



# Role and Performance of OTC Plants

**IEPR OTC Workshop**  
California Energy Commission

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# OTC in California



- 19 facilities, 20,400 MW
  - 17 gas-fired, 2 nuclear
  - 6 utility, 13 merchant
- 49 gas-fired units
  - 45 built before 1978
  - 4 new(er) units



# OTC in California

## Statewide Supply and Demand

2009 Capacity  
59,930 MW

2008 Energy  
≈299,000 GWh

Nuclear	4,478 MW (8%)	32,482 GWh (11%)
Gas Fired	15,922 MW (27%)	23,327 GWh (8%)
↓		
Aging Gas	14,055 MW (23%)	13,940 GWh (5%)
New Gas	1,867 MW (3%)	9,387 GWh (3%)

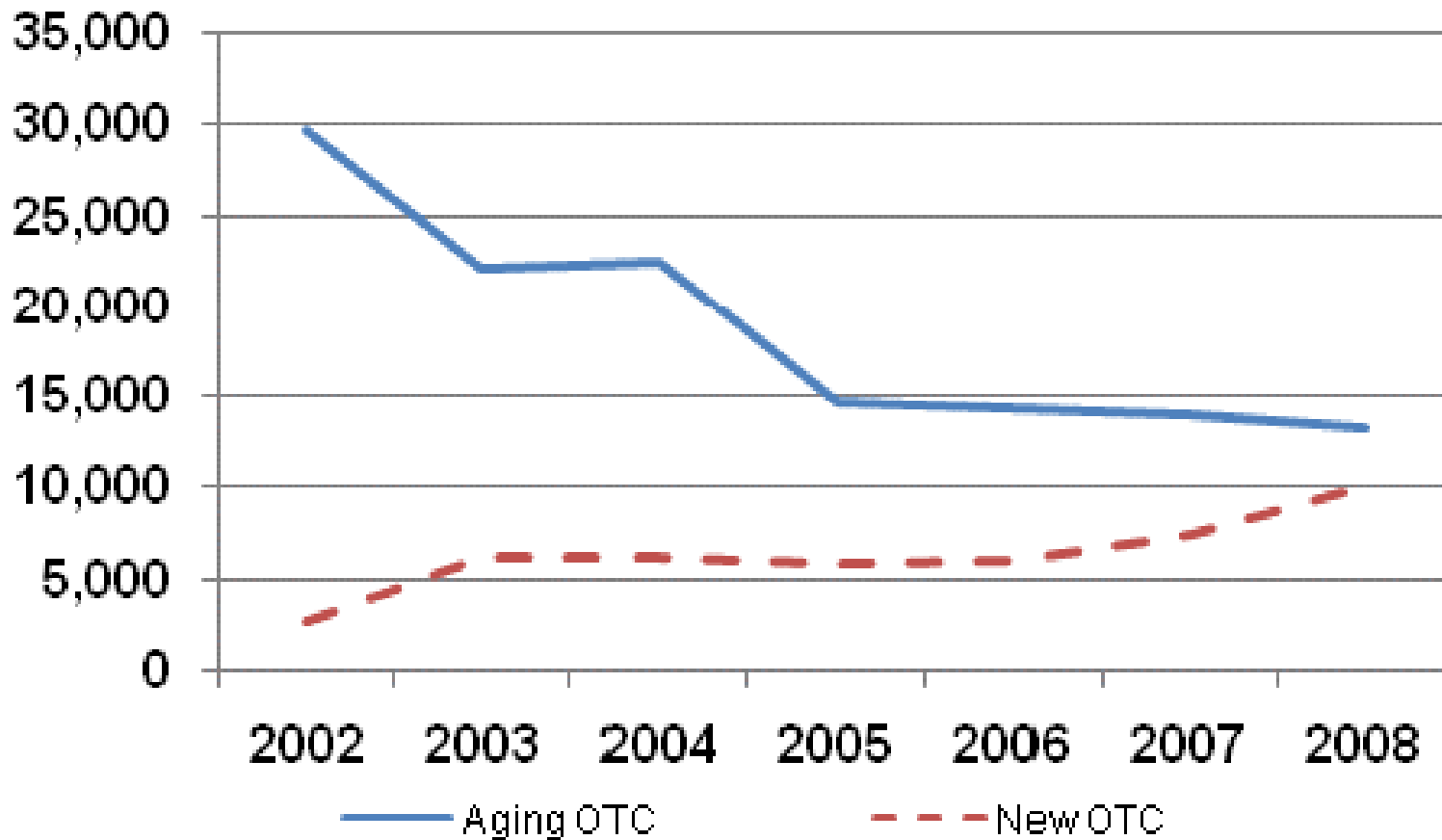


# New & Retooled Plants

- Moss Landing 1-2 (1,080 MW)
  - On line 2002
  - Off-site mitigation satisfied CEQA
- Haynes CC (LADWP; 560 MW)
  - On line 2005, replacing units 3-4
- Harbor CC (LADWP; 227 MW)
  - On line 1994
- Huntington Beach 3-4 (450 MW)
  - On line 2002-2003
  - Retooling of existing units
  - Off-site mitigation satisfied CEQA

