

# California's Summer 2004 Electricity Supply and Demand Outlook

## FINAL STAFF REPORT

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## **California's Summer 2004 Electricity Supply and Demand Outlook**

The California Energy Commission staff's electricity supply and demand outlook for summer 2004 indicates the need for close monitoring and the prudent use of electricity resources, particularly during periods of hotter than normal summer temperatures. While supplies are expected to be adequate under normal (1-in-2 year) weather, on very hot days (1-in-10 year temperatures) statewide projected operating reserves may drop as low as 4.8 percent, which could prompt calling on voluntary conservation programs, interruptible-load programs and other emergency response programs.

The Summer 2004 Electricity Supply and Demand Outlook compares electricity supply and demand for June through October. The peak demand day typically occurs in August, but could fall on any day from July through September. This outlook is based on a number of assumptions to represent the level of electricity supplies likely to be available. These assumptions include:

- Dry hydro conditions reflect a 1-in-5 year probability for hydroelectric generation availability from the Pacific Northwest and in-state facilities;
- Generation capacities from thermal power plants are derated to reflect reduced dependable capacity during summer months;
- No catastrophic events will disrupt the supply and delivery of natural gas to power plants;
- No catastrophic transmission or system-wide electricity failures will occur; and,
- No significant gaming (manipulation) of the California Independent System Operator (CA ISO) decrement market that will significantly affect dispatch decisions or cause transmission congestion.

There are two additional assumptions that differ from the preliminary outlook the Energy Commission prepared in January 2004: 1) spot market imports are now assumed to be 750 megawatts (MW) lower because of ongoing repairs to the Pacific Northwest DC transmission line, and 2) the demand forecast for 2004 is higher to reflect increased demand from more robust economic growth.

In this new forecast, stronger economic and demographic drivers for 2004 are reflected, resulting in additional peak load growth in CA ISO loads over 2003 peaks. The Energy Commission's analysis of recent daily loads in the CA ISO suggests that, after adjusting for weather, demand growth for the last three months was an average of 3.5 percent, higher than the 2.6 percent assumed in the previous forecast. Assuming this growth carries into the summer, this represents an additional increment of 369 MW of peak demand in the CA ISO control area and a corresponding increase of 565 MW of peak demand statewide over the previous summer forecast.

## Hydro Generation Conditions

At the end of April, water storage in California reservoirs was 102 percent of average historical conditions and was 95 percent of average at the end of May. The ability to draw down reservoirs this summer is likely to provide enough fuel to sustain hydro energy production at 85 percent of average. Though a warm and dry spring led to an early melt of the Sierra snowpack, total in-state hydro generation capacity is expected to be at 95 percent of average through late summer.

While hydro generation is significantly less during dry years when compared to a wet year, the effect of using dry year assumptions on the dependable hydro capacity is generally less dramatic. Since the peak demand occurs during a relatively few hours in the summer, storage levels in reservoirs are expected to be sufficient during these hours.

In the Pacific Northwest, hydropower capacity will be near normal to help meet the peak hours of summer demand in California, but the total volume of energy produced during the year will be reduced. This will be the fifth consecutive year with below-average water in the Columbia River Basin, but it is nowhere close to record dry conditions, which were 50 percent of average. According to the May 20th forecast by The Northwest River Forecast Center, water runoff at The Dalles is likely to be 75 percent of average.

**Figure 1** and **Table 1** together show that under normal (1-in-2 year weather) conditions, the statewide operating reserve is expected to be 12.2 percent in August. The estimated operating reserve would decline to 8.2 percent if spot market purchases are excluded from the supply estimate. Under extremely hot conditions (1-in-10 year weather), the state may have a 5 percent operating reserve during the critical summer months of July and August then lowering to 4.8 percent in September due to the likelihood of diminishing hydro availability. This is lower than previously estimated because of the derating of the Pacific Northwest DC transmission line and increased demand in the revised forecast for 2004.

