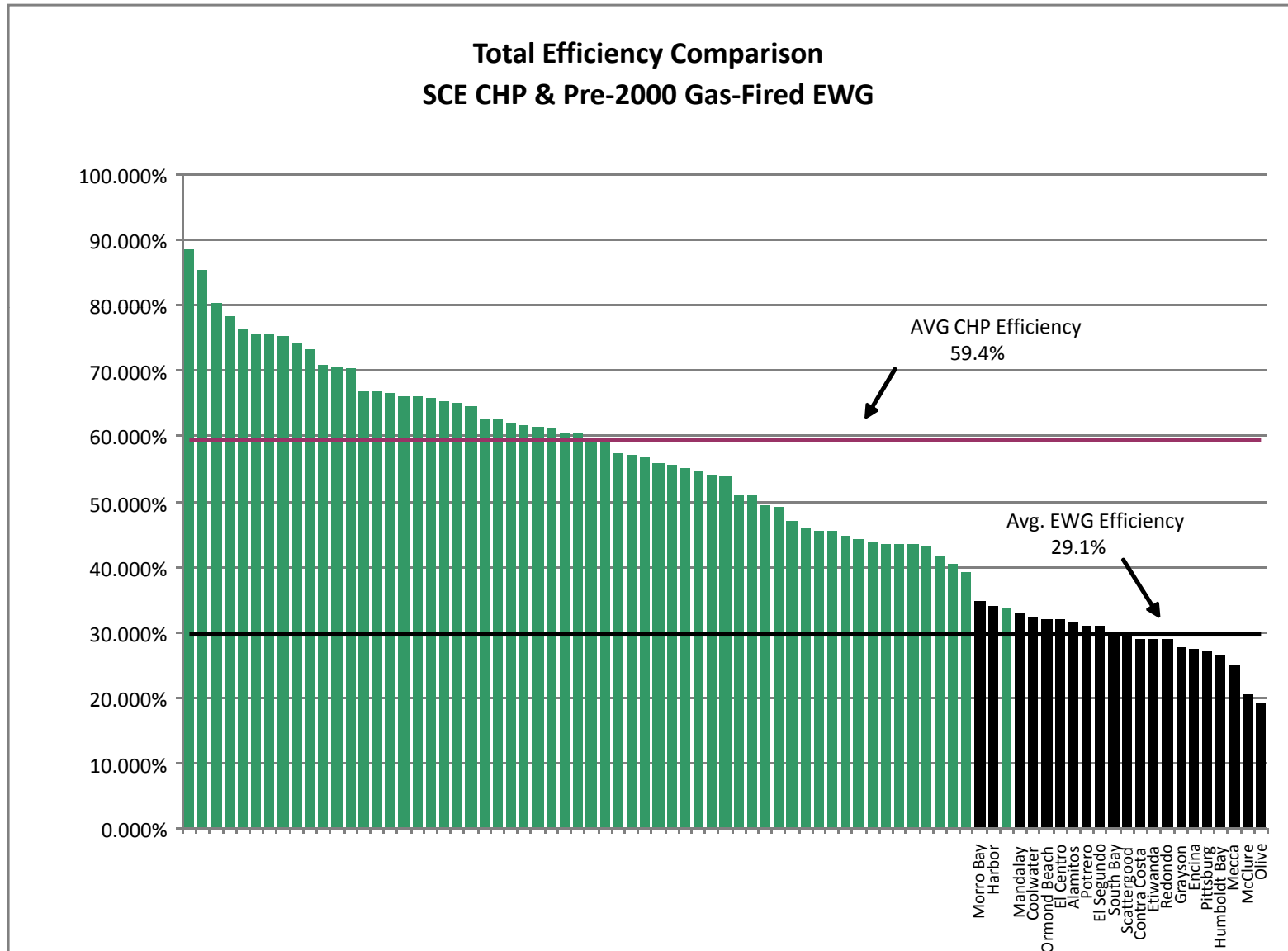
Comparing Alternatives

- 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

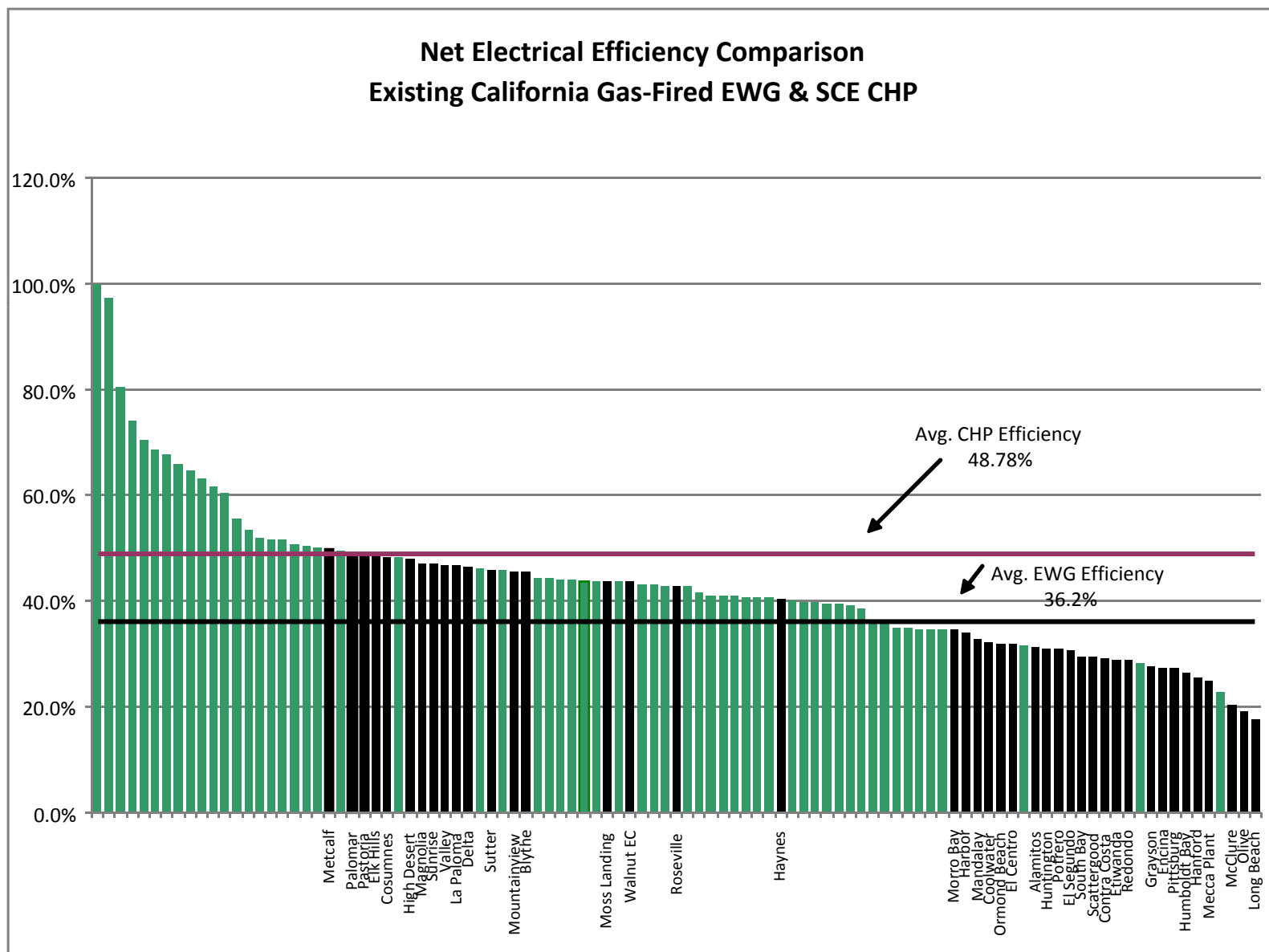