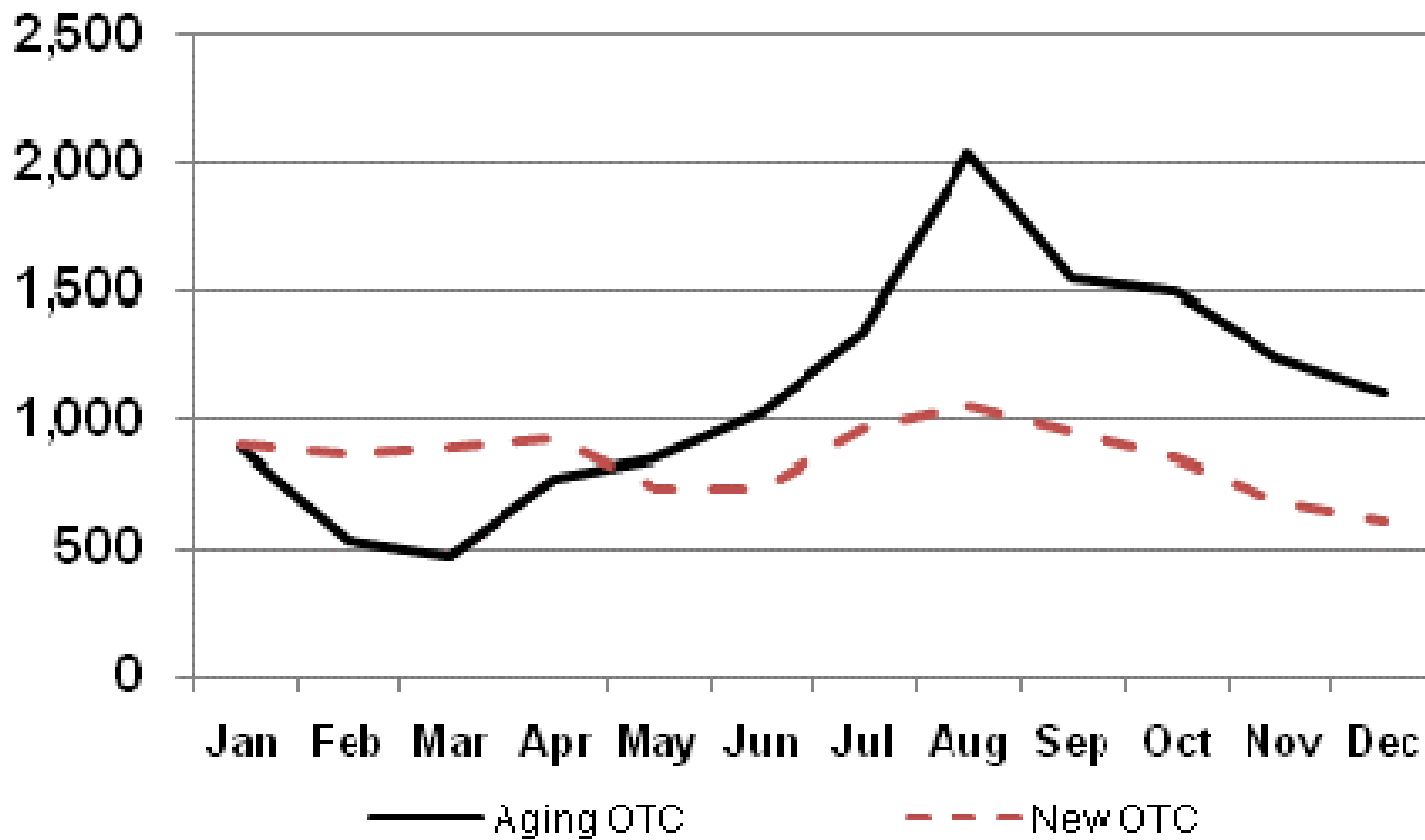


# 2002 - 2008 Generation Gas-fired OTC Plants



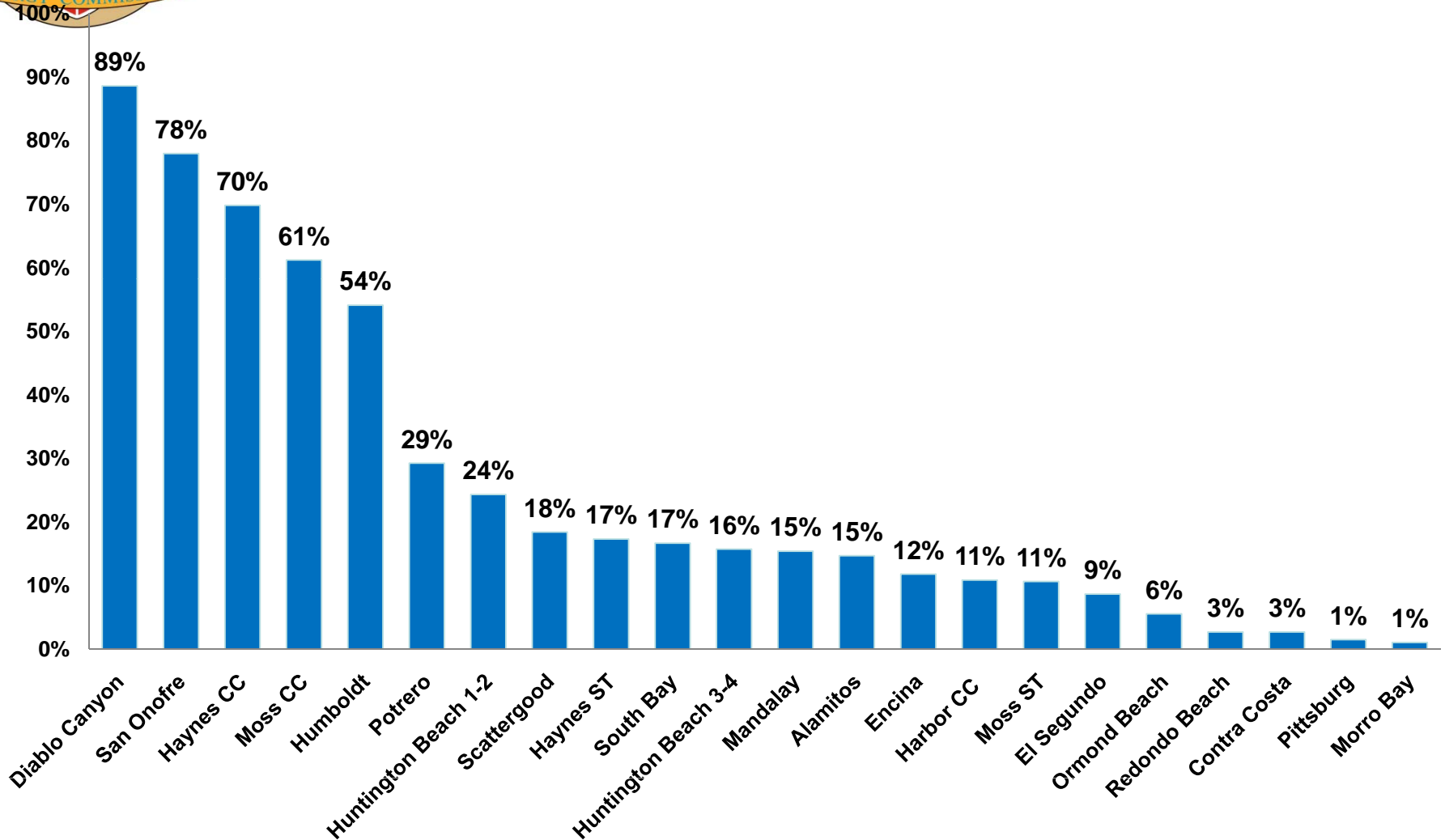


# 2008 Generation Gas-fired OTC Plants



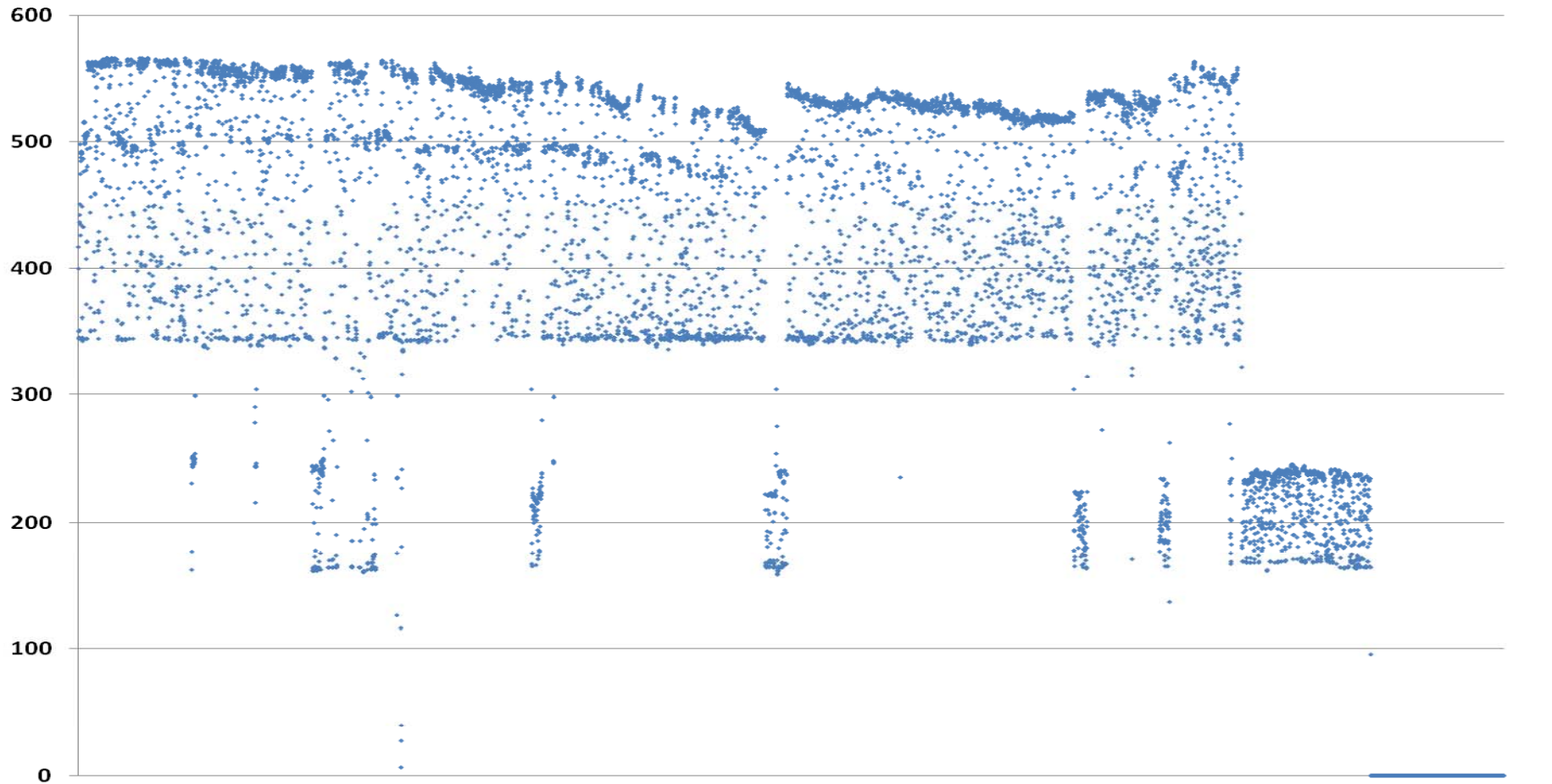


# 2008 Capacity Factors





# Haynes CC 2008 Hourly Generation



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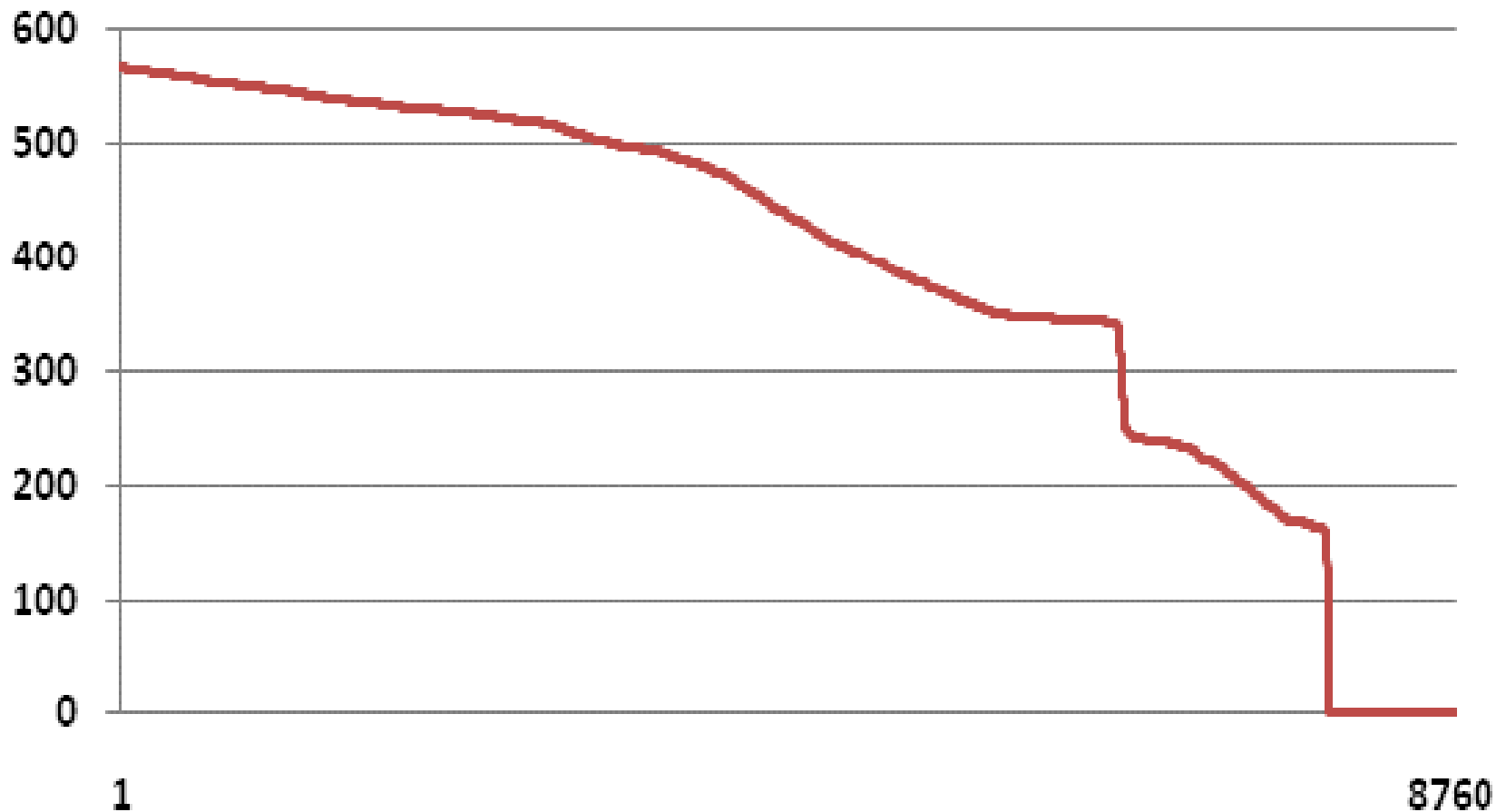
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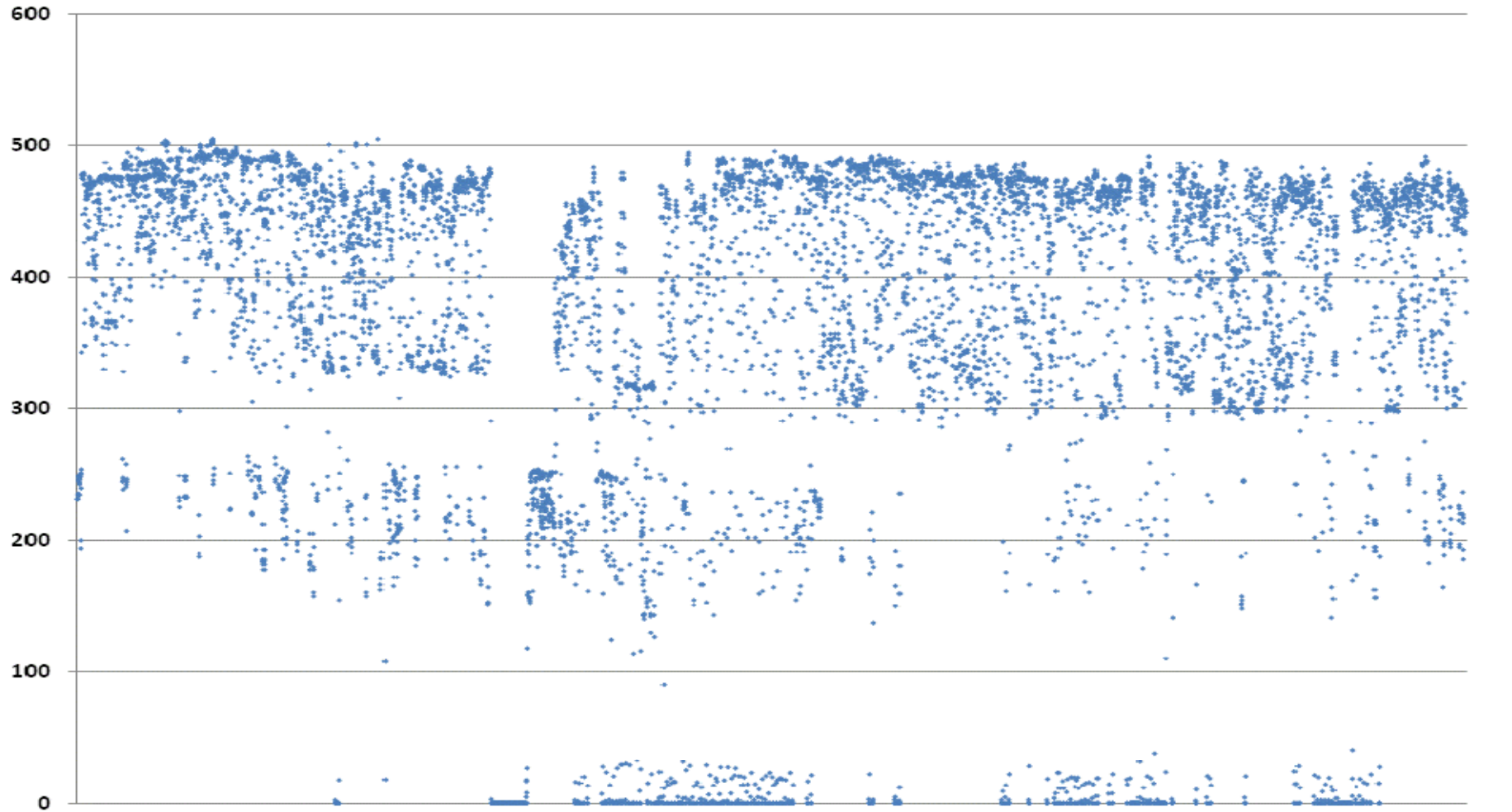


