July 21, 2011

VIA ELECTRONIC MAIL

Ms. Shanna Foley
Ms. Deborah Behles
Environmental Law and Justice Clinic
Golden Gate University School of Law
536 Mission Street
San Francisco, CA 94105-2968

Re: ISO Response to the Pacific Environment Data Request No. 1

Dear Ms. Foley and Ms. Behles:

Enclosed please find the ISO response to the Pacific Environment Data Request No. 1 propounded in the Long Term Procurement Proceeding, CPUC Docket R.10-05-006.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Judith B. Sanders/lamp

Judith B. Sanders
Senior Counsel
California Independent System Operator

cc: Service List R.10-05-006

BEFORE
THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Integrate	**)**	
And Refine Procurement Policies and	**)**	**R.10-05-006**
Consider Long-Term Procurement Plans	**)**	

RESPONSE OF
THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION
TO THE FIRST SET OF DISCOVERY REQUESTS OF
PACIFIC ENVIRONMENT

Below are responses by the California Independent System Operator Corporation to the First Set of Discovery Requests of Pacific Environment.

Request No. 1:

Please provide a description of and any data, information, and documentation related to the following:

a. PLEXOS input assumptions for startup times of existing generating facilities;
b. PLEXOS input assumptions for minimum load requirements and ramp rates of existing generating facilities;
c. PLEXOS input assumptions for startup times for all planned additions; and
d. PLEXOS input assumptions for minimum load requirements and ramp rates for all planned additions.

ISO RESPONSE TO No. 1 a. and c.:

The model assumes that the generators will receive notice in advance so that they can follow the commitment instructions. Therefore, most of the generators' startup time is modeled explicitly.

However, the combined cycle gas turbine (CCGT) units in California do have start profiles modeled. A CCGT is modeled as a single generation unit while physically it has several configurations (combinations of combustion turbines and steam turbines). In the simulation CCGT units tend to jump to their maximum capacity at startup. Physically that is infeasible. A start profile is added to reflect the transition between different configurations. The profiles were determined based on the input from the California IOUs and were added to the vintage case in 2010. All the start profiles are presented in sheet "Generator Start Profile" in the attached data file "PAC Environment Data Request_Data Sheets.xlsx".

ISO RESPONSE TO No. 1 b.:

The PLEXOS inputs are all from publicly information sources, including the CPUC LTPP Scoping Memo, TEPPC PC0 case, etc. See sheet "Generator Capacity & Ram Rates" in the

attached data file for information about minimum capacity and ramp rates of existing generators and planned additions.

ISO RESPONSE TO No. 1 d.:

See ISO RESPONSE TO No. 1 b. and attached documents "GE LMS100.pdf" and "Siemens FP30 2x1 Startup.pdf."

Request No. 2:

CAISO has stated that it is undertaking a further evaluation of incorporating additional studies in its RPS analysis.1 Please provide a description of any of the following information and any inputs that CAISO has incorporated into its modeling runs at the LTPP (including the timeframe of any planned modeling runs), and any data, information, and documentation related to:

a. Balancing area cooperation (including CAISO's Market Redesign and Technology Upgrade);
b. Improved forecasting;
c. Intra-hourly scheduling;
d. Advanced metering structure compatible with other balancing area authorities; and
e. Automated demand response.

ISO RESPONSE TO No. 2 a.:

In the running of CPUC – LTPP scenarios, the ISO updated its load forecasting based on 2010 hour-ahead and real-time (5 minute) load forecasting results compared to actual load. With implementation of Market Redesign and Technology Upgrade, the load forecasting tools were upgraded from those in 2006 which was the basis of data used for the vintage scenarios.

With regards to balancing area cooperation, the assumed that 15% of renewable imports will be dynamic transferred based on the status and expectation of the dynamic transfer policy developed which was approved by ISO Board of Governors on May 19, 2011 meeting. Refer to the following link for final proposal:
http://www.caiso.com/2b72/2b72e3f642fa0.pdf

ISO RESPONSE TO No. 2 b.:

The ISO modified its wind and solar forecast error methodology. As described in its July 1, 2011 testimony, the ISO used a T-1 hour analysis for estimating the wind and solar forecast errors. For wind this resulted in improved forecast error when compared to existing forecast errors for the Participating Intermittent Renewable Resource Program. For solar we also analyzed the forecast error by technology.

ISO RESPONSE TO No. 2 c.:

The ISO had several discussions and is continuing to have discussions with Bonneville Power Authority (BPA) to increase the scheduling frequency on the ties between BPA and the ISO as a pilot project. Currently, both parties are working on agreements and fine tuning the technical details and expect to begin this pilot later on this year (most likely, sometime in the fourth quarter). In addition, in the process of develop the ISO dynamic transfer policy, the ISO had discussions with neighboring balancing authority areas regarding the dynamic transfer policy. Additional documentation on the intra-hour scheduling pilot can be found in attached 2 of the following weblink http://www.caiso.com/2b13/2b13aa17243e0.pdf.

ISO RESPONSE TO No. 2 d.:

The ISO did not directly incorporate any advanced metering structure into its model. However, some of the demand response assumed in the CPUC scoping memo are based anticipated use of advanced metering. To the extent advanced metering were included in the CPUC planning assumptions, the ISO incorporated such assumptions into the load assumptions in for the CPUC scenarios.

ISO RESPONSE TO No. 2 e.:

Demand response was modeled as a supply side resource.

Request No. 3:

Early last year, CAISO received permission from the Federal Energy Regulatory Commission (FERC) to move forward in an agreement between CAISO and AES Energy Storage to demonstrate the ability of AES's Sano energy storage system to provide regulation service to CAISO.[1] CAISO stated in its Letter Agreement to FERC that the Agreement will cover an initial test period to evaluate Sano's ability to provide regulation services and an interim certification period.

a. Please provide all information, data, and results from the regulation service provided by AES's Sano energy storage system during the initial test period and certification period.
b. Please provide all information, data, and results from implementation of the Agreement between CAISO and AES.
c. Please provide the criteria or standards that CAISO used, or is using, to measure and analyze the Sano energy storage system's ability to provide regulation service.

[1] Letter from Nathaniel Davis, Deputy Secretary, Federal Energy Regulatory Commission, 130 FERC ¶ 61,242, Docket No. ER10-660-000 (March 26, 2010), available at http://www.ferc.gov/eventcalendar/Files/20100326175021-ER10-660-000.pdf.

ISO RESPONSE TO No. 3:

Objection. Information about the AES Sano storage system is not relevant to this proceeding and is outside the scope of the ISO's renewable integration study and the ISO's testimony. Furthermore, the information requested is commercially sensitive information and the ISO is prohibited by its tariff from providing it, even subject to a non-disclosure agreement.

Request No. 4:

Please list all energy storage systems currently providing generation, transmission, and or distribution services to California's wholesale power grid, and all energy storage systems currently under construction and or approved by FERC, the Public Utilities Commission, or CEC, including those storage systems that are operating as demonstration projects. In addition, please provide the following information for each energy storage system listed:

a. Type of energy storage system (i.e., flywheel, CAES, NaS, etc.)
b. Rated power capacity (given in kW or MW)
c. Total discharge time
d. Efficiency rate
e. Response time
f. Please provide the criteria or standards used to measure or analyze an energy storage system's ability to provide generation, transmission, or distribution services.

ISO RESPONSE TO No. 4:

Objection. The ISO has made all of its modeling input assumptions publicly available; therefore any relevant information about energy storage systems, which currently comprises pump/storage hydro (refer to response to question 10 below), that were modeled in the ISO's renewable integration studies has been provided to Pacific Environment. To the extent this data request seeks information about energy storage systems that were not modeled in the ISO's studies, such information is not relevant and is beyond the scope of the ISO's studies and testimony in this proceeding. Furthermore, much of the information requested is commercially sensitive and the ISO is prohibited by its tariff from providing it, even subject to a non-disclosure agreement.

Request No. 5:

Please provide all information or data that supports the changes to the operating characteristics of several generators including LM6000 and LMS100 as described in the IOU's and CAISO's May 18, 2011 Motion in R.10-05-006.

ISO RESPONSE TO No. 5:

Change to LMS100 minimum capacity is based on a GE LMS100 brochure (see attached file "GE LMS100.pdf").

Changes to LM6000 minimum capacity and heat rate are based on input from working group participants. These were the same values used in the vintage cases.

Request No. 6:

On page 4 of the July 1, 2011 Track I Direct Testimony of Mark Rothleder on Behalf of the California Independent System Operator Corporation [hereinafter *Track I CAISO Testimony*], Mr. Rothleder states that the "ISO, along with the CPUC, the CEC and other agencies, is in the process of conducting power flow and stability studies to evaluate local area capacity needs created by once through cooling (OTC) environmental restrictions." Please explain the timeline for this process and what work has been completed to date. Please also provide any reports or studies generated from this process.

ISO RESPONSE TO No. 6:

The timeline and study plan for OTC is contained in 2011/2012 Transmission Planning Process Unified Planning Assumptions and Study Plan http://www.caiso.com/2b84/2b84c4a0ec90.pdf. These studies are still in process and no reports have been generated yet. We expect to present study results at our December 8, 2011 stakeholder meeting shown in the study plan schedule. As a member of the Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS), the ISO will also review the generator owners/operators' proposed OTC compliance implementation plans and schedules, and will report to the State Water Board with recommendations in October 2011.

Request No. 7:

On pages 10-11 of Track I CAISO Testimony, Mr. Rothleder describes the assumptions used to model imports from renewables. Please explain the basis of the renewable import assumptions described on page 10, lines 14-18. Then, please explain what assumptions were made for non-renewable imports, and the basis for the assumptions related to nonrenewable imports. In particular, please explain whether non-renewable imports were assumed to provide ancillary service, and if not, why not.

ISO RESPONSE TO No. 7:

The out of state renewable is divided into four categories. 1) 15% assumed to be import into California as a dynamic transfer, 2) 15% assumed to be import into California as a 15 minute intra-hour scheduled, 3) 40% assumed to be import into California as an hourly schedule, and 4) 30% assumed to be unbundled renewable energy credit (REC). The percentages were proposed and developed in collaboration with CPUC Energy Division staff and attempt to recognize the scheduling options that will be available by 2020.

All non-renewable imports are determined on economic basis, subject to transmission limits. In general imports (including renewable and non-renewable) are not assumed to provide ancillary service. The only exception is for the following dynamic resources: HOOVER, APEX_2_MIRDYN, MRCHNT_2_MELDYN, MSQUIT 5 SERDYN, and SUTTER 2 PL1X3.

This is because these resources are dynamically scheduling with the CAISO and are capable of providing ancillary service currently.

Request No. 8:

In Table 4 on page 27 of Track I CAISO Testimony, CAISO provided the location, size and capacity factor planning assumptions for customer side solar resources. Please provide all information and data on which CAISO based these assumptions. Please also describe whether data from the solar units installed pursuant to California's Solar Initiative were considered when making these assumptions.

ISO RESPONSE TO No. 8:

The first 5 columns are from the CPUC Calculator results provided by CPUC. The last two columns were developed and proposed by Nexant as mart of the method to profile these plants.

Request No. 9:

Please describe all assumptions that were changed or modified in the Trajectory High Load case from the Trajectory case. Please explain the basis for each change or modification.

ISO RESPONSE TO No. 9:

The Trajectory High Load case was set up according to the CPUC scoping memo. It has a 10 percent higher load assumption than the Trajectory Case. It also has 1497 MW more renewable resource in order to meet the 33% RPS. The regulation and load following requirements are also higher than the Trajectory Case due to higher load and more renewable resources. Slide 5 in Exhibit 1 contains a list of the load and renewable assumptions for the five CPUC cases. Below is the comparison of regulation and load following requirements of the two cases.

Max Requirement	Regulation -up	Regulation - down	Load following-up	Load following-down
Trajectory	1,219	-991	3,564	-4,122
Trajectory Hi-Load	1,230	-1,014	3,967	-4,424

Request No. 10:

In addition to the Helm Pump Storage assumptions, please explain all other assumptions related to energy storage systems that were made in the inputs to the Plexos Model.

ISO RESPONSE TO No. 10:

Other California pump storage facilities modeled are Castaic, Eastwood, Lake Hodges, SN LS PP_8. There is no specific assumption other than the physical operating characteristics, for these facilities in the model. The pump schedules of these facilities are optimized.

Request No. 11:

Please explain whether, and to what extent, the Plexos model currently takes into account that solar and wind forecasts will continue to improve? If it does take this into account, please explain how. If it does not, please explain why not.

ISO RESPONSE TO No. 11:

The PLEXOS model used for Step 2 production simulation uses hourly profiles of solar and wind. Forecast error and improvement in forecast error are not directly considered in Step 2. Wind and solar forecast error are considered in Step 1 to determine the regulation and load following requirements used as inputs to Step 2. In developing the T-1 hour methodology for estimating solar and wind forecast error, the ISO assumed these values were reflective of improved forecasting.

Request No. 12:

When discussing load profiles used for the four priority scenarios, Mr. Rothleder states on page 41 of the CAISO Testimony that "1,131 MW of upward adjustments were made to account for behind the meter PV that was modeled as supply." Then, on page 5 of Exhibit 3 of its Testimony, CAISO includes Table 12, which calculates peak demand to be used in the load profiles. This table lists 1,131 MW of PV behind the meter as increasing the demand. Please explain the impact and basis of this modification. Please include all information and data that supports this value.

ISO RESPONSE TO No. 12:

The 1131 MWs developed during the development of the modeling for the Vintage cases in 2010 and was accepted by the CPUC Energy Division and CEC for use in the modeling during the review process. Represents a 50% discount from the sum of the PV nameplates of 2262 MWs. The basis of the values was 50% factor is developed by multiplying the capacity credit of 65% for large PV plants by a discount factor. The discount factor is the ratio of the capacity factor of the PV systems on the customer side of the meter (16.2%) to capacity factor of the Large PV plants (21%).

Request No. 13:

Does the CAISO model consider the potential for upgrading existing facilities? For instance, did CAISO consider the capability of existing facilities to upgrade software and other technologies to come on line more quickly? If so, please explain how. If not, please explain why not.

ISO RESPONSE TO No. 13:

The ISO did not make any assumption regarding upgrading of the existing system software or other technologies to come on more quickly. For this phase of studies the ISO modeled what capabilities exist based on currently resource characteristics. If needs are identified, the ISO anticipated studying how such needs could satisfied by further study of options to meet identified needs including potential for upgrading existing equipment to gain additional flexibility.

Request No. 14:

Please provide a copy of all other data requests other parties have served on you and your responses to those data requests.

ISO RESPONSE TO No. 14:

The ISO has attached its response to the first data request of Division of Ratepayer Advocates and its response to the first data request of L. Jan Reid. All other data request responses have been served on the parties.

ATTACHMENT A

PACIFIC ENVIRONMENTAL DATA REQUEST
DATA SHEETS

PAC Environment Data Request
Data Sheets

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
9CWIND 1_1	BPA	Wind		1	18			
9CWIND 2_1	BPA	Wind		1	45			
9CWIND 3_1	BPA	Wind		1	32			
AB_Wind	AB	Wind		1	886			
ABIQUI12_1	NM	Conventional Hydro		1	13	0		
AceTrona	SCE	Cogeneration		1	103	103	3.3	3.3
Afton Cca	NM	CC Frame F		1	235	129	2.4	2.4
AgnwCT1	PG&E_BAY	Cogeneration		1	22	22	2.5	2.5
AguaFria1	SRP	Steam Large Old		1	113	15	1.9	1.9
AguaFria2	SRP	Steam Large Old		1	113	15	1.9	1.9
AguaFria3	SRP	Steam Large Recent		1	181	21	3.0	3.0
AguaFria4	SRP	CT Old Gas		1	73	4	6.0	6.0
AguaFria5	SRP	CT Old Gas		1	73	4	6.0	6.0
AguaFria6	SRP	CT Old Gas		1	73	4	6.0	6.0
AguaMansaPP	SCE	CT LM 6000		1		20	6.0	6.0
			SUMMER	1	43			
			WINTER	1	43			
AirLiqd1	AB	CT Cogen		1	80	48	3.0	3.0
Alameda1	PG&E_BAY	GT		1	26	12	2.7	2.7
Alameda2	PG&E_BAY	GT		1	26	12	2.7	2.7
Alamosa PV	CO	Solar PV		1	8			
Alamosa PV2	CO	Solar PV		1	17			
AlamsGT1	CO	CT Old Gas		1	17	5	2.7	2.7
AlamsGT2	CO	CT Old Gas		1	19	6	2.7	2.7
ALBENI F_1	NW	Conventional Hydro		1	17			
ALBENI F_2	NW	Conventional Hydro		1	17			
ALBENI F_3	NW	Conventional Hydro		1	17			
ALCOVA1_1	CO	Conventional Hydro		1	20			
ALCOVA2_1	CO	Conventional Hydro		1	20			
ALDER11_1	NW	Conventional Hydro		1	26			
ALDER12_1	NW	Conventional Hydro		1	26			
AllenGT1	NEVP	CT Large		1	72	17	1.3	1.3
AllenGT2	NEVP	CT Large		1	75	18	1.3	1.3
Alliance Century_1	SCE	GT		1	10	5	1.2	1.2
Alliance Century_2	SCE	GT		1	10	5	1.2	1.2
Alliance Century_3	SCE	GT		1	10	5	1.2	1.2
Alliance Century_4	SCE	GT		1	10	5	1.2	1.2
Alliance Drews_1	SCE	GT		1	10	5	1.2	1.2
Alliance Drews_2	SCE	GT		1	10	5	1.2	1.2
Alliance Drews_3	SCE	GT		1	10	5	1.2	1.2
Alliance Drews_4	SCE	GT		1	10	5	1.2	1.2
Almond1	TIDC	GT		1	50	12	2.5	2.5
ALPAC_BM1	AB	Biomass RPS		1	41	14		
ALPAC_BM2	AB	Biomass RPS		1	41	14		
ALPAC_BM3	AB	Biomass RPS		1	18	6		
AmerAtlas1	CO	CC Recent		1	87	48	0.7	0.7
AMFLS_1	ID_UT	Conventional Hydro		1	37			
AMFLS_2	ID_UT	Conventional Hydro		1	37			
AMFLS_3	ID_UT	Conventional Hydro		1	37			
Anaheim1	SCE	GT		1	46	21	2.7	2.7
ANDERSN1_1	ID_UT	Conventional Hydro		1	21			
ANDERSN2_1	ID_UT	Conventional Hydro		1	21			
Animas CC_1	WALC	CC Recent		1	25	13	2.5	2.5
ApachCC1A	WALC	CC Old		1	115	63	1.0	1.0
ApachGT1	WALC	CT Old Gas		1	10	3	2.7	2.7
ApachGT2	WALC	CT Old Gas		1	20	6	0.7	0.7
ApachGT3	WALC	CT Old Gas		1	65	20	2.2	2.2
ApachST2	WALC	Coal Large Recent		1	175	70	1.8	3.3
ApachST3	WALC	Coal Large Recent		1	175	70	1.8	1.8
AptDiesl	CO	Steam Small Old		1	10	3	0.2	0.2
AragonM_W1	NM	Wind		1	90			
Arapaho4_NG	CO	CCGT		1	109	55	2.5	2.5
Arapaho7	CO	CC Recent		1	132	73	2.5	2.5
ARCOProd1	SCE	Cogeneration		1	142	142	1.0	1.0
ArcoWilm	SCE	Cogeneration		1	142	142	1.0	1.0
Ardenville W1	AB	Wind		1	69			
ArlngtnST1	SRP	CC Frame F		1	600	314	6.8	6.8
Armstrong CG	BC	Biomass RPS		1	20	9		
Arrow	BC	Conventional Hydro		1	250			
ARTESIA:DC	NM	Negative Bus Load		1	193			

PAC Environment Data Request
Data Sheets

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
AUR_GTG2	AB	CT Cogen		1	26	12	0.9	0.9
AvenalEnergyCenter	PG&E_VLY	CCGT		1		240	2.5	2.5
			SUMMER	1	600			
			WINTER	1	600			
AZ State Rollup	SRP	Conventional Hydro		1	14			
AZ_LgPV	APS	Solar PV		1	290			
Badger1	PG&E_VLY	Cogeneration		1	42	42	2.5	2.5
BAJAC3-EN	CFE	CC Recent		1	288	158	2.4	2.4
BAJA-SL	CFE	CT Future		1	124	37	1.9	1.9
Balzac1	AB	CC Recent		1	167	92	1.4	1.4
BARPKGEN	SCE	GT		1	49	29	5.3	5.3
BARRLAK1_1	CO	CT Large		1	64	9	1.3	1.3
BARRLAK2_1	CO	CT Large		1	64	9	1.3	1.3
Basin Creek Gen.	MT	IC		1	54	8	1.3	1.3
BAT #5_5	AB	Coal Large Recent		1	368	147	3.6	3.6
BBILL1-2_1	CO	Small Hydro RPS		1	9			
BBILL3-4_1	CO	Small Hydro RPS		1	9			
BEAGLE_1	MT	Conventional Hydro		1	24			
Bear Mtn W1	BC	Wind		1	120			
BearCrk1	AB	CC Cogen		1	80	44	0.9	0.9
BEAVER_1	NW	CC Old		1	519	285	4.3	4.3
BenFrench CT1	CO	CT Small		1	25	11	2.7	2.7
BenFrench CT2	CO	CT Small		1	25	11	2.7	2.7
BenFrench CT3	CO	CT Small		1	25	11	2.7	2.7
BenFrench CT4	CO	CT Small		1	25	11	2.7	2.7
BenFrench ST1	CO	Coal Small Old		1	25	10	3.3	3.3
Bennett Crk W1	ID_UT	Wind		1	20			
Bennett Mtn CT1	ID_UT	CT Large		1	170	77	5.3	5.3
Beowaw1	SPP	Geothermal		1	19	9	0.2	0.2
BIG CLIF_1	BPA	Conventional Hydro		1	22			
Big Horn	BPA	Wind		1	200			
Big Horn W2	BPA	Wind		1	50			
Big Horn W3	BPA	Wind		1	150			
BigHanafrdST	BPA	CC Frame F		1	268	147	2.6	2.6
BIGHORN1_1	AB	Conventional Hydro		1	60			
BIGHORN2_2	AB	Conventional Hydro		1	60			
Biglow Cnyn Wind_1	NW	Wind		1	126			
Biglow Cnyn Wind_2	NW	Wind		1	150			
Biglow Cnyn Wind_3	NW	Wind		1	175			
Billings1	MT	PC Steam		1	65	5	1.1	1.1
Biomass	PACW	Other Steam		1	24	7	0.4	0.4
Black Mntn_1	APS	CT Future		1	45	27	3.0	3.0
Black Mntn_2	APS	CT Future		1	45	27	3.0	3.0
Blackspring Ridge_1	AB	Wind		1	300			
BLACKWTR:DC	NM	Negative Bus Load		1	50			
BLISS 1_1	ID_UT	Conventional Hydro		1	27			
BLISS 2_1	ID_UT	Conventional Hydro		1	27			
BLISS 3_1	ID_UT	Conventional Hydro		1	27			
Blue Mt Geo	SPP	Geothermal		1	50	25	0.3	0.3
BlueTrail W1	AB	Wind		1	66			
Bluffview CC_1	WALC	CC Recent		1	53	27	2.5	2.5
Blundll1	ID_UT	Geothermal		1	24	12	0.2	0.2
Blundll2	ID_UT	Geothermal		1	13	7	0.1	0.1
Blundll3	ID_UT	Geothermal		1	35	18	0.5	0.5
BluSprc1	CO	CT Large		1	140	34	2.0	2.0
BluSprc2	CO	CT Large		1	140	34	2.0	2.0
Blythe1	SCE	CCGT		1	520	208	7.8	7.8
BMESA1-2_1	CO	Conventional Hydro		1	43			
BMESA1-2_2	CO	Conventional Hydro		1	43			
BnFrnchD1	CO	IC		1	10	1	0.3	0.3
BnFrnchD2	CO	IC		1	10	1	0.3	0.3
BO TERM:nt	CO	Negative Bus Load		1	5			
Boardmn1	NW	Coal Large Recent		1	510	204	5.1	5.1
Bonanza1	ID_UT	Coal Large Recent		1	468	187	4.7	4.7
BONN PH2_B	BPA	Conventional Hydro		1	65			
BONN PH2_C	BPA	Conventional Hydro		1	65			
BONN PH2_D	BPA	Conventional Hydro		1	65			
BONN PH2_E	BPA	Conventional Hydro		1	65			
BONN PH2_F	BPA	Conventional Hydro		1	65			
BONN PH2_G	BPA	Conventional Hydro		1	65			

PAC Environment Data Request
Data Sheets

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
BONN PH2_I	BPA	Conventional Hydro		1	65			
BONN PH2_J	BPA	Conventional Hydro		1	65			
BONNVIL1_1	BPA	Conventional Hydro		1	65			
BONNVIL1_2	BPA	Conventional Hydro		1	65			
BONNVIL1_9	BPA	Conventional Hydro		1	65			
BONNVIL1_A	BPA	Conventional Hydro		1	65			
BONNVIL2_3	BPA	Conventional Hydro		1	65			
BONNVIL2_4	BPA	Conventional Hydro		1	65			
BONNVIL2_5	BPA	Conventional Hydro		1	65			
BONNVIL2_6	BPA	Conventional Hydro		1	65			
BONNVIL2_7	BPA	Conventional Hydro		1	65			
BONNVIL2_8	BPA	Conventional Hydro		1	65			
Bonnybrook CC	AB	CC Cogen		1	165	83	1.0	1.0
Borax1	SCE	Cogeneration		1	21	21	2.7	2.7
Border	SDGE	GT		1	49	23	2.7	2.7
BoulderPk	NW	IC		1	24	2	0.8	0.8
BOUNDARY_1	NW	Conventional Hydro		1	353			
BOUNDARY_2	NW	Conventional Hydro		1	353			
BOUNDARY_3	NW	Conventional Hydro		1	353			
BOUNDARY_4	NW	Conventional Hydro		1	167			
BOUNDRY2_5	NW	Conventional Hydro		1	210			
BOUNDRY2_6	NW	Conventional Hydro		1	210			
Bow River	AB	Conventional Hydro		1	326			
BOX CAN1_1	NW	Conventional Hydro		1	18			
BOX CAN2_2	NW	Conventional Hydro		1	18			
BOX CAN3_3	NW	Conventional Hydro		1	18			
BOX CAN4_4	NW	Conventional Hydro		1	18			
BOYLE 1_1	PACW	Conventional Hydro		1	49			
BOYLE 2_2	PACW	Conventional Hydro		1	42			
BOYSEN1_1	CO	Conventional Hydro		1	15			
BPWCst1	SCE	Cogeneration		1	23	23	2.7	2.7
BRAZ#1 9_1	AB	Conventional Hydro		1	160			
BRAZ#2 9_2	AB	Conventional Hydro		1	195			
Brlngt11	CO	CT Old Oil		1	60	18	2.0	2.0
Brlngt12	CO	CT Old Oil		1	60	18	2.0	2.0
Broadway 3 Pasadena	SCE	ST		1	63	10	1.7	1.7
BrrrdTh1	BC	Steam Large Old		1	150	23	2.5	2.5
BrrrdTh2	BC	Steam Large Old		1	150	23	2.5	2.5
BrrrdTh3	BC	Steam Large Old		1	150	23	2.5	2.5
BrrrdTh4	BC	Steam Large Old		1	150	23	2.5	2.5
BrrrdTh5	BC	Steam Large Old		1	152	23	2.5	2.5
BrrrdTh6	BC	Steam Large Old		1	152	23	2.5	2.5
BrsCgn12	CO	CC Recent		1	120	66	1.0	1.0
BrsCgn3	CO	CC Recent		1	70	37	0.6	0.6
BRWNL 1_1	ID_UT	Conventional Hydro		1	113			
BRWNL 2_1	ID_UT	Conventional Hydro		1	113			
BRWNL 3_1	ID_UT	Conventional Hydro		1	113			
BRWNL 4_1	ID_UT	Conventional Hydro		1	113			
BRWNL 5_1	ID_UT	Conventional Hydro		1	275			
Buffalo Vly	SPP	Geothermal		1	24	12	0.5	0.5
Burley	ID_UT	Wind		1	20			
CABGOR12_1	NW	Conventional Hydro		1	68			
CABGOR12_2	NW	Conventional Hydro		1	68			
CABGOR34_3	NW	Conventional Hydro		1	68			
CABGOR34_4	NW	Conventional Hydro		1	68			
CabinCreek_1	CO	Pumped Storage		1	162			
CabinCreek_2	CO	Pumped Storage		1	162			
Calgary1	AB	CC Frame F		1	260	120	2.1	2.1
CALPK_EC_1	SDGE	GT		1	42	19	2.7	2.7
Campbell Hill W1	WY	Wind		1	99			
Cancarb1	AB	Biomass RPS		1	36	14	0.5	0.5
CANYON_1	MT	Conventional Hydro		1	58			
CanyonPowerPlant_1	SCE	CT LM 6000		1		20	6.0	6.0
			SUMMER	1	50			
			WINTER	1	50			
CanyonPowerPlant_2	SCE	CT LM 6000		1		20	6.0	6.0
			SUMMER	1	50			
			WINTER	1	50			
CanyonPowerPlant_3	SCE	CT LM 6000		1		20	6.0	6.0
			SUMMER	1	50			