**Figure 2** and **Table 2** together present a similar assessment for the CA ISO control area, which serves approximately 75 percent of the statewide electricity demand. The projected operating reserve for the CA ISO area for normal summer temperatures is expected to be 11.9 percent in August. The estimated operating reserve would decline to 8.2 percent if spot market purchases are excluded from the supply estimate. Under extremely hot conditions (1-in-10 year weather), the CA ISO is expected to have a minimum 4.5 percent operating reserve (spot market purchases included) during the critical summer months of July, August and September.

This outlook is designed to evaluate electricity demand and supply balances under reasonable and likely circumstances. Summer supplies are expected to exceed summer demand under normal conditions both statewide and for the CA ISO. While rotating outages or actual blackouts are unlikely in California in 2004, it does not mean they cannot happen. Extreme weather conditions, equipment failure, human error in forecasting, or scheduling of daily resources may result in localized supply shortages.

The outlook did not focus on the potential for natural catastrophes, acts of war or sabotage, natural gas supply curtailments, or other low probability events. Each control area in California is required to maintain an operating reserve designed to accommodate contingencies such as a large power plant or transmission line going out of service. Building an electricity generation and delivery system that could withstand any or all contingencies would be very expensive and result in higher electricity rates. Additionally, unless the corresponding market structure is designed properly, it could dampen future investment in new facilities, slow the implementation of efficiency and demand response programs, and hinder the development of renewable generation resources.

### **Changes Since Last Supply Demand Outlook**

The year's first preliminary electricity supply and demand assessment was posted on the Energy Commission's website in early January and was presented to the State Assembly, Utilities and Commerce Committee on January 15, 2004. The Energy Commission continually revises its outlook as new information becomes available.

These ongoing revisions, such as changing online dates for new generation facilities, have measurable effects on supply and demand balances. For example, a 750 MW derate was applied to "Spot Market Imports" for both the statewide and CA ISO control area balances. This change is made to account for the reduced transfer capability over the DC Intertie (direct-current transmission line from the Pacific Northwest) due to ongoing repairs and upgrades that will occur through the summer. Likewise, the adjustment for increased demand in 2004 reduced projected operating reserves for the CA ISO control area, and statewide, by roughly 1 percent and 1.2 percent, respectively. The demand forecast was not adjusted for the period 2005 through 2010 because it is not yet clear that the underlying economic growth is sustainable new growth, or simply reflects the same projected economic growth concentrated in earlier quarters.

In addition, the method for calculating "Projected Operating Reserves" was modified by removing reserve requirements on firm imports to increase consistency with how the CA ISO measures operating reserves.

## Long-term Outlook of Supply and Peak Demand for 2004-2010

**Table 3** and **Figure 3** together show the extended outlook through 2010. Lines 9 and 12 show projected operating reserves for normal (1-in-2 year) and hot (1-in-10 year) summer weather, respectively. While new generation is expected to improve supply/demand balances in the summer of 2005, by the summer of 2006, reserve margins may, again, fall below 5 percent, the threshold for triggering implementation of voluntary load reduction programs. For the years 2005-2010, this assessment counts only those proposed power plants that are deemed as having a 75 percent or greater probability of coming on-line. New generation will need to be added each year from 2005 through 2008 in order to maintain system reliability.

### Summary

While electricity supply is expected to exceed demand for normal temperature conditions this summer, if hot (1-in-10 year) temperatures occur, the CA ISO may be forced to call on interruptible load customers to shed loads. These customers have agreed to shed load when called upon in exchange for being charged a lower electricity rate. Interruptible load programs and programs such as price response and voluntary response can be activated when real-time operating reserves drop below 5 percent. This report warns of the possibility of these programs being enacted if the estimated operating reserves for June, July and August fall to 4.6 percent, 4.5 percent and 4.6 percent, respectively, for the CA ISO control area. The 1,885 MW capacity expected from emergency programs is more than sufficient to ensure that operating reserves remain above 5 percent during a 1-in-10 year temperature demand.