# Haynes CC 2008 Load Duration Curve





# Moss Landing 1 2008 Hourly Generation



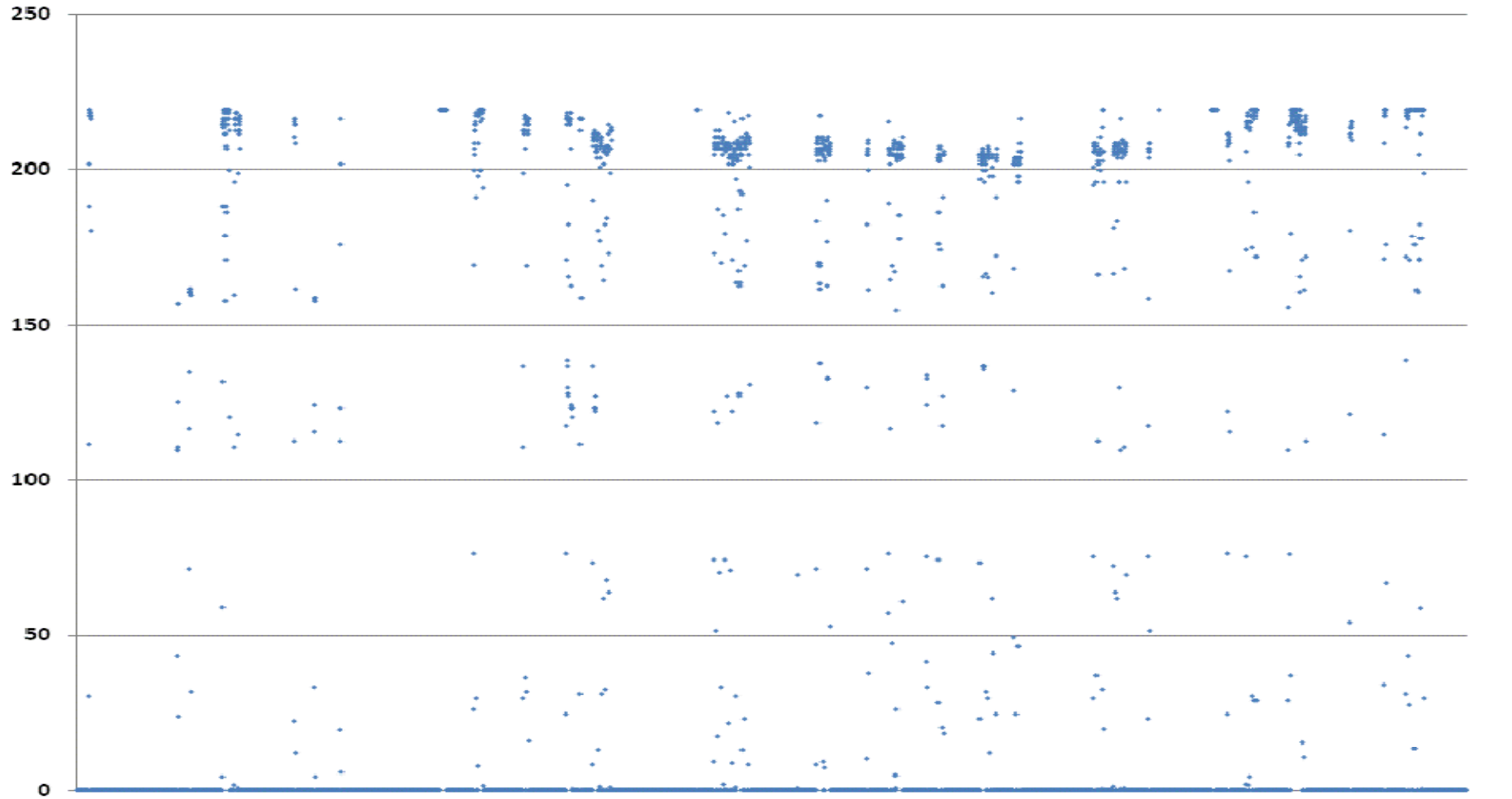
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# Harbor CC 2008 Hourly Generation



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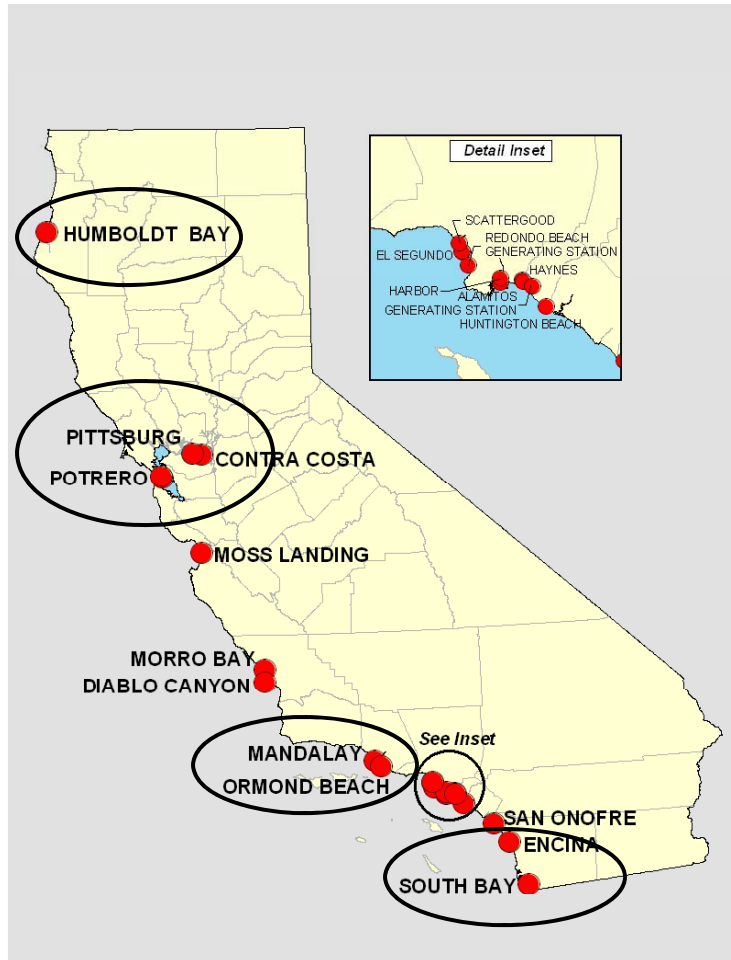


# Harbor CC 2008 Load Duration Curve





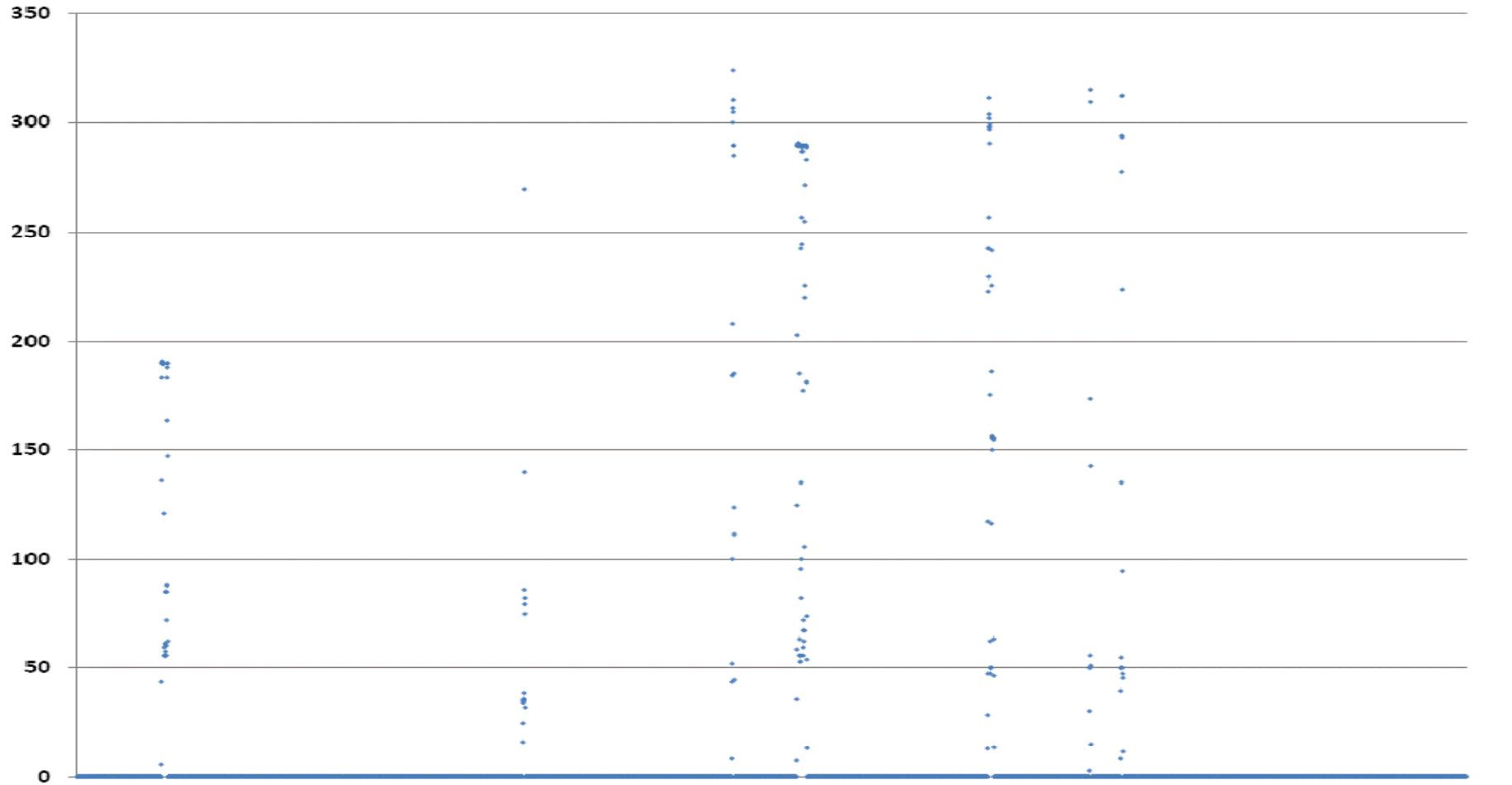
# Local Reliability



- 16 of the 19 facilities are in one of 5 ISO-defined transmission-constrained areas or LADWP control area