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
			WINTER	1	50			
CanyonPowerPlant_4	SCE	CT LM 6000		1		20	6.0	6.0
			SUMMER	1	50			
			WINTER	1	50			
Carbon1	ID_UT	Coal Small Old		1	67	27	3.3	3.3
Carbon2	ID_UT	Coal Small Old		1	105	42	3.3	3.3
CARMEN_1	BPA	Conventional Hydro		1	50			
CARMEN_2	BPA	Conventional Hydro		1	50			
CARMEN_3	BPA	Conventional Hydro		1	12			
Carslnd1	AB	CT Cogen		1	40	18	1.3	1.3
Carslnd2	AB	CT Cogen		1	40	18	1.3	1.3
Carson Lk Basin Geo_1	SPP	Geothermal		1	31	16	0.3	0.3
Carson Lk Basin Geo_2	SPP	Geothermal		1	31	16	0.3	0.3
Carson1	SMUD	CT Cogen		1	43	11	1.0	1.0
Carson2	SMUD	GT		1	96	41	2.5	2.5
CarsonCG	SCE	Cogeneration		1	46	46	2.5	2.5
Cascade	ID_UT	Conventional Hydro		1	12			
Cassia Farms W1	ID_UT	Wind		1	11			
Cassia Gulch W1	ID_UT	Wind		1	19			
CASTAIC	LDWP	Pumped Storage		1	1486	360		
CastlRk_W1	AB	Wind		1	112			
CASTRIV2_1	AB	Wind		1	21			
CASTRIV3_2	AB	Wind		1	19			
Cavalier1	AB	CC Recent		1	120	66	0.9	0.9
CbsPrsn1	NM	CT Large		1	143	34	2.0	2.0
CCCPrsd1	CFE	CC Frame F		1	253	139	2.5	2.5
CCCPrsd2	CFE	CC Frame F		1	253	139	2.5	2.5
Cedar Creek II	CO	Wind		1	250			
Cedar Falls	NW	Conventional Hydro		1	30			
Cedar Point Wind	CO	Wind		1	252			
Celgar Mill CT2	BC	Biomass RPS		1	7	1		
Celgar Mill CT3	BC	Biomass RPS		1	48	10		
Centralia1	BPA	Coal Large Recent		1	728	291	7.3	7.3
Centralia2	BPA	Coal Large Recent		1	728	291	7.3	7.3
CerroPr2-1	CFE	Geothermal		1	105	52	1.0	1.0
CerroPr2-2	CFE	Geothermal		1	105	52	1.0	1.0
CerroPr3-1	CFE	Geothermal		1	105	52	1.0	1.0
CerroPr3-2	CFE	Geothermal		1	105	52	1.0	1.0
CerroPr4-1	CFE	Geothermal		1	29	14	0.3	0.3
CerroPr4-2	CFE	Geothermal		1	29	14	0.3	0.3
CerroPr4-3	CFE	Geothermal		1	29	14	0.3	0.3
CerroPr4-4	CFE	Geothermal		1	29	14	0.3	0.3
CerroPr5-1	CFE	Geothermal		1	107	54	1.1	1.1
CerroPrl1-1	CFE	Geothermal		1	36	18	0.4	0.4
CerroPrl1-2	CFE	Geothermal		1	36	18	0.4	0.4
CerroPrl1-3	CFE	Geothermal		1	36	18	0.4	0.4
CerroPrl1-4	CFE	Geothermal		1	36	18	0.4	0.4
CerroPrl1-5	CFE	Geothermal		1	23	12	0.2	0.2
CGNation1	PG&E_VLY	Cogeneration		1	25	25	2.7	2.7
ChalkClf1	PG&E_VLY	Cogeneration		1	45	45	2.7	2.7
CHANDLER_1	BPA	Conventional Hydro		1	13			
CHELAN_1	NW	Conventional Hydro		1	27			
CHELAN_2	NW	Conventional Hydro		1	27			
Cherokee3CCGT	CO	CCGT		1	569	285	2.5	2.5
Cherokee4_NG	CO	CCGT		1	351	175	2.5	2.5
ChevCad1	PG&E_VLY	Cogeneration		1	1	1	2.7	2.7
ChevGen1	PG&E_BAY	Cogeneration		1	8	8	2.0	2.0
ChevGen2	PG&E_BAY	Cogeneration		1	2	2	2.0	2.0
ChhlsGn3	BPA	CC Frame F		1	520	286	6.4	6.4
CHIEF J2_5	BPA	Conventional Hydro		1	94			
CHIEF J2_6	BPA	Conventional Hydro		1	94			
CHIEF J2_7	BPA	Conventional Hydro		1	94			
CHIEF J2_8	BPA	Conventional Hydro		1	94			
CHIEF J2_9	BPA	Conventional Hydro		1	94			
CHIEF J2_A	BPA	Conventional Hydro		1	94			
CHIEF J2_B	BPA	Conventional Hydro		1	94			
CHIEF J2_C	BPA	Conventional Hydro		1	94			
CHIEF J5_I	BPA	Conventional Hydro		1	94			
CHIEF J5_J	BPA	Conventional Hydro		1	94			
CHIEF J5_K	BPA	Conventional Hydro		1	94			

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
CHIEF J5_M	BPA	Conventional Hydro		1	94			
CHIEF J5_N	BPA	Conventional Hydro		1	94			
CHIEF J5_O	BPA	Conventional Hydro		1	94			
CHIEF J5_P	BPA	Conventional Hydro		1	94			
CHIEF J5_Q	BPA	Conventional Hydro		1	94			
CHIEF J5_R	BPA	Conventional Hydro		1	94			
CHIEF J5_S	BPA	Conventional Hydro		1	94			
CHIEF J5_T	BPA	Conventional Hydro		1	94			
CHIEF JO_1	BPA	Conventional Hydro		1	94			
CHIEF JO_2	BPA	Conventional Hydro		1	94			
CHIEF JO_3	BPA	Conventional Hydro		1	94			
CHIEF JO_4	BPA	Conventional Hydro		1	94			
CHIEF JO_D	BPA	Conventional Hydro		1	94			
CHIEF JO_E	BPA	Conventional Hydro		1	94			
CHIEF JO_F	BPA	Conventional Hydro		1	94			
CHIEF JO_G	BPA	Conventional Hydro		1	94			
CHIN CH9_1	AB	Conventional Hydro		1	12			
ChinChuteW1	AB	Wind		1	30			
ChinoNM	NM	CT Small		1	84	38	2.8	2.8
CHINOOK9_1	AB	Conventional Hydro		1	11	0		
Cholla1	APS	Coal Large Recent		1	116	46	1.1	1.1
Cholla2	APS	Coal Large Recent		1	245	98	2.5	2.5
Cholla3	APS	Coal Large Recent		1	260	104	2.6	2.6
Cholla4	APS	Coal Large Recent		1	380	152	3.8	3.8
ChowchillaPkr	PG&E_VLY	CT Old Gas		1		20	7.5	7.5
			SUMMER	1	48			
			WINTER	1	48			
ChristinaLk1	AB	CT Cogen		1	94	52	5.7	5.7
ChristinaLk2	AB	CT Cogen		1	85	26	1.0	1.0
CicloCombinadoMexicali	SDGE	CCGT		1		100	7.5	7.5
			SUMMER	1	180			
			WINTER	1	180			
Cimarron Solar_1	CO	Solar PV		1	30			
Cipres1	CFE	CT Old Oil		1	28	8	0.9	0.9
ClarkCC1C	NEVP	CC Old		1	219	120	1.8	1.8
ClarkCC2C	NEVP	CC Old		1	243	134	2.0	2.0
ClarkGT11	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT12	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT13	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT14	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT15	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT16	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT17	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT18	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT19	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT20	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT21	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT22	NEVP	CT Future		1	57	34	3.5	3.5
ClarkGT4	NEVP	CT Old Gas		1	50	15	1.3	1.3
ClarkMnt1	SPP	CT Small		1	70	21	2.3	2.3
ClarkMnt4	SPP	CT Small		1	70	21	2.3	2.3
ClearwaterPowerPlant	SCE	CCGT		1		20	6.0	6.0
			SUMMER	1	28			
			WINTER	1	28			
Clover Bar Peaker_1	AB	CT Small		1	48	14	1.3	1.3
Clover Bar Peaker_2	AB	CT Large		1	101	45	5.3	5.3
Clover Bar Peaker_3	AB	CT Large		1	101	45	5.3	5.3
CLRWATR1_1	PACW	Conventional Hydro		1	16			
CLRWATR2_1	PACW	Conventional Hydro		1	26			
CO GRN E_1	CO	Wind		1	81			
CO GRN W	CO	Wind		1	75			
CO GRN W_1	CO	Wind		1	81			
CO State Rollup	CO	Conventional Hydro		1	93			
CO_Wind	CO	Wind		1	420			
Coalinga1	PG&E_VLY	Cogeneration		1	36	36	2.7	2.7
Coalinga25D	PG&E_VLY	GT		1	17	7	2.7	2.7
COCHRAN_1	MT	Conventional Hydro		1	50			
ColdLake1	AB	CT Large		1	85	20	1.3	1.3
ColdLake2	AB	CT Large		1	85	20	1.3	1.3
ColoPwPr2#1	CO	CC Recent		1	75	41	0.6	0.6

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Colstrip1	MT	Coal Large Recent		1	334	134	3.3	3.3
Colstrip2	MT	Coal Large Recent		1	336	134	3.4	3.4
Colstrip3	MT	Coal Large Recent		1	763	305	7.6	7.6
Colstrip4	MT	Coal Large Recent		1	763	305	7.6	7.6
Comanch1	CO	Coal Large Recent		1	332	133	3.3	3.3
Comanch2	CO	Coal Large Recent		1	338	135	3.4	3.4
Comanche III	CO	Coal SuperC		1	750	300	7.5	7.5
Combine Hills W1	PACW	Wind		1	41			
Combine Hills W2	BPA	Wind		1	63			
CONKLIN2	AB	CT Future		1	85	26	5.7	5.7
CONWIND_1	BPA	Wind		1	50			
Coolidge Peaker P01	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P02	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P03	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P04	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P05	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P06	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P07	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P08	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P09	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P10	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P11	SRP	CT Future		1	47	21	5.3	5.3
Coolidge Peaker P12	SRP	CT Future		1	47	21	5.3	5.3
CoolwtrS3	SCE	CCGT		1	241	40	2.5	2.5
CoolwtrS4	SCE	CCGT		1	241	40	2.5	2.5
COPCO 1_1	PACW	Small Hydro RPS		1	12			
COPCO 1_2	PACW	Small Hydro RPS		1	12			
COPCO 2G_1	PACW	Small Hydro RPS		1	30			
Copper Mtn Solar_1	NEVP	Solar PV		1	48			
Copper1	NM	CT Old Gas		1	69	21	1.3	1.3
Corette1	MT	Coal Large Recent		1	154	62	1.5	1.5
Corona1	SCE	Cogeneration		1	32	32	2.7	2.7
Coronad1	SRP	Coal Large Recent		1	398	159	4.0	4.0
Coronad2	SRP	Coal Large Recent		1	427	171	4.3	4.3
Cosumnes3	SMUD	CCGT		1	500	185	2.5	2.5
COUGAR T_1	BPA	Conventional Hydro		1	15			
COUGAR T_2	BPA	Conventional Hydro		1	15			
COULEE01_1	BPA	Conventional Hydro		1	267			
COULEE02_2	BPA	Conventional Hydro		1	267			
COULEE03_3	BPA	Conventional Hydro		1	267			
COULEE04_4	BPA	Conventional Hydro		1	267			
COULEE05_5	BPA	Conventional Hydro		1	267			
COULEE06_6	BPA	Conventional Hydro		1	267			
COULEE07_7	BPA	Conventional Hydro		1	267			
COULEE08_8	BPA	Conventional Hydro		1	267			
COULEE09_9	BPA	Conventional Hydro		1	267			
COULEE10_A	BPA	Conventional Hydro		1	267			
COULEE11_B	BPA	Conventional Hydro		1	267			
COULEE12_C	BPA	Conventional Hydro		1	267			
COULEE13_D	BPA	Conventional Hydro		1	267			
COULEE14_E	BPA	Conventional Hydro		1	267			
COULEE15_F	BPA	Conventional Hydro		1	267			
COULEE16_G	BPA	Conventional Hydro		1	267			
COULEE17_I	BPA	Conventional Hydro		1	267			
COULEE18_J	BPA	Conventional Hydro		1	267			
COULEE19_1	BPA	Conventional Hydro		1	267			
COULEE19_1a	BPA	Conventional Hydro		1	267			
COULEE20_1	BPA	Conventional Hydro		1	267			
COULEE21_1	BPA	Conventional Hydro		1	267			
COULEE22_1	BPA	Conventional Hydro		1	267			
COULEE23_1	BPA	Conventional Hydro		1	267			
COWFALLS_1	BPA	Conventional Hydro		1	35			
COWFALLS_2	BPA	Conventional Hydro		1	35			
COWLEY N_1	AB	Wind		1	20			
Cowley Ridge W1	AB	Wind		1	21			
CowlitzST	BPA	Other Steam		1	131	39	2.2	2.2
CPVGT1	PG&E_VLY	CCGT		1	660	264	2.5	2.5
Craig1	CO	Coal Large Recent		1	410	164	4.1	4.1
Craig2	CO	Coal Large Recent		1	410	164	4.1	4.1
Craig3	CO	Coal Large Recent		1	408	163	4.1	4.1

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
CrckttC1	PG&E_BAY	Cogeneration		1	174	174	2.5	2.5
CrdnlCT1	PG&E_BAY	Cogeneration		1	11	11	2.7	2.7
CrdnlST1	PG&E_BAY	Cogeneration		1	11	11	2.7	2.7
Creed1	PG&E_VLY	GT		1	48	21	2.7	2.7
CRYSTAL_1	CO	Conventional Hydro		1	28			
CTLR G1_1	ID_UT	Conventional Hydro		1	15			
CTLR G2_1	ID_UT	Conventional Hydro		1	15			
CTRPKGEN	SCE	GT		1	49	29	5.3	5.3
CTY LAJ:TS	CO	Negative Bus Load		1	5			
CTY LAM:nt	CO	Negative Bus Load		1	5			
CtyRvrsd	APS	CT Old Gas		1	56	17	1.3	1.3
CurrantST	ID_UT	CC Frame F		1	525	272	5.3	5.3
CUSHMN11_1	NW	Conventional Hydro		1	24			
CUSHMN12_2	NW	Conventional Hydro		1	24			
CUSHMN2_1	NW	Conventional Hydro		1	30			
CUSHMN2_2	NW	Conventional Hydro		1	30			
CUSHMN2_3	NW	Conventional Hydro		1	30			
CWBUS1_1	NW	Biomass RPS		1	11	3		
Cymric31X#1	PG&E_VLY	Cogeneration		1	5	5	2.7	2.7
CytSpgsA	NW	CC Recent		1	250	138	2.1	2.1
CytSpgsST2	NW	CC Frame F		1	250	138	2.5	2.5
DALS0102_1	BPA	Conventional Hydro		1	86			
DALS0102_2	BPA	Conventional Hydro		1	86			
DALS0304_3	BPA	Conventional Hydro		1	86			
DALS0304_4	BPA	Conventional Hydro		1	86			
DALS0506_5	BPA	Conventional Hydro		1	86			
DALS0506_6	BPA	Conventional Hydro		1	86			
DALS0708_7	BPA	Conventional Hydro		1	86			
DALS0708_8	BPA	Conventional Hydro		1	86			
DALS0910_9	BPA	Conventional Hydro		1	86			
DALS0910_A	BPA	Conventional Hydro		1	86			
DALS1112_B	BPA	Conventional Hydro		1	86			
DALS1112_C	BPA	Conventional Hydro		1	86			
DALS1314_D	BPA	Conventional Hydro		1	86			
DALS1314_E	BPA	Conventional Hydro		1	86			
DALS1516_F	BPA	Conventional Hydro		1	86			
DALS1516_G	BPA	Conventional Hydro		1	86			
DALS1718_I	BPA	Conventional Hydro		1	86			
DALS1718_J	BPA	Conventional Hydro		1	86			
DALS1920_K	BPA	Conventional Hydro		1	86			
DALS1920_M	BPA	Conventional Hydro		1	86			
DALS2122_N	BPA	Conventional Hydro		1	86			
DALS2122_O	BPA	Conventional Hydro		1	86			
DALSF1F2_F1	BPA	Conventional Hydro		1	86			
DALSF1F2_F2	BPA	Conventional Hydro		1	86			
DanskCT1	ID_UT	CT Small		1	45	14	1.5	1.5
DanskCT2	ID_UT	CT Small		1	45	14	1.5	1.5
DanskCT3	ID_UT	CT Large		1	171	77	5.3	5.3
DAVISG1_1	WALC	Conventional Hydro		1	52			
DAVISG2_1	WALC	Conventional Hydro		1	52			
DAVISG3_1	WALC	Conventional Hydro		1	52			
DAVISG4_1	WALC	Conventional Hydro		1	52			
DAVISG5_1	WALC	Conventional Hydro		1	52			
DavJohnst1	WY	Coal Large Old		1	109	44	1.1	1.1
DavJohnst2	WY	Coal Large Recent		1	109	44	1.1	1.1
DavJohnst3	WY	Coal Large Recent		1	227	91	2.3	2.3
DavJohnst4	WY	Coal Large Recent		1	329	132	3.3	3.3
Deerland Peaker U1	AB	CT LM 6000		1	48	21	5.3	5.3
Deerland Peaker U2	AB	CT LM 6000		1	48	21	5.3	5.3
Deerland Peaker U3	AB	CT LM 6000		1	48	21	5.3	5.3
Deerland Peaker U4	AB	CT LM 6000		1	48	21	5.3	5.3
Delano_CT1	SCE	GT		1	50	20	6.0	6.0
DeltaSTG1	PG&E_BAY	CCGT		1	887	213	6.7	6.7
DENASTG1	NM	CC Frame F		1	575	289	5.9	5.9
Desert Peak 2 Geo	SPP	Geothermal		1	25	13	0.2	0.2
Desert Peak 3 Geo	SPP	Geothermal		1	10	5	0.1	0.1
DesertP1	ID_UT	CT Small		1	35	15.75	1.166666667	1.166666667
DesertP2	ID_UT	CT Small		1	35	15.75	1.166666667	1.166666667
DESRT PK:nt	SPP	Negative Bus Load		1	7.036			
DesrtBasST1	SRP	CC Frame F		1	625	319	5.9	5.9

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
DETROIT_1	BPA	Conventional Hydro		1	50			
DETROIT_2	BPA	Conventional Hydro		1	50			
DEXTER_1	BPA	Small Hydro RPS		1	17			
Dexzel1	PG&E_VLY	Cogeneration		1	28.24	28.24	2.5	2.5
DiablCnyn1	PG&E_VLY	Nuclear		1	1122	921	3.666666667	3.666666667
DiablCnyn2	PG&E_VLY	Nuclear		1	1118	940	3.666666667	3.666666667
DIABLO31_1	NW	Conventional Hydro		1	86			
DIABLO32_2	NW	Conventional Hydro		1	86			
DIASHOW9_1	AB	Biomass RPS		1	40	14	0	0
Dickson Dam	AB	Conventional Hydro		1	15			
Discovry1	PG&E_VLY	Cogeneration		1	1.7	1.7	2.666666667	2.666666667
DK MossLand1	PG&E_VLY	CCGT		1	520	166.59	4.99	4.99
DK MossLand2	PG&E_VLY	CCGT		1	520	166.59	5.02	5.02
DK3Moapa	NEVP	CC Frame F		1	570	313.5	7.14	7.14
DK6Moapa	NEVP	CC Frame F		1	570	313.5	7.14	7.14
DMossPtr1	TEP	CT Small		1	73	21.9	2.433333333	2.433333333
DokieW1	BC	Wind		1	144			
DoubleC1	PG&E_VLY	Cogeneration		1	37.59	37.59	2.666666667	2.666666667
Douglas1	WALC	Steam Small Recent		1	20	5.2	0.333333333	0.333333333
DowABST	AB	CC Recent		1	130	71.5	1.083333333	1.083333333
DowChmcl1	AB	CC Recent		1	110	60.5	0.916666667	0.916666667
DowChmcl2	AB	CC Recent		1	110	60.5	0.916666667	0.916666667
Drayton	AB	Biomass RPS		1	11.6	3.48		
Dry Lake Wind Phase 1	SRP	Wind		1	63			
Dry Lake Wind Phase 2	SRP	Wind		1	64			
DRYFORK1	WY	Coal Large Recent		1	385	154	3.85	3.85
DSM_AESO_1	AB	DSM		1	11	3.63	12.5	12.5
DSM_CHPD_1	NW	DSM		1	40	13.2	12.5	12.5
DSM_EPE_1	NM	DSM		1	35	11.55	12.5	12.5
DSM_EPE_2	NM	DSM		1	34	11.22	12.5	12.5
DSM_EPE_3	NM	DSM		1	32	10.56	12.5	12.5
DSM_IPC_1	ID_UT	DSM		1	128	42.24	12.5	12.5
DSM_IPC_2	ID_UT	DSM		1	128	42.24	12.5	12.5
DSM_IPC_3	ID_UT	DSM		1	55	18.15	12.5	12.5
DSM_IPC_4	ID_UT	DSM		1	55	18.15	12.5	12.5
DSM_NEVP_1	NEVP	DSM		1	92	30.36	12.5	12.5
DSM_NEVP_2	NEVP	DSM		1	49	16.17	12.5	12.5
DSM_NEVP_3	NEVP	DSM		1	47	15.51	12.5	12.5
DSM_NEVP_4	NEVP	DSM		1	45	14.85	12.5	12.5
DSM_NEVP_5	NEVP	DSM		1	42	13.86	12.5	12.5
DSM_NEVP_6	NEVP	DSM		1	41	13.53	12.5	12.5
DSM_PACE_ID	ID_UT	DSM		1	54	17.82	12.5	12.5
DSM_PACE_UT1	ID_UT	DSM		1	96	31.68	12.5	12.5
DSM_PACE_UT2	ID_UT	DSM		1	90	29.7	12.5	12.5
DSM_PACE_UT3	ID_UT	DSM		1	77	25.41	12.5	12.5
DSM_PACE_UT4	ID_UT	DSM		1	72	23.76	12.5	12.5
DSM_PACE_UT5	ID_UT	DSM		1	69	22.77	12.5	12.5
DSM_PACE_UT6	ID_UT	DSM		1	66	21.78	12.5	12.5
DSM_PACE_UT7	ID_UT	DSM		1	62	20.46	12.5	12.5
DSM_PACE_UT8	ID_UT	DSM		1	55	18.15	12.5	12.5
DSM_PACE_WY1	WY	DSM		1	52	17.16	12.5	12.5
DSM_PACE_WY2	WY	DSM		1	51	16.83	12.5	12.5
DSM_PACE_WY3	WY	DSM		1	30	9.9	12.5	12.5
DSM_PACW_1	PACW	DSM		1	26	8.58	12.5	12.5
DSM_PACW_2	PACW	DSM		1	19	6.27	12.5	12.5
DSM_PNM_1	NM	DSM		1	25	8.25	12.5	12.5
DSM_PNM_2	NM	DSM		1	20	6.6	12.5	12.5
DSM_PSC_1	CO	DSM		1	74	24.42	12.5	12.5
DSM_PSC_2	CO	DSM		1	58	19.14	12.5	12.5
DSM_PSC_3	CO	DSM		1	57	18.81	12.5	12.5
DSM_PSC_4	CO	DSM		1	54	17.82	12.5	12.5
DSM_PSC_5	CO	DSM		1	54	17.82	12.5	12.5
DSM_PSC_6	CO	DSM		1	52	17.16	12.5	12.5
DSM_SPP_1	SPP	DSM		1	32	10.56	12.5	12.5
DSM_SPP_2	SPP	DSM		1	31	10.23	12.5	12.5
DSM_SPP_3	SPP	DSM		1	30	9.9	12.5	12.5
DSM_SPP_4	SPP	DSM		1	28	9.24	12.5	12.5
DSM_SRP_1	SRP	DSM		1	174	57.42	12.5	12.5
DSM_SRP_2	SRP	DSM		1	170	56.1	12.5	12.5
DSM_SRP_3	SRP	DSM		1	146	48.18	12.5	12.5

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DSM_TEP_1	TEP	DSM		1	64	21.12	12.5	12.5
DSM_TEP_2	TEP	DSM		1	40	13.2	12.5	12.5
DSM_TEP_3	TEP	DSM		1	38	12.54	12.5	12.5
DSM_TEP_4	TEP	DSM		1	31	10.23	12.5	12.5
Dunlap Wind 1	WY	Wind		1	111			
Dunvegan Hydro	AB	Conventional Hydro		1	100			
DWOR 1_1	BPA	Conventional Hydro		1	152			
DWOR 2_1	BPA	Conventional Hydro		1	152			
DWOR 3_1	BPA	Conventional Hydro		1	152			
East3rdS1	PG&E_BAY	Cogeneration		1	18	18	1	1
EASTWOOD_1	SCE	Pumped Storage		1	200	52		
Echo Wind_1	PACW	Wind		1	64.5			
El Dorado Solar_1	NEVP	Solar PV		1	10			
El Segundo 2_5	SCE	CCGT		1	265	106	2.5	2.5
El Segundo 2_7	SCE	CCGT		1	265	106	2.5	2.5
ELBERT-1_1	CO	Pumped Storage		1	100			
ELBERT-2_1	CO	Pumped Storage		1	100			
ELCAJNGT_1	SDGE	GT		1	15	15	1.8	1.8
ElCajonEnergyCenter	SDGE	CT LM 6000		1		25	7.5	7.5
			SUMMER	1	46			
			WINTER	1	46			
ElCentro2	IID	ST		1	35	10.5	1.666666667	1.666666667
ElCentro2A	IID	CCGT		1	95	64.6	2.5	2.5
ElCentro3	IID	ST		1	44	13.2	1.666666667	1.666666667
ElCentro4	IID	ST		1	80	20	2	2
ELEPHANT BUTTE1-3_1	NM	Conventional Hydro		1	28			
ElkHlls3	PG&E_VLY	CCGT		1	550	176.69	2.56	2.56
Elkhorn Wind	ID_UT	Wind		1	101			
Ellwood1	SCE	CT Old Gas		1	54	21.6		
ELMWORTH_5	AB	IC		1	12	0.96	0.1	0.1
Ely Wind	SPP	Wind		1	50			
EMMETT_1	ID_UT	Small Hydro RPS		1	5.1			
EMMETT_3	ID_UT	Small Hydro RPS		1	5.1			
EMMETTBM	ID_UT	Other Steam		1	7	2.1	0.116666667	0.116666667
EncogenL	NW	CC Recent		1	173	95.15	1.441666667	1.441666667
ENMX_Crsfld_1	AB	CT LM 6000		1	40	18	5.333333333	5.333333333
ENMX_Crsfld_2	AB	CT LM 6000		1	40	18	5.333333333	5.333333333
ENMX_Crsfld_3	AB	CT LM 6000		1	40	18	5.333333333	5.333333333
Entrprs	SDGE	GT		1	50	22.62	2.666666667	2.666666667
ESTES1_1	CO	Conventional Hydro		1	15			
ESTES2_1	CO	Conventional Hydro		1	15			
ESTES3_1	CO	Conventional Hydro		1	15			
ETWPKGEN	SCE	GT		1	49	29.4	5.33	5.33
Everett	BPA	Biomass RPS		1	47	28.2	0.783333333	0.783333333
Existing Bio - IID	IID	Biomass RPS		1	51.86676291			
Existing Bio - OOS	PACW	Biomass RPS		1	76.27103825			
Existing Bio - PGE	PG&E_VLY	Biomass RPS		1	534.5631357			
Existing Bio - SCE	SCE	Biomass RPS		1	198.1329392			
Existing Bio - SDGE	SDGE	Biomass RPS		1	79.2235436			
Existing Geothermal - IID	IID	Geothermal		1	475.8516899			
Existing Geothermal - OOS	SPP	Geothermal		1	96.83469946			
Existing Geothermal - PGE	PG&E_VLY	Geothermal		1	947.9523203			
Existing Geothermal - SCE	SCE	Geothermal		1	345.7348506			
Existing_0509_Solar_IID	IID	Solar Thermal		1	22.48773094			
Existing_0509_Solar_SCE	SCE	Solar Thermal		1	80.75139746			
Existing_Small Hydro_NW	PACW	Small Hydro		1	127.39			
Existing_Solar_IID	IID	Solar Thermal		1	78.70705828			
Existing_Solar_SCE	SCE	Solar Thermal		1	283.1409759			
Existing_Wind_OOS	PACW	Wind		1	338.8888889			
Existing_Wind_PGE	PG&E_VLY	Wind		1	610.6150499			
Existing_Wind_SCE	SCE	Wind		1	1034.347916			
FALL CRK_1	PACW	Small Hydro RPS		1	2			
FARADAY_1	NW	Conventional Hydro		1	21.5			
FARADAY_1a	NW	Conventional Hydro		1	22.69444444			
FarWes1A	SPP	Geothermal		1	11.3	5.65	0.113	0.113
FarWes2	SPP	Geothermal		1	11.3	5.65	0.113	0.113
FarWes3	SPP	Geothermal		1	11.3	5.65	0.113	0.113
FarWest1	SPP	Geothermal		1	11.3	5.65	0.113	0.113
Faulkner Geo_1	SPP	Geothermal		1	35	17.5	0.49	0.49
FeatherRvr1	PG&E_VLY	GT		1	46.3	18.52	5.556	5.556

