Northwest Power and Conservation Council

July 10, 2012

MEMORANDUM

TO: Power Committee members
FROM: John Fazio, Senior Power System Analyst
SUBJECT: Impact of California Once-Through-Cooling Regulations on Southwest Market

The Pacific Northwest is electrically connected with both Canadian and Southwest power systems. Because of this, power is often transferred between regions when prices and need are at appropriate levels. The Canadian system faces a similar pattern of electricity demand as the Northwest and thus often does not have surplus power to share during periods of Northwest need. However, California loads peak in summer and, if California resources are built to meet that need, it should regularly have surplus capacity for Northwest use during the winter period.

Northwest resource adequacy assessments and resource expansion strategies assume that some amount of California surplus will be available to aid in meeting Northwest demand. The use of out-of-region surplus capacity helps keep Northwest rates lower by reducing the amount of resources that need to be built. Currently, our adequacy assessments assume that about 3,000 megawatts of out-of-region supply are available during all winter hours and 1,000 megawatts during light-load summer hours.

However, a number of policy and physical changes in California appear likely to cause the amount of this market supply to decrease over the next 5 years. For example, two units at the San Onofre Nuclear Generating Station (about 2,000 megawatts) are out of service and it is not clear when or if they may return to service. California is scheduled to implement a greenhouse gas cap and trade program in 2013, which will affect the operation of its coal plants and, perhaps to a lesser degree, its gas-fueled plants. In addition, regulations prohibiting the operation of thermal generating projects that use water in a "once through cooling" (OTC) process will lead to a substantial number of retirements over the next 5 years.

The presentation today (led by Bonneville Power Administration analyst Rob Diffely) focuses on the effects of the OTC retirements on the availability of winter market resources for the Northwest. California is planning to acquire new resources to make up for the loss of OTC resources but a significant amount of California summer resources are made up of demand response measures and imports from the desert Southwest and the Northwest – resources that are not available to the Northwest for winter use.

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

Impact of California Once-Through-Cooling Regulations on Southwest Market

Rob Diffely, BPA
NW Power and Conservation Council
Power Committee Meeting
Boise, Idaho
July 10th, 2012

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Outline

- Background
- Calculating the SW Surplus
- OTC Clean Water Act and Retirements
- New SW Resources
  - Gas-fired plants
  - RPS requirements
- Adequacy Forum Assumptions
- SONGS Nuclear Plant

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BACKGROUND

- NW is interconnected with SW
- Regions share resources to keep costs down
- SW usually has winter surplus
- Policy and physical change reduce available winter surplus for NW use – SONGS nuclear outage, renewable portfolio and clean water policies (e.g. Once Through Cooling regulations)
- Winter surplus could drop significantly
- Any drop in market assumptions will affect NW adequacy and resource strategies

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SW Import Market

- Transmission Capability
  - Past 5 years of historical data examined for both the A.C. and D.C. Interties (includes derates for outages and maintenance)
  - South to North winter transfer capacity – conservative estimate of 3,000 MW
- Winter surplus power in California
  - Inferred from state agency planning documents

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California PUC Resource Adequacy Program

- All IOUs and Community Choice Aggregators (most load in California)
- Mandatory since 2006 – required to meet monthly peak loads with a 15% adequacy requirement margin
- Results include physical CAISO resources (74%), imports (13%), DWR contracts (5%), Demand Response (4%), and Reliability Must Run resources (2%)
- Only net qualifying capacity counts - based on historical performance (i.e. derate of wind and solar)

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2010 Cal PUC RA Report

- August peak loads are 16 GW higher than winter peak loads
- Adjusting for demand response* 2 GW and summer imports into California of 8 GW still leaves 6 GW for winter export

	2010 Peak Load + 15% (GW)
December	36
January	34
February	33
August	52

*Demand Response resources are available either when the CAL-ISO declares a system emergency or part of a price response program in the day ahead market (not designed for export)

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2017 NW Resource Adequacy Assessment SW Imports Assumption - Key Drivers

- Peak Load Growth
- New Gas-Fired Power Plants
- OTC Retirements
- 33% RPS requirement for 2020
- SONGS outage