# Morro Bay 3 2008 Hourly Generation



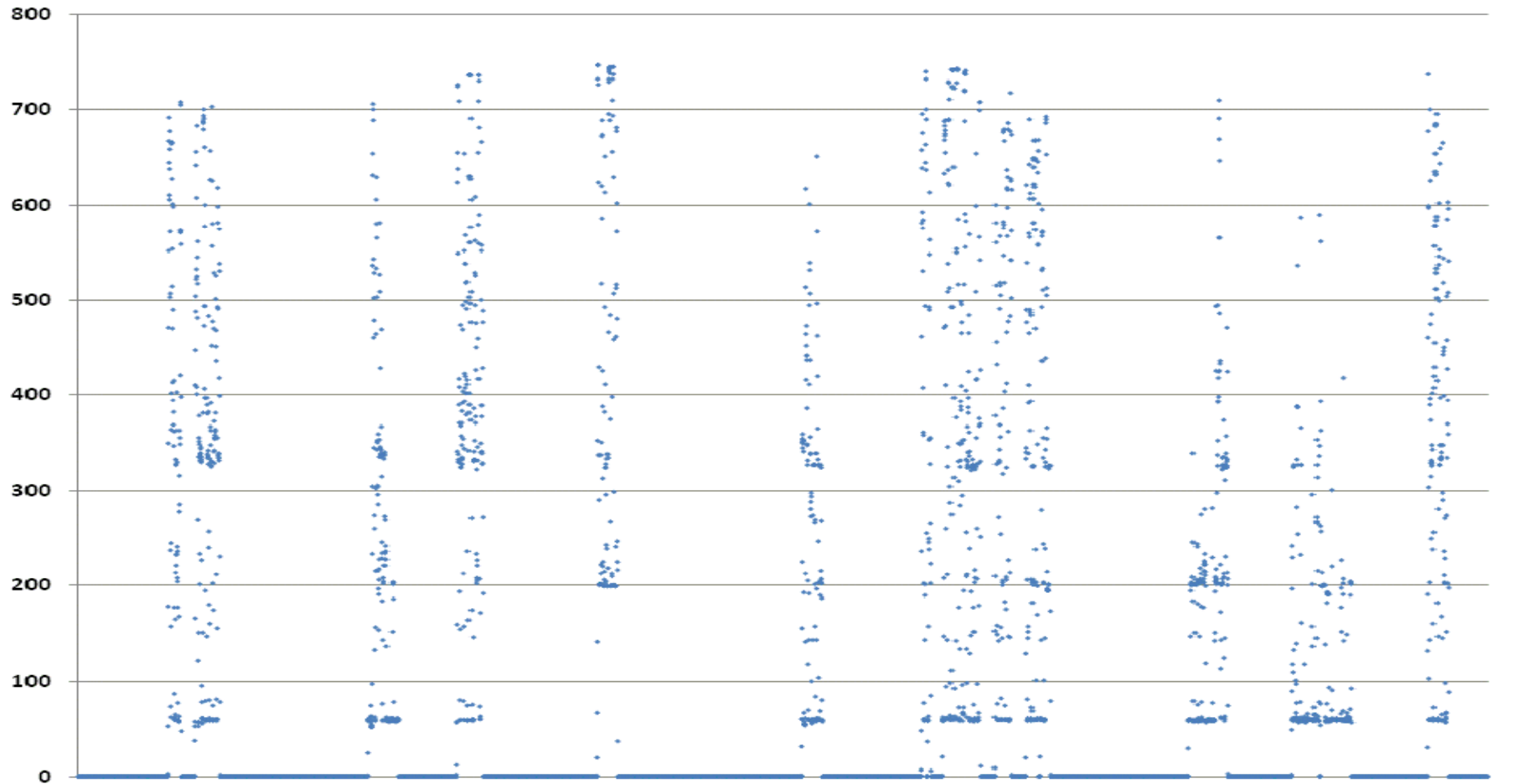
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# Moss Landing 6 2008 Hourly Generation



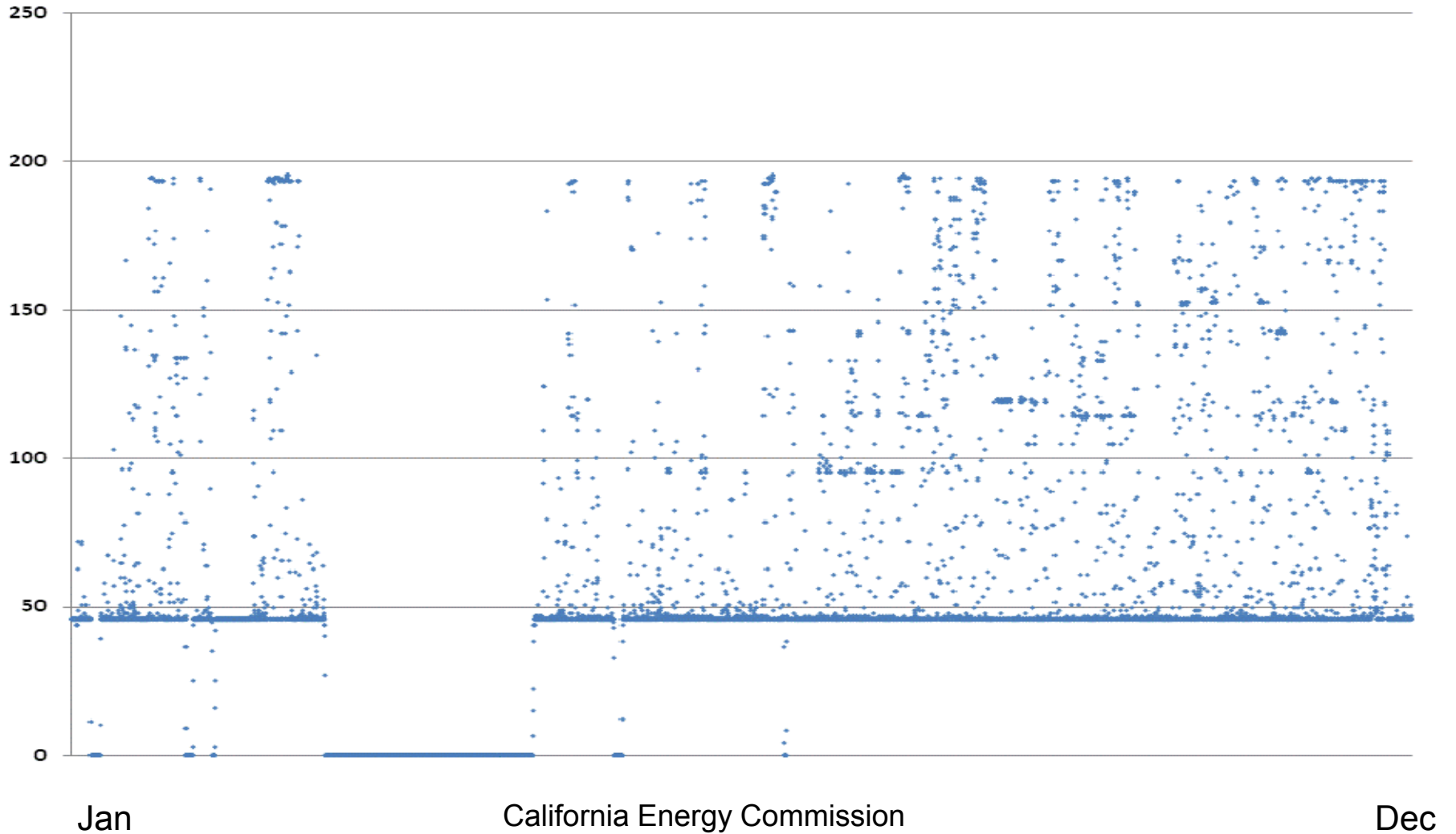
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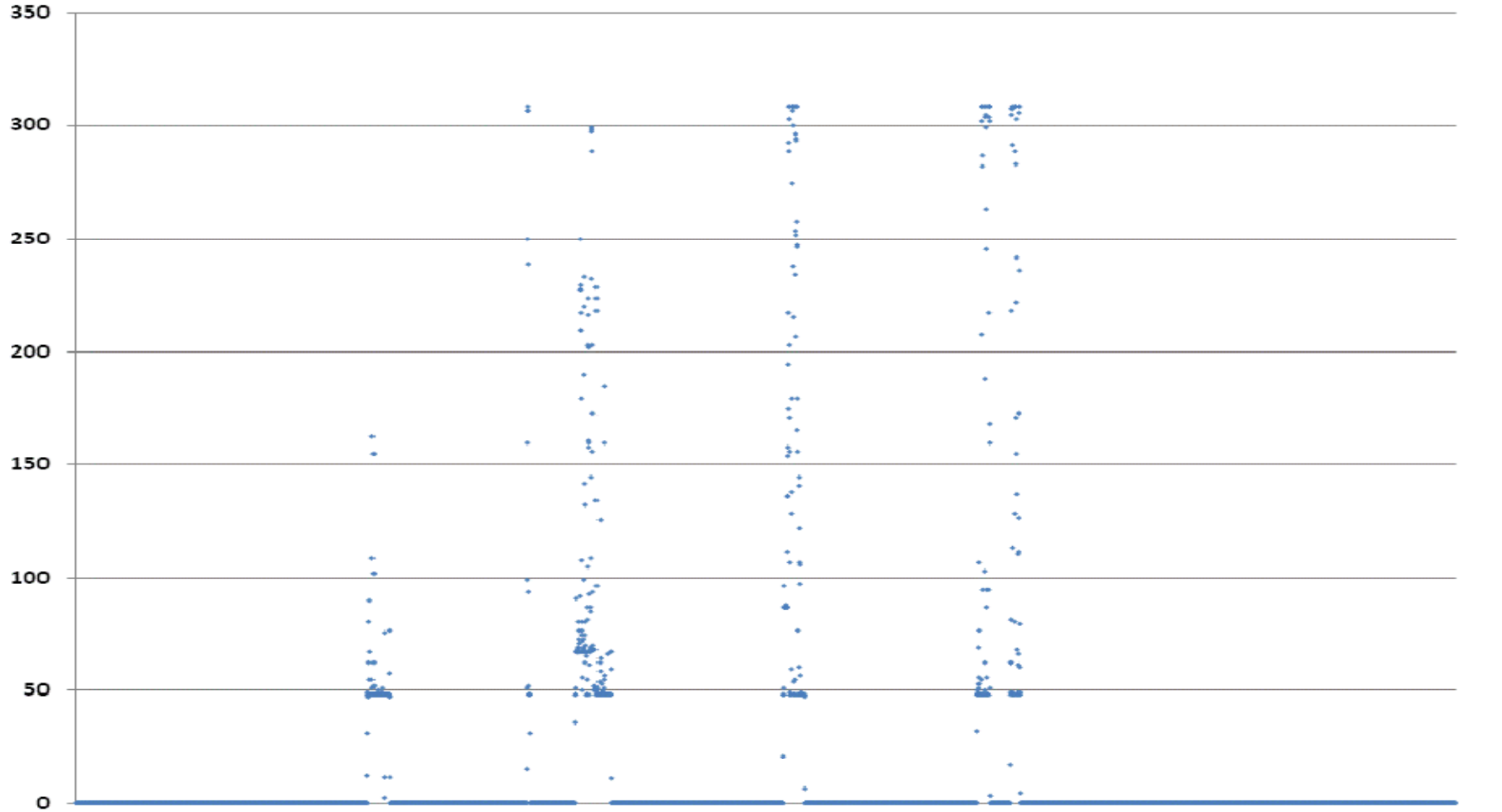
# Potrero 3 2008 Hourly Generation