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Finley	BPA	CT Small		1	30	13.5	1	1
FISHCREK_1	PACW	Conventional Hydro		1	13			
FLATIRN1_2	CO	Conventional Hydro		1	43			
FLATIRN2_1	CO	Conventional Hydro		1	43			
FLGORG1_1	CO	Conventional Hydro		1	50			
FLGORG2_1	CO	Conventional Hydro		1	50			
FLGORG3_1	CO	Conventional Hydro		1	50			
FntnVly1	CO	CT Small		1	40	18	1.333333333	1.333333333
FntnVly2	CO	CT Small		1	40	18	1.333333333	1.333333333
FntnVly3	CO	CT Small		1	40	18	1.333333333	1.333333333
FntnVly4	CO	CT Small		1	40	18	1.333333333	1.333333333
FntnVly5	CO	CT Small		1	40	18	1.333333333	1.333333333
FntnVly6	CO	CT Small		1	40	18	1.333333333	1.333333333
FONTNLLE_1	CO	Small Hydro RPS		1	10			
Foster Creek1	AB	CT Cogen		1	40	18	1.5	1.5
Foster Creek2	AB	CT Cogen		1	40	18	1.5	1.5
FOSTER_1	BPA	Conventional Hydro		1	12.5			
FOSTER_2	BPA	Conventional Hydro		1	12.5			
Foster3	PG&E_BAY	Cogeneration		1	16.77	16.77	2.5	2.5
FPLBlythell	SCE	CCGT		1		208	7.8	7.8
			SUMMER	1	520			
			WINTER	1	520			
FrCrnrs4	APS	Coal Large Recent		1	770	308	7.5	7.5
FrCrnrs5	APS	Coal Large Recent		1	770	308	7.5	7.5
Fredonia1	NW	CT Old Gas		1	104	31.2	2	2
Fredonia2	NW	CT Old Gas		1	104	31.2	2	2
Fredonia3	NW	CT Small		1	50	22.5	1.666666667	1.666666667
Fredonia4	NW	CT Small		1	50	22.5	1.666666667	1.666666667
Fredrck1	NW	CT Old Gas		1	74.4	22.32	1.333333333	1.333333333
Fredrck2	NW	CT Old Gas		1	74.4	22.32	1.333333333	1.333333333
FredrckST	BPA	CC Frame F		1	270	132	2.7	2.7
FREMONT1_1	CO	Conventional Hydro		1	33.4			
FREMONT2_1	CO	Conventional Hydro		1	33.4			
Fresno Cogen Exp	PG&E_VLY	Cogeneration		1	50.5	50.5	2.5	2.5
Fresno1	PG&E_VLY	Cogeneration		1	8	8	2.5	2.5
Fresno2	PG&E_VLY	Cogeneration		1	8	8	2.666666667	2.666666667
FrntRang1	CO	CC Frame F		1	510	230	4.8	4.8
FrtChurch2	SPP	Steam Large Recent		1	117	9.36	1.95	1.95
FrtLuptn1	CO	CT Old Gas		1	50	15	1.333333333	1.333333333
FrtLuptn2	CO	CT Old Gas		1	50	15	1.333333333	1.333333333
FrtNelsn1	AB	CT Small		1	49	22.05	1.633333333	1.633333333
FrtStVrain5	CO	CT Large		1	155	69.75	5.333333333	5.333333333
FrtStVrain6	CO	CT Large		1	155	69.75	5.333333333	5.333333333
FrtStVrainRP	CO	CC Recent		1	758	416.9	5.866666667	5.866666667
Fruita1	CO	CT Old Gas		1	17	5.1	2.666666667	2.666666667
FT CRK1_1	WY	Wind		1	52			
FT CRK2_1	WY	Wind		1	52			
FtJames1	PACW	Biomass RPS		1	37	22.2	0.616666667	0.616666667
FtMcleodW1	AB	Wind		1	81			
FtPeck1	MT	Conventional Hydro		1	75			
Gadsby 1	ID_UT	Steam Small Old		1	69	13.8	1.666666667	1.666666667
Gadsby 2	ID_UT	Steam Small Old		1	69	13.8	1.666666667	1.666666667
Gadsby 3	ID_UT	Steam Large Old		1	100	15	1.666666667	1.666666667
Gadsby 4	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
Gadsby 5	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
Gadsby 6	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
Galena 3 Geo	SPP	Geothermal		1	21.3	10.65	0.265	0.265
GapAB_CC1	AB	CC Recent		1	600	240	2.5	2.5
GapAB_CT1	AB	CT Future		1	400	100	5.333333333	5.333333333
GapAB_CT2	AB	CT Future		1	400	100	5.333333333	5.333333333
GapAB_CT3	AB	CT Future		1	200	50	5.333333333	5.333333333
GapMX_CT1	CFE	CT Future		1	400	120	5.333333333	5.333333333
GATEWAY_1	PG&E_BAY	CCGT		1	579	265	9.69	9.69
GEMST G1_1	ID_UT	Conventional Hydro		1	23.4			
Gen @ BUS_19148_ID_1	SCE	Cogeneration		1	19.93	19.93	2.666666667	2.666666667
Gen @ BUS_19149_ID_2	SCE	Cogeneration		1	17.5	17.5	2.666666667	2.666666667
Gen @ BUS_19436_ID_1	SCE	Cogeneration		1	34.76	34.76	2.5	2.5
Genesee1	AB	Coal Large Recent		1	384	153.6	3.84	3.84
Genesee2	AB	Coal Large Recent		1	384	153.6	3.84	3.84
Genesee3	AB	Coal SuperC		1	450	180	4.7	4.7

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GeorgBrds1	CO	Steam Small Old		1	23	6.9	0.383333333	0.383333333
GeorgBrds2	CO	Steam Small Old		1	17	5.1	0.283333333	0.283333333
GeorgBrds3	CO	Steam Small Old		1	17	5.1	0.283333333	0.283333333
GEPST1	BPA	CC Frame F		1	291	140.25	3.03	3.03
GHOST G9_1	AB	Small Hydro RPS		1	1.1			
Ghost Pine W1	AB	Wind		1	75			
GilaRvrST1	APS	CC Frame F		1	578	282.15	5.89	5.89
GilaRvrST2	APS	CC Frame F		1	568	276.65	5.89	5.89
GilaRvrST3	APS	CC Frame F		1	562	273.35	5.89	5.89
GilaRvrST4	APS	CC Frame F		1	556	270.05	4.86	4.86
Gilroy1	PG&E_BAY	GT		1	45	13.28	1.333333333	1.333333333
Gilroy2	PG&E_BAY	GT		1	45	13.28	1.333333333	1.333333333
Gilroy3	PG&E_BAY	GT		1	45	13.28	1.333333333	1.333333333
Glacier Wind_1	MT	Wind		1	106.5			
Glacier Wind_2	MT	Wind		1	103.5			
GLENC1-2_1	WALC	Conventional Hydro		1	165			
GLENC1-2_2	WALC	Conventional Hydro		1	165			
GLENC3-4_3	WALC	Conventional Hydro		1	165			
GLENC3-4_4	WALC	Conventional Hydro		1	165			
GLENC5-6_5	WALC	Conventional Hydro		1	165			
GLENC5-6_6	WALC	Conventional Hydro		1	165			
GLENC7-8_7	WALC	Conventional Hydro		1	157			
GLENC7-8_8	WALC	Conventional Hydro		1	157			
GLENDO1_1	CO	Conventional Hydro		1	19			
GLENDO2_1	CO	Conventional Hydro		1	19			
GLENOMA_1	BPA	Conventional Hydro		1	30			
Glenrock Wind_1	WY	Wind		1	99			
Glenrock Wind_3	WY	Wind		1	39			
GoalLine1	SDGE	Cogeneration		1	44.04	44.04	2.5	2.5
Gold River BM1	BC	Biomass RPS		1	45	4.5		
Gold River BM2	BC	Biomass RPS		1	45	4.5		
Golden Hills W1	BPA	Wind		1	200			
Golden Valley W1	ID_UT	Wind		1	18			
Goodnoe Hills	BPA	Wind		1	96			
Goodsprings WHRS	NEVP	Biomass RPS		1	5.8	1.16		
Goose1	PG&E_VLY	GT		1	47.5	14.25	2.666666667	2.666666667
Gordon M. Shrum	BC	Conventional Hydro		1	2730			
GORGE 4_4	NW	Conventional Hydro		1	76.05363128			
GORGE_1	NW	Conventional Hydro		1	34.16312849			
GORGE_2	NW	Conventional Hydro		1	34.16312849			
GORGE_3	NW	Conventional Hydro		1	37.62011173			
Goshen North Wind	ID_UT	Wind		1	125			
Goshen_II W1	ID_UT	Wind		1	100			
GRACE G3_1	ID_UT	Small Hydro RPS		1	10			
GRACE G4_1	ID_UT	Small Hydro RPS		1	10			
GRACE G5_1	ID_UT	Small Hydro RPS		1	10			
Grass Vly Geo	SPP	Geothermal		1	31.5	15.75	0.315	0.315
Grayson3	LDWP	ST		1	18	5.4	1.666666667	1.666666667
Grayson4	LDWP	ST		1	44	23.3	4	4
Grayson5	LDWP	ST		1	44	11	4	5
Grayson8A	LDWP	CCGT		1	39	19.5	5	5
Grayson9	LDWP	GT		1	45	11.3	3	3
GrdPrEco_1	AB	Biomass RPS		1	25	7.5		
Greeley3	CO	CC Recent		1	75	41.25	0.625	0.625
GREEN PT_1	BPA	Conventional Hydro		1	92			
Greenlf1-1	PG&E_VLY	Cogeneration		1	18.92	18.92	2.666666667	2.666666667
Greenlf1-2	PG&E_VLY	Cogeneration		1	18.92	18.92	2.666666667	2.666666667
Greenlf2-1	PG&E_VLY	Cogeneration		1	35.29	35.29	2.666666667	2.666666667
GREENMT1_1	CO	Conventional Hydro		1	13			
GREENMT2_1	CO	Conventional Hydro		1	13			
GREENSPG_1	PACW	Conventional Hydro		1	17.2			
Griffith3	WALC	CC Frame F		1	600	302.5	6.42	6.42
GrnlfPkr	PG&E_VLY	GT		1	59.8	17.94	1.333333333	1.333333333
GRYSHB_CC1	BPA	CC Recent		1	650	324.5	5	5
GWF Tracy CCGT	PG&E_VLY	CCGT		1	299	94	7.5	7.5
GWFHanfr1	PG&E_VLY	GT		1	54.8	24.66	1.333333333	1.333333333
GWFHanfr2	PG&E_VLY	GT		1	54.8	24.66	1.333333333	1.333333333
GWFHenrt1	PG&E_VLY	GT		1	48	21.65	1.333333333	1.333333333
GWFHenrt2	PG&E_VLY	GT		1	48	21.65	1.333333333	1.333333333
GWFPwr1	PG&E_VLY	Cogeneration		1	9.005	9.005	2.666666667	2.666666667

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Hagerman	ID_UT	Wind		1	50			
Halkirk 1 Wind	AB	Wind		1	150			
Happy Jack W1	CO	Wind		1	30			
Harbor10B	LDWP	CCGT		1	162	82.08	7	7
HarbrCLP	SCE	Cogeneration		1	100	100	2.5	2.5
HarbrLCT10	LDWP	GT		1	47.5	20	2.666666667	2.666666667
HarbrLM61	LDWP	GT		1	47.5	20	2.666666667	2.666666667
HarbrLM62	LDWP	GT		1	47.5	20	2.666666667	2.666666667
HarbrLM63	LDWP	GT		1	47.5	20	2.666666667	2.666666667
HarbrLM64	LDWP	GT		1	47.5	20	2.666666667	2.666666667
Hardin Generation	MT	Coal Large Recent		1	119	47.6	1.19	1.19
HarquaST1	SRP	CC Frame F		1	378	207.9	3.78	3.78
HarquaST2	SRP	CC Frame F		1	378	207.9	3.78	3.78
HarquaST3	SRP	CC Frame F		1	378	207.9	3.78	3.78
Harry Allen CC1	NEVP	CC Recent		1	524	288.2	4.033333333	4.033333333
Harvest Wind_1	BPA	Wind		1	99			
HAUSER_1	MT	Conventional Hydro		1	17			
Hay Canyon W1	BPA	Wind		1	100			
Hayden1	CO	Coal Large Recent		1	203	81.2	2.03	2.03
Hayden2	CO	Coal Large Recent		1	286	114.4	2.86	2.86
Haynes GT1	LDWP	CT Large		1	100	45	5.33	5.33
Haynes GT2	LDWP	CT Large		1	100	45	5.33	5.33
Haynes GT3	LDWP	CT Large		1	100	45	5.33	5.33
Haynes GT4	LDWP	CT Large		1	100	45	5.33	5.33
Haynes GT5	LDWP	CT Large		1	100	45	5.33	5.33
Haynes GT6	LDWP	CT Large		1	100	45	5.33	5.33
Haynes10	LDWP	CCGT		1	585	163.8	2.5	7
HDesrtST1	SCE	CCGT		1	830	475	4.36	4.36
HEADGAT1_1	WALC	Conventional Hydro		1	6.5			
HEADGAT2_1	WALC	Conventional Hydro		1	6.5			
HEADGAT3_1	WALC	Conventional Hydro		1	6.5			
HEADWORK_1	NW	Conventional Hydro		1	20			
HELMS 1_1	PG&E_VLY	Pumped Storage		1	400	200		
HELMS 2_1	PG&E_VLY	Pumped Storage		1	400	200		
HELMS 3_1	PG&E_VLY	Pumped Storage		1	400	200		
HELSCYN1_1	ID_UT	Conventional Hydro		1	153			
HELSCYN2_1	ID_UT	Conventional Hydro		1	153			
HELSCYN3_1	ID_UT	Conventional Hydro		1	153			
Heritage Small Hydro	BC	Conventional Hydro		1	2000			
Hermstn1B	PACW	CC Frame F		1	237	130.35	2.366666667	2.366666667
Hermstn2B	PACW	CC Frame F		1	237	130.35	2.366666667	2.366666667
HermstST1	BPA	CC Frame F		1	616	300.85	7.5	7.5
HEYBURN:nt	ID_UT	Negative Bus Load		1	10			
Hgonzales_1	SCE	CT Small		1		2	7.5	7.5
			SUMMER	1	5.75			
			WINTER	1	5.75			
Hgonzales_2	SCE	CT Small		1		2	7.5	7.5
			SUMMER	1	5.75			
			WINTER	1	5.75			
High Lonesome W1	NM	Wind		1	100			
High Plains W1	WY	Wind		1	99			
Highwood CC1	MT	CC Recent		1	120	54	2.5	2.5
HILLS CR_1	BPA	Conventional Hydro		1	37			
HiSierra1	PG&E_VLY	Cogeneration		1	42.98	42.98	2.666666667	2.666666667
Hntngtn1	ID_UT	Coal Large Recent		1	463	185.2	4.45	4.45
Hntngtn2	ID_UT	Coal Large Recent		1	468	187.2	4.266666667	4.266666667
HOLTER_1	MT	Conventional Hydro		1	38.4			
Hoover - CAISO	WALC	Hydro		1	525			
Hoover - LDWP	WALC	Hydro		1	551			
Hoover - WECC	WALC	Hydro		1	875			
Hopkins Ridge	NW	Wind		1	157			
Horizon Cogen	AB	CC Cogen		1	103	25.75	1	1
Horse Mesa Pump	SRP	Pumped Storage		1	96			
Hot Springs W1	ID_UT	Wind		1	20			
HotSulphrSprgs Geo_1	SPP	Geothermal		1	48	24	0.48	0.48
HR_Milner_1	AB	Coal Large Recent		1	143	57.2	3.333333333	3.333333333
HR_Milner_CC1	AB	CC Recent		1	500	225	2.5	2.5
HRSHOEGN	MT	Wind		1	9			
HRSMS123_1	SRP	Small Hydro RPS		1	10			
HRSMS123_2	SRP	Small Hydro RPS		1	10			

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
HRSMS123_3	SRP	Small Hydro RPS		1	10			
HumboltBay Repower 1	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 10	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 2	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 3	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 4	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 5	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 6	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 7	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 8	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HumboltBay Repower 9	PG&E_VLY	GT		1	16.3	6.52	1.63	1.63
HUNGHR12_1	BPA	Conventional Hydro		1	77.5			
HUNGHR12_2	BPA	Conventional Hydro		1	77.5			
HUNGHR34_3	BPA	Conventional Hydro		1	77.5			
HUNGHR34_4	BPA	Conventional Hydro		1	77.5			
Hunter1	ID_UT	Coal Large Recent		1	447	178.8	4.3	4.3
Hunter2	ID_UT	Coal Large Recent		1	460	184	4.6	4.6
Hunter3	ID_UT	Coal Large Recent		1	460	184	4.6	4.6
IBMCott1	PG&E_BAY	Oil		1	50	15	1.333333333	1.333333333
ICE H1-2_1	BPA	Conventional Hydro		1	114.8333333			
ICE H1-2_2	BPA	Conventional Hydro		1	114.8333333			
ICE H3-4_3	BPA	Conventional Hydro		1	114.8333333			
ICE H3-4_4	BPA	Conventional Hydro		1	114.8333333			
ICE H5-6_5	BPA	Conventional Hydro		1	114.8333333			
ICE H5-6_6	BPA	Conventional Hydro		1	114.8333333			
ID Sml Hydro Aggr	ID_UT	Small Hydro RPS		1	186.5			
Inland Empire_1	SCE	CCGT		1	400	160	2.5	2.5
Inland Empire_2	SCE	CCGT		1	400	160	2.5	2.5
Inland1	SCE	Cogeneration		1	9.3	9.3	2.666666667	2.666666667
Intrmnt1	ID_UT	Coal Large Recent		1	897	358.8	8.97	8.97
Intrmnt2	ID_UT	Coal Large Recent		1	950	380	9.5	9.5
IRONGATE_1	PACW	Small Hydro RPS		1	20			
IRP Gap CCCT UT1	ID_UT	CC Recent		1	607	333.85	4.583333333	4.583333333
IRP Gap CCCT UT2	ID_UT	CC Recent		1	536	294.8	4.583333333	4.583333333
IRP Gap SCCT ID1	ID_UT	CT Large		1	100	45	5.333333333	5.333333333
Irrican	AB	Conventional Hydro		1	7			
IrvngGT1	TEP	CT Old Gas		1	22	6.6	2.666666667	2.666666667
IrvngGT2	TEP	CT Old Gas		1	22	6.6	2.666666667	2.666666667
Irvngtn1	TEP	Steam Small Old		1	73	21.9	1.216666667	1.216666667
Irvngtn2	TEP	Steam Small Recent		1	73	18.98	1.216666667	1.216666667
Irvngtn3	TEP	Steam Large Recent		1	102	8.16	1.7	1.7
Irvngtn4	TEP	Coal Large Recent		1	115	46	1.15	1.15
IslndCgn	BC	CC Cogen		1	240	132	2	2
JACKSN1_1	BPA	Conventional Hydro		1	55.9			
JACKSN2_1	BPA	Conventional Hydro		1	55.9			
JmBrdgr1	WY	Coal Large Recent		1	539	215.6	5.316666667	5.316666667
JmBrdgr2	WY	Coal Large Recent		1	539	215.6	5.316666667	5.316666667
JmBrdgr3	WY	Coal Large Recent		1	539	215.6	5.316666667	5.316666667
JmBrdgr4	WY	Coal Large Recent		1	539	215.6	5.316666667	5.316666667
JoffrCgnP	AB	CC Cogen		1	474	260.7	4.85	4.85
JOHNSTN:nt	CO	Negative Bus Load		1	3			
JONDAY01_1	BPA	Conventional Hydro		1	155.25			
JONDAY01_2	BPA	Conventional Hydro		1	155.25			
JONDAY03_3	BPA	Conventional Hydro		1	155.25			
JONDAY03_4	BPA	Conventional Hydro		1	155.25			
JONDAY05_5	BPA	Conventional Hydro		1	155.25			
JONDAY05_6	BPA	Conventional Hydro		1	155.25			
JONDAY07_7	BPA	Conventional Hydro		1	155.25			
JONDAY07_8	BPA	Conventional Hydro		1	155.25			
JONDAY09_9	BPA	Conventional Hydro		1	155.25			
JONDAY09_A	BPA	Conventional Hydro		1	155.25			
JONDAY11_B	BPA	Conventional Hydro		1	155.25			
JONDAY11_C	BPA	Conventional Hydro		1	155.25			
JONDAY13_D	BPA	Conventional Hydro		1	155.25			
JONDAY13_E	BPA	Conventional Hydro		1	155.25			
JONDAY15_F	BPA	Conventional Hydro		1	155.25			
JONDAY15_G	BPA	Conventional Hydro		1	155.25			
JRWood1	PG&E_VLY	Cogeneration		1	1.84	1.84	2.666666667	2.666666667
Judith Gap Wind	MT	Wind		1	135			
KANANAS9_3	AB	Small Hydro RPS		1	19			

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Kearl Cogen 1	AB	CT Cogen		1	100	50	1	1
Kearn2AB1	SDGE	GT		1	14	14	1.68	1.68
Kearn2AB2	SDGE	GT		1	14	14	1.68	1.68
Kearn2CD1	SDGE	GT		1	14	14	1.68	1.68
Kearn2CD2	SDGE	GT		1	13	13	1.56	1.56
Kearn3AB1	SDGE	GT		1	15	15	1.8	1.8
Kearn3AB2	SDGE	GT		1	14	14	1.68	1.68
Kearn3CD1	SDGE	GT		1	14	14	1.68	1.68
Kearn3CD2	SDGE	GT		1	14	14	1.68	1.68
KearnGT1	SDGE	GT		1	16	16	1.92	1.92
Kephlls1	AB	Coal Large Recent		1	411	164.4	4.11	4.11
Kephlls2	AB	Coal Large Recent		1	411	164.4	4.11	4.11
Kephlls3	AB	Coal SuperC		1	450	180	4.5	4.5
KernFrnt1	PG&E_VLY	Cogeneration		1	37.6	37.6	2.5	2.5
KERR12_1	MT	Conventional Hydro		1	122			
KERR3_1	MT	Conventional Hydro		1	70			
KETTLEAV_1	NW	Biomass RPS		1	48	14.4		
Kettles Hill W1	AB	Wind		1	63			
KingCty1	PG&E_VLY	Cogeneration		1	92.19	92.19	2.5	2.5
KingCtyPk	PG&E_VLY	GT		1	50	22.13	1.333333333	1.333333333
Kit Carson W1	CO	Wind		1	51			
KlamGT1	PACW	CT Small		1	50	22.5	1.666666667	1.666666667
KlamGT2	PACW	CT Small		1	50	22.5	1.666666667	1.666666667
KlmthCgn	PACW	CC Frame F		1	536	321.6	1.75	1.75
Klodike 2	BPA	Wind		1	75			
KLOND W1_1	BPA	Wind		1	12.5			
KLOND W1_2	BPA	Wind		1	12.5			
Klondike W3-A	BPA	Wind		1	225			
Klondike W3-B	BPA	Wind		1	75			
KN Waste Heat	BC	Biomass RPS		1	11	3.3		
Kngsbrg1	PG&E_VLY	Cogeneration		1	23.31	23.31	2.5	2.5
KNNCTT1	ID_UT	Coal Small Old		1	82.5	33	3.333333333	3.333333333
KNNCTT2	ID_UT	Coal Small Old		1	50	20	3.333333333	3.333333333
KNNCTT3	ID_UT	Coal Small Old		1	50	20	3.333333333	3.333333333
KNNCTT4	ID_UT	CC Frame F		1	50	27.5	0.5	0.5
KOMO K_1	NW	Conventional Hydro		1	14			
KORTES1_1	CO	Conventional Hydro		1	12			
KORTES2_1	CO	Conventional Hydro		1	12			
KORTES3_1	CO	Conventional Hydro		1	12			
KrnRvrC2	PG&E_VLY	CCGT		1	76	50.16	2.5	2.5
KyrenCC1A	SRP	CC Frame F		1	250	137.5	2.5	2.5
Kyrene1	SRP	Steam Small Old		1	34	9.86	0.566666667	0.566666667
Kyrene2	SRP	Steam Small Old		1	72	12.02	1.2	1.2
KyrenGT4	SRP	CT Old Gas		1	59	4.01	5	5
KyrenGT5	SRP	CT Old Gas		1	53	5.99	6	6
KyrenGT6	SRP	CT Old Gas		1	53	5.99	6	6
L MALAD_1	ID_UT	Conventional Hydro		1	16			
L SAMN 1_1	ID_UT	Conventional Hydro		1	17.5			
L SAMN 2_1	ID_UT	Conventional Hydro		1	17.5			
L SAMN 3_1	ID_UT	Conventional Hydro		1	17.5			
L SAMN 4_1	ID_UT	Conventional Hydro		1	17.5			
La Rumorosa Wind	CFE	Wind		1	10			
LAGRND_1	NW	Conventional Hydro		1	24			
LAGRND5_1	NW	Conventional Hydro		1	43			
LAMAR DC_1	CO	CT Old Gas		1	210	63	2.166666667	2.166666667
Lambie1	PG&E_VLY	GT		1	47.5	14.25	8	8
LamrPlt1	CO	Coal Small Recent		1	38	15.2	0.38	0.38
Lancaster CC_1	NW	CC Frame F		1	278	136.4	2.5	2.5
Lange 1	CO	CT Small		1	38.7	17.42	1.29	1.29
Langley_Gulch CC	ID_UT	CC Recent		1	300	165	2.5	2.5
LANL TA-3_4	NM	CT Small		1	24	10.8	0.8	0.8
LaPaloma1	PG&E_VLY	CCGT		1	256	76.5	6.5	6.5
LaPaloma2	PG&E_VLY	CCGT		1	256	76.5	5	5
LaPaloma3	PG&E_VLY	CCGT		1	256	76.5	6.6	6.6
LaPaloma4	PG&E_VLY	CCGT		1	256	76.5	6.2	6.2
Larkspr1	SDGE	GT		1	45	20.54	2.666666667	2.666666667
Larkspr2	SDGE	GT		1	45	20.54	2.666666667	2.666666667
LaRosCC	SDGE	CCGT		1	352	193.6	2.5	2.5
LaRosit1	CFE	CC Frame F		1	250	137.5	1.856	1.856
LaRosit2	CFE	CC Frame F		1	250	137.5	2.5	2.5