There is an ongoing need to monitor the status of potential new capacity proposed for the period starting 2006 and beyond. Because the retirement of older natural gas fired generating units can affect reserve margins in the state, the Energy Commission has initiated a study on the role and value of aging power generators in the state's power plant fleet. The Energy Commission continues to monitor and track announced retirements as well as new capacity additions to the state's generation capacity.

**Table 1**  
**California Statewide Electricity Supply/Demand Outlook**  
**Summer 2004**  
**California Energy Commission**

Line		June	July	August	September	October
1	CEC 2004 Baseline Demand Forecast (1-in-2 Weather) <sup>1</sup>	48,554	53,896	53,896	53,896	43,720
2	1-in-10 Weather Adjustment <sup>1</sup>	3,019	3,351	3,351	3,351	1,577
3	1-in-2 Operating Reserve	3,042	3,416	3,416	3,416	2,786
4	1-in-10 Reserve Adjustment <sup>1</sup>	211	235	235	235	110
5	<b>California Statewide Peak Demand + Operating Reserve</b>	<b>54,826</b>	<b>60,898</b>	<b>60,898</b>	<b>60,898</b>	<b>48,193</b>
6	ISO Control Area Merchant Thermal <sup>2</sup>	23,922	23,912	23,898	23,892	23,973
7	ISO Municipal Utility Thermal Resources	1,021	1,021	1,021	1,021	1,022
8	ISO Control Area Hydro (derated)	8,783	8,782	8,779	8,854	8,115
9	IOU Retained Generation	5,291	5,291	5,291	5,291	5,291
10	Net Imports ISO Control Area	5,095	5,095	5,095	5,095	3,920
11	QF Capacity (dependable)	5,623	5,597	5,573	5,535	5,754
12	LADWP Control Area Resources (hydro derated)	7,803	7,803	7,803	7,803	7,734
13	Imperial Irrigation District + Other Non ISO Municipals	1,487	1,504	1,504	1,504	1,484
14	SMUD Control Area Resources (hydro derated)	1,811	1,811	1,811	1,711	1,409
15	<b>Dependable Capacity</b>	<b>60,835</b>	<b>60,815</b>	<b>60,774</b>	<b>60,705</b>	<b>58,702</b>
16	Estimated Nuclear Refueling Outage	-	-	-	-	(1,102)
17	Economic Outages	-	-	-	-	(3,000)
18	Generation Retirements <sup>3</sup>	(601)	(601)	(601)	(601)	(601)
19	Estimated Forced and Planned Outages	(3,750)	(3,750)	(3,750)	(3,750)	(6,140)
20	<b>Estimated Forced &amp; Scheduled Outages</b>	<b>(4,351)</b>	<b>(4,351)</b>	<b>(4,351)</b>	<b>(4,351)</b>	<b>(10,843)</b>
21	<b>Available Capacity</b>	<b>56,484</b>	<b>56,464</b>	<b>56,423</b>	<b>56,354</b>	<b>47,859</b>
22	<b>Resource Surplus/Deficit Before Additions<sup>4</sup></b>	<b>1,658</b>	<b>(4,434)</b>	<b>(4,475)</b>	<b>(4,544)</b>	<b>(334)</b>
23	Generation Additions (dependable) @ 75% Probability	624	624	664	664	664
24	Sempra DWR Contract Obligation <sup>5</sup>	800	800	800	800	800
25	<b>Total Available Capacity</b>	<b>57,908</b>	<b>57,888</b>	<b>57,887</b>	<b>57,818</b>	<b>49,323</b>
26	<b>Resource Surplus/Deficit Before Spot Market<sup>6</sup></b>	<b>3,082</b>	<b>(3,010)</b>	<b>(3,011)</b>	<b>(3,080)</b>	<b>1,130</b>
27	Expected Spot Market Imports <sup>7</sup>	1,950	1,950	1,950	1,950	1,950
28	<b>Resource Surplus/Deficit With Spot Market Imports</b>	<b>5,032</b>	<b>(1,060)</b>	<b>(1,061)</b>	<b>(1,130)</b>	<b>3,080</b>
29	<b>Estimated Operating Reserve (1-in-2 Weather)</b>	<b>26%</b>	<b>12.2%</b>	<b>12.2%</b>	<b>12.0%</b>	<b>19%</b>
30	<b>Estimated Operating Reserve (1-in-2 Weather) w/o Spot Market Imports</b>	<b>22%</b>	<b>8.2%</b>	<b>8.2%</b>	<b>8.0%</b>	<b>14%</b>
31	<b>High Temperature Operating Reserve</b>	<b>18%</b>	<b>5.0%</b>	<b>5.0%</b>	<b>4.8%</b>	<b>14%</b>
32	<b>High Temperature Operating Reserve (1-in-10 Weather) w/o Spot Market Imports</b>	<b>14%</b>	<b>1.2%</b>	<b>1.2%</b>	<b>1.1%</b>	<b>10%</b>
33	<b>Emergency Response Programs</b>					
34	Expected Interruptible/Emergency Programs <sup>8</sup>	1,112	1,112	1,112	1,112	1,112
35	Expected Price Response	453	453	453	453	453
36	Expected Voluntary Response	321	321	321	321	321
37	<b>Emergency Response Program Total</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>