# Pittsburg 5 2008 Hourly Generation



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# Resource Adequacy

- System-wide, zonal, and local capacity and stability requirements must be satisfied
- Slow-start units in San Diego and LA basin must often operate at minimum load levels to meet spinning reserve requirements later in the day. Some are used year round, others primarily in the summer when loads are higher

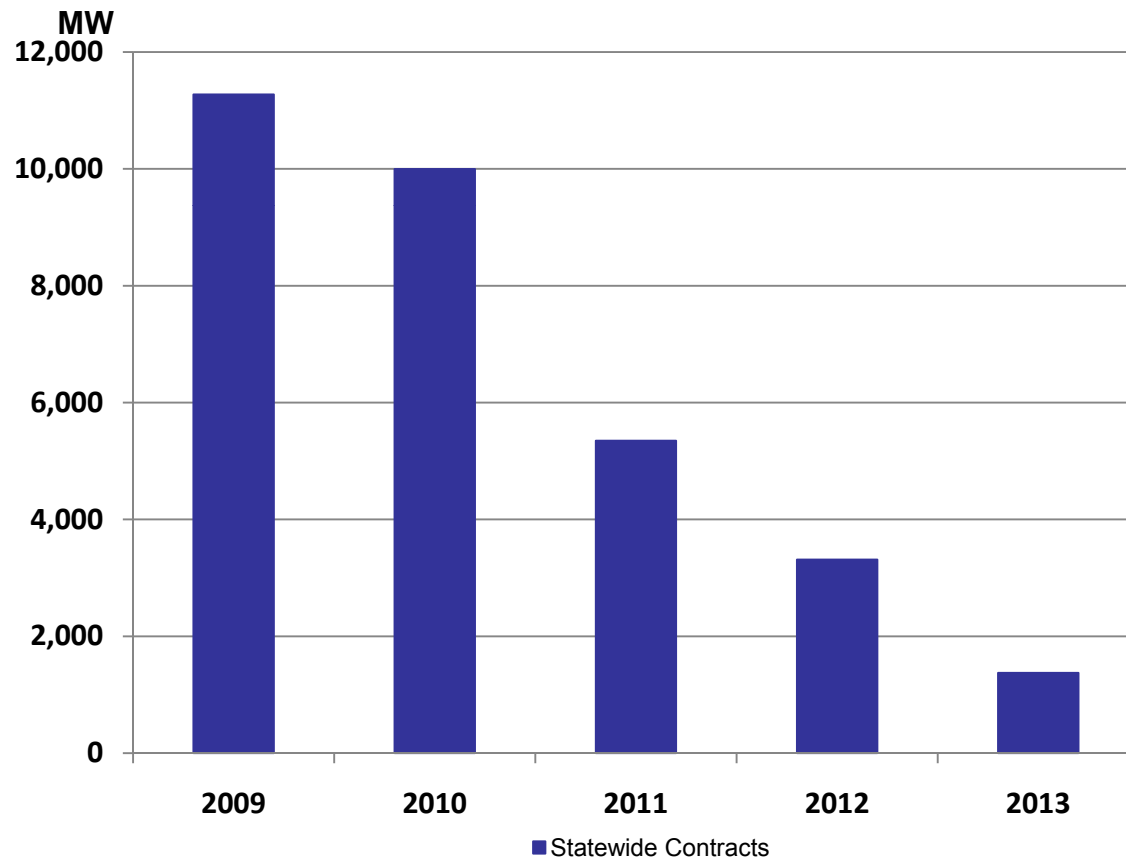


# Resource Adequacy

- RA requirements compel contracts
  - IOUs and LSEs in the ISO control area enter into RA contracts with generators
  - RMR contracts with ISO as backstop
  - Tolling/dispatch agreements between generators and LSEs
  - Legacy DWR contracts



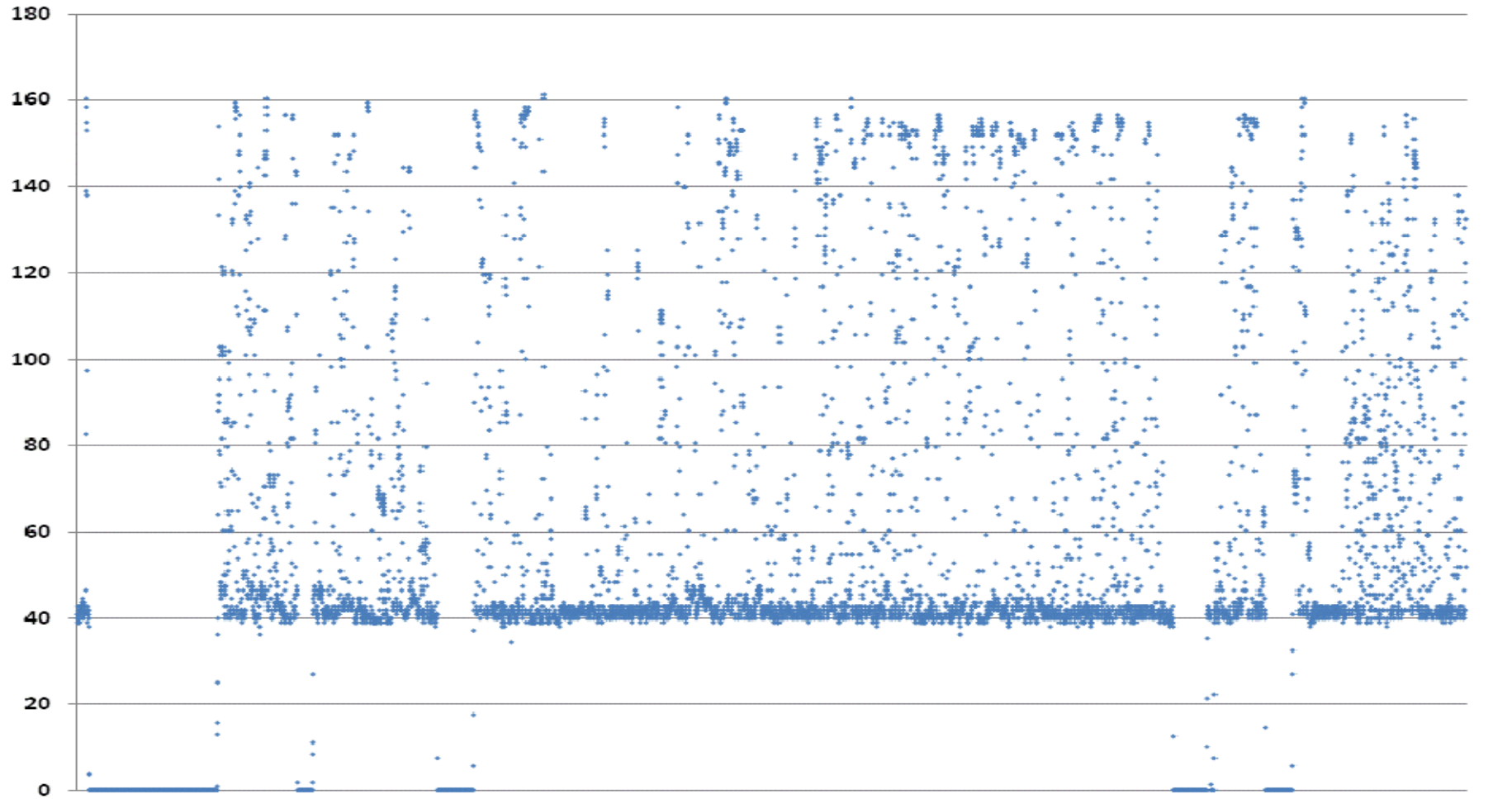
# Under Contract



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# Scattergood 1 2008 Hourly Generation