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
LaRosit3	CFE	CC Frame F		1	250	137.5	2.5	2.5
Lava Beds W1	ID_UT	Wind		1	18			
LDWP_DGPV	LDWP	Solar PV		1	178.4231866			
LDWP_ST	LDWP	Solar Thermal		1	370			
LDWP_Wind	LDWP	Wind		1	272.1444671			
LEABURGS_1	BPA	Conventional Hydro		1	13.8			
LEADVIL1:nt	CO	Negative Bus Load		1	2.8			
Leaning Juniper W1	BPA	Wind		1	100			
Leaning Juniper W2	BPA	Wind		1	277			
LEMOLO1_1	PACW	Conventional Hydro		1	32			
LEMOLO2_1	PACW	Conventional Hydro		1	35			
LFD_Energy	LFD	LFD		1	5001			
LFD_Only	LFD	LFD		1	5001	1		
LIBBY_1	BPA	Conventional Hydro		1	120			
LIBBY_2	BPA	Conventional Hydro		1	120			
LIBBY_3	BPA	Conventional Hydro		1	120			
LIBBY_4	BPA	Conventional Hydro		1	120			
LIBBY_5	BPA	Conventional Hydro		1	120			
Lightning Dock Geo_1	NM	Geothermal		1	15	7.5	0.5	0.5
Lincoln1	CO	CT Large		1	77	18.48	1.333333333	1.333333333
Lincoln2	CO	CT Large		1	77	18.48	1.333333333	1.333333333
Linden Ranch W1	BPA	Wind		1	50			
LIT GOOS_1	BPA	Conventional Hydro		1	154.6666667			
LIT GOOS_2	BPA	Conventional Hydro		1	154.6666667			
LIT GOOS_3	BPA	Conventional Hydro		1	154.6666667			
LIT GOOS_4	BPA	Conventional Hydro		1	154.6666667			
LIT GOOS_5	BPA	Conventional Hydro		1	154.6666667			
LIT GOOS_6	BPA	Conventional Hydro		1	154.6666667			
LITFAL34_3	NW	Conventional Hydro		1	35			
LkHodgPS1	SDGE	Pumped Storage		1	20	5		
LkHodgPS2	SDGE	Pumped Storage		1	20	5		
LM Biomass	BC	Biomass RPS		1	53	15.9		
LngBchPk1	SCE	GT		1	65	39	5.33	5.33
LngBchPk2	SCE	GT		1	65	39	5.33	5.33
LngBchPk3	SCE	GT		1	65	39	5.33	5.33
LngBchPk4	SCE	GT		1	65	39	5.33	5.33
LO BAKER_1	NW	Conventional Hydro		1	76			
Lodi Energy Center	PG&E_VLY	CCGT		1		80	7.5	7.5
			SUMMER	1	255			
			WINTER	1	255			
Lodi GT1	PG&E_VLY	GT		1	25.6	11.52	2.666666667	2.666666667
Long Lake CG_1	AB	CT Cogen		1	80	48	1	1
Long Lake CG_2	AB	CT Cogen		1	80	48	1	1
Long Lake CG_3	AB	CT Cogen		1	11.5	6.9	1	1
Long Lake CG_4	AB	CT Cogen		1	11.5	6.9	1	1
LONGLKG1_1	NW	Conventional Hydro		1	22.6			
LONGLKG2_2	NW	Conventional Hydro		1	22.6			
LONGLKG3_3	NW	Conventional Hydro		1	22.6			
LONGLKG4_4	NW	Conventional Hydro		1	22.6			
LONGVIEW_1	BPA	Wind		1	89			
LOOKOUT_1	BPA	Conventional Hydro		1	49.66666667			
LOOKOUT_2	BPA	Conventional Hydro		1	49.66666667			
LOOKOUT_3	BPA	Conventional Hydro		1	49.66666667			
Los Esteros Calpine	PG&E_BAY	CCGT		1	320	128	7.5	7.5
LOST CRK_1	BPA	Conventional Hydro		1	27			
LOST CRK_2	BPA	Conventional Hydro		1	27			
LOW GRAN_1	BPA	Conventional Hydro		1	146.667			
LOW GRAN_2	BPA	Conventional Hydro		1	146.667			
LOW GRAN_3	BPA	Conventional Hydro		1	146.667			
LOW GRAN_4	BPA	Conventional Hydro		1	146.667			
LOW GRAN_5	BPA	Conventional Hydro		1	146.667			
LOW GRAN_6	BPA	Conventional Hydro		1	146.667			
LOW MON_1	BPA	Conventional Hydro		1	153.6666667			
LOW MON_2	BPA	Conventional Hydro		1	153.6666667			
LOW MON_3	BPA	Conventional Hydro		1	153.6666667			
LOW MON_4	BPA	Conventional Hydro		1	153.6666667			
LOW MON_5	BPA	Conventional Hydro		1	153.6666667			
LOW MON_6	BPA	Conventional Hydro		1	153.6666667			
Lower Snake Rvr W1	NW	Wind		1	250			
Loyaltn1	SPP	Biomass RPS		1	13	3.9		

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Lrdsbrg1	NM	CT Small		1	40	18	1.333333333	1.333333333
Lrdsbrg2	NM	CT Small		1	40	18	1.333333333	1.333333333
LrmRStt2	CO	Coal Large Recent		1	553.5	221.4	5.535	5.535
LrmRStt3	CO	Coal Large Recent		1	553.5	221.4	5.535	5.535
LsMdnsS1	PG&E_BAY	CCGT		1	555	161.26	7.97	7.97
LsVgsCgl3	NEVP	CC Frame F		1	120	66	1.41	1.41
LsVgsCgll3	NEVP	CC Frame F		1	120	66	1.41	1.41
LUCKYPK1_1	NW	Conventional Hydro		1	45			
LUCKYPK2_2	NW	Conventional Hydro		1	45			
LUCKYPK2_3	NW	Conventional Hydro		1	11.3			
LVCgn2-1	NEVP	CC Cogen		1	50	27.5	0.375	0.375
LvrdgRd1	PG&E_BAY	Cogeneration		1	9.005	9.005	1	1
Macho Springs	TEP	Wind		1	50			
Mackay	AB	CT Cogen		1	150	36	2	2
Mackenzie Green	BC	Biomass RPS		1	50	15		
Magic Wind W1	ID_UT	Wind		1	20			
MagnST	LDWP	CCGT		1	328	187	7	7
Magrath Wind	AB	Wind		1	30			
Malaga	PG&E_VLY	GT		1	47	21.15	2.666666667	2.666666667
Malaga 2	PG&E_VLY	GT		1	47	21.15	2.666666667	2.666666667
Malburg CC1	SCE	CCGT		1	134	59.5	2.01	2.01
Manchif1	CO	CT Large		1	140	33.6	2	2
Manchif2	CO	CT Large		1	140	33.6	2	2
MAPLETO1:nt	CO	Negative Bus Load		1	3.9			
MarchPntL	NW	CC Old		1	140	77	1.166666667	1.166666667
MARENGO	PACW	Wind		1	140			
MARENGO_2	NW	Wind		1	70			
Mariposa_EP1	PG&E_BAY	GT		1	50	35	3.333333333	3.333333333
Mariposa_EP2	PG&E_BAY	GT		1	50	35	3.333333333	3.333333333
Mariposa_EP3	PG&E_BAY	GT		1	50	35	3.333333333	3.333333333
Mariposa_EP4	PG&E_BAY	GT		1	50	35	3.333333333	3.333333333
Marsh_Landing1	PG&E_BAY	GT		1	190	108	13.33333333	13.33333333
Marsh_Landing2	PG&E_BAY	GT		1	190	108	13.33333333	13.33333333
Marsh_Landing3	PG&E_BAY	GT		1	190	108	13.33333333	13.33333333
Marsh_Landing4	PG&E_BAY	GT		1	190	108	13.33333333	13.33333333
MARTIN 2:nt	CO	Negative Bus Load		1	0.5			
MartnDrk5	CO	Coal Small Recent		1	47	18.8	0.47	0.47
MartnDrk6	CO	Coal Small Recent		1	79	31.6	0.79	0.79
MartnDrk7	CO	Coal Large Recent		1	133.7	53.48	1.337	1.337
MAYFIELD_1	NW	Conventional Hydro		1	45			
MAYFIELD_2	NW	Conventional Hydro		1	45			
MAYFIELD_3	NW	Conventional Hydro		1	45			
MAYFIELD_4	NW	Conventional Hydro		1	45			
MCBRIDE2_1	AB	Wind		1	26.4			
MCBRIDE3_2	AB	Wind		1	9.9			
MCBRIDE3_3	AB	Wind		1	12.5			
MCBRIDE4_4	AB	Wind		1	27.2			
McCllln1	SMUD	GT		1	77	19.3	1.333333333	1.333333333
McClure1	SMUD	Oil		1	61	15.3	1.333333333	1.333333333
McClure2	SMUD	Oil		1	61	15.3	1.333333333	1.333333333
McFadden Ridge I	WY	Wind		1	28.5			
McNary Fish	BPA	Conventional Hydro		1	8.9			
MCNY0102_1	BPA	Conventional Hydro		1	78.57142857			
MCNY0102_2	BPA	Conventional Hydro		1	78.57142857			
MCNY0304_3	BPA	Conventional Hydro		1	78.57142857			
MCNY0304_4	BPA	Conventional Hydro		1	78.57142857			
MCNY0506_5	BPA	Conventional Hydro		1	78.57142857			
MCNY0506_6	BPA	Conventional Hydro		1	78.57142857			
MCNY0708_7	BPA	Conventional Hydro		1	78.57142857			
MCNY0708_8	BPA	Conventional Hydro		1	78.57142857			
MCNY0910_9	BPA	Conventional Hydro		1	78.57142857			
MCNY0910_A	BPA	Conventional Hydro		1	78.57142857			
MCNY1112_B	BPA	Conventional Hydro		1	78.57142857			
MCNY1112_C	BPA	Conventional Hydro		1	78.57142857			
MCNY1314_D	BPA	Conventional Hydro		1	78.57142857			
MCNY1314_E	BPA	Conventional Hydro		1	78.57142857			
MedcnHt10	AB	CT Small		1	28.2	12.69	0.94	0.94
MedcnHt11	AB	CT Small		1	27.9	12.56	0.93	0.93
MedcnHt12	AB	Steam Small Recent		1	39.8	10.35	0.663333333	0.663333333
MedcnHt15	AB	CT Small		1	41.5	12.45	2.666666667	2.666666667

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
MedcnHt3	AB	Steam Small Recent		1	37.8	9.83	0.63	0.63
MedcnHt7	AB	CT Old Gas		1	29.9	8.97	2.666666667	2.666666667
MedcnHt9	AB	CT Old Gas		1	44.9	13.47	2.666666667	2.666666667
MERWIN 1_1	PACW	Conventional Hydro		1	56			
MERWIN 2_1	PACW	Conventional Hydro		1	56			
MERWIN 3_1	PACW	Conventional Hydro		1	56			
MesquitST1	SRP	CC Frame F		1	625	341.46	6.77	6.77
MesquitST2	SRP	CC Frame F		1	625	341.46	6.77	6.77
Metcalf	PG&E_BAY	CCGT		1	600	173.9	5.69	5.69
Mexical2	CFE	CT Old Oil		1	22.1	6.63	0.736666667	0.736666667
Mexical3	CFE	CT Old Oil		1	22.1	6.63	0.736666667	0.736666667
Mica	BC	Conventional Hydro		1	2650			
Midsun1	PG&E_VLY	Cogeneration		1	68.09666667	68.09666667	2.666666667	2.666666667
Midsun2	PG&E_VLY	Cogeneration		1	68.09666667	68.09666667	2.666666667	2.666666667
Midsun3	PG&E_VLY	Cogeneration		1	68.09666667	68.09666667	2.666666667	2.666666667
Milagro CT_1	WALC	CT Cogen		1	32	14.4	1	1
Milagro CT_2	WALC	CT Cogen		1	32	14.4	1	1
MILCTYDC:D1	MT	Negative Bus Load		1	140			
Miller_Ranch W1	BPA	Wind		1	150			
MILNER_1	ID_UT	Conventional Hydro		1	47.74436742			
MILNER_2	ID_UT	Conventional Hydro		1	11.75563258			
MINIDOKA_8	ID_UT	Conventional Hydro		1	13.85			
MINIDOKA_9	ID_UT	Conventional Hydro		1	13.85			
MINTFRM_CC1	BPA	CC Recent		1	376	185.9	3.133333333	3.133333333
Miramar MEFI	SDGE	GT		1	49	9.2	1.67	1.67
Miramar MEFII	SDGE	GT		1	49	9.2	1.67	1.67
Miramar1	SDGE	GT		1	17	17	2.04	2.04
Miramar2	SDGE	GT		1	17	17	2.04	2.04
Mirant3	NEVP	CC Frame F		1	550	275	6.36	6.36
Mobil1	SCE	Cogeneration		1	0.35	0.35	2.666666667	2.666666667
MojGen1	SCE	Cogeneration		1	49.27	49.27	2.5	2.5
MONROEA_1	NW	Conventional Hydro		1	15.6			
MONTANA1_1	MT	Coal Small Recent		1	42	16.8	0.42	0.42
Mormon Flat Pump	SRP	Pumped Storage		1	50			
MORONY_1	MT	Conventional Hydro		1	47			
MORRO1-2_1	CO	Conventional Hydro		1	80			
MORRO1-2_2	CO	Conventional Hydro		1	80			
MorrwPwr	BPA	CT Small		1	24.8	11.16	0.826666667	0.826666667
MOSSY RK_1	NW	Conventional Hydro		1	192			
MOSSY RK_2	NW	Conventional Hydro		1	192			
MountHayes1	BC	Wind		1	27			
MountWind1	WY	Wind		1	60			
MountWind2	WY	Wind		1	80			
MRCHN23C	NEVP	CC Frame F		1	533	293.15	5.19	5.19
MRLPKGEN	SCE	GT		1	49	29.4	5.33	5.33
MT HOME:nt	ID_UT	Negative Bus Load		1	10			
MT State Rollup	MT	Conventional Hydro		1	31.5			
MT_Wind	MT	Wind		1	300			
MTNVWAS1_1	SCE	CCGT		1	528	169.9	3.7	3.7
MTNVWBS1_1	SCE	CCGT		1	528	169.9	3.7	3.7
MtPosoCG1	PG&E_VLY	Cogeneration		1	21.695	21.695	1	1
MtPosoCG2	PG&E_VLY	Cogeneration		1	21.695	21.695	1	1
MuskgRvr1	AB	CT Cogen		1	85	51	2.5	2.5
MuskgRvr2	AB	CT Cogen		1	85	51	2.5	2.5
Mustus Biomass	AB	Biomass RPS		1	35	14		
Mystic	MT	Conventional Hydro		1	12			
Naughtn1	ID_UT	Coal Large Recent		1	167	66.8	1.666666667	1.666666667
Naughtn2	ID_UT	Coal Large Recent		1	210	84	2.1	2.1
Naughtn3	ID_UT	Coal Large Recent		1	330	132	3.3	3.3
Navajo Dam	WALC	Conventional Hydro		1	30			
Navajo1	SRP	Coal Large Recent		1	750	300	7.5	7.5
Navajo2	SRP	Coal Large Recent		1	750	300	7.5	7.5
Navajo3	SRP	Coal Large Recent		1	750	300	7.5	7.5
NC Biomass	BC	Biomass RPS		1	53	15.9		
NC1A-NV1	NEVP	IC		1	23	1.84	0.766666667	0.766666667
NC1A-NV2	NEVP	IC		1	23	1.84	0.766666667	0.766666667
NC1B-NV1	NEVP	IC		1	23	1.84	0.766666667	0.766666667
NC1B-NV2	NEVP	IC		1	19.5	1.56	0.65	0.65
NC2A-NVC1	NEVP	IC		1	23	1.84	0.766666667	0.766666667
NC2A-NVC2	NEVP	IC		1	23	1.84	0.766666667	0.766666667

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NC2B-NV1	NEVP	IC		1	23	1.84	0.766666667	0.766666667
NC2B-NV2	NEVP	IC		1	19.5	1.56	0.65	0.65
NchlsRd1	PG&E_BAY	Cogeneration		1	17.72	17.72	3.333333333	3.333333333
NCWCD_1	CO	Pumped Storage		1	36			
Neal Hot Springs	ID_UT	Geothermal		1	26	13	0.5	0.5
Nebo_CC	ID_UT	CC Recent		1	150	82.5	1.083333333	1.083333333
New Resources	BC	Conventional Hydro		1	5000			
Newman1	NM	Steam Small Recent		1	74	19.24	1.283333333	1.283333333
Newman2	NM	Steam Small Recent		1	76	19.76	1.333333333	1.333333333
Newman3	NM	Steam Large Recent		1	97	7.76	1.683333333	1.683333333
NEWMN_CC5	NM	CC Recent		1	288	142.56	2.4	2.4
NewmnCC4	NM	CC Old		1	222	122.1	1.85	1.85
NI Wind	BC	Wind		1	144			
NINEMI34_3	NW	Conventional Hydro		1	11			
NINEMI34_4	NW	Conventional Hydro		1	11			
NLNDGT#1	IID	GT		1	46.5	35	5.333333333	5.333333333
NLNDGT#2	IID	GT		1	46.5	35	5.333333333	5.333333333
NM State Rollup	NM	Conventional Hydro		1	8.2			
NM Wind_EC1	NM	Wind		1	204			
No_Colorado Wind	CO	Wind		1	174			
NORTH FK_1	NW	Conventional Hydro		1	27			
NORTH FK_2	NW	Conventional Hydro		1	27			
Northeast1	NW	CT Old Gas		1	68	20.4	1.333333333	1.333333333
NorthIslCT1	SDGE	Cogeneration		1	34.16	34.16	2.666666667	2.666666667
NorthLp1	TEP	CT Old Gas		1	22	6.6	2.666666667	2.666666667
NorthLp2	TEP	CT Old Gas		1	22	6.6	2.666666667	2.666666667
NorthLp3	TEP	CT Old Gas		1	22	6.6	2.666666667	2.666666667
NorthLp4	TEP	CT Old Gas		1	20	6	2.666666667	2.666666667
NOXON 5_5	NW	Conventional Hydro		1	132			
NOXON12_1	NW	Conventional Hydro		1	108			
NOXON12_2	NW	Conventional Hydro		1	108			
NOXON34_3	NW	Conventional Hydro		1	108			
NOXON34_4	NW	Conventional Hydro		1	108			
NP15_Dispatch	PG&E_VLY	Hydro		1	0	0	0	0
NP15_ROR	PG&E_VLY	Hydro		1	1800			
NrthPrairie1	AB	CT Large		1	93	27.9	5.333333333	5.333333333
NSimpGT1	CO	CT Small		1	38.7	17.42	1.29	1.29
NSimpGT2	CO	CT Small		1	40	18	1.333333333	1.333333333
NSimpsN1	CO	Coal Small Recent		1	18.6	7.44	0.186	0.186
NSimpsN2	CO	Coal Small Recent		1	82.2	32.88	0.822	0.822
NTC MCRD QF	SDGE	Cogeneration		1	1.64	1.64		
Nucla1	CO	Coal Small Old		1	15	6	3.333333333	3.333333333
Nucla2	CO	Coal Small Old		1	15	6	3.333333333	3.333333333
Nucla3	CO	Coal Small Old		1	15	6	3.333333333	3.333333333
Nucla4	CO	Coal Small Recent		1	70	28	0.7	0.7
NV Solar One	NEVP	Solar CSP0		1	75			
NV State Rollup	SPP	Conventional Hydro		1	8.2			
NV_LgPV	NEVP	Solar PV		1	50			
NV_ST	NEVP	Solar Thermal		1	400			
NvlStCT1	SDGE	Cogeneration		1	36.47	36.47	2.5	2.5
NW_Wind	BPA	Wind		1	2355			
OAKGROVE_1	NW	Conventional Hydro		1	25			
OAKGROVE_2	NW	Conventional Hydro		1	25			
Ocotill1	APS	Steam Large Recent		1	114.9	9.19	1.915	1.915
Ocotill2	APS	Steam Large Recent		1	114.9	9.19	1.915	1.915
OctllGT1	APS	CT Old Gas		1	55.9	16.77	1.333333333	1.333333333
OctllGT2	APS	CT Old Gas		1	55.9	16.77	1.333333333	1.333333333
Oildale1	PG&E_VLY	Cogeneration		1	37.5	37.5	2.5	2.5
OLDMAN R_1	AB	Conventional Hydro		1	16.1			
OLDMAN R_2	AB	Conventional Hydro		1	16.1			
OldmnRvr_W1	AB	Wind		1	46.8			
Olive1	LDWP	ST		1	42	21.7	1.666666667	1.666666667
Olive2	LDWP	ST		1	55	16.4	2	2
OLSChino1	SCE	Cogeneration		1	25.07	25.07	2.5	2.5
OmarHl1	SCE	Cogeneration		1	77.25	77.25	2.5	2.5
OmarHl2	SCE	Cogeneration		1	77.25	77.25	2.5	2.5
OmarHl3	SCE	Cogeneration		1	77.25	77.25	2.5	2.5
OmarHl4	SCE	Cogeneration		1	77.25	77.25	2.5	2.5
ONED G1_1	ID_UT	Small Hydro RPS		1	6.333333			
ONED G23_1	ID_UT	Small Hydro RPS		1	6.333333			

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ONED G23_2	ID_UT	Small Hydro RPS		1	6.333333			
OR Sml Hydro Aggr	NW	Small Hydro RPS		1	74.3			
Orange Grove AFC 1	SDGE	GT		1	48	20	2	2
Orange Grove AFC 2	SDGE	GT		1	48	20	2	2
OSAGE1_1	CO	Coal Small Old		1	11.5	4.6	3.333333333	3.333333333
OSAGE2_2	CO	Coal Small Old		1	11.5	4.6	3.333333333	3.333333333
OSAGE3_3	CO	Coal Small Old		1	11.5	4.6	3.333333333	3.333333333
OtayST1	SDGE	CCGT		1	590	236	4.8	4.8
OXBOW1-2_1	ID_UT	Conventional Hydro		1	55			
OXBOW1-2_2	ID_UT	Conventional Hydro		1	55			
OXBOW3-4_3	ID_UT	Conventional Hydro		1	55			
OXBOW3-4_4	ID_UT	Conventional Hydro		1	55			
OXMTN	PG&E_BAY	Cogeneration		1	10.14	10.14	1	1
Oxnard1	SCE	Cogeneration		1	32.53	32.53	2.666666667	2.666666667
P&GOxnrd2	SCE	Cogeneration		1	44.65	44.65	2.666666667	2.666666667
PALIS G1_1	ID_UT	Conventional Hydro		1	44.1			
PALIS G2_1	ID_UT	Conventional Hydro		1	44.1			
PALIS G3_1	ID_UT	Conventional Hydro		1	44.1			
PALIS G4_1	ID_UT	Conventional Hydro		1	44.1			
PalomrST1	SDGE	CCGT		1	546	164.09	3.69	3.69
PaloVerd1	APS	Nuclear		1	1345	672.5	4.483333333	4.483333333
PaloVerd2	APS	Nuclear		1	1345	672.5	4.483333333	4.483333333
PaloVerd3	APS	Nuclear		1	1345	672.5	4.483333333	4.483333333
PancheCpk	PG&E_VLY	GT		1	49	22.05	2.666666667	2.666666667
PancheWhd	PG&E_VLY	GT		1	49	22.05	2.666666667	2.666666667
Panoche EC_1	PG&E_VLY	GT		1	95.49	40	12	12
Panoche EC_2	PG&E_VLY	GT		1	95.49	40	12	12
Panoche EC_3	PG&E_VLY	GT		1	95.49	40	12	12
Panoche EC_4	PG&E_VLY	GT		1	95.49	40	12	12
PARKERG1_1	WALC	Conventional Hydro		1	26			
PARKERG2_1	WALC	Conventional Hydro		1	26			
PARKERG3_1	WALC	Conventional Hydro		1	26			
PARKERG4_1	WALC	Conventional Hydro		1	26			
Pasadna1	SCE	GT		1	22.3	6.69	2.67	2.67
Pasadna2	SCE	GT		1	22.3	6.69	2.67	2.67
Pasadna3	SCE	GT		1	44.83	13.45	2.67	2.67
Pasadna4	SCE	GT		1	42.42	12.73	2.67	2.67
Pawnee1	CO	Coal Large Recent		1	498.2	199.28	4.982	4.982
PdtJrz-5	CFE	Steam Large Recent		1	152	12.16	2.533333333	2.533333333
PdtJrz-6	CFE	Steam Large Recent		1	152	12.16	2.533333333	2.533333333
PdtJrzG1	CFE	CT Old Gas		1	28	8.4	2.666666667	2.666666667
PdtJrzG2	CFE	CT Old Gas		1	28	8.4	2.666666667	2.666666667
PdtJrzG3	CFE	CT Large		1	152.5	36.6	2	2
Peace Canyon	BC	Conventional Hydro		1	700			
Pebble Springs W1	BPA	Wind		1	99			
Pegs1	NM	Coal Large Recent		1	245	98	2.45	2.45
PELTON_1	NW	Conventional Hydro		1	36			
PELTON_2	NW	Conventional Hydro		1	36			
PELTON_3	NW	Conventional Hydro		1	36			
PELTONR1_1	PACW	Conventional Hydro		1	20.3			
PG&E_BAY Existing CHP Bundle	PG&E_BAY	CHP		1	69.05653407	69.05653407		
PG&E_BAY Generic LMS100	PG&E_BAY	CT Future		1	100	50	12	12
PG&E_BAY New CHP	PG&E_BAY	CHP		1	91.54499204	91.54499204		
PG&E_BAY QF Agg	PG&E_BAY	QF		1	4.1	4.1		
PG&E_VLY Existing CHP Bundle	PG&E_VLY	CHP		1	208.4485047	208.4485047		
PG&E_VLY Generic LMS100	PG&E_VLY	CT Future		1	100	50	12	12
PG&E_VLY New CHP	PG&E_VLY	CHP		1	276.3303569	276.3303569		
PG&E_VLY QF Agg	PG&E_VLY	QF		1	27.6	27.6		
PGE_BAY_Econ DR_Hi_A	PG&E_BAY	DR		1	57.4	57.4		
PGE_BAY_Econ DR_Hi_S	PG&E_BAY	DR		1	114.9	114.9		
PGE_BAY_Econ DR_Low_A	PG&E_BAY	DR		1	111.9	111.9		
PGE_BAY_Econ DR_Low_S	PG&E_BAY	DR		1	223.8	223.8		
PGE_BAY_Econ DR_Mid_A	PG&E_BAY	DR		1	111.9	111.9		
PGE_BAY_Econ DR_Mid_S	PG&E_BAY	DR		1	223.8	223.8		
PGE_VLY_Econ DR_Hi_A	PG&E_VLY	DR		1	57.4	57.4		
PGE_VLY_Econ DR_Hi_S	PG&E_VLY	DR		1	114.9	114.9		
PGE_VLY_Econ DR_Low_A	PG&E_VLY	DR		1	111.9	111.9		
PGE_VLY_Econ DR_Low_S	PG&E_VLY	DR		1	223.8	223.8		
PGE_VLY_Econ DR_Mid_A	PG&E_VLY	DR		1	111.9	111.9		
PGE_VLY_Econ DR_Mid_S	PG&E_VLY	DR		1	223.8	223.8		