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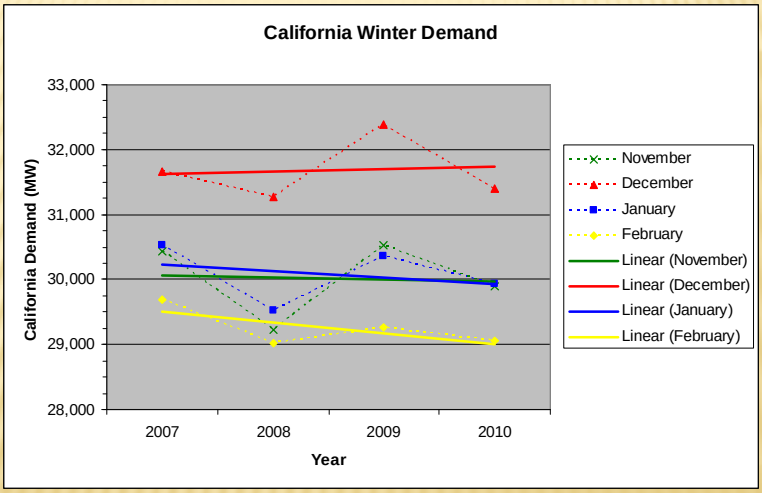
Winter Peak Load Trends



Source: Cal PUC Resource Adequacy Reports

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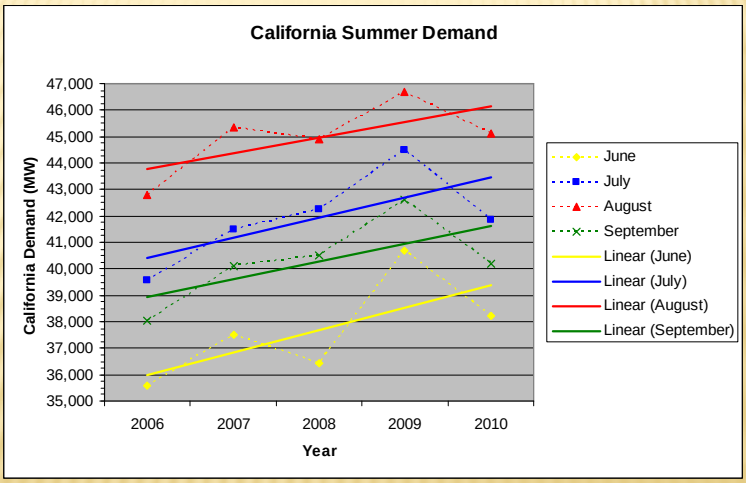
Summer Peak Load Trends



Source: Cal PUC Resource Adequacy Reports

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OTC – Clean Water Act

- The 1972 Clean Water Act – section 316(b) requires that the location, design, construction and capacity of cooling water intakes reflect best technology available
- In May 2010, the California Water Resources Board (Board) adopted a statewide water quality control policy on the use of Once-Through-Cooling (OTC) to implement section 316(b)
- The policy outlines a phased implementation schedule which mandates compliance for OTC on or before certain dates
- Closure dates in the table (page 12) are either from the owner (early closure) or from the Board

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OTC Retirements

- All plants on this list are gas steam plants with an average on-line date of 1962
- Not likely cost effective to retrofit these facilities with new cooling systems
- Some sites are being retrofitted with new combined cycle units – counted as new facilities not rerates
- List does not include LADWP facilities or Diablo and SONGS (Need to correct OTC by 2022 and 2024 or face retirement)