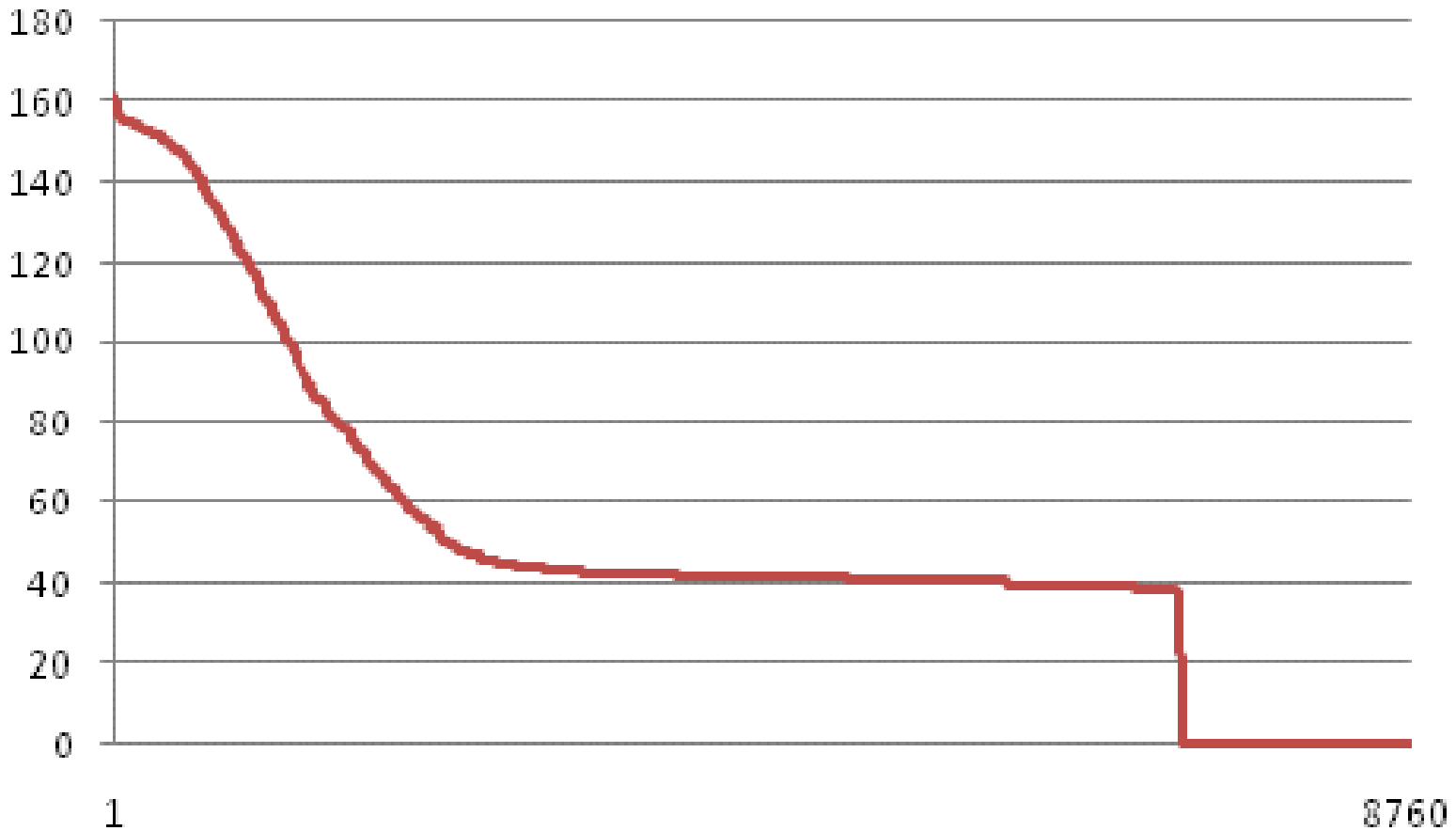
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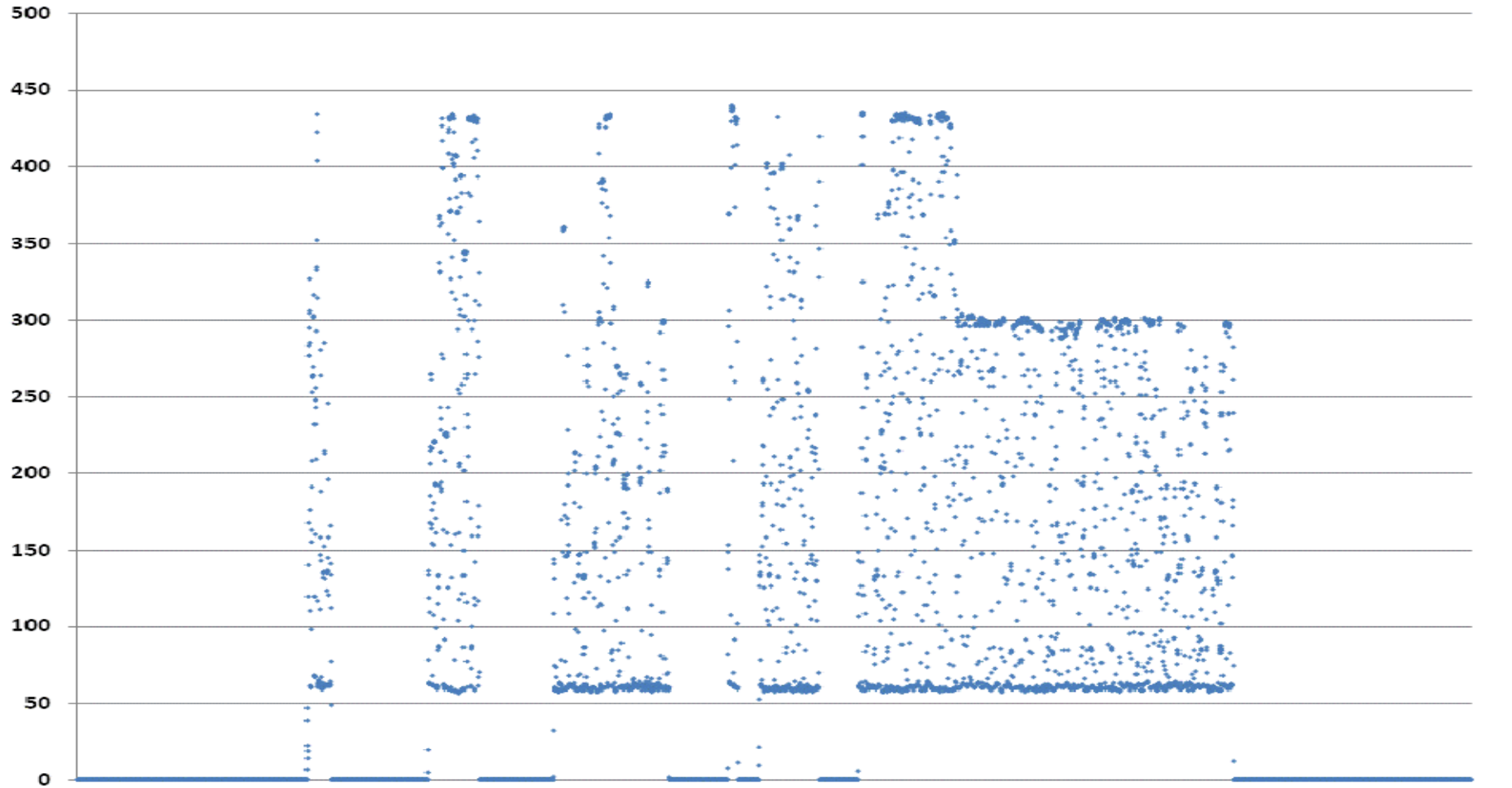


# Scattergood 1 2008 Load Duration Curve





# Scattergood 3 2008 Hourly Generation



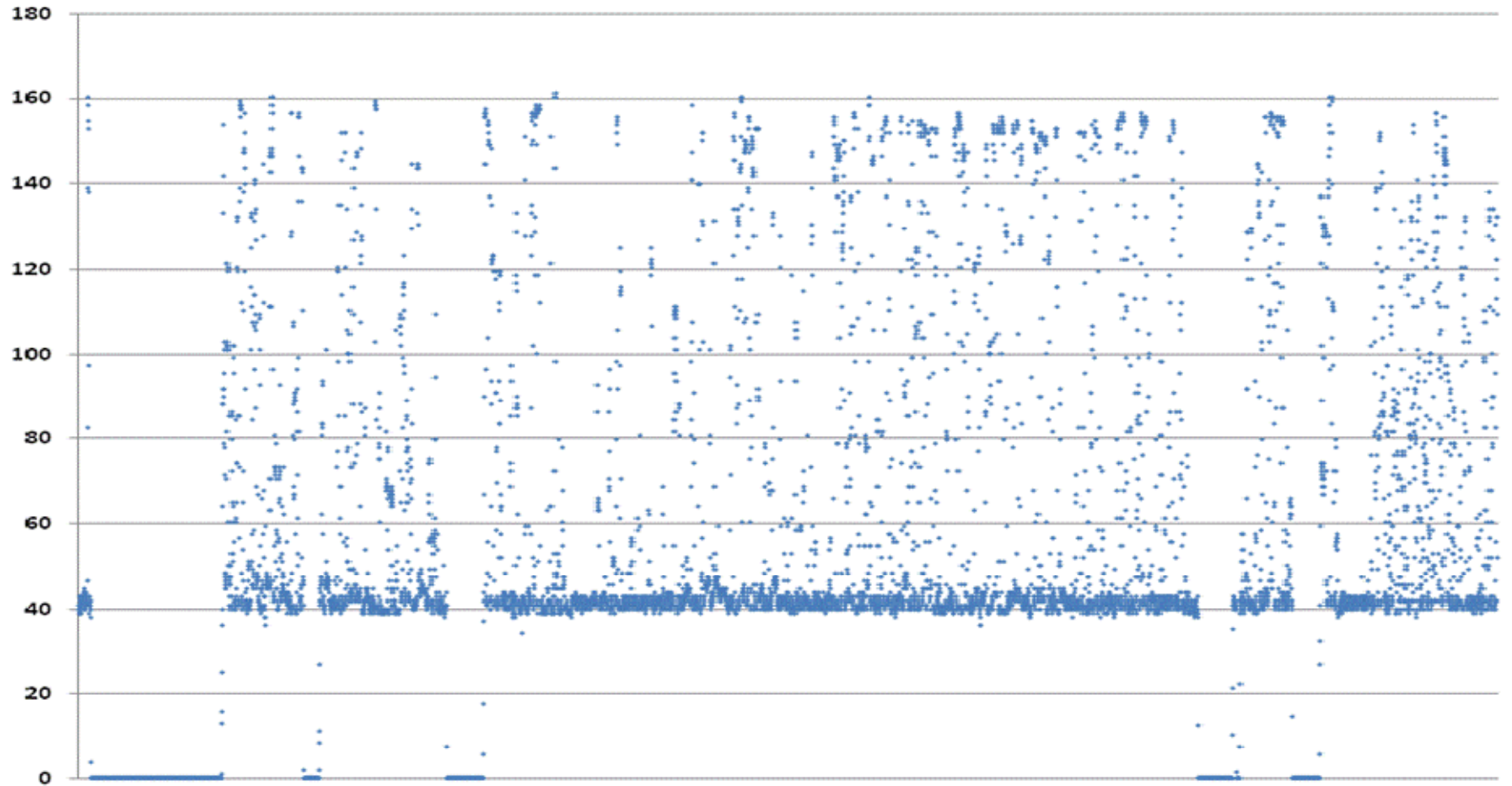
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# Encina 5 2008 Hourly Generation



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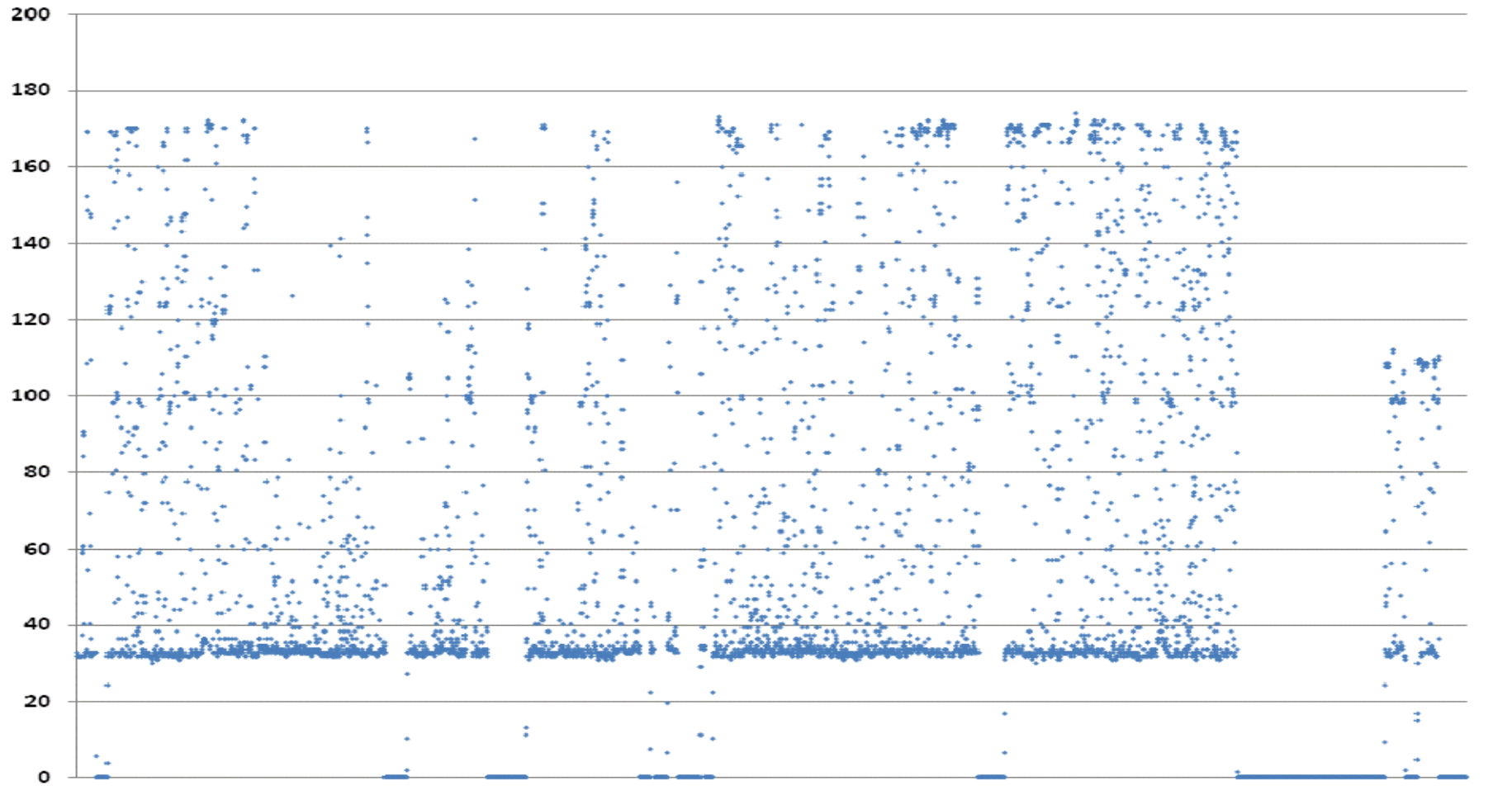
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# South Bay 3 2008 Hourly Generation