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PGE-Bay_DGPV	PG&E_BAY	Solar PV		1	349.856			
PGE-Bay_SmPV	PG&E_BAY	Solar PV		1	86.50295763			
PGECovanta	NW	Other Steam		1	15.4	4.62	0.256666667	0.256666667
PGE-Valley_DGPV	PG&E_BAY	Solar PV		1	553.1969315			
PGE-Valley_LgPV	PG&E_VLY	Solar PV		1	1182			
PGE-Valley_SmPV	PG&E_BAY	Solar PV		1	406.5			
PGE-Valley_Wind	PG&E_VLY	Wind		1	972.3843215			
PHP 1	NW	Conventional Hydro		1	24			
Pico 2	PG&E_BAY	CCGT		1	161	73.5	2.5	2.5
PinonPn2	SPP	CC Recent		1	108	59.4	1.608333333	1.608333333
PJX 3_1	CFE	CC Recent		1	259	128.21	2.158333333	2.158333333
PJZ-VAP	CFE	CC Recent		1	93	46.04	0.775	0.775
PLNENDG3_1	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG3_2	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG3_3	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG3_4	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG3_5	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG3_6	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG3_7	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG4_1	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG4_2	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG4_3	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG4_4	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG4_5	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG4_6	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PLNENDG4_7	CO	IC		1	8.257	0.66056	0.275233333	0.275233333
PlnsEnd1	CO	CT Small		1	55	24.75	1.833333333	1.833333333
PlnsEnd2	CO	CT Small		1	55	24.75	1.833333333	1.833333333
POLEHILL_1	CO	Conventional Hydro		1	38.2			
Poplar Creek Cogen 1	AB	CC Cogen		1	356	157.6983784	1	1
PORTWW_CC1	NW	CC Frame G		1	400	206.25	4	4
POSTSTRT_1	NW	Conventional Hydro		1	10.2			
Potlatch3	NW	Biomass RPS		1	33.3	9.99		
Potlatch4	NW	Biomass RPS		1	50	15		
PplrHll1	AB	CT Small		1	45	20.25	1.5	1.5
PR Wind	BC	Wind		1	403			
Prct&GMpk	SMUD	GT		1	41.3	10.3	2.666666667	2.666666667
Prctr&Gm3	SMUD	Cogeneration		1	123	123	2.5	2.5
PRIEST R_9	NW	Conventional Hydro		1	96.8			
PRIEST R_A	NW	Conventional Hydro		1	96.8			
PRIESTR2_1	NW	Conventional Hydro		1	96.8			
PRIESTR2_2	NW	Conventional Hydro		1	96.8			
PRIESTR2_3	NW	Conventional Hydro		1	96.8			
PRIESTR2_4	NW	Conventional Hydro		1	96.8			
PRIESTR2_5	NW	Conventional Hydro		1	96.8			
PRIESTR2_6	NW	Conventional Hydro		1	96.8			
PRIESTR2_7	NW	Conventional Hydro		1	96.8			
PRIESTR2_8	NW	Conventional Hydro		1	96.8			
Primros1	AB	CT Large		1	75	18	1.333333333	1.333333333
Prince George Biomass	BC	Biomass RPS		1	30	12		
PRSPCT21_1	PACW	Conventional Hydro		1	19			
PRSPCT22_2	PACW	Conventional Hydro		1	19			
PSEBear1	PG&E_VLY	Cogeneration		1	45.79	45.79	1.333333333	1.333333333
PSELivOk1	PG&E_VLY	Cogeneration		1	44.4	44.4	2.666666667	2.666666667
PSEMcKev1	PG&E_VLY	Cogeneration		1	43.07	43.07	2.666666667	2.666666667
PstrnrS1	SCE	CCGT		1	500	165	6.83	6.83
PstrnrS2	SCE	CCGT		1	250	75	2.5	2.5
PtLoma1	SDGE	Cogeneration		1	17.18	17.18	2.666666667	2.666666667
PTZLOGN1	CO	Wind		1	200			
PTZLOGN2	CO	Wind		1	200			
PublDsl1	CO	Steam Small Recent		1	10	2.6	0.166666667	0.166666667
Pueblo 6	CO	Steam Small Old		1	20	6	0.333333333	0.333333333
Pueblo Airport CC_1	CO	CC Recent		1	200	110	2.5	2.5
Pueblo Airport CT_1	CO	CT Future		1	90	27	5.333333333	5.333333333
Pueblo Airport CT_2	CO	CT Future		1	90	27	5.333333333	5.333333333
PYRAMD1A	NM	CT Small		1	40	18	1.333333333	1.333333333
PYRAMD1B	NM	CT Small		1	40	18	1.333333333	1.333333333
PYRAMD2A	NM	CT Small		1	40	18	1.333333333	1.333333333
PYRAMD2B	NM	CT Small		1	40	18	1.333333333	1.333333333
RAFTRVR	ID_UT	Geothermal		1	10	5	0.1	0.1

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
RAINBOW_3	MT	Conventional Hydro		1	35			
Rainbw4	AB	CT Small		1	45	20.25	1.5	1.5
Rainbw56	AB	CT Small		1	45	20.25	1.5	1.5
RamEsPk	SDGE	GT		1	35	35	2.666666667	2.666666667
RamOtay1	SDGE	GT		1	35	35	2.666666667	2.666666667
Rathdrm1	NW	CT Large		1	88	20.71	2	2
Rathdrm2	NW	CT Large		1	88	20.71	2	2
Rattlesnake Road W1	BPA	Wind		1	103			
RawhdGT1	CO	CT Small		1	63	28.35	2.1	2.1
RawhdGT2	CO	CT Small		1	63	28.35	2.1	2.1
RawhdGT3	CO	CT Small		1	63	28.35	2.1	2.1
RawhdGT4	CO	CT Small		1	63	28.35	2.1	2.1
Rawhide GT 5	CO	CT Future		1	138	82.8	9.2	9.2
Rawhide1	CO	Coal Large Recent		1	288	115.2	2.71	2.71
RAY RES9_1	AB	Conventional Hydro		1	20			
RayDNxn1	CO	Coal Large Recent		1	205	82	2.05	2.05
RCDC W_1	CO	CT Old Gas		1	200	60	2	2
RCECCTG1	PG&E_BAY	CCGT		1	600	240	2.5	2.5
RckyMnt3	CO	CC Frame F		1	621	263.45	5.85	5.85
RddngGT1	SMUD	GT		1	24.4	11	2.666666667	2.666666667
RddngGT2	SMUD	GT		1	31	14	2.666666667	2.666666667
RddngGT3	SMUD	GT		1	31	13.95	2.666666667	2.666666667
RddngST	SMUD	CCGT		1	82	59.86	2.5	2.5
RdGrdnr4	NEVP	Coal Large Recent		1	275	110	2.75	2.75
RDNixonG1	CO	CT Small		1	40	18	1.333333333	1.333333333
RDNixonG2	CO	CT Small		1	40	18	1.333333333	1.333333333
RedBluff	PG&E_VLY	GT		1	50	22.5	1.333333333	1.333333333
Redding CC5_1	SMUD	ST		1	70	35	1.67	1.67
Redding CC6_1	SMUD	ST		1	47	18.8	1.67	1.67
RedhwkST1	APS	CC Frame F		1	530	272.04	4.92	4.92
RedhwkST2	APS	CC Frame F		1	530	272.04	4.92	4.92
Redwater	AB	CT Cogen		1	40.8	18.36	1.36	1.36
Reeves1	NM	Steam Small Old		1	40	12	0.666666667	0.666666667
Reeves2	NM	Steam Small Old		1	60	18	1.666666667	1.666666667
Revelstoke	BC	Conventional Hydro		1	2500			
Ridgeline	ID_UT	Wind		1	64.5			
RioGrnd6	NM	Steam Small Old		1	48	14.4	0.8	0.8
RioGrnd7	NM	Steam Small Old		1	45	13.5	0.75	0.75
RioGrnd8	NM	Steam Large Recent		1	150	12	2.5	2.5
Ripon1	SMUD	GT		1	47.5	35	1.333333333	1.333333333
Ripon2	SMUD	GT		1	47.5	35	1.333333333	1.333333333
River Mill	NW	Conventional Hydro		1	23			
Riverside ERC_1	SCE	GT		1	48	19.2	1.67	1.67
Riverside ERC_2	SCE	GT		1	48	19.2	1.67	1.67
RiversideEnergyUnit3	SCE	CT LM 6000		1		20	6	6
			SUMMER	1	48			
			WINTER	1	48			
RiversideEnergyUnit4	SCE	CT LM 6000		1		20	6	6
			SUMMER	1	48			
			WINTER	1	48			
RivrVwPk1	PG&E_BAY	GT		1	59.2	26.64	1.333333333	1.333333333
ROCK IS_1	NW	Conventional Hydro		1	30.39			
ROCK IS_2	NW	Conventional Hydro		1	30.39			
ROCK IS_3	NW	Conventional Hydro		1	30.39			
ROCK IS_4	NW	Conventional Hydro		1	30.39			
ROCK IS_5	NW	Conventional Hydro		1	30.39			
ROCK IS_6	NW	Conventional Hydro		1	30.39			
ROCK IS_7	NW	Conventional Hydro		1	30.39			
ROCK IS_8	NW	Conventional Hydro		1	30.39			
ROCK IS_9	NW	Conventional Hydro		1	30.39			
ROCK IS_A	NW	Conventional Hydro		1	30.39			
ROCK IS2_1	NW	Conventional Hydro		1	30.38888889			
ROCK IS2_2	NW	Conventional Hydro		1	30.38888889			
ROCK IS2_3	NW	Conventional Hydro		1	30.38888889			
ROCK IS2_4	NW	Conventional Hydro		1	30.38888889			
ROCK IS2_5	NW	Conventional Hydro		1	30.38888889			
ROCK IS2_6	NW	Conventional Hydro		1	30.38888889			
ROCK IS2_7	NW	Conventional Hydro		1	30.38888889			
ROCK IS2_8	NW	Conventional Hydro		1	30.38888889			
Rock River W1	WY	Wind		1	50			

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Rockwod1	IID	GT		1	32	6.3	2.666666667	2.666666667
Rockwod2	IID	Oil		1	32	9.6	2.666666667	2.666666667
RockyFrd	CO	Steam Small Old		1	10	3	0.166666667	0.166666667
ROCKYR01_1	NW	Conventional Hydro		1	115.0909091			
ROCKYR02_2	NW	Conventional Hydro		1	115.0909091			
ROCKYR03_3	NW	Conventional Hydro		1	115.0909091			
ROCKYR04_4	NW	Conventional Hydro		1	115.0909091			
ROCKYR05_5	NW	Conventional Hydro		1	115.0909091			
ROCKYR06_6	NW	Conventional Hydro		1	115.0909091			
ROCKYR07_7	NW	Conventional Hydro		1	115.0909091			
ROCKYR08_8	NW	Conventional Hydro		1	115.0909091			
ROCKYR09_9	NW	Conventional Hydro		1	115.0909091			
ROCKYR10_A	NW	Conventional Hydro		1	115.0909091			
ROCKYR11_B	NW	Conventional Hydro		1	115.0909091			
Rolling Hills W1	WY	Wind		1	99			
Roosevelt LF	BPA	Biomass RPS		1	10.5	3.15		
RosevlEC_CC1	SMUD	CCGT		1	160	83	5	5
Rosevll1	SMUD	GT		1	25.6	11.52	2.666666667	2.666666667
Rosevll2	SMUD	GT		1	25.6	11.52	2.666666667	2.666666667
ROSS 42_1	NW	Conventional Hydro		1	112.125			
ROSS 42_2	NW	Conventional Hydro		1	112.125			
ROSS 44_3	NW	Conventional Hydro		1	112.125			
ROSS 44_4	NW	Conventional Hydro		1	112.125			
ROUND B1_1	NW	Conventional Hydro		1	100			
ROUND B2_2	NW	Conventional Hydro		1	100			
ROUND B3_3	NW	Conventional Hydro		1	100			
ROZA_1	BPA	Conventional Hydro		1	13			
RpsAZbio1	APS	Biomass RPS		1	6	1.8		
RpsAZbio2	APS	Biomass RPS		1	7.668194903	2.300458471		
RpsAZcsp1	APS	Solar CSP6		1	205.2918537			
RpsAZdg1	TEP	Solar PV		1	305.4159877			
RpsAZdg2	WALC	Solar PV		1	87.01138146			
RpsAZgeo1	SRP	Geothermal		1	165	82.5	0.5	0.5
RpsAZpv1	APS	Solar PV		1	466			
RpsAZpv2	APS	Solar PV		1	190			
RPSAZpv3	TEP	Solar PV		1	250			
RpsAZwnd1	APS	Wind		1	77.0666507			
RpsAZwndNM1	APS	Wind		1	100			
RpsCA_BCBiomass1	BC	Biomass RPS		1	1.611603546			
RpsCA_Biogas1	SCE	Biogas		1	2			
RpsCA_Biogas2	SCE	Biogas		1	9			
RpsCA_Biogas3	SCE	Biogas		1	1.6			
RpsCA_Biogas4	SCE	Biogas		1	15			
RpsCA_Biogas5	LDWP	Biogas		1	144.5490868			
RpsCA_Biogas6	PG&E_VLY	Biogas		1	3			
RpsCA_Biogas7	SCE	Biogas		1	3			
RpsCA_Biomass1	PG&E_VLY	Biomass RPS		1	11			
RpsCA_Biomass2	PG&E_VLY	Biomass RPS		1	44			
RpsCA_Biomass3	PG&E_VLY	Biomass RPS		1	50			
RpsCA_Biomass4	SDGE	Biomass RPS		1	21			
RpsCA_Geothermal1	SDGE	Geothermal		1	139			
RpsCA_Geothermal2	SDGE	Geothermal		1	40			
RpsCA_Geothermal4	IID	Geothermal		1	437.7898127			
RpsCA_Geothermal5	SDGE	Geothermal		1	10.78810696			
RpsCA_Geothermal6	SDGE	Geothermal		1	39.28366551			
RpsCA_NMBiomass1	NM	Biomass RPS		1	32			
RpsCA_NVGeothermal1	NEVP	Geothermal		1	0			
RpsCA_NWHydro1	BPA	Hydro		1	15.6555773			
RpsCA_UTGeothermal1	ID_UT	Geothermal		1	42.33478461			
RpsCA_UTGeothermal2	ID_UT	Geothermal		1	112.1376234			
RpsCOcsp1	CO	Solar CSP6		1	125			
RpsCOcsp2	CO	Solar CSP6		1	128.5691102			
RpsCOpv1	CO	Solar PV		1	60			
RpsCOpv2	CO	Solar PV		1	699.5100897			
RPSCOpvNM1	CO	Solar PV		1	50			
RpsCOwnd1	CO	Wind		1	200			
RpsCOwnd2	CO	Wind		1	299			
RpsCOwnd3	CO	Wind		1	524.6312591			
RpsMTwnd1	MT	Wind		1	75			
RpsMTwnd2	MT	Wind		1	150.6854704			

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
RpsNMbio1	NM	Biomass RPS		1	15	4.5		
RpsNMbio2	NM	Biomass RPS		1	19.41073906	5.823221718		
RpsNMcsp1	NM	Solar CSP6		1	161.3788353			
RpsNMpv1	NM	Solar PV		1	10.8			
RpsNMpv2	NM	Solar PV		1	100			
RpsNMpv3	NM	Solar PV		1	29			
RpsNMwnd1	NM	Wind		1	59			
RpsNMwnd2	NM	Wind		1	297.565885			
RpsNVbio1	NEVP	Biomass RPS		1	13.8	4.14		
RpsNVbio2	SPP	Biomass RPS		1	6.7	2.01		
RpsNVcsp1	NEVP	Solar CSP6		1	110			
RpsNVcsp2	NEVP	Solar CSP6		1	242			
RpsNVpv1	NEVP	Solar PV		1	17.5			
RpsNVpv2	NEVP	Solar PV		1	20.5			
RpsNVpv3	NEVP	Solar PV		1	26.5			
RpsNVwnd1	SPP	Wind		1	100			
RpsORbio1	PACW	Biomass RPS		1	19.9	5.97		
RpsORbio2	NW	Biomass RPS		1	58	17.4		
RpsORchp1	NW	Biomass RPS		1	6	1.8		
RpsORgeo1	NW	Geothermal		1	58	29	0.5	0.5
RpsORhyd1	PACW	Small Hydro RPS		1	6			
RpsORpv1	PACW	Solar PV		1	9			
RpsORpv2	NW	Solar PV		1	11.4			
RpsORwnd1	NW	Wind		1	360			
RpsUTwndWY1	WY	Wind		1	99			
RpsUTwndWY2	WY	Wind		1	170.3654451			
RpsWAbio1	NW	Biomass RPS		1	20	6		
RpsWAbio2	NW	Biomass RPS		1	44	13.2		
RpsWAbioOR1	NW	Biomass RPS		1	14	4.2		
RpsWAgeoOR1	NW	Geothermal		1	136	68	0.5	0.5
RpsWAhyd1	NW	Small Hydro RPS		1	3			
RpsWAhyd2	NW	Small Hydro RPS		1	2			
RpsWAhyd3	NW	Small Hydro RPS		1	22.2			
RpsWAhyd4	NW	Small Hydro RPS		1	9			
RpsWAhyd5	NW	Small Hydro RPS		1	8.8			
RpsWAhyd6	NW	Small Hydro RPS		1	126.6498777			
RpsWAwnd1	NW	Wind		1	150			
RpsWAwnd2	NW	Wind		1	150			
RpsWAwnd3	NW	Wind		1	550			
RpsWAwnd4	BPA	Wind		1	153.3772891			
RSVLTGEN_1	SRP	Conventional Hydro		1	36			
RuprtGT1	BC	CT Old Gas		1	33	9.9	2.666666667	2.666666667
RuprtGT2	BC	CT Old Gas		1	33	9.9	2.666666667	2.666666667
RvrRdCC1	BPA	CC Frame F		1	260	143	2.6	2.6
RYAN_1	MT	Conventional Hydro		1	60			
Rye Patch Geo	SPP	Geothermal		1	12	6	0.12	0.12
Saddlebrook CC1	AB	CC Recent		1	350	192.5	2.916666667	2.916666667
SaguarAZ1	APS	CT Old Gas		1	54.5	16.35	1.333333333	1.333333333
SaguarAZ2	APS	CT Old Gas		1	54.5	16.35	1.333333333	1.333333333
SaguarAZ3	APS	CT Large		1	80	9.23	1.333333333	1.333333333
SaguarNV3	NEVP	CC Recent		1	105	57.75	0.875	0.875
SagurAZGT1	APS	Steam Large Recent		1	110	8.8	1.833333333	1.833333333
SagurAZGT2	APS	Steam Large Old		1	99	14.85	1.65	1.65
Salmon Falls W1	ID_UT	Wind		1	21			
SalnRvr1	PG&E_VLY	Cogeneration		1	32.94	32.94	2.5	2.5
Salt Wells Geo	SPP	Geothermal		1	15.2	7.6	0.1	0.1
Sanger1	PG&E_VLY	Cogeneration		1	26.96	26.96	2.5	2.5
SanJuan1	NM	Coal Large Recent		1	327	130.8	3.27	3.27
SanJuan2	NM	Coal Large Recent		1	316	126.4	3.16	3.16
SanJuan3	NM	Coal Large Recent		1	497	198.8	4.97	4.97
SanJuan4	NM	Coal Large Recent		1	507	202.8	5.07	5.07
SanOnfr2	SCE	Nuclear		1	1122	910	3.67	3.67
SanOnfr3	SCE	Nuclear		1	1124	918	3.67	3.67
Santa Teresa	NM	Solar PV		1	20			
Santan 1	SRP	CC Old		1	92	50.6	0.766666667	0.766666667
Santan 2	SRP	CC Old		1	92	50.6	0.766666667	0.766666667
Santan 3	SRP	CC Old		1	92	50.6	0.766666667	0.766666667
Santan 4	SRP	CC Old		1	92	50.6	0.766666667	0.766666667
SantanX5S	SRP	CC Frame F		1	626	344.3	5.82	5.82
SantanX6S	SRP	CC Frame F		1	301	165.55	2.77	2.77

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Sargent1	PG&E_VLY	Cogeneration		1	30.85	30.85	2.5	2.5
SC_FirebagS2_1	AB	CT Large		1	80	36	5.333333333	5.333333333
SC_FirebagS3_1	AB	CT Large		1	80	36	5.333333333	5.333333333
SC_FirebagS3_2	AB	CT Large		1	80	36	5.333333333	5.333333333
SC_FirebagS4_1	AB	CT Large		1	80	36	5.333333333	5.333333333
SC_FirebagS4_2	AB	CT Large		1	80	36	5.333333333	5.333333333
SCE Existing CHP Bundle	SCE	CHP		1	86.10672284	86.10672284		
SCE Generic LMS100	SCE	CT Future		1	100	50	12	12
SCE New CHP	SCE	Cogeneration		1	290.1305056	290.1305056		
SCE QF Agg	SCE	QF		1	88.24	88.24		
SCE_DGPV	SCE	Solar PV		1	480.5866287			
SCE_Econ DR_Hi_A1	SCE	DR		1	150	150		
SCE_Econ DR_Hi_A2	SCE	DR		1	150	150		
SCE_Econ DR_Hi_S1	SCE	DR		1	200	200		
SCE_Econ DR_Hi_S2	SCE	DR		1	200	200		
SCE_Econ DR_Hi_S3	SCE	DR		1	200	200		
SCE_Econ DR_Low_A1	SCE	DR		1	160.6	160.6		
SCE_Econ DR_Low_A2	SCE	DR		1	160.6	160.6		
SCE_Econ DR_Low_S1	SCE	DR		1	214.1	214.1		
SCE_Econ DR_Low_S2	SCE	DR		1	214.1	214.1		
SCE_Econ DR_Low_S3	SCE	DR		1	214.1	214.1		
SCE_Econ DR_Mid_A1	SCE	DR		1	160.6	160.6		
SCE_Econ DR_Mid_A2	SCE	DR		1	160.6	160.6		
SCE_Econ DR_Mid_S1	SCE	DR		1	214.1	214.1		
SCE_Econ DR_Mid_S2	SCE	DR		1	214.1	214.1		
SCE_Econ DR_Mid_S3	SCE	DR		1	214.1	214.1		
SCE_LgPV	SCE	Solar PV		1	2289			
SCE_SmPV	SCE	Solar PV		1	499.9970424			
SCE_ST	SCE	Solar Thermal		1	2919			
SCE_Wind	SCE	Wind		1	2998.955533			
SClaraGiaPk2	PG&E_BAY	GT		1	26.9	12.11	2.666666667	2.666666667
SClaraGiaPk3	PG&E_BAY	GT		1	26.9	12.11	2.666666667	2.666666667
SClaraPK	PG&E_BAY	Cogeneration		1	25.8	25.8	2.666666667	2.666666667
Scotford Ind	AB	CT Cogen		1	18	6.3	1	1
ScotfordST	AB	CC Frame F		1	195	107.25	1.84	1.84
SDG&E Existing CHP Bundle	SDGE	CHP		1	5.664388386	5.664388386		
SDG&E New CHP	SDGE	CHP		1	26.49949547	26.49949547		
SDG&E QF Agg	SDGE	QF		1	2.95	2.95		
SDGE Generic LMS100	SDGE	CT Future		1	100	50	12	12
SDGE_DGPV	SDGE	Solar PV		1	159.9601991			
SDGE_Econ DR_Hi_A	SDGE	DR		1	7.1	7.1		
SDGE_Econ DR_Hi_S	SDGE	DR		1	14.2	14.2		
SDGE_Econ DR_Low_A	SDGE	DR		1	46.7	46.7		
SDGE_Econ DR_Low_S	SDGE	DR		1	93.4	93.4		
SDGE_Econ DR_Mid_A	SDGE	DR		1	46.7	46.7		
SDGE_Econ DR_Mid_S	SDGE	DR		1	93.4	93.4		
SDGE_LgPV	SDGE	Solar PV		1	55.8			
SDGE_SmPV	SDGE	Solar PV		1	52			
SDGE_ST	SDGE	Solar Thermal		1	300			
SDGE_Wind	SDGE	Wind		1	558			
SEEGEN Burnaby	BC	Biomass RPS		1	24.75	13.6125		
SEMINOE3_1	CO	Conventional Hydro		1	15			
Sentinel_1	SCE	GT		1	96	42.5	12	12
Sentinel_2	SCE	GT		1	96	42.5	12	12
Sentinel_3	SCE	GT		1	96	42.5	12	12
Sentinel_4	SCE	GT		1	96	42.5	12	12
Sentinel_5	SCE	GT		1	96	42.5	12	12
Sentinel_6	SCE	GT		1	96	42.5	12	12
Sentinel_7	SCE	GT		1	96	42.5	12	12
Sentinel_8	SCE	GT		1	96	42.5	12	12
Seven Mile Hill W1	WY	Wind		1	99			
Seven Mile Hill W2	WY	Wind		1	19.5			
Shell Caroline_1	AB	CT Small		1	19	6.65	2.666666667	2.666666667
Shepard Energy Centre	AB	CC Frame G		1	800	360	2.5	2.5
Shepherds_Flat W1	BPA	Wind		1	290			
Shepherds_Flat W2	BPA	Wind		1	265			
Shepherds_Flat W3	BPA	Wind		1	290			
Shernss1	AB	Coal Large Recent		1	378	151.2	3.78	3.78
Shernss2	AB	Coal Large Recent		1	378	151.2	3.78	3.78
Shoshone	CO	Conventional Hydro		1	14.4			

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
SHSNFALS_1	ID_UT	Conventional Hydro		1	61.5			
SIDNEYDC_1	CO	CT Old Gas		1	200	60	2	2
SIERRP_1	CO	Biomass RPS		1	31	9.3		
Silver Sage W1	CO	Wind		1	42			
Silverhawk CC1	NEVP	CC Frame F		1	520	286	2.5	2.5
Simplot1	ID_UT	Coal Small Recent		1	15	6	0.15	0.15
SimpsnCG	SCE	Cogeneration		1	27.6	27.6	1	1
SimpsnQF	PG&E_VLY	Cogeneration		1	22.08	22.08	1.666666667	1.666666667
SJCogen1	PG&E_VLY	Cogeneration		1	1.84	1.84	1.333333333	1.333333333
Slate Creek	PACW	Small Hydro RPS		1	4.2			
SLIDECRK_1	PACW	Conventional Hydro		1	20			
SMITHFLS_1	NW	Conventional Hydro		1	38.1			
SMNOE1_2_1	CO	Conventional Hydro		1	15			
SMNOE1_2_2	CO	Conventional Hydro		1	15			
SMUD New CHP	SMUD	CHP		1	174.9385	174.9385		
SMUD_DGPV	SMUD	Solar PV		1	27.25705419			
SMUD_Wind	SMUD	Wind		1	232.2156785			
SN LS PP_8	PG&E_VLY	Pumped Storage		1	345	100		
SNOQPWR2_1	NW	Small Hydro RPS		1	9.8			
SNOQPWR2_2	NW	Conventional Hydro		1	43.5			
SnrsPwr3	PG&E_VLY	CCGT		1	585	117	4.59	4.59
SODA G12_1	ID_UT	Small Hydro RPS		1	6			
SODA G12_2	ID_UT	Small Hydro RPS		1	6			
SODASPGS_1	PACW	Conventional Hydro		1	14			
SODER2	AB	Wind		1	68.3			
Soderglen1	AB	Wind		1	68.3			
Solana Solar	APS	Solar CSP6		1	280			
SolTann1	PG&E_VLY	Cogeneration		1	9.79	9.79	2.666666667	2.666666667
SouthPnt1	WALC	CC Frame F		1	540	280.5	5.2	5.2
SP15 Dispatch	SCE	Hydro		1	0	0	0	0
SP15 ROR	SCE	Hydro		1	181			
SPACCST	SMUD	Cogeneration		1	98.62	98.62	2.5	2.5
SpanishFrk W1	ID_UT	Wind		1	19			
SpingsGenProj	SCE	CT LM 6000		1		20	7.5	7.5
			SUMMER	1	44			
			WINTER	1	44			
SpknMSW1	NW	Biomass RPS		1	23	6.9	0.383333333	0.383333333
SPNDLE1	CO	CT Future		1	157	94.2	10.46666667	10.46666667
SPNDLE2	CO	CT Future		1	157	94.2	10.46666667	10.46666667
SpringCynW1	CO	Wind		1	60			
Springerville 4	TEP	Coal Large Recent		1	400	160	4	4
SPRNGFLD:TS	CO	Negative Bus Load		1	2.314			
Sprngrv1	TEP	Coal Large Recent		1	380	152	3.8	3.8
Sprngrv2	TEP	Coal Large Recent		1	380	152	3.8	3.8
Sprngrv3	TEP	Coal Large Recent		1	430	172	4.3	4.3
SRPpv1	SRP	Solar PV		1	125			
Star Point W1	BPA	Wind		1	98.7			
Starwood_CT1	PG&E_VLY	GT		1	55.5	24	12	12
Starwood_CT2	PG&E_VLY	GT		1	55.5	24	12	12
STATL W1_1	BPA	Wind		1	22.5			
STATL W1_2	BPA	Wind		1	22.5			
STATL W1_3	BPA	Wind		1	22.5			
STATL W1_4	BPA	Wind		1	22.5			
STATL W2_1	BPA	Wind		1	26.25			
STATL W2_2	BPA	Wind		1	26.25			
STATL W2_3	BPA	Wind		1	26.25			
STATL W2_4	BPA	Wind		1	26.25			
STATL W2_5	BPA	Wind		1	26.25			
STATL W2_6	BPA	Wind		1	26.25			
STATL W2_7	BPA	Wind		1	26.25			
STATL W2_8	BPA	Wind		1	26.25			
Steamboat IV Geo	SPP	Geothermal		1	62	31	0.62	0.62
Steamboat Sprgs Geo	SPP	Geothermal		1	30	15	0.3	0.3
STEGALDC_1	CO	CT Old Gas		1	100	30	1.333333333	1.333333333
STEWMTN_1	SRP	Conventional Hydro		1	13			
StigPkr	PG&E_VLY	GT		1	50	22.5	1.333333333	1.333333333
Stillwater_Geo	SPP	Geothermal		1	30.1	15.05	0.5	0.5
STILLWTR:nt	SPP	Negative Bus Load		1	2			
StockCG1	PG&E_VLY	Cogeneration		1	42.74	42.74	3.333333333	3.333333333
StocktOR1	PG&E_VLY	Cogeneration		1	30.16	30.16	1.666666667	1.666666667