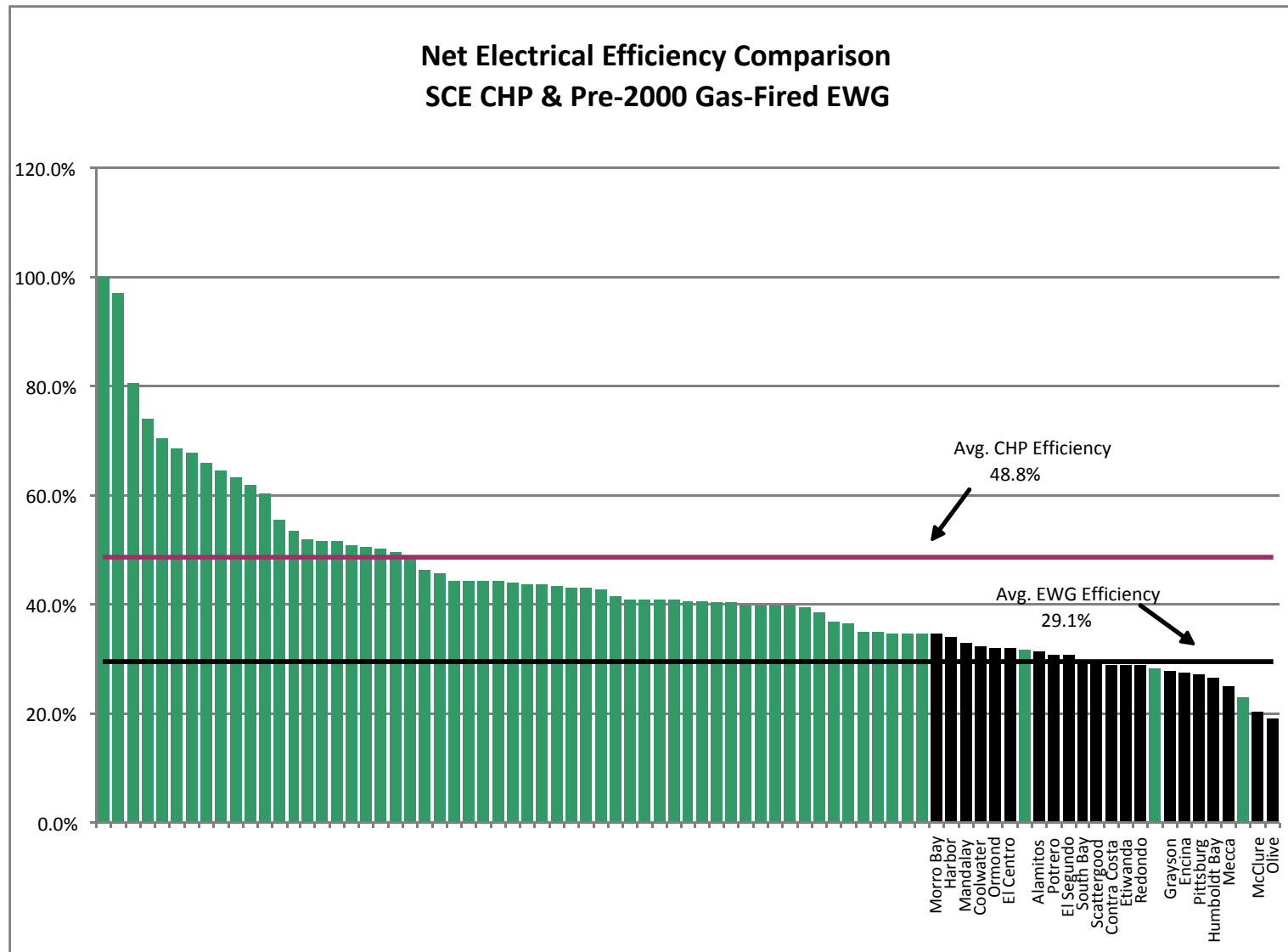
Comparing Alternatives

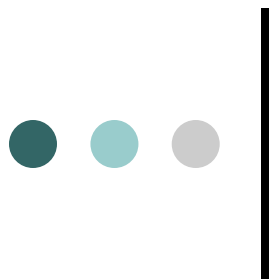
- Existing CHP exceeds net electrical efficiency of current EWG fleet in SCE territory by 12.5%
- Benefit increases to 19% when comparing CHP and EWG of comparable vintage