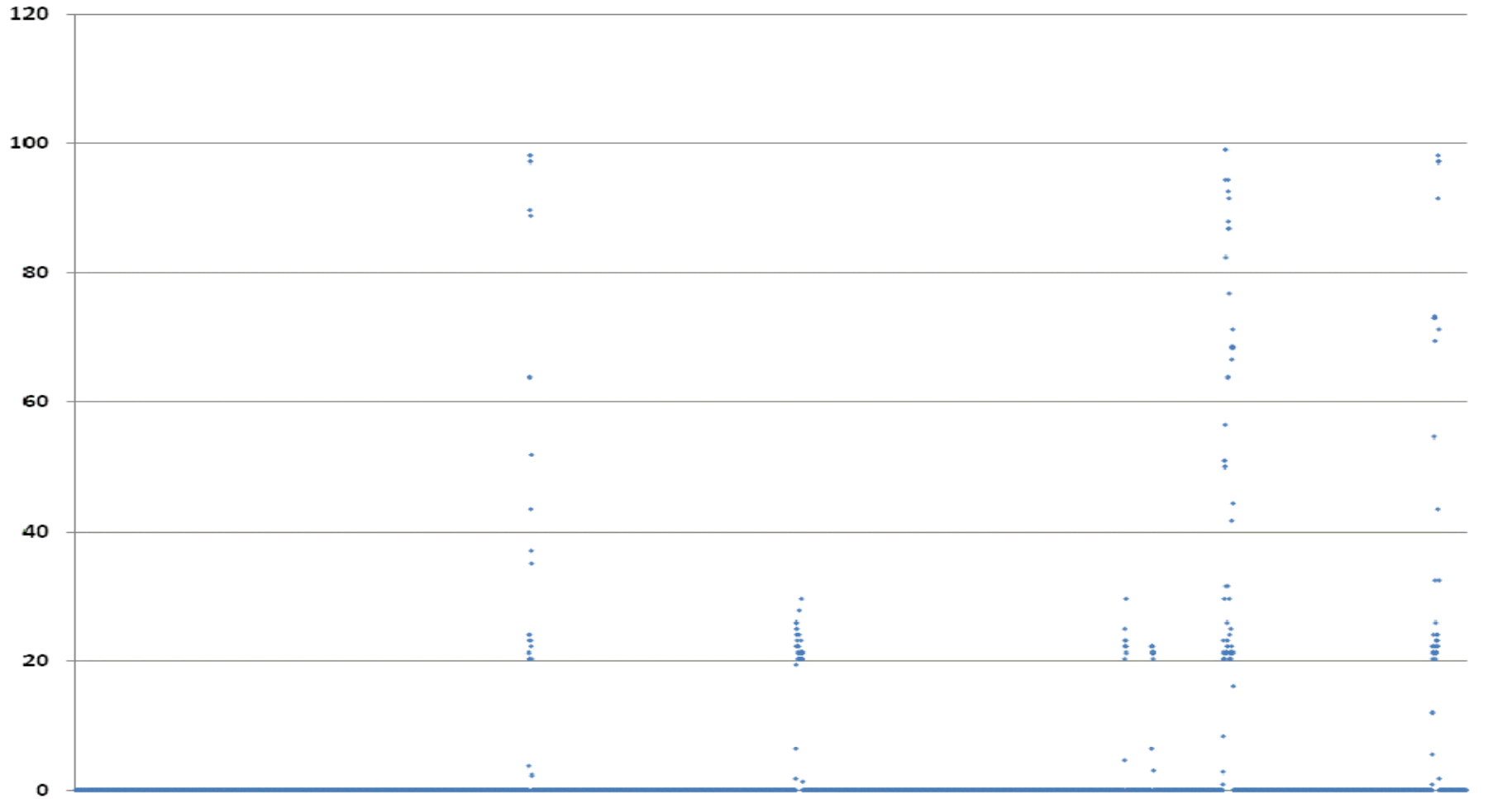
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# Encina 1 2008 Hourly Generation



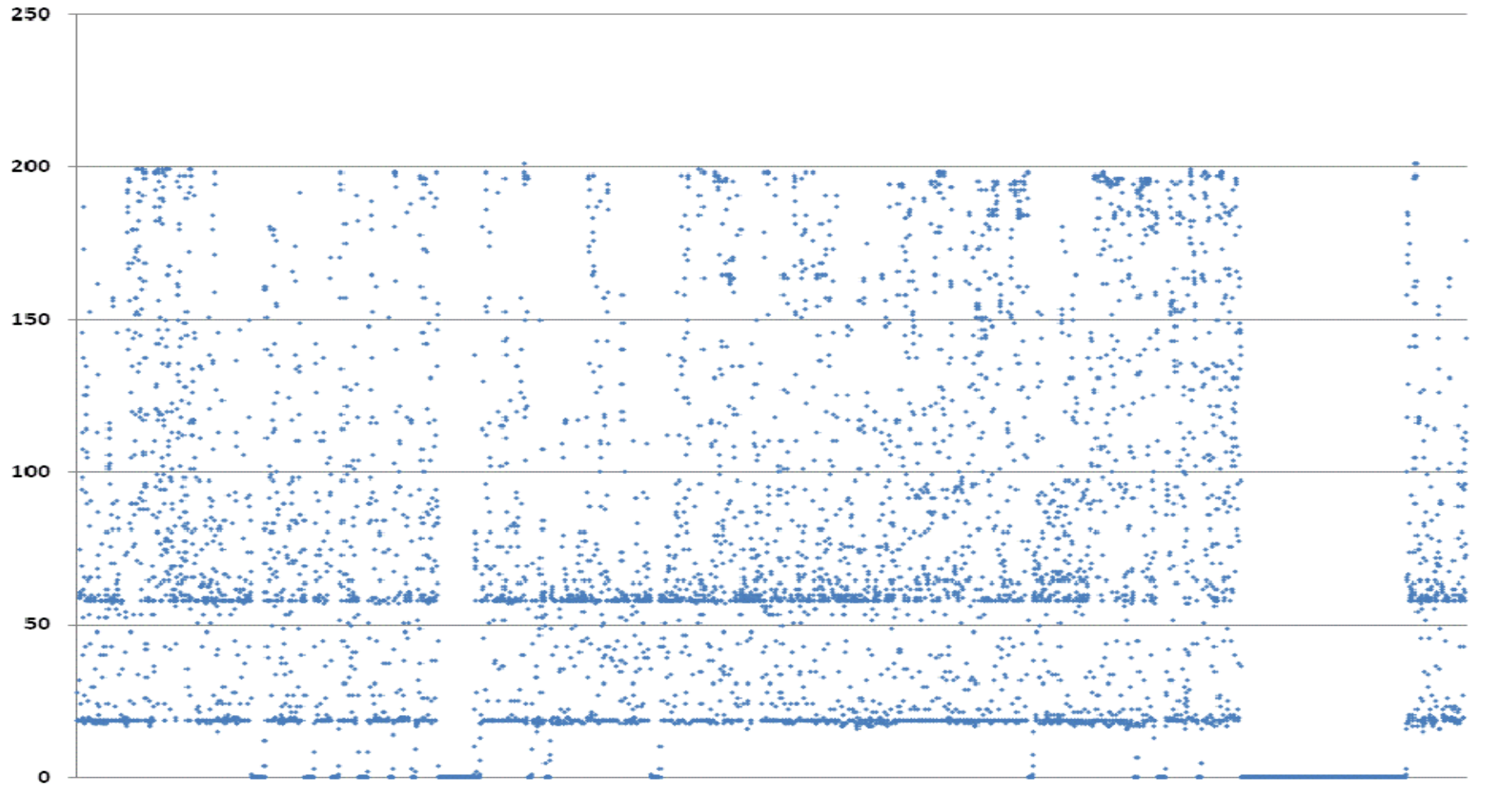
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# Huntington Beach 1 2008 Hourly Generation