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Stone Creek	NW	Conventional Hydro		1	12			
STRIKE 1_1	ID_UT	Conventional Hydro		1	30.333			
STRIKE 2_1	ID_UT	Conventional Hydro		1	30.333			
STRIKE 3_1	ID_UT	Conventional Hydro		1	30.333			
Sturg3VV	AB	CT Small		1	45	20.25	1.5	1.5
Sturgeon1	AB	CT Small		1	10	3	0.333333333	0.333333333
Sturgeon2	AB	CT Small		1	8	2.4	0.266666667	0.266666667
SULIVAN_1	NW	Conventional Hydro		1	22			
SumasL	NW	CC Recent		1	132	72.6	1.1	1.1
SUMERFA1_1	NW	Conventional Hydro		1	47			
SUMERFA2_1	NW	Conventional Hydro		1	47			
Summerview1	AB	Wind		1	68.4			
Summerview2	AB	Wind		1	66			
SUMMIT1:nt	CO	Negative Bus Load		1	3			
SUMV ST1_1	ID_UT	CC Recent		1	550	300	4.583333333	4.583333333
Suncor1	AB	CT Cogen		1	34.4	4.47	1.146666667	1.146666667
Suncor2	AB	CT Cogen		1	31.4	4.08	1.046666667	1.046666667
Sundanc1	AB	Coal Large Recent		1	280	112	2.8	2.8
Sundanc2	AB	Coal Large Recent		1	280	112	2.8	2.8
Sundanc3	AB	Coal Large Recent		1	353	141.2	4.03	4.03
Sundanc4	AB	Coal Large Recent		1	406	162.4	4.03	4.03
Sundanc5	AB	Coal Large Recent		1	406	162.4	3.53	3.53
Sundanc6	AB	Coal Large Recent		1	399	159.6	4.06	4.06
SundncGT1	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT10	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT2	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT3	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT4	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT5	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT6	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT7	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT8	APS	CT Small		1	42	18.9	1.4	1.4
SundncGT9	APS	CT Small		1	42	18.9	1.4	1.4
Sunnysd1	ID_UT	Coal Cogen		1	95.3	57.18	0.95	0.95
SunPeak1	NEVP	CT Large		1	70	16.8	1.333333333	1.333333333
SunPeak2	NEVP	CT Large		1	70	16.8	1.333333333	1.333333333
SunPeak3	NEVP	CT Large		1	70	16.8	1.333333333	1.333333333
Sunrise2	NEVP	CT Old Gas		1	69	20.7	1.333333333	1.333333333
SUNSHINE:nt	CO	Negative Bus Load		1	1.7			
Sutter3	SMUD	CCGT		1	540	177.94	6.69	6.69
SWANFALL_1	ID_UT	Conventional Hydro		1	13.5			
SWANFALL_2	ID_UT	Conventional Hydro		1	13.5			
SWIFT1-1_1	PACW	Conventional Hydro		1	123			
SWIFT1-2_1	PACW	Conventional Hydro		1	123			
SWIFT1-3_1	PACW	Conventional Hydro		1	123			
SWIFT2-1_1	BPA	Conventional Hydro		1	66.5			
SWIFT2-2_1	BPA	Conventional Hydro		1	66.5			
SycmrCG1	SCE	Cogeneration		1	64.4675	64.4675	2.5	2.5
SycmrCG2	SCE	Cogeneration		1	64.4675	64.4675	2.5	2.5
SycmrCG3	SCE	Cogeneration		1	64.4675	64.4675	2.5	2.5
SycmrCG4	SCE	Cogeneration		1	64.4675	64.4675	2.5	2.5
SYNC_B79_16	AB	Small Hydro RPS		1	10			
SYNC_UE4	AB	CT Cogen		1	7	3.36	0.233333333	0.233333333
SYNC_UE5	AB	CT Cogen		1	15	7.2	0.5	0.5
Syncrude1	AB	CT Cogen		1	57.6	7.49	1.92	1.92
Syncrude2	AB	CT Cogen		1	46.6	6.06	1.553333333	1.553333333
Syncrude3	AB	CT Cogen		1	23	2.99	0.766666667	0.766666667
Syncrude4	AB	CT Cogen		1	50	6.5	1.666666667	1.666666667
Syncrude5	AB	CT Cogen		1	23	2.99	0.766666667	0.766666667
Syncrude6	AB	CT Cogen		1	70	9.1	2.333333333	2.333333333
SyncrudeTar	AB	CT Cogen		1	86	11.18	2.866666667	2.866666667
Taber Wind_1	AB	Wind		1	80			
TAYLOR 9_1	AB	Conventional Hydro		1	14			
TESLA1_1	CO	Conventional Hydro		1	27.6	0.1		
TexcCgn1	PG&E_VLY	Cogeneration		1	4.12	4.12	2.5	2.5
TexcCgn2	PG&E_VLY	Cogeneration		1	8.01	8.01	2.5	2.5
TexMidset1	PG&E_VLY	Cogeneration		1	33.56	33.56	2.5	2.5
Thermo Geo Hatch	ID_UT	Geothermal		1	10.5	5.25	0.5	0.5
THOMSON_1	MT	Conventional Hydro		1	37.5			
THOMSON_7	MT	Conventional Hydro		1	57			

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Three Mile Cnyn W1	PACW	Wind		1	9.9			
ThrmFtL1	CO	CC Recent		1	181	99.55	1.508333333	1.508333333
Thrmlct1	SDGE	CCGT		1	600	300	2.5	2.5
Thrmnd2B	CO	CC Recent		1	33	18.15	0.275	0.275
Thrmnds1	CO	CC Recent		1	116	63.8	0.966666667	0.966666667
TnskFrnL	NW	CC Recent		1	266	146.3	2.216666667	2.216666667
TOKETEE_1	PACW	Conventional Hydro		1	45			
TopOfWorld Wind	WY	Wind		1	200			
TOWAOC_1	CO	Conventional Hydro		1	12			
Tracy Fac. Add.	SPP	CC Recent		1	580	291.5	4.283333333	4.283333333
TracyST3	SPP	Steam Large Old		1	108	28.08	3.333333333	3.333333333
TRICntr3	SPP	CT Large		1	60	14.4	1.333333333	1.333333333
TRICntr4	SPP	CT Large		1	60	14.4	1.333333333	1.333333333
TRICntr5	SPP	CT Large		1	60	14.4	1.333333333	1.333333333
TRICntr6	SPP	CT Large		1	60	14.4	1.333333333	1.333333333
TS Power Plant	SPP	Coal Small Recent		1	203	81.2	2.03	2.03
Tuana Springs Wind_1	ID_UT	Wind		1	16.8			
Tuolumne W1	BPA	Wind		1	137			
Turnbull Hydro	MT	Small Hydro RPS		1	13			
Twin Falls Hydro	NW	Conventional Hydro		1	24			
TWINFALL:nt	ID_UT	Negative Bus Load		1	15			
TWINFALL_1	NW	Conventional Hydro		1	26.93959184			
TWINFALL_2	NW	Conventional Hydro		1	27.16040816			
TWNBUTTE	CO	Wind		1	300			
U SAMN 1_1	ID_UT	Conventional Hydro		1	18			
U SAMN 2_1	ID_UT	Conventional Hydro		1	16.5			
U_Calgary CG	AB	CT Cogen		1	15	5.25	1	1
UCBerk1	PG&E_BAY	Cogeneration		1	24.96	24.96	2.5	2.5
UCMDSmud1	SMUD	Cogeneration		1	27	27	2.666666667	2.666666667
UMPSgnr3	ID_UT	CT Old Gas		1	15	4.5	2.666666667	2.666666667
UnChem1	PG&E_BAY	Cogeneration		1	14.68	14.68	2.666666667	2.666666667
UNCLRsr1	PG&E_BAY	Cogeneration		1	0	0	2.666666667	2.666666667
UNCLRsr2	PG&E_BAY	Cogeneration		1	0	0	2.666666667	2.666666667
UNCLRsr3	PG&E_BAY	Cogeneration		1	0	0	2.666666667	2.666666667
Univrsty1	PG&E_VLY	Cogeneration		1	31.66	31.66	2.666666667	2.666666667
UntdCgn1	PG&E_BAY	Cogeneration		1	22.96	22.96	2.5	2.5
UP BAKER_1	NW	Conventional Hydro		1	52			
UP BAKER_2	NW	Conventional Hydro		1	52			
Upriver Dam	NW	Conventional Hydro		1	18			
UT State Rollup	ID_UT	Conventional Hydro		1	70.2			
UT_Wind	ID_UT	Wind		1	103.5			
VacaDxn	PG&E_VLY	GT		1	49	14.7	2.666666667	2.666666667
ValentiaCT	NM	CT Large		1	145	87	5.333333333	5.333333333
VALLEY	LDWP	CCGT		1	242	72.6	5	5
VALLEY2	LDWP	CCGT		1	242	72.6	5	2.5
ValleyGT6	LDWP	ST		1	165	49.5	5	5
ValleyST8	LDWP	CCGT		1	430	163.4	7	7
ValleyView1	AB	CT Small		1	45	13.5	1.5	1.5
ValleyView2	AB	CT Small		1	45	20.25	2.666666667	2.666666667
Valmont6	CO	CT Old Gas		1	53	15.9	1.333333333	1.333333333
Valmont7	CO	Coal Small Recent		1	37	14.8	0.37	0.37
Valmont8	CO	Coal Small Recent		1	37	14.8	0.37	0.37
Valmy1	SPP	Coal Large Recent		1	265	106	2.65	2.65
Valmy2	SPP	Coal Large Recent		1	300	120	3	3
VANSYCLE_1	NW	Wind		1	25			
VANSYCLE_2	PACW	Wind		1	98.9			
VI Landfill Waste	BC	Biomass RPS		1	90	27		
VI Wind	BC	Wind		1	267			
Victorville Hybrid	SCE	CCGT		1		200	7.5	7.5
			SUMMER	1	563			
			WINTER	1	563			
Vine	PACW	Other Steam		1	40	12	0.666666667	0.666666667
VIlyLM61	LDWP	ST		1	47.5	14.25	4	4
WA Sml Hydro Aggr	BPA	Small Hydro RPS		1	35			
Walnut	TIDC	CCGT		1	250	75.32751092	2.5	2.5
Walnut Crk_1	SCE	GT		1	100	40	12	12
Walnut Crk_2	SCE	GT		1	100	40	12	12
Walnut Crk_3	SCE	GT		1	100	40	12	12
Walnut Crk_4	SCE	GT		1	100	40	12	12
Walnut Crk_5	SCE	GT		1	100	40	12	12

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Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
WANAPUM_1	NW	Conventional Hydro		1	95.5			
WANAPUM_2	NW	Conventional Hydro		1	95.5			
WANAPUM_3	NW	Conventional Hydro		1	95.5			
WANAPUM_4	NW	Conventional Hydro		1	95.5			
WANAPUM_5	NW	Conventional Hydro		1	95.5			
WANAPUM_6	NW	Conventional Hydro		1	95.5			
WANAPUM2_7	NW	Conventional Hydro		1	95.5			
WANAPUM2_8	NW	Conventional Hydro		1	95.5			
WANAPUM2_9	NW	Conventional Hydro		1	95.5			
WANAPUM2_A	NW	Conventional Hydro		1	95.5			
Watsnvl1	PG&E_VLY	Cogeneration		1	0	0	2.5	2.5
Wauna2	BPA	CC Recent		1	35	19.25	0.291666667	0.291666667
WdlndCC1	SMUD	CCGT		1	65	32.5	2.5	2.5
WdlndMd1	SMUD	GT		1	49.4	35	2.666666667	2.666666667
WdlndMd2	SMUD	CCGT		1	80	40	2.5	2.5
Weldwood1	AB	Biomass RPS		1	19	4.94	0.316666667	0.316666667
Weldwood2	AB	Biomass RPS		1	29	7.54	0.483333333	0.483333333
WELLS_1	NW	Conventional Hydro		1	85			
WELLS_2	NW	Conventional Hydro		1	85			
WELLS_3	NW	Conventional Hydro		1	85			
WELLS_4	NW	Conventional Hydro		1	85			
WELLS_5	NW	Conventional Hydro		1	85			
WELLS_6	NW	Conventional Hydro		1	85			
WELLS_7	NW	Conventional Hydro		1	85			
WELLS_8	NW	Conventional Hydro		1	85			
WELLS_9	NW	Conventional Hydro		1	85			
WELLS_A	NW	Conventional Hydro		1	85			
Western 102-01	SPP	IC		1	8	2	1	1
Western 102-02	SPP	IC		1	8	2	1	1
Western 102-03	SPP	IC		1	8	2	1	1
Western 102-04	SPP	IC		1	8	2	1	1
Western 102-05	SPP	IC		1	8	2	1	1
Western 102-06	SPP	IC		1	8	2	1	1
Western 102-07	SPP	IC		1	8	2	1	1
Western 102-08	SPP	IC		1	8	2	1	1
Western 102-09	SPP	IC		1	8	2	1	1
Western 102-10	SPP	IC		1	8	2	1	1
Western 102-11	SPP	IC		1	8	2	1	1
Western 102-12	SPP	IC		1	8	2	1	1
Western 102-13	SPP	IC		1	8	2	1	1
Western 102-14	SPP	IC		1	8	2	1	1
Weyerhs1	SCE	Cogeneration		1	12.64	12.64	1	1
WhdGates1	PG&E_VLY	GT		1	49	22.05	2.666666667	2.666666667
Wheat_Field W1	BPA	Wind		1	96.6			
WhiteMtn1	APS	Biomass RPS		1	24	7.2		
Whithrn1	NW	CT Old Oil		1	74.4	22.32	2.48	2.48
Whithrn3	NW	CT Old Gas		1	74.4	22.32	1.333333333	1.333333333
WHTCK W1	BPA	Wind		1	200			
WhtcrtP1	AB	Biomass RPS		1	25	21.25		
WilbrEst1	PG&E_BAY	Cogeneration		1	16.77	16.77	1	1
Wild Horse	BPA	Wind		1	229			
Wild Horse_W2	NW	Wind		1	44			
Wild Steer Butte W1	AB	Wind		1	775			
Williams Lk BM1	BC	Biomass RPS		1	65	48.75		
Willow Creek W1	BPA	Wind		1	72			
Windy Flats W12	BPA	Wind		1	262.4			
Winnmcc1	SPP	CT Old Gas		1	20	6	2.666666667	2.666666667
Wintering Hills Wind_SC1	AB	Wind		1	99			
WJOHN DY:nt	ID_UT	Negative Bus Load		1	8			
WlbrWst1	PG&E_BAY	Cogeneration		1	16.94	16.94	1	1
Wldflwr1	SCE	GT		1	45	22.5	2.67	2.67
Wldflwr2	SCE	GT		1	45	22.5	2.67	2.67
Wldflwr3	SCE	GT		1	45	22.5	2.67	2.67
WM Higgins CC1	NEVP	CC Frame F		1	530	291.5	2.5	2.5
WNClark1	CO	Coal Small Old		1	17.5	7	3.333333333	3.333333333
WNClark2	CO	Coal Small Old		1	23.5	9.4	3.333333333	3.333333333
WNP2	BPA	Nuclear		1	1160.09	580.05	3.866966667	3.866966667
Wolfskill1	PG&E_VLY	GT		1	60.5	27.23	1.333333333	1.333333333
WstlckD1	AB	Biomass RPS		1	16.9	5.07		
WstPhnxCC1	APS	CC Old		1	92	50.6	0.708333333	0.708333333

Generator	Region	Technology	Timeslice	Band	Max Capacity (MW)	Min Capacity (MW)	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
WstPhnxCC2	APS	CC Old		1	92	50.6	0.708333333	0.708333333
WstPhnxCC3	APS	CC Old		1	92	50.6	0.708333333	0.708333333
WstPhnxCC4	APS	CC Recent		1	120	66	1	1
WstPhnxCC5	APS	CC Frame F		1	506	304.54	5.3	5.3
WstPhnxGT1	APS	CT Small		1	56.2	25.29	1.873333333	1.873333333
WstPhnxGT2	APS	CT Small		1	56.2	25.29	1.873333333	1.873333333
WstVlly1	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
WstVlly2	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
WstVlly3	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
WstVlly4	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
WstVlly5	ID_UT	CT Small		1	40	18	1.333333333	1.333333333
WY State Rollup	CO	Conventional Hydro		1	22			
WY_Wind	WY	Wind		1	96			
Wycnrgy1	BPA	CT Old Gas		1	12.2	3.66	2.666666667	2.666666667
Wycnrgy2	BPA	CT Old Gas		1	35	10.5	2.666666667	2.666666667
WYGEN	CO	Coal Small Recent		1	82.2	32.88	0.822	0.822
WYGEN 2 Wyodak WY	CO	Coal Small Recent		1	100	40	1	1
WYGEN 3	CO	Coal Small		1	100	40	3.333333333	3.333333333
WYNOOCHE_1	NW	Conventional Hydro		1	15.3			
WYO_Wind_1	WY	Wind		1	144			
Wyodak1	WY	Coal Large Recent		1	339.4	135.76	3.4	3.4
YALE GEN_1	PACW	Conventional Hydro		1	105.5			
YALE GEN_2	PACW	Conventional Hydro		1	105.5			
YbaCtyCG1	PG&E_VLY	Cogeneration		1	43.58	43.58	2.666666667	2.666666667
YbaCtyPk1	PG&E_VLY	GT		1	48.7	21.92	2.666666667	2.666666667
YELLO1-2_1	CO	Conventional Hydro		1	72			
YELLO1-2_2	CO	Conventional Hydro		1	72			
YELLO3-4_3	CO	Conventional Hydro		1	72			
YELLO3-4_4	CO	Conventional Hydro		1	72			
Yelm	NW	Conventional Hydro		1	11.4			
YnkCthn1	SPP	Geothermal		1	19.2	9.6	0.192	0.192
YuccaCT1	APS	CT Old Gas		1	19.1	5.73	2.666666667	2.666666667
YuccaCT2	APS	CT Old Gas		1	19.1	5.73	2.666666667	2.666666667
YuccaCT3	APS	CT Old Gas		1	55	16.5	1.333333333	1.333333333
YuccaCT4	APS	CT Old Oil		1	55	16.5	1.833333333	1.833333333
YuccaCT5	APS	CT Small		1	48	21.6	1.6	1.6
YuccaCT6	APS	CT Small		1	48	21.6	1.6	1.6
YuccaGT	APS	CT Old Gas		1	21	6.3	2.666666667	2.666666667
YuccaST	APS	Steam Small Old		1	75	15	1.25	1.25
Grand Total					276458.603	72348.47454	3408.313567	3412.8969

PAC Environment Data Request
Data Sheets

Generator	Region	Technology	Band	H01	H02	H03	H04	H05
Blythe1	SCE	CCGT	1	68.64	139.36	208		
CoolwtrS3	SCE	CCGT	1	8	16	24	32	40
CoolwtrS4	SCE	CCGT	1	8	16	24	32	40
Cosumnes3	SMUD	CCGT	1	61.07	124	185.07		
CPVGT1	PG&E_VLY	CCGT	1	87.12	176.88	264		
DeltaSTG1	PG&E_BAY	CCGT	1	42.54	85.07	127.61	170.14	212.68
DK MossLand1	PG&E_VLY	CCGT	1	54.98	111.62	166.59		
DK MossLand2	PG&E_VLY	CCGT	1	54.98	111.62	166.59		
El Segundo 2_5	SCE	CCGT	1	34.98	71.02	106		
El Segundo 2_7	SCE	CCGT	1	34.98	71.02	106		
ElCentro2A	IID	CCGT	1	21.32	43.28	64.6		
ElkHlls3	PG&E_VLY	CCGT	1	35.34	70.68	106.01	141.35	176.69
GATEWAY_1	PG&E_BAY	CCGT	1	132.5	265			
Grayson8A	LDWP	CCGT	1	17.33	35.18	52.5		
GWF Tracy CCGT	PG&E_VLY	CCGT	1	62.8	125.6			
Harbor10B	LDWP	CCGT	1	16.42	32.83	49.25	65.66	82.08
Haynes10	LDWP	CCGT	1	32.76	65.52	98.28	131.04	163.8
HDesrtST1	SCE	CCGT	1	156.75	318.25	475		
Inland Empire_1	SCE	CCGT	1	32	64	96	128	160
Inland Empire_2	SCE	CCGT	1	32	64	96	128	160
KrnRvrC2	PG&E_VLY	CCGT	1	16.55	33.61	50.16		
LaPaloma1	PG&E_VLY	CCGT	1	25.25	51.26	76.5		
LaPaloma2	PG&E_VLY	CCGT	1	25.25	51.26	76.5		
LaPaloma3	PG&E_VLY	CCGT	1	25.25	51.26	76.5		
LaPaloma4	PG&E_VLY	CCGT	1	25.25	51.26	76.5		
LaRosCC	SDGE	CCGT	1	63.89	129.71	193.6		
Los Esteros Calpine	PG&E_BAY	CCGT	1	64	128			
LsMdnsS1	PG&E_BAY	CCGT	1	53.22	108.04	161.26		
MagnST	LDWP	CCGT	1	61.7	125.26	186.96		
Malburg CC1	SCE	CCGT	1	19.64	39.87	59.5		
Metcalf	PG&E_BAY	CCGT	1	57.39	116.51	173.9		
MTNVWAS1_1	SCE	CCGT	1	56.08	113.86	169.94		
MTNVWBS1_1	SCE	CCGT	1	56.08	113.86	169.94		
OtayST1	SDGE	CCGT	1	77.88	158.12	236		
PalomrST1	SDGE	CCGT	1	54.15	109.94	164.09		
Pico 2	PG&E_BAY	CCGT	1	24.26	49.25	73.5		
PstrnrS1	SCE	CCGT	1	54.6	110.85	165.45		
PstrnrS2	SCE	CCGT	1	24.9	50.55	75.45		
RCECCTG1	PG&E_BAY	CCGT	1	79.2	160.8	240		
RddngST	SMUD	CCGT	1	19.75	40.11	59.86		
RosevlEC_CC1	SMUD	CCGT	1	27.39	55.61	83		
SnrsPwr3	PG&E_VLY	CCGT	1	38.61	78.39	117		
Sutter3	SMUD	CCGT	1	58.72	119.22	177.94		
Thrmlct1	SDGE	CCGT	1	60	120	180	240	300
VALLEY	LDWP	CCGT	1	14.52	29.04	43.56	58.08	72.6
VALLEY2	LDWP	CCGT	1	14.52	29.04	43.56	58.08	72.6
ValleyST8	LDWP	CCGT	1	32.68	65.36	98.04	130.72	163.4
Walnut	TIDC	CCGT	1	24.86	50.47	75.33		
WdlndCC1	SMUD	CCGT	1	26.33	53.47	79.8		
WdlndMd2	SMUD	CCGT	1	13.2	26.8	40		

Generator Start Profile

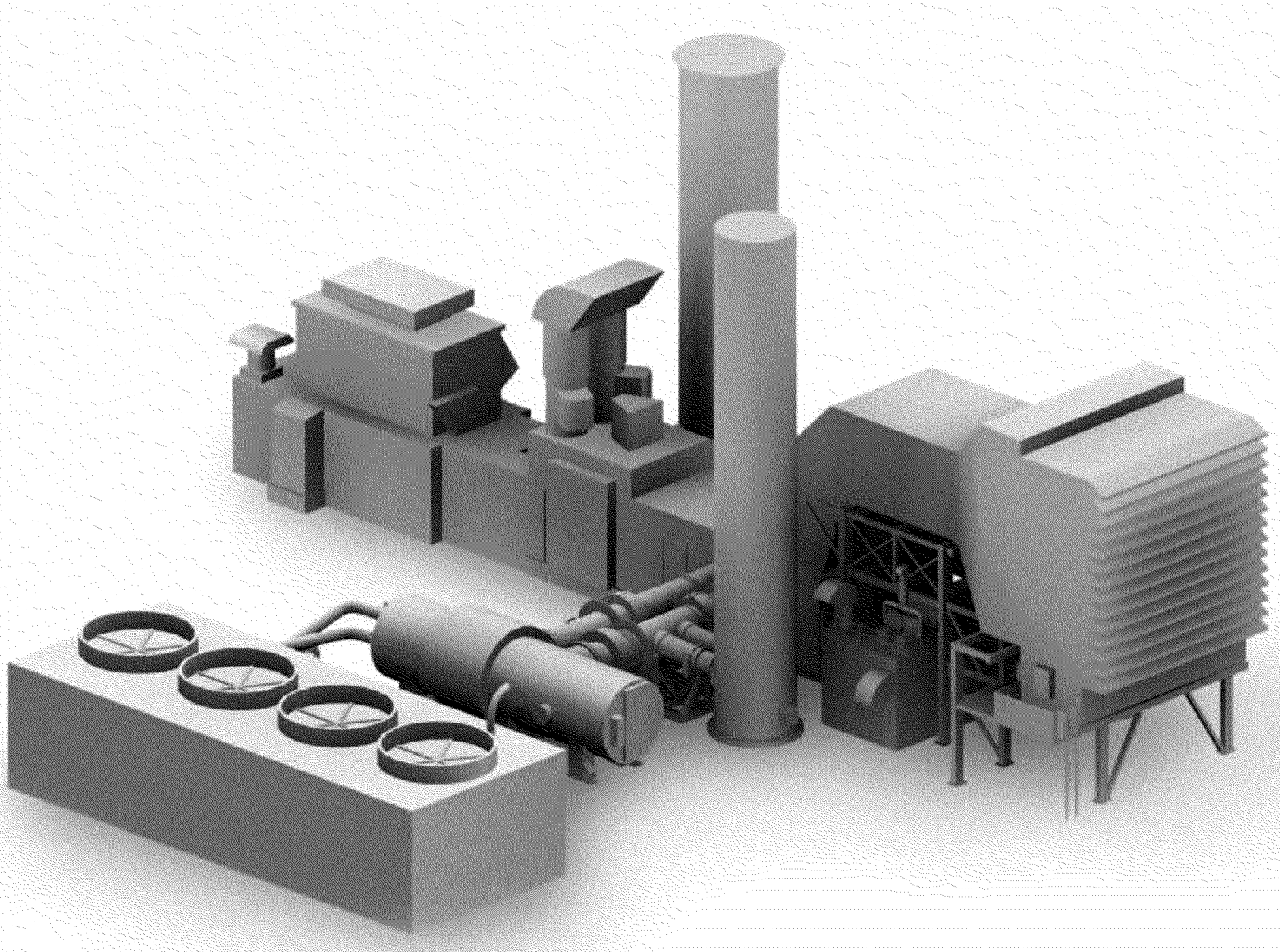
ATTACHMENT B

GE LMS 100

GE
Energy

LMS100®

Flexible Power



imagination at work

GE Energy is a leading supplier of aeroderivative gas turbines and packaged generator sets for industrial and marine applications. We provide power-generating equipment to utilities, industries and marine fleets throughout the world and are the world's largest, most experienced gas turbine service provider.