<sup>1</sup> July-Sept are constant because peak could occur in any month; May and October are 1-in-5 scenarios.

<sup>2</sup> There is 1,167 MW of mothballed generation that was removed from the analysis that could possibly be returned to service if given a 6-month advance notice.

<sup>3</sup> Generation is removed from assessment to account for 2004 retirements.

<sup>4</sup> Resource surplus above what is required for Operating Reserves. This is calculated by subtracting line 5 from line 21

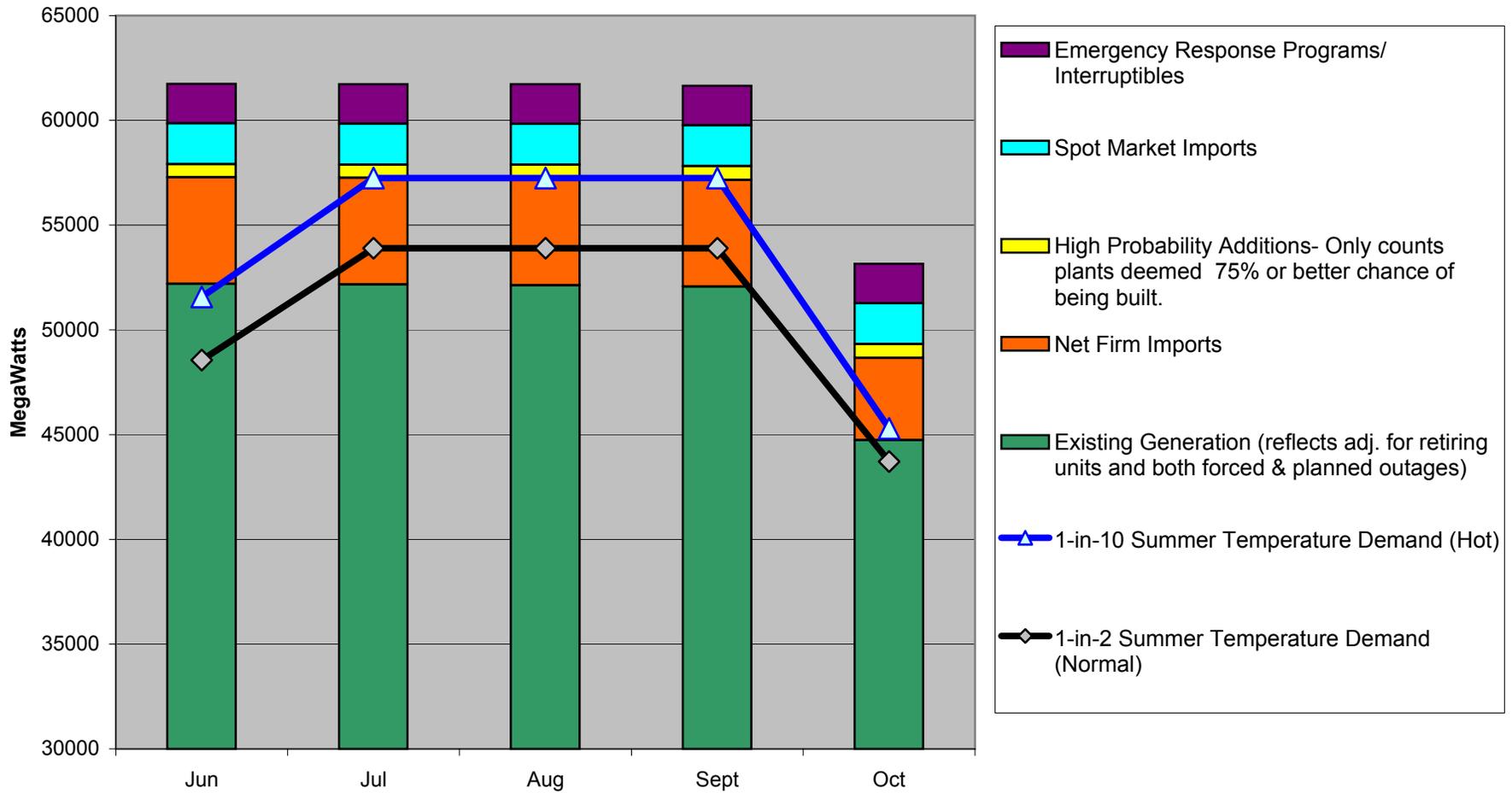
<sup>5</sup> This line represents generation built under contract in Mexico. Has been derated to account for transmission limitations.