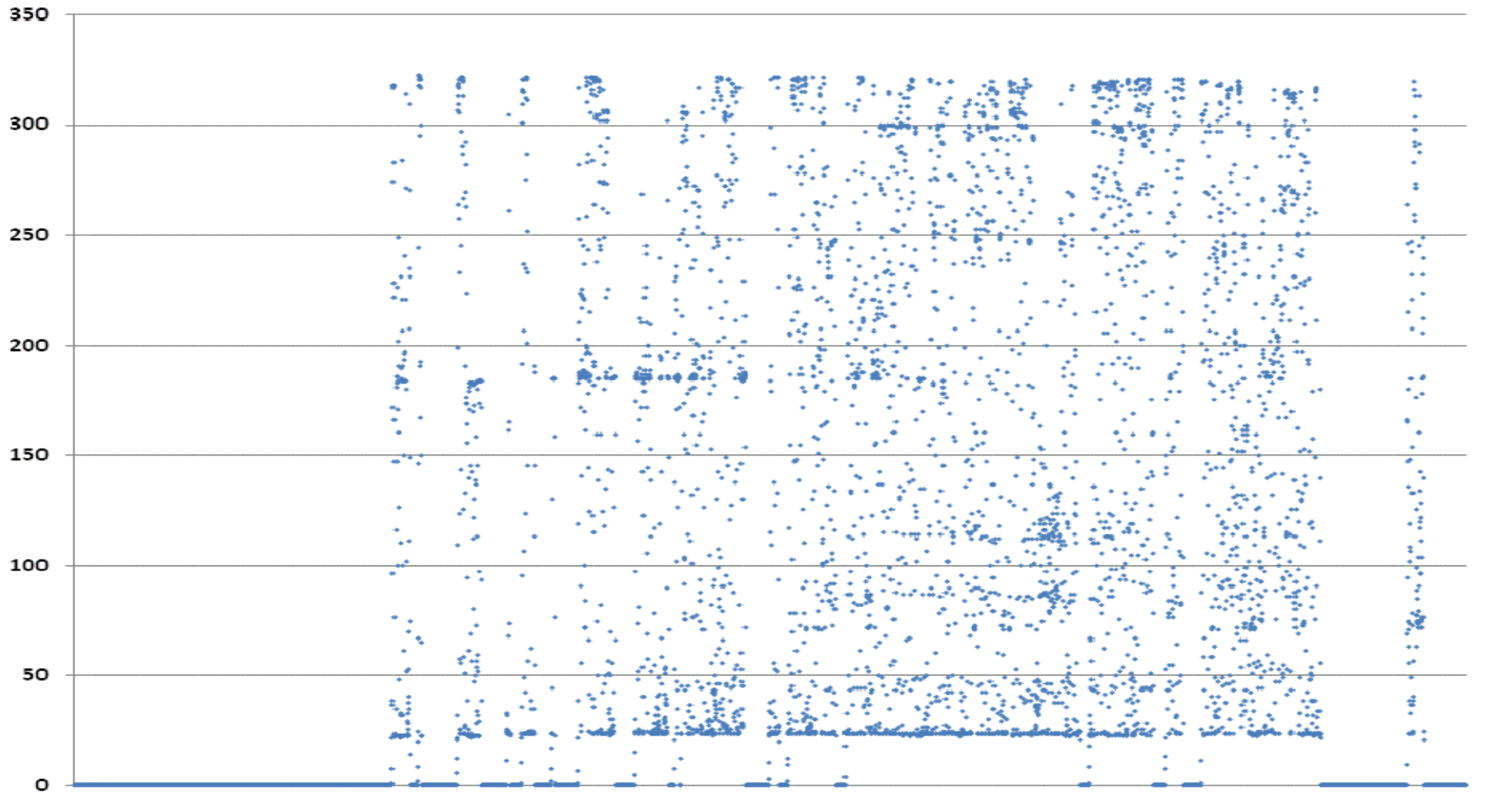
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# Alamitos 3 2008 Hourly Generation



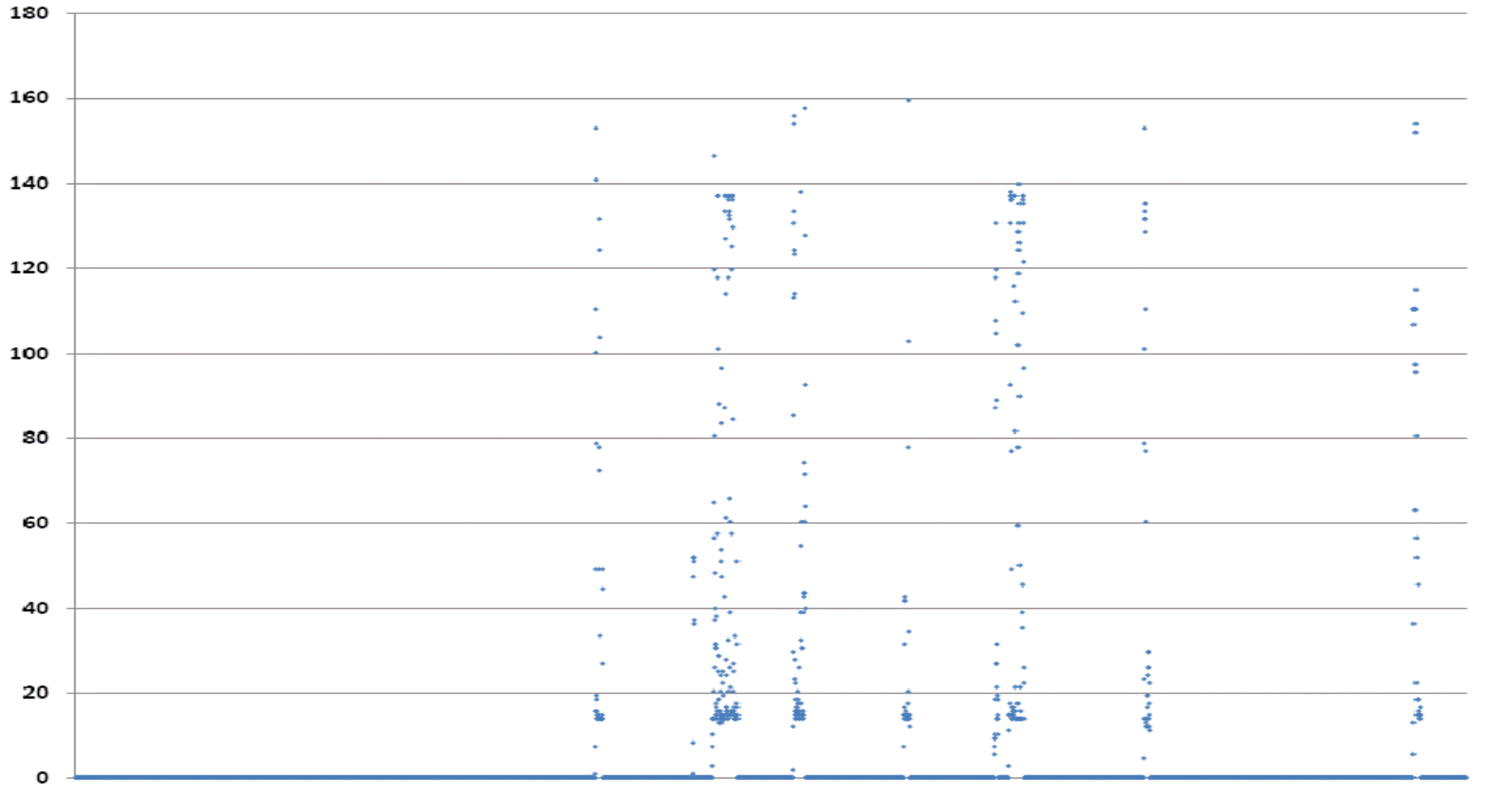
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# Alamitos 2 2008 Hourly Generation



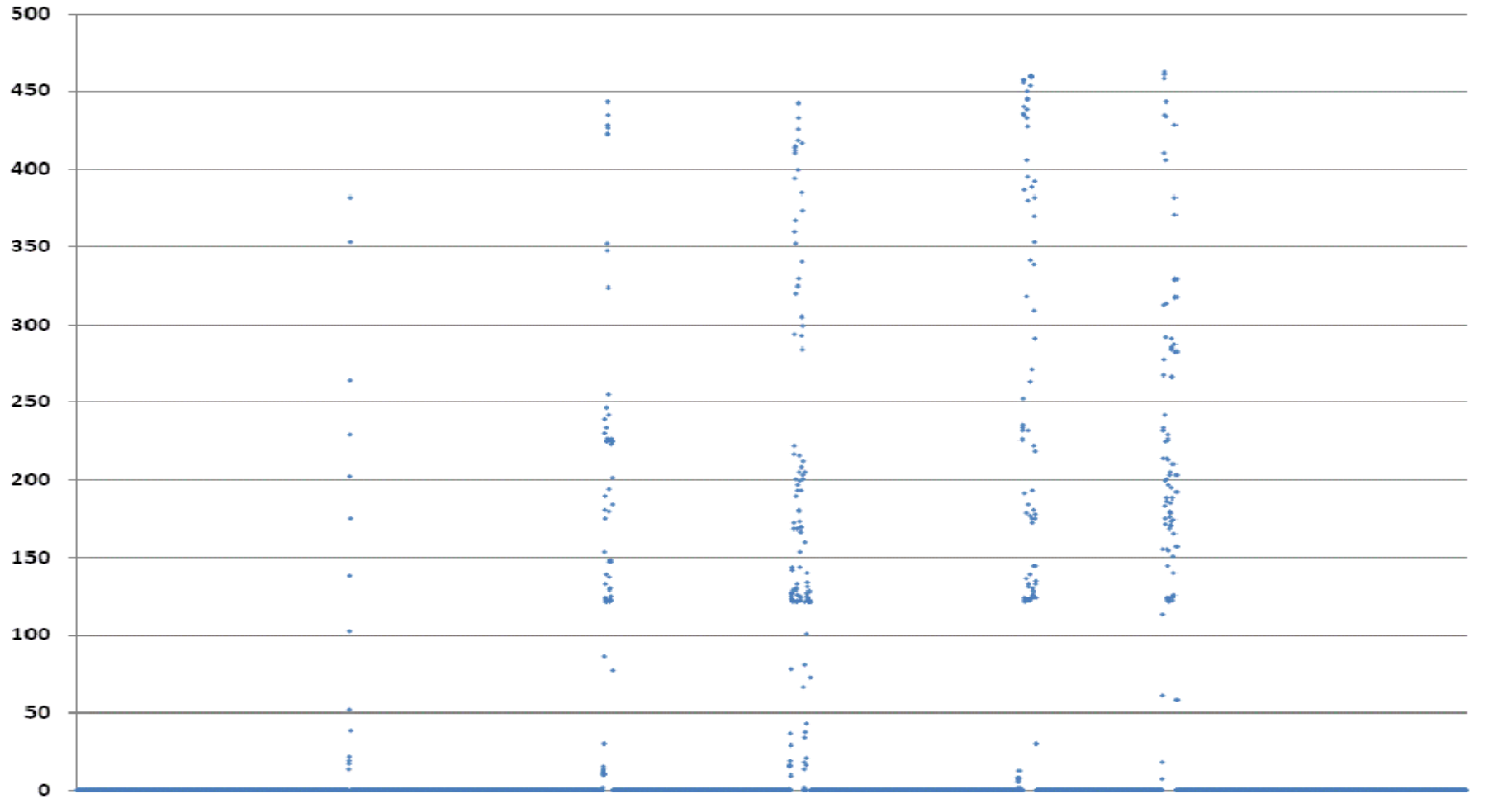
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# Redondo Beach 8 2008 Hourly Generation



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# Refitting

- Studies done on potential for, costs of refitting
  - EPRI, October 2007; TetraTech, January 2008\*
- EPRI found retrofit costs between \$17 - \$675+ million, totaling \$3.6 - \$4.2B, with additional penalties (reduced heat rate, higher O&M costs, lower capacity)

\*[http://www.waterboards.ca.gov/water\\_issues/programs/npdes/cwa316.shtml](http://www.waterboards.ca.gov/water_issues/programs/npdes/cwa316.shtml)

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# Refitting

- EPRI found wet cooling “while theoretically possible at most sites, [is] of a high degree of difficulty and cost at 9 of the 18 plants studied primarily due to severe space constraints and to the impracticality of making major capital investments at facilities with low utilization.”
- Tetra Tech found that that “wet-cooling retrofits were ‘technically feasible’ [at 12 of 15 facilities] but that “‘feasible’ facilities still face hurdles.”





# Nuclear Plants

- Generate 60% of the energy from OTC plants
- Have unique issues (safety, NRC jurisdiction)
- High estimated retrofit costs, performance penalties
  - San Onofre: >\$675M
  - Diablo Canyon: \$750M - \$1,200M
- San Onofre complicated as
  - ability to retire other SoCal OTC plants depends on presence/absence of San Onofre
  - import capacity into SoCal a function of San Onofre