A Single Solution for Your Needs

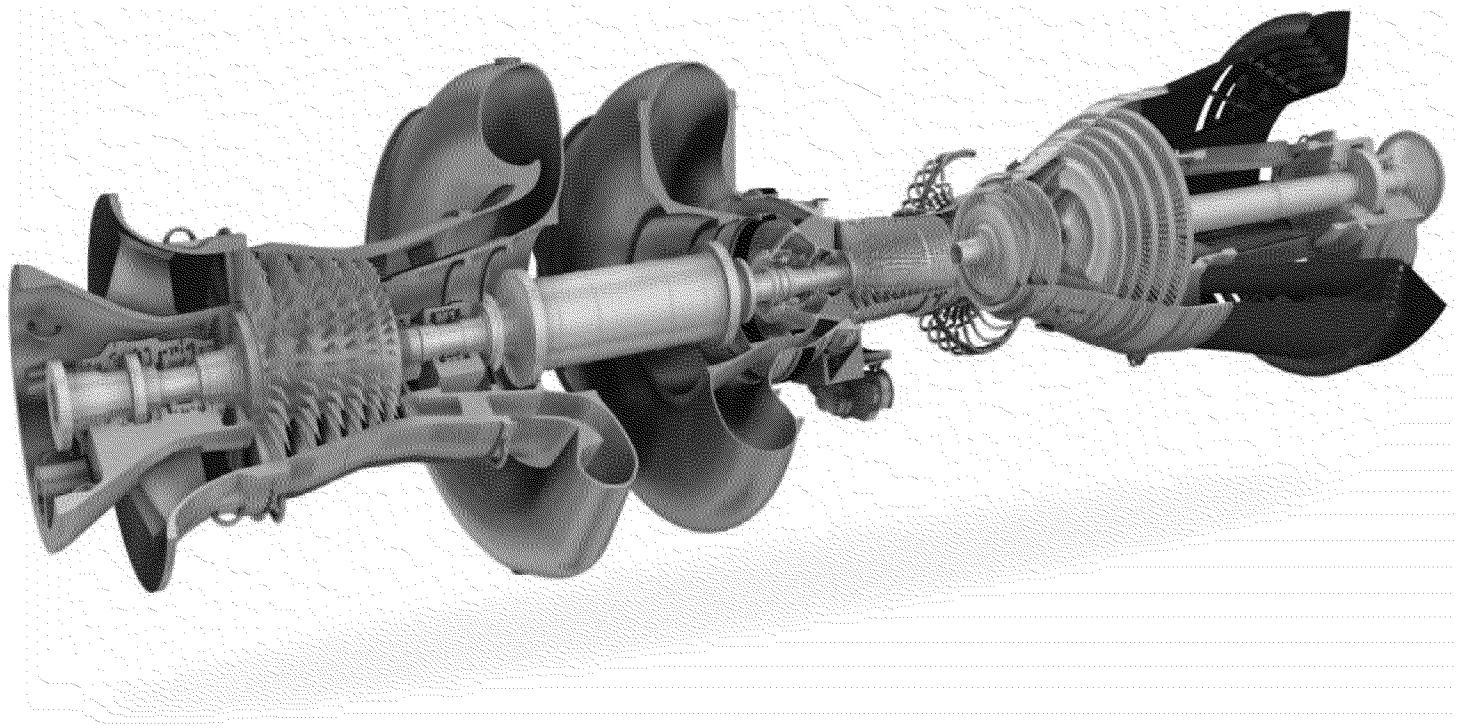
Defining a new era of flexible power generation, GE's revolutionary LMS100 provides a single, economical solution for the dispatch needs of nearly every market condition. With unparalleled efficiency, 10-minute start times, unmatched hot day performance, load following and cycling capabilities, and reliability derived from proven architecture and technology, the LMS100 is the ideal solution for power generation planners and developers.

A combination of frame and aeroderivative gas turbine technologies, this powerful machine represents the most extensive collaboration of design and manufacturing expertise in the history of GE—delivering over 100 MW with thermal efficiency in excess of 44%.

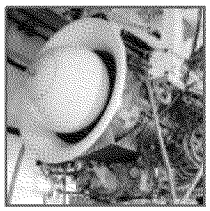
Offering superior value unavailable in other 80–160 MW gas turbines through high part-power efficiency, cycling capability without maintenance impact, dispatch reliability, turndown capability, and low emissions, the LMS100 gives dispatchers confidence they can meet customer and business needs at any time, day or night.

Efficiency
\+ Fast starts
\+ Hot day performance
\+ Load following and cycling capabilities
\+ Reliability
\+ No maintenance penalties

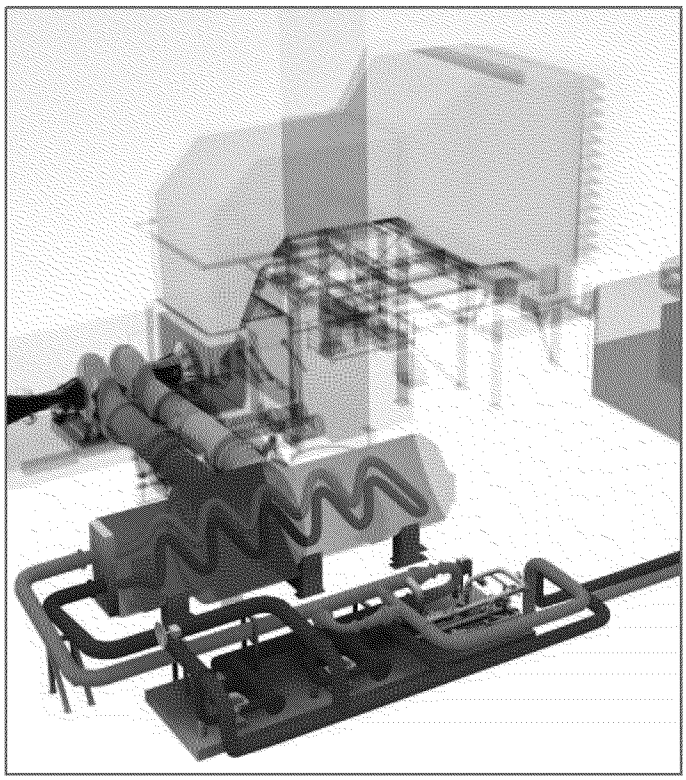
= LMS100® Flexible Power



Our Foundation for Flexibility



The LMS100 provides unsurpassed simple-cycle efficiency and increased power output thanks to an innovative intercooling system.



The intercooling system takes compressed air from the low-pressure compressor, cools it to optimal temperatures and then redelivers it to the high-pressure compressor. In providing a near constant stream of low temperature air to the high pressure compressor, the work of compression is reduced. The result is a higher pressure ratio (42:1) and increased mass flow (460 lb/sec).

In simple-cycle applications, the LMS100 can achieve thermal efficiency in excess of 44%. That's nearly a 10 point improvement over every turbine in its size range. The impressive level of efficiency—when combined with the ability to cycle without maintenance interval impact—may translate into $4-7 MM in Net Present Value Savings over 15 years.*

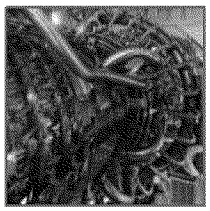
LMS100 ISO Performance Data

Model	ISO Base Rating (kW)	Heat Rate (Btu/kWh)	Efficiency %	Mass Flow (lb/sec)	Turbine Speed (RPM)	Exhaust Temp (F)	Comments
LMS100PB	97,718	7,592	45.0%	453	3,600	783	DLE, 25 ppm NO_X
LMS100PB	97,878	7,579	45.0%	453	3,000	784	DLE, 25 ppm NO_X
LMS100PA	103,112	7773	43.9%	469	3,600	770	water injected to 25 ppm NO_X
LMS100PA	103,162	7769	43.9%	469	3,000	767	water injected to 25 ppm NO_X

Conditions: *Performance at the generator terminals; NO_X = 25 ppm or 50 mg/Nm3; 59F or 15C, 60% Relative Humidity; No Losses; Fuel Spec. Gas (LHV= 19,000 BTU/lb)*

* 5¢/mmBtu gas

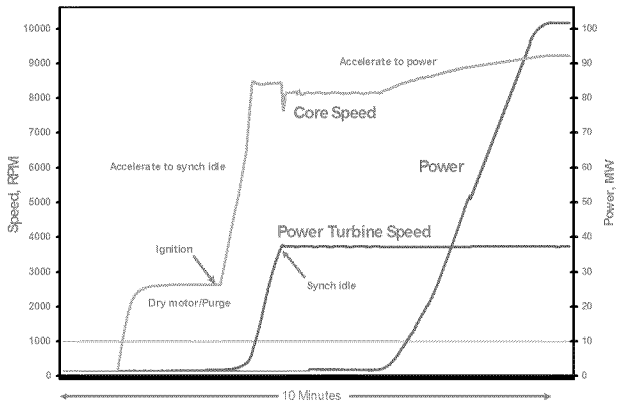
Features of Flexibility



As the only company with the necessary technology base and product experience to bring this innovative product to the power generation industry, GE has incorporated extensive customer feedback into the LMS100 development program—ensuring it has the flexibility to meet current and future needs. The resulting breakthrough system delivers 100 MW of power with:

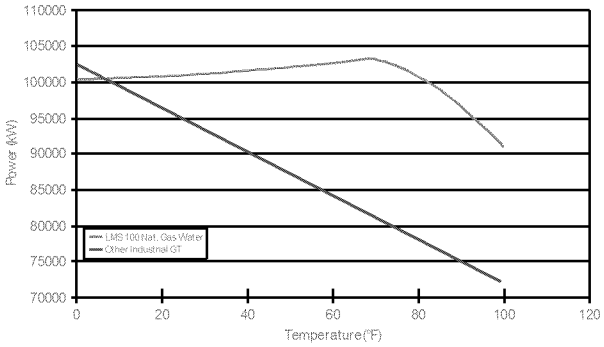
10-minute fast starts with cycling capability

The flexibility of aircraft engine technology—with 10-minute starts from cold iron to full power—and the ability to start and stop in short 15 minute cycles (several times per day, if needed) **without impacting maintenance intervals**.



Incredible hot day performance

The flexibility to sustain power levels on hot days when demand is greatest. The LMS100 will increase in power as the temperature rises—up to 75°F (~24°C)—and then fall off in power at a much slower rate than conventional gas turbines. When the temperature again increases demand on the grid, the LMS100 will be at the top of the list to dispatch

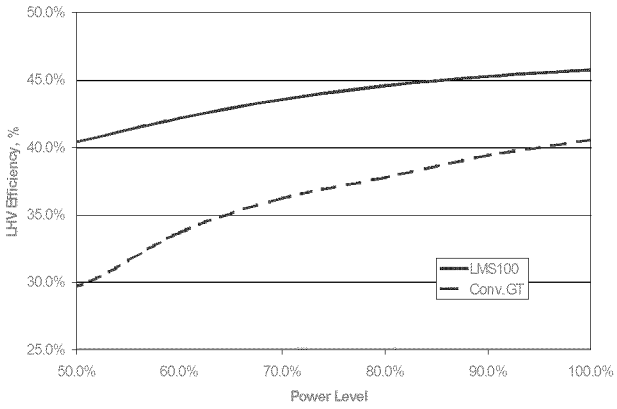


Improved load following and part load efficiency

The flexibility to provide 50 MW of power in less than one minute. When operating at 50% power, the LMS100 can ramp to full power in less than 60 seconds, providing fast response to load demand variations.

The flexibility to provide power at part load as efficiently as most gas turbines at full load—enabling efficient operation anywhere between 50 and 100 MW, as demand requires. At 50% load, the LMS100 can deliver power at 40% simple-cycle efficiency.

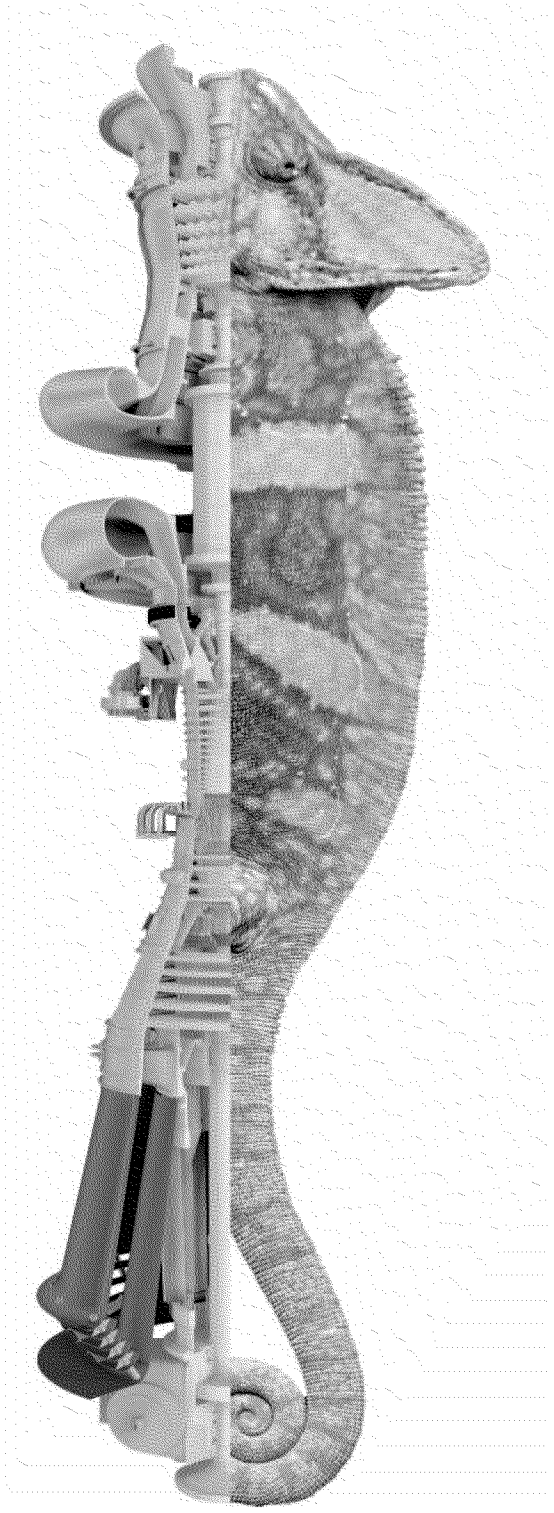
The flexibility to provide grid support without load reduction. Even with up to 5% grid frequency variation, the LMS100 can operate with very little power loss—making it uniquely capable of supporting the grid in times of high demand and load fluctuations.



Efficient Performance

Better efficiency also means less fuel burned per megawatt generated and less CO_2 emissions. The efficiency advantage of the LMS100 offers potential savings in terms of CO_2 taxes through reduced greenhouse gas emissions of as much as $0.6 MM each year when compared to a typical simple-cycle gas turbine plant.

Based on an average peaking season of 2,184 hours, the LMS100 reduces CO_2 emissions by more than 30,000 tons when compared to a typical simple-cycle 100 MW gas turbine plant. This CO_2 reduction is equal to the amount of carbon dioxide absorbed by approximately 7,400 acres of forest.



ecomagination[S]

a GE commitment

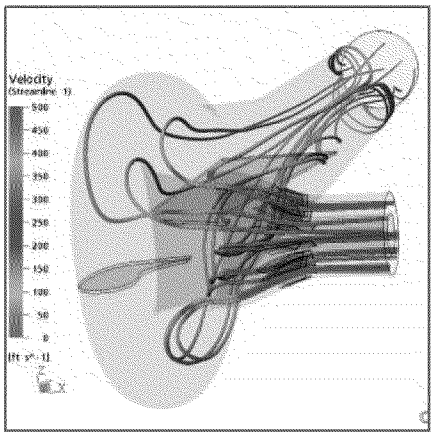
Ecomagination is GE's commitment to aggressively bring to market new technologies that will help customers meet pressing environmental challenges. Ecomagination technologies offer improved efficiency, lower emissions and/or improved operating performance compared to other similar power generation technologies in the same power class. The LMS100, as one of the newest products in the ecomagination portfolio offers our customers 100 MW at 46% thermal efficiency with a wide range of operating flexibility for peaking, mid-range and base-load operation with lower start up emissions and 10-minute starts.

Proven, Reliable Technology

Sound heritage

The LMS100 core engine is derived from the CF6 family of aircraft engines, the same baseline architecture as the LM6000®. The current LM6000 fleet includes 588 operating engines with over 10.5 million accumulated fired hours of operation. Reliability for the LM6000 fleet is currently 99.14% and availability is currently 97.76%. The low-pressure compressor (LPC) is derived from GE's MS6001FA gas turbine which has 65 units in operation with more than 1,000,000 hours of operation.

**Based on ORAP® reliability data, using current sample, which includes 151 operating units.ORAP®, All rights reserved: SPS®*



Customer-designed controls

The LMS100 control system employs the Mark VIe and fiber optics for signal transmission between the package and control system. This system reduces the number of signal interconnects by 90% and the number of mechanical interconnects by 25%—which yields a simpler and more reliable design with a faster, more efficient installation and startup.

Designed for reliability

In addition, the integrated control system includes redundant sensors with smart selection logic to reduce single sensor failure trips. The fiberoptic distributed I/O (input/output) system is located outside the module to prevent electromagnetic or radio frequency interference and minimize false trips. Reliability of the LMS100 is further enhanced by redundant fans, fuel pumps, resistance temperature detectors (RTDs) and remote monitoring and diagnostics.

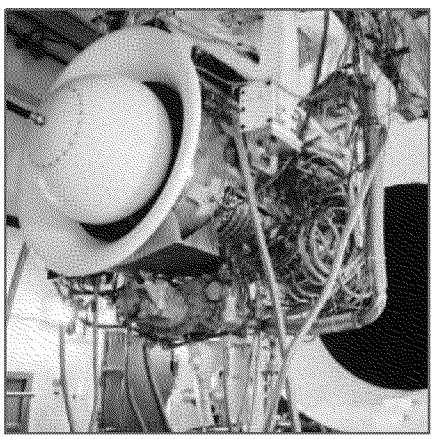
Comprehensive full scale validation tests

Consistent with GE's practice for design validation, extensive design assurance and validation tests were established and executed for both the engine and balance of plant equipment.

The core engine, a gas generator consisting of the LMS100 high-pressure compressor, single annular combustor and high-pressure turbine, completed testing in December 2004 at the high altitude test cell in GE's aircraft engine facility in Ohio. More than 1500 pieces of instrumentation were used to measure key design parameters. The testing confirmed aeromechanics, mechanical design and variable geometry optimization for performance, paving the way for full scale power plant validation testing.

Extensive, full scale testing of an LMS100 simple-cycle power plant was conducted at GE's packaging facility in Houston, Texas. More than 2,500 pieces of instrumentation were used to validate performance, emissions, intercooler operation and sub-system capability at the most extreme operating conditions expected in commercial service.

The LMS100 full load power plant test, completed in November 2005, confirmed performance, operability, emissions, mechanical and electrical operations all successfully met or exceeded the requirements. Testing demonstrated 10-minute starts, fast load following, transient capability and efficiency—all hallmark characteristics of the LMS100.



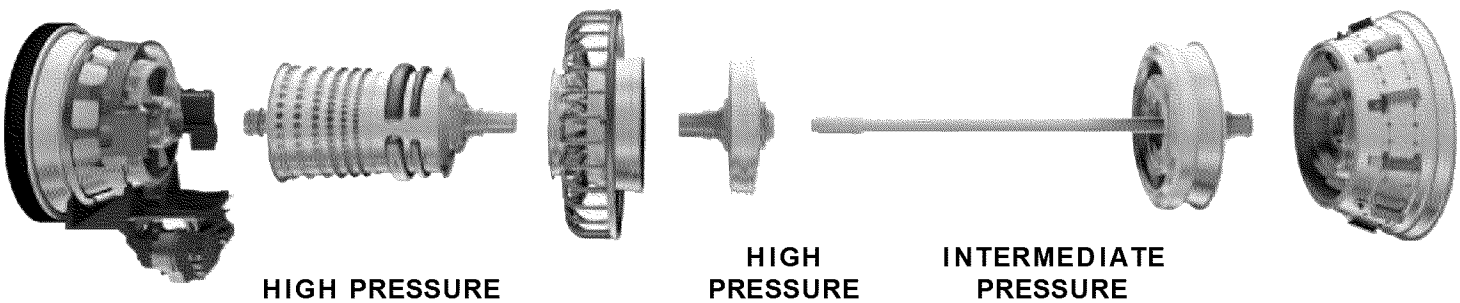
Designed for Availability and Main

Maintainability features

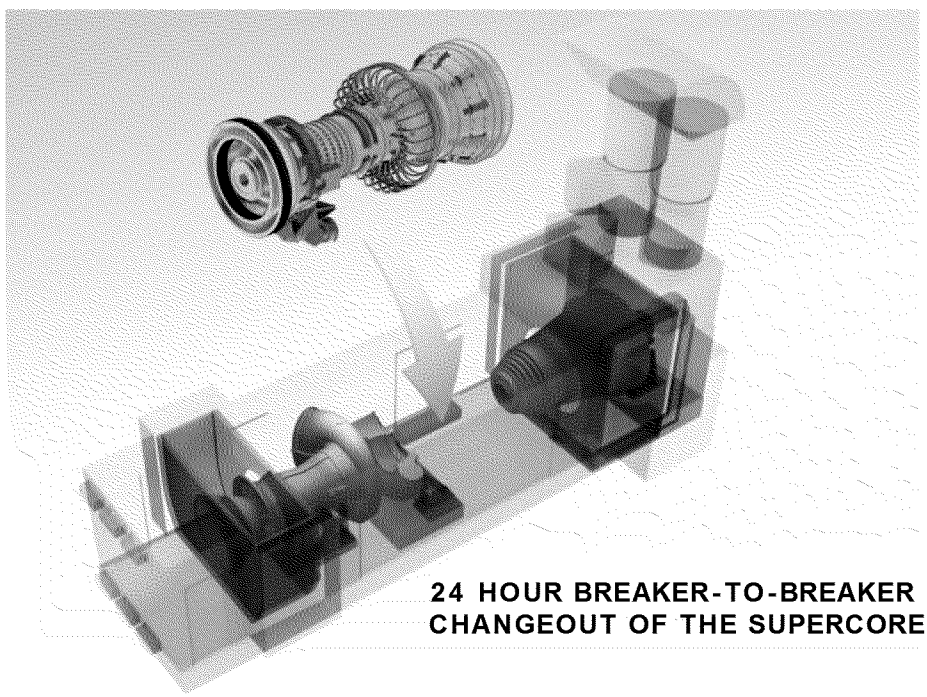
- Modular construction permits replacement of the aero components without total disassembly
- Multiple borescope ports allow on-condition monitoring without turbine disassembly
- Condition-based maintenance and remote diagnostics
- Split casing construction of the booster (LPC) and aeroderivative compressor allows detailed on-site inspection and blade replacement
- Package accessory systems are externally mounted for ease of on-site replacement
- Package mounted maintenance cranes in auxiliary module

Modular "supercore" enhances power plant availability

GE has established a target availability of 97.5% and 98.5% target reliability for a mature LMS100 power plant. The "supercore" consists of the HPC, Combustor, HPT and IPT rotable modules, which can be exchanged in less than **four** days during on-site maintenance to optimize plant availability.



FRONT FRAME | **HIGH PRESSURE COMPRESSOR (HPC)** | **COMBUSTOR** | **HIGH PRESSURE TURBINE (HPT)** | **INTERMEDIATE PRESSURE TURBINE (IPT)** | **TURBINE MID FRAME**



24 HOUR BREAKER-TO-BREAKER CHANGEOUT OF THE SUPERCORE

tainability

LMS100 service intervals

Interval	Scheduled Maintenance Action	Outage Duration
4,000 hours (every 4K h)	Borescope inspection (includes cool-down time)	12 hours
25,000 hours	Hot section interval* 1) On-site hot section replacement (combustor, HPT, IPT)	4 days[a]
50,000 hours	Depot maintenance[b] 1) Major hot section overhaul (combustor, HPT, IPT) 2) Inspect booster, intercooler, scroll frames, HPC, aft shaft and bearings [c] 3) Power turbine overhaul	4 days[a]
75,000 hours	Hot section interval[b] 1) On-site hot section replacement (combustor, HPT, IPT)	4 days[a]
100,000 hours	Depot maintenance[b] 1) Major hot section overhaul (combustor, HPT, IPT) 2) Inspect booster, intercooler, scroll frames, HPC, aft shaft and bearings [c] 3) Power turbine overhaul	4 days[a]

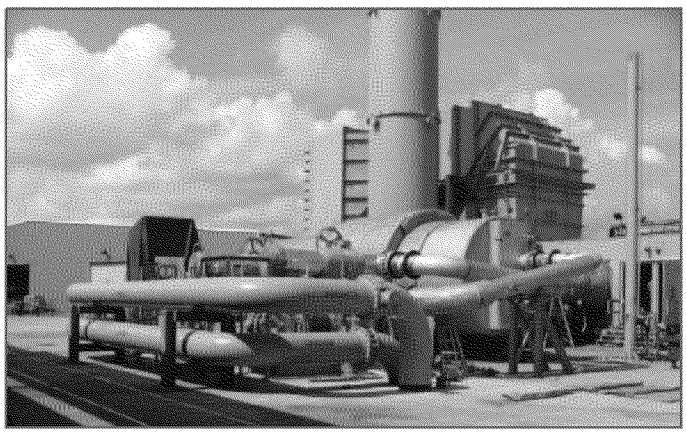
(a) Rotable module installed during maintenance period.
(b) Lease/spare "supercore" and Power Turbine modules are installed during maintenance period. For depot maintenance, outage duration is 60 days if no spare/lease module(s) are used.
(c) Roller and ball bearings are replaced at 50,000 hours; hydrodynamic bearings are inspected.

Maintenance services

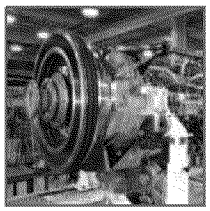
All warranty and follow-on services for the LMS100 will be provided by GE Energy either on site or at one of several service center locations around the world. These services can include Contractual Service Agreements (CSAs), lease engines, spare parts, rotable modules, training resources and user conferences.

GE Energy's Contractual Services Agreements provide the field service, labor, parts and repairs necessary for equipment maintenance while protecting your investment and minimizing your costs. CSA programs can be structured to include unplanned maintenance events with guarantee incentives on reliability and availability.

GE's lease engine program provides a spare "supercore" that can be installed in 24 hours when service center maintenance is required. The power turbine module can also be replaced within an additional 24 hours.



Flexible Growth Platform



The LMS100 is a flexible growth platform designed to meet your changing energy needs. While actual plant layout depends on specific customer needs and site requirements, there are four basic LMS100 configurations available when combined with intercooler selection and combustion technology.

- *LMS100 Single Annular Combustor with Water* – Water or steam can be injected into the combustor to provide emission reduction and achieve 25 ppm NO_X levels while operating on natural gas fuels between 50% and 100% power.

- *LMS100 DLE* – An advanced dry low emission (DLE) combustor will be available for sites that have a restriction on water usage. Using the DLE combustor, customers will be able to achieve 25 ppm for both NO_X and CO emissions while operating on natural gas fuels.