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OTC Plant Closure

Plant	Unit	On-Line	MW	Retirement	Owner	Design (mgpd)
Contra Costa	6	1964	359	2013	GenOn	440
Contra Costa	7	1964	359	2013	GenOn	440
El Segundo	3	1964	342	2014	NRG	399
El Segundo	4	1964	342	2014	NRG	399
Morro Bay	3	1962	359	2015	Dynergy	
Morro Bay	4	1963	359	2015	Dynergy	668
Pittsburg	5	1960	326	2017	GenOn	
Pittsburg	6	1961	326	2017	GenOn	462
Encina	1	1954	110	2017	NRG	
Encina	2	1956	110	2017	NRG	
Encina	3	1958	110	2017	NRG	
Encina	4	1973	306	2017	NRG	
Encina	5	1978	345	2017	NRG	857
Moss Landing	6	1967	510	2017	Dynergy	
Moss Landing	7	1968	510	2017	Dynergy	865
Huntington Beach	1	1958	218	2020	AES	
Huntington Beach	2	1958	218	2020	AES	
Huntington Beach	3	1961	225	2020	AES	
Huntington Beach	4	1961	225	2020	AES	514
Redondo Beach	5	1954	163	2020	AES	
Redondo Beach	6	1957	163	2020	AES	
Redondo Beach	7	1967	495	2020	AES	
Redondo Beach	8	1967	495	2020	AES	471
Mandalay	1	1959	218	2020	GenOn	
Mandalay	2	1959	218	2020	GenOn	253
Ormond Beach	1	1971	806	2020	GenOn	
Ormond Beach	2	1973	806	2020	GenOn	685
Alamitos	1	1956	156	2020	AES	207
Alamitos	2	1957	156	2020	AES	207
Alamitos	3	1961	310	2020	AES	392
Alamitos	4	1962	310	2020	AES	392
Alamitos	5	1964	495	2020	AES	674
Alamitos	6	1966	495	2020	AES	674
			10,945			8,999

Source: California Water Resources Board / Ventyx

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Gas-Fired Plants Under Construction

- The 2010 CPUC RA report does not include these plants in their analysis:

Update June 2012

New Gas Fired Plants

(Started Construction or On-Line)

Plant	MW	Percent Complete	Notes:
Humbolt Bay	163	On-Line	10 Reciprocating Engines
Colusa	660	On-Line	Combined Cycle
Riverside	96	On-Line	Simple Cycle
Canyon	200	On-Line	Simple Cycle
Tracy	145	93%	Conversion of Simple to Combined Cylcle
Lodi	255	95%	Combined Cycle
Almond	174	97%	Simple Cycle
Los Esteros	140	33%	Simple Cycle
Walnut Creek	500	21%	Simple Cycle - 5 LMS 100s
Marsh Landing	760	36%	Combined Cycle
Sentinel Peaker	850	45%	Simple Cycle - 8 LMS 100s
El Segundo	630	25%	Combined Cycle - Repower OTC site
Mariposa	200	95%	Simple Cycle
Oakley	624	10%	Combined Cycle
Russel City	600	27%	Combined Cycle
	5997		

http://www.energy.ca.gov/sitingcases/all_projects.htm

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California RPS Requirement

- 33% Renewable Portfolio Standard of total resources procured by 2020

	2011 Percent of Retail Sales from Renewables
PG&E	20%
SCE	21%
SDG&E	21%

In Development and Approved	MW
PV	4498
Solar Thermal	2475
Wind	2718
Biogas/mass	164
Geothermal	80
	9935

Source http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm

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RPS - Solar Net Qualifying Capacity

- Solar Thermal and Solar PV – little winter capacity

Net Qualifying Capacity (MW)

	Summer			Winter		
	Jun	Jul	Aug	Dec	Jan	Feb
LUZ SOLAR 3-7 *	176.12	175.00	175.22	5.56	0.76	13.47
LUZ SOLAR 8-9 *	177.41	171.42	163.48	3.77	0.61	15.68
SUNRAY ENERGY*	177.41	171.42	163.48	-	-	0.02
Vaca-Dixon Solar PV (2 MW)	1.06	0.94	0.69	0.04	0.09	0.13

* Solar Thermal

Source: NQC for Local Area Data for Compliance Year 2012

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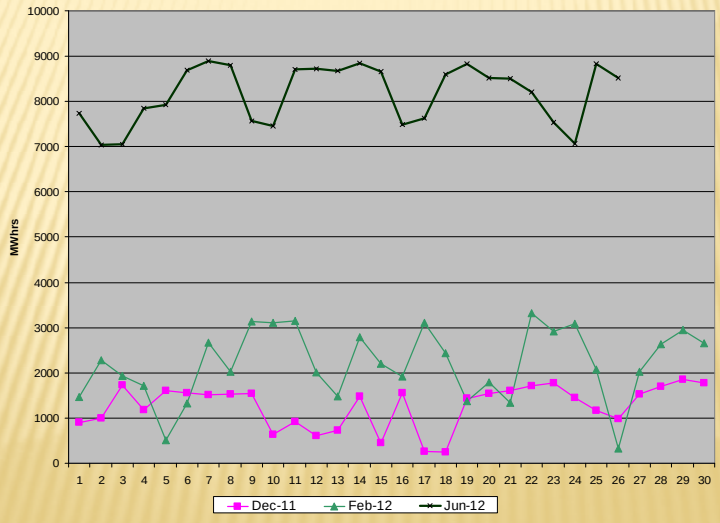
RPS - Daily Solar Energy in Cal-ISO