<sup>6</sup> Resource surplus beyond what is needed for Operating Reserves. It is calculated by subtracting line 5 from sum of lines 25 & 27

<sup>7</sup> Spot market estimate is conservative: assumes dry hydro year and is based on historical observations.

<sup>8</sup> Subscribed load reduction discounted to reflect expected load reduction.

**Figure 1**  
**Statewide Supply/Demand Outlook**  
**Summer 2004**  
**California Energy Commission**



**Table 2**  
**California ISO Control Area**  
**Electricity Supply/Demand Outlook**  
**Summer 2004**  
**California Energy Commission**

Line		June	July	August	September	October
1	CEC 2004 Baseline Demand Forecast (1-in-2 Weather) <sup>1</sup>	39,783	44,160	44,160	44,160	35,822
2	1-in-10 Weather Adjustment <sup>1</sup>	2,470	2,742	2,742	2,742	1,258
3	1-in-2 Operating Reserve	2,428	2,735	2,735	2,735	2,233
4	1-in-10 Reserve Adjustment <sup>1</sup>	173	192	192	192	88
5	<b>California ISO Control Area Demand + Operating Reserve</b>	<b>44,854</b>	<b>49,828</b>	<b>49,828</b>	<b>49,828</b>	<b>39,401</b>
6	ISO Control Area Merchant Thermal <sup>2</sup>	23,922	23,912	23,898	23,892	23,973
7	ISO Municipal Utility Thermal Resources	1,021	1,021	1,021	1,021	1,022
8	ISO Control Area Hydro (derated)	8,783	8,782	8,779	8,854	8,115
9	IOU Retained Generation	5,291	5,291	5,291	5,291	5,291
10	Net Imports ISO Control Area	5,095	5,095	5,095	5,095	3,920
11	QF Capacity (dependable)	5,623	5,597	5,573	5,535	5,754
12	<b>Dependable Capacity</b>	<b>49,735</b>	<b>49,697</b>	<b>49,657</b>	<b>49,688</b>	<b>48,075</b>
13	Estimated Nuclear Refueling Outage	-	-	-	-	-
14	Economic Outages	-	-	-	-	(3,000)
15	Generation Retirements	-	-	-	-	-
16	Estimated Forced and Planned Outages	(3,250)	(3,250)	(3,250)	(3,250)	(5,640)
17	<b>Estimated Forced &amp; Scheduled Outages</b>	<b>(3,250)</b>	<b>(3,250)</b>	<b>(3,250)</b>	<b>(3,250)</b>	<b>(8,640)</b>
18	<b>Available Capacity</b>	<b>46,485</b>	<b>46,447</b>	<b>46,407</b>	<b>46,438</b>	<b>39,435</b>