LMS100 System Configurations

Product Offerings	Fuel	Combustor	Diluent	Power Augmentation	NOx Level
LMS100 SAC, 50/60 Hz	Gas, Liquid or Dual Fuel	Single Annular (SAC)	Water	None	25 ppm
LMS100 DLE, 50/60 Hz	Gas	DLE2	None	None	25 ppm

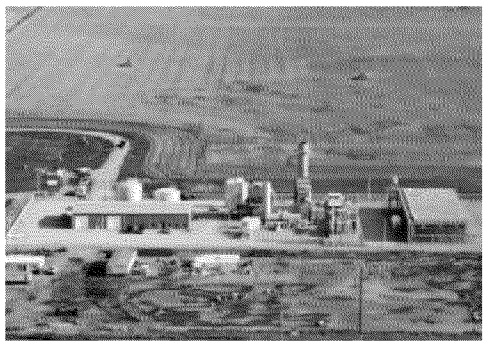
Four basic LMS100 configurations are available as this product is introduced. When combined with intercooler selection and duty applications, the LMS100 offers 20 different configuration choices.

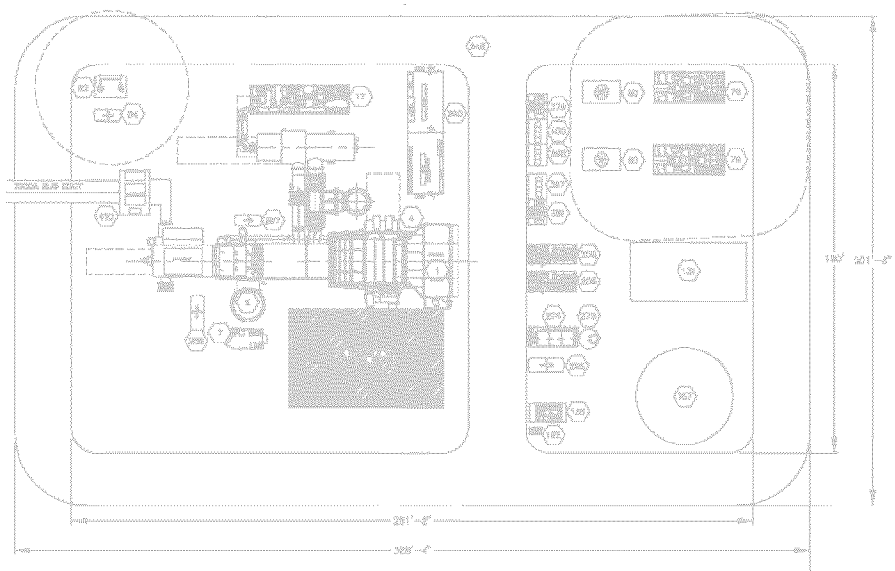
- *Intercooler Options* – Water is the primary cooling agent in the shell and tube heat exchanger available with the LMS100. In areas with an abundant water supply, a standard evaporative cooling tower can be integrated. An optional closed-loop wet intercooler can be provided with a secondary dry, fin-fan cooler if water usage is restricted.

Applications

- *Feed Water Applications*—Increased efficiency, improved flexibility and better economics are among the potential benefits of integrating the LMS100 gas turbine for feed water heating in a coal fired steam plant. The improved efficiency and increased output are achieved through minor modifications of the steam cycle to reduce or eliminate steam extractions in lieu of the gas turbine exhaust and intercooler to heat the feed water.

- *Wind Farm Integration* – The operating characteristics of the LMS100 make it an ideal solution for firming variable wind power. Alternative power sources require high maneuverability, high efficiency (even at partial load), fast starting, low initial capital costs (consistent with moderate to low capacity factors) and good environmental characteristics. The LMS100 simple-cycle gas turbine has all of these characteristics, making a high performance hybrid wind-GT system now economically possible.





GE Energy
1333 West Loop South
Houston, Texas 77027
713.803.0900
www.ge-energy.com/lms100

For more information on the LMS100 gas turbine system, contact your GE Energy representative or email us at energy.aeromarketing@ge.com.

imagination at work

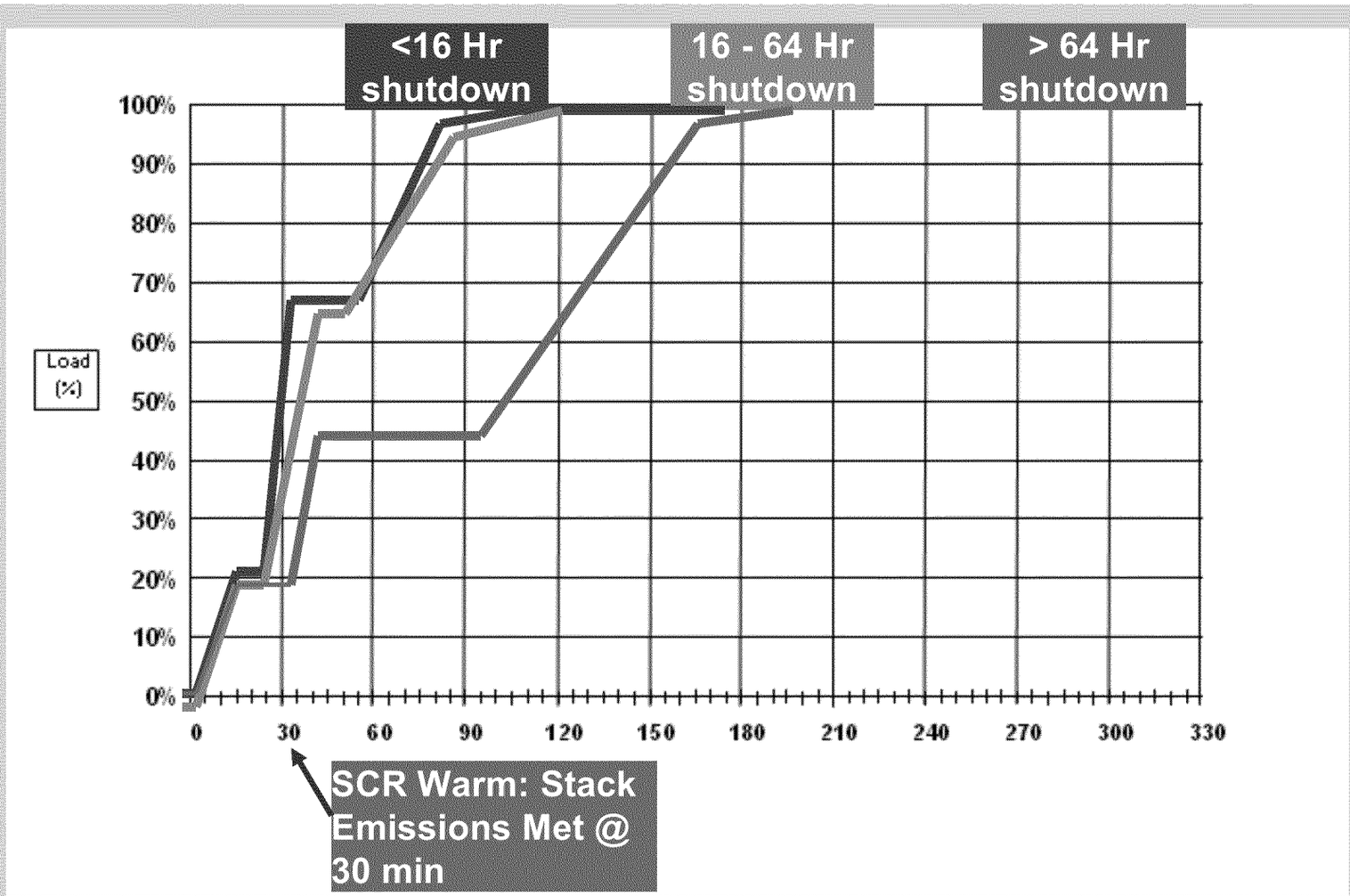
GEA-14355 A (09/06)

ATTACHMENT C

SIEMENS FP30
2X1 STARTUP

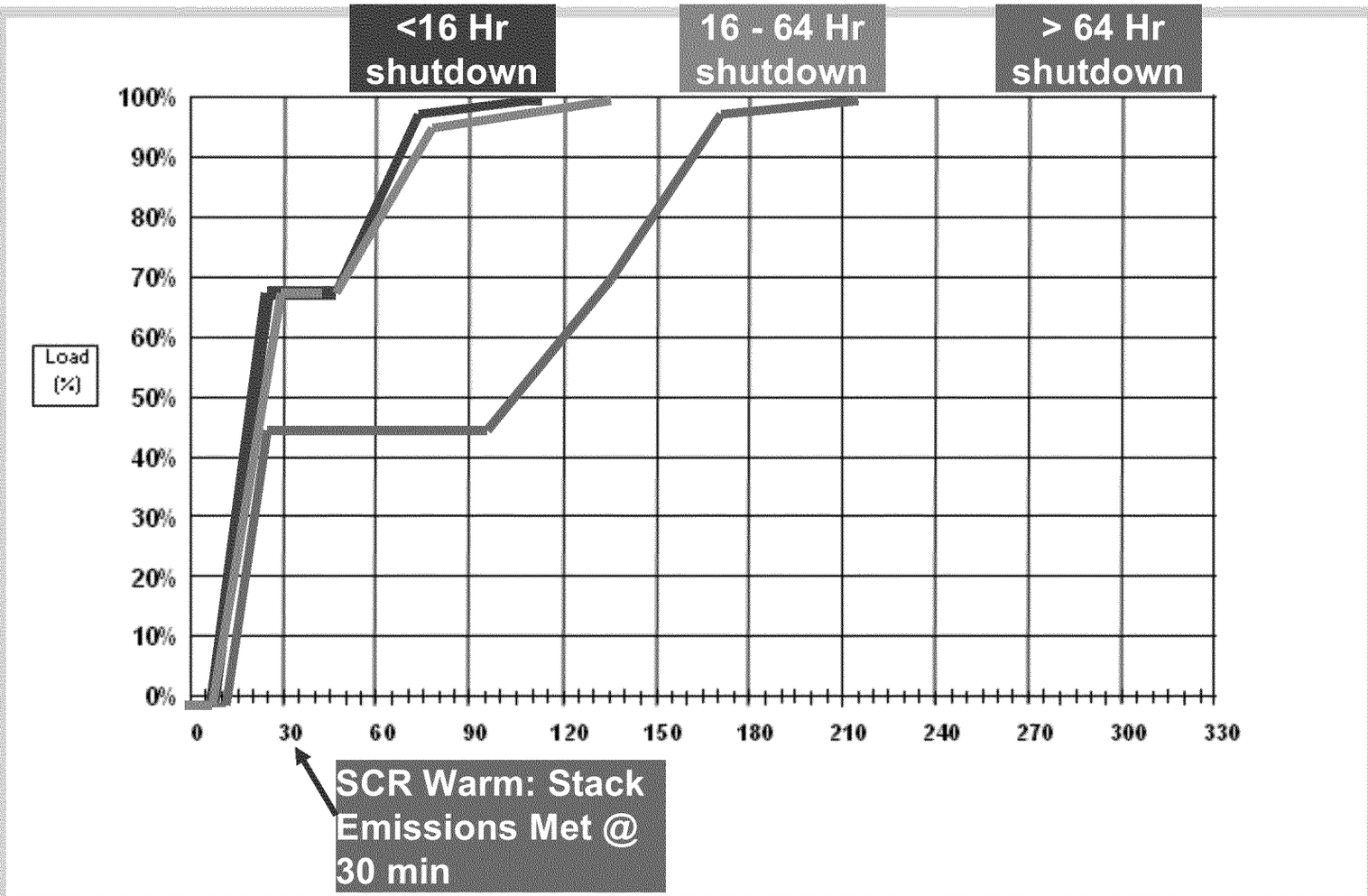
Flex-Plant™ 30 (Drum) : 2x1 Startup Profiles
Total Plant Load

SIEMENS



Flex-Plant™ 30 (Benson) : 2x1 Startup Profiles
Total Plant Load

SIEMENS



ATTACHMENT D

RESPONSE OF THE CALIFORNIA ISO
TO THE FIRST SET OF DATA REQUESTS
FROM L. JAN REID
FEBRUARY 1, 2011

February 1, 2011

VIA ELECTRONIC MAIL

Mr. L. Jan Reid
Coast Economic Consulting
3185 Gross Road
Santa Cruz, CA 9506-2091

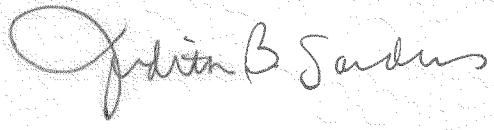
Re: ISO Response to the first set of L. Jan Reid Data Requests

Dear Mr. Reid:

Enclosed please find the ISO response to the first set of L. Jan Reid Data Requests propounded in the Long Term Procurement Proceeding, CPUC Docket R.10-05-006.

Please do not hesitate to contact me if you have any questions.

Sincerely,



Judith B. Sanders
Senior Counsel
California Independent System Operator

Cc: Service List R.10-05-006

BEFORE
THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Integrate And Refine Procurement Policies and Consider Long-Term Procurement Plans	)))	R.10-05-006

RESPONSES OF THE
THE CALIFORNIA INDEPENDENT SYSTEM
OPERATOR CORPORATION TO
THE FIRST SET OF DATA REQUESTS FROM
L. JAN REID

Data Request No. 1:

Pursuant to Public Utilities Code § 1822(a), please provide a working copy of the model(s) used by the CAISO (CAISO Model) which was used to produce results presented by the CAISO at the CPUC's November 30, 2010 workshop.

Response to Data Request No. 1:

For the Step 1 analysis the ISO used software developed by Pacific Northwest National Laboratory (PNNL). The ISO cannot make the software available due to commercial licensing restrictions but has made the input data available:

http://www.caiso.com/23bb/23bbc01d7bd0.html

At that page please reference:

33% RPS Study Step 1 Input Profile Data
zip 16497K | Abstract | 11/15/2010 08:57

For the Step 2 analysis the ISO uses the commercially available production simulation software PLEXOS that can be acquired. The ISO has posted the input data used, which is available data are available on the ISO website at

http://www.caiso.com/23bb/23bbc01d7bd0.html

At that page please reference:

Getting to 33% RPS
33% RPS Integration Study Step 2 Production Simulation Input Data
zip 15048K | Abstract | 01/07/2011 11:57

Data Request No. 2:

. Pursuant to Public Utilities Code § 1822(b), please provide a listing of all of the equations and assumptions built into the CAISO Model.

Response to Data Request No. 2:

Please refer to the Integration of Renewable Resources: Technical Appendices for California ISO Renewable Integration Studies Volume 1 post on the CAISO website at:

http://www.caiso.com/282d/282d85c9391b0.pdf

Data Request No. 3:

Pursuant to Public Utilities Code § 1822(c), please provide an electronic copy of any and all data bases used by the CAISO's Model.

Response to Data Request No. 3:

See response to Data Request No. 1. Step 2 data inputs and other related data are available on the CAISO website at

http://www.caiso.com/23bb/23bbc01d7bd0.html

Data Request No. 4:

Please provide a list of the hardware requirements necessary to run the CAISO's Model. Hardware requirements include computer type, processor speed, available memory, and free hard drive space.

Response to Data Request No.4:

The hardware requirement to run Plexos is dictated by the Xpress Solver that Plexos uses. Here is a link to the requirement http://www.fico.com/en/Products/DMTools/xpress-overview/Pages/Xpress-Hardware.aspx.

The ISO uses virtual machines with the following configuration

CPU: Six-Core AMD Opteron(tm) Processor 8435 (2 Cores available for each virtual machine)

Memory – 8 GB

HD Space – 10 GB

Plexos Software

PLEXOS Version - 6.104 R16

Solver - Xpress-MP 20.00.11 (component - PLEXOS Support for Xpress-MP and Xpress-MP Base Product)

Data Request No. 5

Please provide the CAISO Model's run time for one year of data. (e.g., 36 hours)

Response to Data Request No. 5:

The total run time for the "33% Reference Case with no Load Following Down Requirement" case is 751.1 hours on one ISO virtual machine (it was actually run on four virtual machines simultaneously).

Run time by month (hours)

Jan – 80.2, Feb – 71.0, Mar – 85.9, Apr – 96.9, May – 70.1, Jun – 71.7,

Jul – 21.5, Aug – 23.3, Sep – 39.9, Oct – 61.3, Nov – 71.3, Dec – 58.0

Data Request No. 6:

Please provide an electronic copy of any CAISO studies which show that the T-2 persistence method is more accurate than the T-1 persistence method for estimating improved error values

Response to Data Request No. 6:

The CAISO has not asserted that the T-2 persistence method is more accurate than the T-1 method and therefore has no studies to provide. The T-2 was used for analysis of forecast error. The ISO has also performed analysis using T-1 persistence. The ISO proposes to use T-1 persistance as the basis for improved solar forecasting error approach after perfuming T-2 and T-1 persistance analysis on the new profiles being developed based on the new CPUC scenarios.

Data Request No. 7:

At the December 20, 2010 pre-hearing conference (PHC) in this proceeding, Judith Sanders of the CAISO stated that the CAISO would be able to model two additional scenarios by March, 2011. (December 20, 2010 PHC Transcript, p. 145, lines 6-23) Please provide a detailed explanation of why it will take the CAISO two months to model two additional scenarios.

Response to Data Request No. 7:

As noted in the response to Data Request No.5, the production simulation is simulation of all 8760 hours an operational year given the input requirements. This process requires significant amount of computational time as well as running, review of results a rerunning to resolve observed violations until all violations are resolved. This effort takes approximately 1 month per scenario.

ATTACHMENT E

RESPONSE OF THE CALIFORNIA ISO
TO THE FIRST SET OF DRA DATA REQUESTS

BEFORE
THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Integrate	**)**	
And Refine Procurement Policies and	**)**	**R.10-05-006**
Consider Long-Term Procurement Plans	**)**	

RESPONSE OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION TO THE FIRST SET OF DRA DATA REQUESTS

I. Request for Previous Data Requests

Please provide a copy of any prior data requests to CAISO (from any party) related to this proceeding, as well as CAISO's response.

RESPONSE TO DR. I:

Attached please find the ISO's responses to a data request submitted by L. Jan Reid on Feburary 1, 2011.

II. Questions Regarding the PLEXOS Model

1. Please state the input assumptions used in 2020 for the Helms pumped storage station characteristics, in particular the availability of the pumps during pumping mode, by month, and the monthly energy storage targets and energy usage schedules, as reflected in the modeling parameters in the most recent "33% RPS Integration Study Step 2 Production Simulation Full Plexos Model Data" updated June 9, 2011 (as posted on the CAISO website).

RESPONSE TO DR NO. II.1:

The model has the following assumptions about the Helms pumps

- There are three pumps that can operate simultaneously from Jan to May and from Oct to Dec. There will be only one pump available for the rest of year 2020.
- PG&E provided pump and usage targets. The storage should reach reservoir maximum volume at the end of May

Pump/Usage Target	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pump (GWh)				30.2	29.9							
Usage (GWh)						13.5	18.0	18.0	10.6			

- Based on that the monthly initial and end storage volumes are set as follows

Reservoir Storage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Initial Volume (GWh)	120	120	120	124	154	184	171	153	135	124	120	120
End Volume (GWh)	120	120	124	154	184	171	153	135	124	120	120	120

2. Please identify and describe any other relevant aspects of the modeling of this pumped storage facility as it may affect the requirements for load following down, load following up, regulation down or regulation up needs.

RESPONSE TO DR NO. II.2:

Besides the pump load, as assumed above, other relevant modeling aspects of Helms pump storage are:

- Max generation capacity per unit: 400 MW
- Min generation capacity per unit: 200 MW
- Max pump load per unit: 325 MW
- Min Pump Load per unit: 320 MW
- In generating mode, each Helms unit can provide upward AS and load following-up for all its unloaded on-line capacity (up to 200 MW). It can also provide up to 200 MW regulation-down and load following-down.

These aspects may affect the supply of load following and regulation services in the system. They should not affect the requirements for the services.

3. Is the planned Oakley 600 MW (nominal) power plant included in the modeling assumptions? If it is not included, please explain why not

RESPONSE TO DR NO. II. 3:

The Oakley plant is not included in the model. This plant was not in the CPUC LTPP Scoping Memo because it was not sufficiently through planning approval process yet.

4. Slide 64 of the May 10, 2011 workshop presentation, and page 2 of the "Step 2 Analysis – Draft Database and Model modifications from April 29th Results" references 2,626 MW of resources that contribute towards ISO Ancillary Services (AS) and load following requirements. DRA has the following questions:

a. What are the specific load following and AS characteristics assigned to these resources in the PLEXOS model?

RESPONSE TO DR NO. II. 4a:

The only change to these units was to have the resources contribute to the ISO AS and load following requirements, instead of to the MUNI requirements. There is no change to the contribution capability.

b. How was it determined that these resources, and the MW quantities associated with them, would be available in 2020 to serve AS and load following requirements in the PLEXOS model?

RESPONSE TO DR NO. II. 4b:

These resources currently are providing AS in the ISO markets.

c. Are these the only external (to CAISO balancing area) resources that are allowed to contribute to AS and load following requirements within PLEXOS?

RESPONSE TO DR. NO. II. 4c:

The Hoover generating resource also contributes to AS and load following requirements within PLEXOS.

d. Does the modeling construct allow for CAISO to include additional external resources as potentially contributing to AS and load following requirements? If so, please explain how; if not, please explain why not.

RESPONSE TO DR. NO. II. 4d:

Yes, the model has the capability to do that if the person running the model specifies which AS or load following a unit can contribute to and at what rate.

5. Concerning the use of T-1 forecast error for solar and wind resources:

a. Please confirm, or explain otherwise, that the Step 1 input parameters for solar and wind use a T-1 (1 hour ahead) forecast error.

RESPONSE TO DR. NO. II. 5a:

Yes, the wind and solar hour-ahead forecast errors are necessary input data for the Step 1 analysis.

The wind and solar profiles in the 33% Trajectory case were used to calculate the T-1 (1 hour ahead) forecast error for each season. An aggregated wind profile was used to calculate the T-1 wind forecast error. Four separate solar forecast errors were calculated based on solar technology: Large PV, Large Solar Thermal, Distributed PV and Customer Side PV. Note that the Solar T-1 persistent model applies to the clearness index and not solar production. The solar forecast errors were calculated for each solar technology and grouped by clearness index.

b. Does CAISO have the ability to use forecast error data using shorter time intervals, either 30 minutes or 15 minutes (T-30min, T-15min)? Please explain.

RESPONSE TO DR. NO. II. 5b:

No, this capability is not available in the Step 1 methodology. The current Step 1 methodology was design to mimic the current ISO market scheduling process and timelines. Incorporating shorter time intervals would require significant software changes to the model.

c. Will CAISO run sensitivities using shorter forecast errors? If so, please explain which forecast errors would be used; if not, please explain why not and qualitatively explain the effect of using T-1, as opposed to shorter time interval forecast errors.

RESPONSE TO DR. NO. II. 5c:

Not at this time. As explained above T-1 hour best reflect the ISO market scheduling processes and timelines. The ISO already moved from using a T-2 hour forecast to a T-1 forecast with the expectation that the current T-75 minute Hour Ahead Scheduling Process will be able to move closer to real-time. While one can expect that T-1 hour persistence forecast will have larger variation than a shorter time interval persistence forecast, the full realization of the lower forecast errors may not be achieved unless market scheduling timelines are also shorter.

6. Reference slide 27 of the 5/10/2011 presentation:

a. Please explain specifically in which hours of the year (2020) the load following down shortfall violation occurs, for each of the trajectory and environmentally-constrained runs.

RESPONSE TO DR. NO. II. 6a:

Slide 27 presented the maximum load following-down shortfalls of Trajectory Case and Environment Case. Both occurred at Dec 31, Hour-End 17.

b. Please explain qualitatively your understanding of why these violations occur, and why they do not occur in the cost-constrained and time-constrained scenarios.

RESPONSE TO DR. NO. II. 6b:

The model has a simulation interval of one hour and needs to balance energy supply and demand based on hourly averages. The load following requirement represents the difference between the hourly average and the 5-minute "actual" energy.

Hour-End 17 in December is the time the sun sets. During that hour the solar energy drops quickly. There is a big difference in solar energy from the beginning of the hour to the end of the hour. There is over generation at the beginning of the hour and under generation at the end of the hour. To overcome this, there are very large load following-down and load

following-up requirements for this hour. At that time the overall load is about to pick up. Sufficient resources have been committed, but are running at lower capacity. There may not enough downward capacity to meet the high load following-down requirement.

In the Cost-Constrained and Time-Constrained Cases there is not as much solar energy as the other two cases.

7. What, if any, proposed or in-construction hydro (small, large, or pumped storage) projects did CAISO include in the study? Please list specific projects, with storage capacity, status (e.g., in construction) and estimated completion date of each project if available.

RESPONSE TO DR. NO. II.7:

There is one new pump storage plant included in the model. It is the "Hodges-Olivenhain Pump Storage" in the SDG&E area that should come online in 2011. It has two units. Each has a maximum capacity of 20 MW. The maximum storage capacity of the plant is 0.125 GWh. The plant can contribute to load following up and down and non-spinning.

8. It is DRA's understanding that Nexant, E3, PLEXOS, PG&E, SCE and SDG&E have all provided consulting services or advice to CAISO regarding the modeling under consideration in this proceeding. Please describe the specific contributions of each of these parties to the modeling effort.

RESPONSE TO DR. NO. II.8:

Nexant and PLEXOS provided consulting services to the ISO. Nexant developed the wind and solar 1 minute and hourly profiles and PLEXOS provided the underlying production simulation software and provided services to run the production simulation model. PG&E, SCE and SDG&E (the IOUS) engaged E3 to provide consulting services for the studies and metrics that the IOUs developed, and the ISO worked collaboratively with the IOUs and E3 as its studies were conducted. To the best of the ISO's knowledge, E3-reconcilled the production simulation resources and with scoping memo, developed gas prices external to California, and performed metrics (step 3) for the IOUs. The IOUs and E3 participated as part of the 33% RPS review working group and any input or advice provided by the participants was verified by the ISO before being incorporated into the ISO's studies.

III. Request for Responses to Concerns Raised in Previous Comments

DRA requests that the CAISO respond to various concerns regarding the CAISO model raised by DRA and other parties in earlier comments filed in this proceeding. The table below summarizes each concern by quoting a portion of the relevant comment and references the source by filing date and party name. E.g., the comment filed by DRA on January 14, 2011 is referred to as "110114 DRA". (For reference purposes and to provide the full context, we have attached the source comments to this e-mail).

For each concern listed in the table, please:

a) Describe any modeling changes that the CAISO or its collaborators have made to address the issue;
b) If no changes have been made in response to a particular concern, please explain whether the CAISO disagrees with the substance of the criticism (if so, please elaborate on the CAISO's perspective) or whether the CAISO has not had the time or resources to address the concern;
c) If a concern has not been addressed due to a lack of time or resources, please indicate whether or not the CAISO plans to address the concerns in the future and share the results with the parties. DRA recognizes that addressing a concern may involve changes to the core model, sensitivity analysis or other methods and requests that the CAISO to be as specific as possible regarding what approach is anticipated.

RESPONSE TO DR. SECTION III:

Objection. This request is improper and beyond the scope of the CPUC's discovery rules. The ISO reviewed all of the above-referenced comments at the time these comments were filed and submitted replies if the ISO considered the comments to raise concerns or issues that needed to be clarified. Furthermore, if the parties submitting comments raised issues about the ISO's modeling assumptions and techniques that the ISO considered to be valid, the ISO has incorporated these suggested changes into its studies and has shared this information with DRA and the other parties. The ISO suggests that DRA review the reply comments filed by the ISO on October 11, 2011 and January 26, 2011 and all of the modeling and study results information that has been provided thus far.

Finally, this request is unduly burdensome. The ISO is in the midst of finalizing its study results and preparing testimony for submission on July 1, 2011. As noted above, the ISO has already considered the comments submitted in this docket and has incorporated any valid suggestions into its studies. Requiring the ISO to commit the resources needed to go back through comments filed months ago and provide written responses - when the ISO did not believe responses were required in the first place - is time consuming, burdensome and will not lead to useful or relevant information in this proceeding. Furthermore, it is possible that some of the comments and concerns raised by parties in January, 2011, have been resolved or explained away, making this request even less useful for the purposes of this proceeding.