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NW 2017 Resource Adequacy Assessment

- NW RA Steering Committee has decided to adjust California market by new gas-fired plants and OTC closures (4,800 MW by 2017)
  - Reduces SW winter market to approximately 1,700 MW
- No decisions have been made on RPS resources
  - Expecting decisions will be made this summer before the 2017 NW adequacy assessment is prepared

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SONGS Outage

- Steam turbines replaced by Mitsubishi in 2009 and 2010 at a cost of $670 million
- SONGS – Unit 2 Offline in January 12 (planned), Unit 3 Offline on Jan 31 (leak in steam tubes)
- SONGS provide 2,250 MW to Southern California (80% SCE and 20% San Diego)
- May 8th, 2012 “SCE and the ISO have maintained throughout the SONGS outage that nuclear safety has no timeline and the units will only be returned to service when SCE and the NRC are satisfied it is safe to do so. SCE has not filed a request with the NRC seeking to restart the plant”
- NRC stated June 19th 2012, “When it made the equipment, the Tokyo-based company used a computer model to approximate water and steam levels, but the analysis was faulty.”

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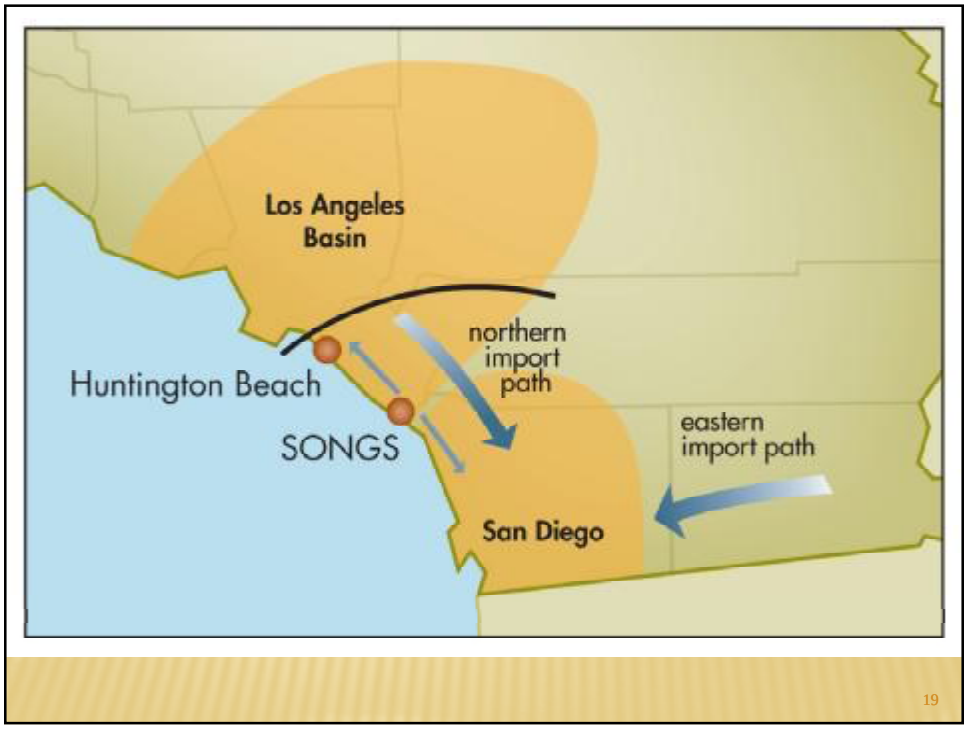
Los Angeles Basin
northern import path
Huntington Beach
SONGS
eastern import path
San Diego
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