19	<b>Resource Surplus/Deficit Before Additions<sup>3</sup></b>	<b>1,631</b>	<b>(3,381)</b>	<b>(3,422)</b>	<b>(3,391)</b>	<b>34</b>
20	Generation Additions (dependable) @ 75% Probability	144	144	144	144	144
21	Sempra DWR Contract Obligation <sup>4</sup>	800	800	800	800	800
22	<b>Total Available Capacity</b>	<b>47,429</b>	<b>47,391</b>	<b>47,351</b>	<b>47,382</b>	<b>40,379</b>
23	<b>Resource Surplus/Deficit Before Spot Market<sup>5</sup></b>	<b>2,575</b>	<b>(2,437)</b>	<b>(2,478)</b>	<b>(2,447)</b>	<b>978</b>
24	Expected Spot Market Imports <sup>6</sup>	1,450	1,450	1,450	1,450	1,450
25	<b>Resource Surplus/Deficit With Spot Market Imports<sup>7</sup></b>	<b>4,025</b>	<b>(987)</b>	<b>(1,028)</b>	<b>(997)</b>	<b>2,428</b>
26	<b>Estimated Operating Reserve (1-in-2 Weather)</b>	<b>26%</b>	<b>12.0%</b>	<b>11.9%</b>	<b>12.0%</b>	<b>19%</b>
27	<b>Estimated Operating Reserve (1-in-2 Weather) w/o Spot Market Imports</b>	<b>22%</b>	<b>8.3%</b>	<b>8.2%</b>	<b>8.2%</b>	<b>14%</b>
28	<b>High Temperature Operating Reserve</b>	<b>18%</b>	<b>4.6%</b>	<b>4.5%</b>	<b>4.6%</b>	<b>14%</b>
29	<b>High Temperature Operating Reserve (1-in-10 Weather) w/o Spot Market Imports</b>	<b>14%</b>	<b>1.2%</b>	<b>1.1%</b>	<b>1.1%</b>	<b>10%</b>
30	<b>Emergency Response Programs</b>					
31	Expected Interruptible/Emergency Programs <sup>8</sup>	1,112	1,112	1,112	1,112	1,112
32	Expected Price Response	453	453	453	453	453
33	Expected Voluntary Response	321	321	321	321	321
34	<b>Emergency Response Program Total</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>

<sup>1</sup> July-Sept are constant because peak could occur in any month; May and October are 1-in-5 scenarios

<sup>2</sup> There is 1,167 MW of mothballed generation that was removed from the analysis that could possibly be returned to service if given a 6-month advance notice.

<sup>3</sup> Resource surplus above what is required for Operating Reserves. It is calculated by subtracting line 5 from line 18

<sup>4</sup> This line represents generation built under contract in Mexico. Has been derated to account for transmission limitations.