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

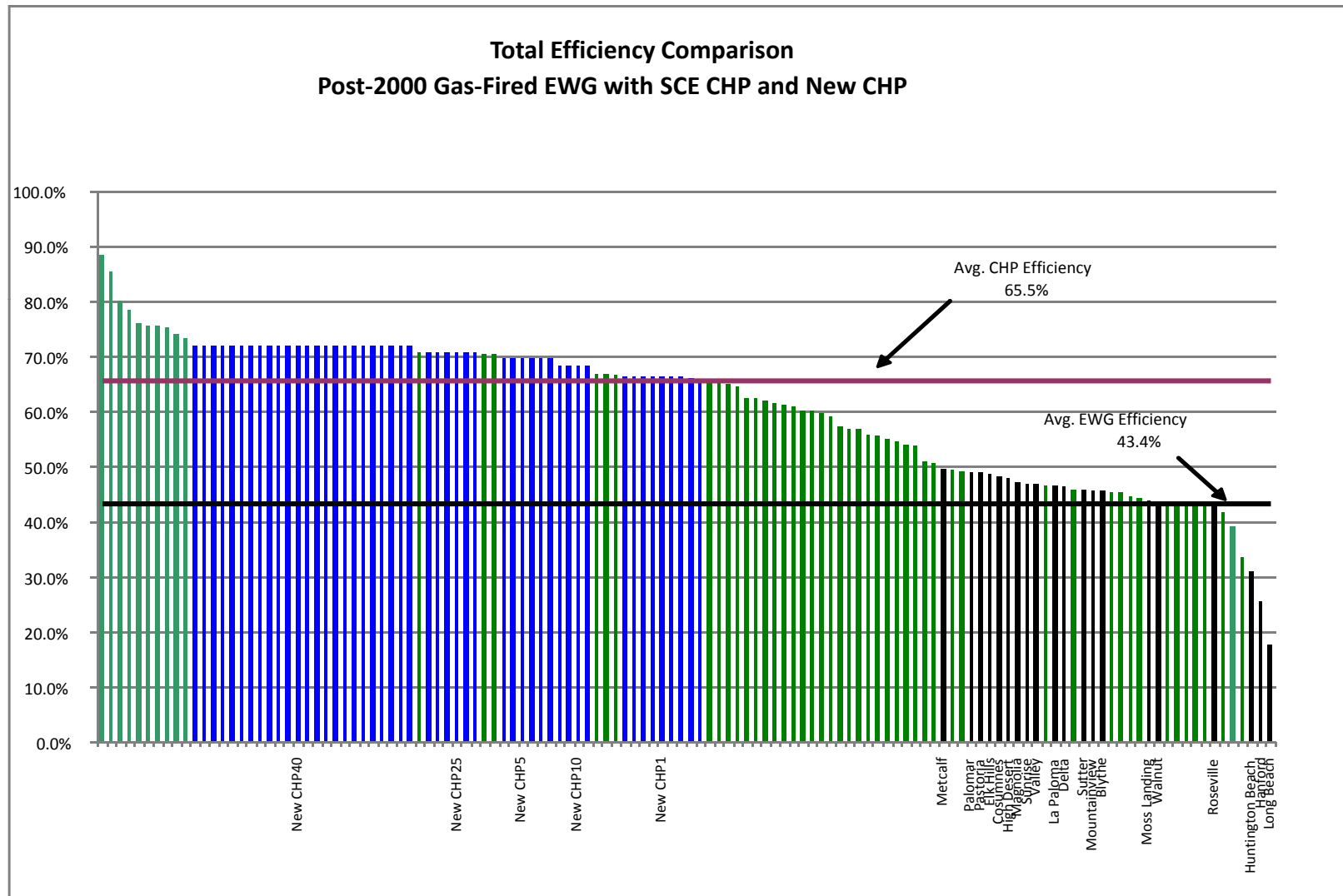
Source for Metcalf data: FERC Form 923



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