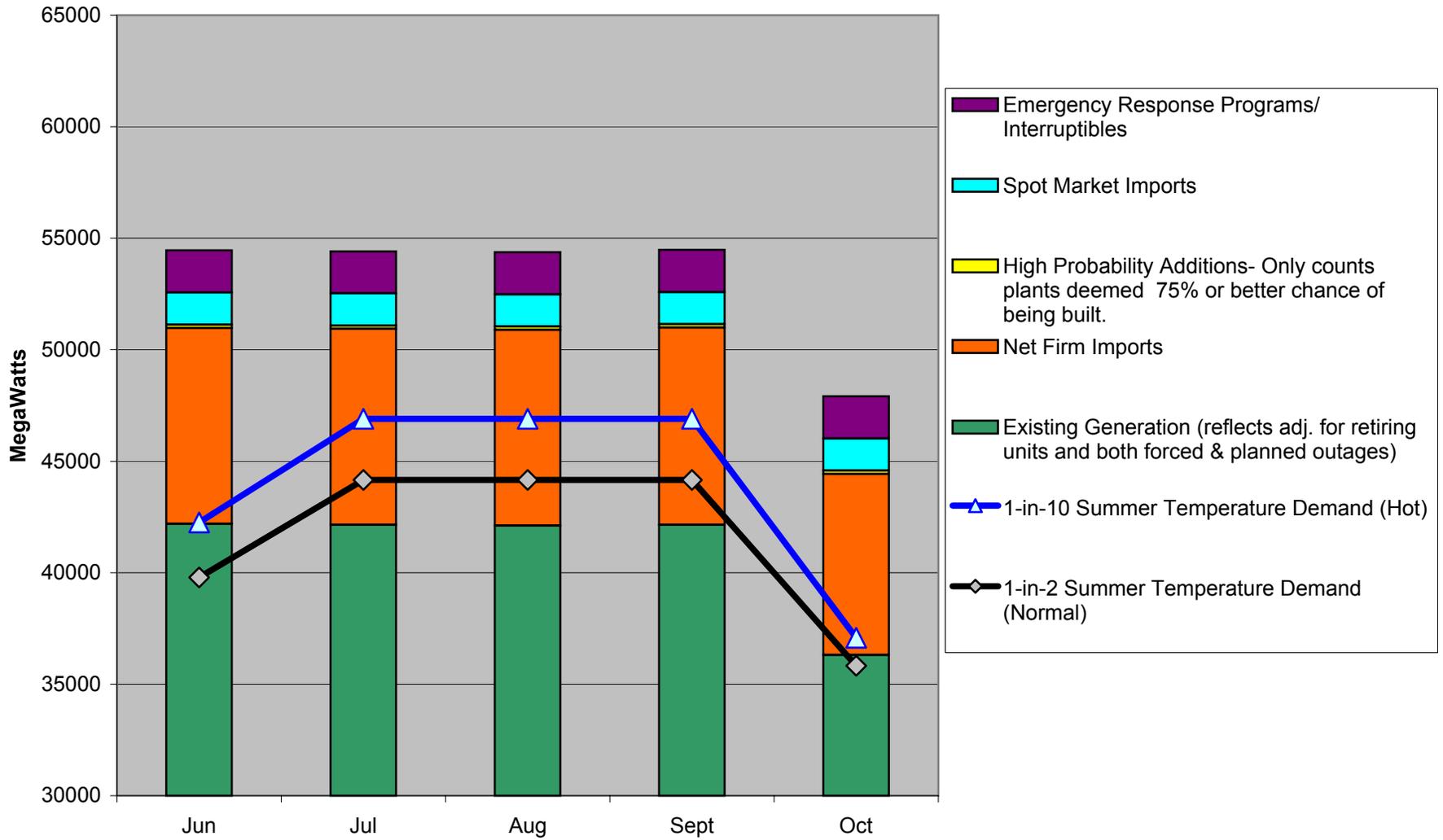
<sup>5</sup> Resource surplus above what is required for Operating Reserves. It is calculated by subtracting line 5 from line 22

<sup>6</sup> Spot market estimate is conservative. It assumes dry hydro year conditions and is based on historical observations.

<sup>7</sup> Resource surplus above what is required for Operating Reserves. It is calculated by subtracting line 5 from sum of lines 22 & 24.

<sup>8</sup> Subscribed load reduction discounted to reflect expected load reduction.

**Figure 2**  
**CA ISO Control Area**  
**Supply/Demand Outlook**  
**Summer 2004**  
**California Energy Commission**





**Figure 3**  
**2004-2010 Statewide**  
**Electricity Supply/Demand Outlook**  
 California Energy Commission

