

F2 MEGAWATT HOURS AND SOLAR TECHNOLOGY DISTRIBUTION

The allocation of renewable energy in the Development Focus Areas (DFAs) was done in megawatts (MW), see Appendix F1. Additionally, the allocation did not distinguish between solar photovoltaic (PV) and solar thermal as the DRECP assumes the same acres of disturbance per MW for all solar technologies. However, for the analysis of some resources, the MW hours (MWh) are used rather than the total MW and distribution of the solar technology is important.

This appendix provides tables with MWh and solar technology distribution for each alternative. The calculation of the MWh used the hours per MW from the 2013 Integrated Energy Policy Report Draft Lead Commissioner Report; see Table 18, California's RPS Portfolio, December 2012 and the notes page of this Appendix.

The distribution of the solar MW into solar PV and solar thermal technologies used the percentage of the total solar projects proposed for each technology in the Plan Area from 2008 to the present; see the notes page of this Appendix.

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Appendix F2
MWh and Technology Distribution for Impact Analysis

SUMMARY TABLE:						
Megawatt Hours (MWh)	Preferred Alternative	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	2012 MWh	2012 MWh	MWh	MWh	MWh	MWh
Solar	25,877,613	29,749,491	31,623,218	19,986,400	29,871,327	27,743,512
Wind	8,983,772	15,922,062	1,163,162	17,000,060	3,547,364	6,443,171
Geothermal	14,445,200	1,631,203	14,445,200	14,445,200	14,445,200	14,445,200
DG	5,195,561	1,565,763	5,196,550	5,196,550	5,196,550	5,196,550
Total	54,502,145	48,868,519	52,428,130	56,628,210	53,060,441	53,828,434

Appendix F2
MWh and Technology Distribution for Impact Analysis

MWh and Technology Distribution for Impact Analysis	No Action Alternative												
	SUBUNITS of Ecoregion Subareas	TOTAL Solar MW	Solar MWh	Solar Thermal	Solar PV	Wind MW	Wind MWh	Geotherm al MW	Geotherm al MWh	DG MW	DG MWh	Total MWs	Total MWh
Cadiz Valley and Chocolate Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadiz Valley and Chocolate Mountains - 2	5071	10901594	1065	4006	0	0	0	0	267	573768	5337	11475362	
Cadiz Valley and Chocolate Mountains - 3	0	0	0	0	0	0	0	0	0	0	0	0	0
Imperial Borrego Valley - 1	2431	5227404	511	1921	925	2705657	316	1631203	128	275127	3800	9839390	
Imperial Borrego Valley - 2	2906	6246889	610	2295	0	0	0	0	119	255032	3024	6501921	
Imperial Borrego Valley - 3	0	0	0	0	0	0	0	0	0	0	0	0	0
Kingston and Funeral Mountains - 1	553	1188046	116	437	0	0	0	0	0	0	553	1188046	
Mojave and Silurian Valley - 1	3	6093	1	2	0	0	0	0	0	321	3	6413	
Mojave and Silurian Valley - 2	0	0	0	0	0	0	0	0	0	0	0	0	0
Owens River Valley - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Panamint Death Valley - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinto Lucerne Valley and Eastern Slopes - 1	2	4062	0	1	128	374719	0	0	0	214	130	378994	
Pinto Lucerne Valley and Eastern Slopes - 2	135	290411	28	107	0	0	0	0	7	15285	142	305696	
Piute Valley and Sacramento Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Providence and Buillion Mountains - 1	401	863111	84	317	0	0	0	0	85	181707	486	1044818	
Providence and Buillion Mountains - 2	0	0	0	0	0	0	0	0	0	0	0	0	0
West Mojave and Eastern Slopes - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
West Mojave and Eastern Slopes - 2	886	1904936	186	700	4389	12841687	0	0	47	100260	5321	14846882	
West Mojave and Eastern Slopes - 3	94	203085	20	75	0	0	0	0	5	10689	99	213774	
West Mojave and Eastern Slopes - 4	770	1654735	162	608	0	0	0	0	41	87091	810	1741827	
West Mojave and Eastern Slopes - 5	113	243702	24	90	0	0	0	0	6	12826	119	256528	
West Mojave and Eastern Slopes - 6	472	1015424	99	373	0	0	0	0	25	53443	497	1068868	
Grand Total	13837	29749491	2906	10931	5442	15922062	316	1631203	728	1565763	20323	48868519	

solar sub-totals are not counted in total MW

Appendix F2
MWh and Technology Distribution for Impact Analysis

MWh and Technology Distribution for Impact Analysis	Preferred Alternative												
	SUBUNITS of Ecoregion Subareas	TOTAL Solar MW	Solar MWh	Solar Thermal	Solar PV	Wind MW	Wind MWh	Geotherm al MW	Geotherm al MWh	DG MW	DG MWh	Total MWs	Total MWh
Cadiz Valley and Chocolate Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadiz Valley and Chocolate Mountains - 2	3301	7098053	693	2608	1355	3965043	0	0	270	581271	4927	11644367	
Cadiz Valley and Chocolate Mountains - 3	5	10277	1	4	1	3812	0	0	1	1379	7	15468	
Imperial Borrego Valley - 1	1390	2988071	292	1098	21	62880	974	5023052	381	820159	2766	8894162	
Imperial Borrego Valley - 2	2283	4908648	479	1804	89	259488	1619	8351100	400	858991	4390	14378227	
Imperial Borrego Valley - 3	0	0	0	0	0	0	0	0	0	0	0	0	
Kingston and Funeral Mountains - 1	419	900867	88	331	0	0	0	0	0	0	419	900867	
Mojave and Silurian Valley - 1	364	782316	76	287	0	0	0	0	46	99955	410	882271	
Mojave and Silurian Valley - 2	0	0	0	0	0	0	0	0	0	0	0	0	
Owens River Valley - 1	91	195960	19	72	0	0	208	1071048	0	0	299	1267007	
Panamint Death Valley - 1	0	0	0	0	0	0	0	0	0	0	0	0	
Pinto Lucerne Valley and Eastern Slopes - 1	888	1909185	186	702	714	2090519	0	0	66	142118	1669	4141822	
Pinto Lucerne Valley and Eastern Slopes - 2	0	0	0	0	0	0	0	0	0	0	0	0	
Piute Valley and Sacramento Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	
Providence and Buillion Mountains - 1	141	303555	30	112	0	0	0	0	25	53637	166	357192	
Providence and Buillion Mountains - 2	0	0	0	0	0	0	0	0	0	0	0	0	
West Mojave and Eastern Slopes - 1	143	308322	30	113	0	0	0	0	0	0	143	308322	
West Mojave and Eastern Slopes - 2	1634	3513072	343	1291	635	1858688	0	0	397	853550	2666	6225310	
West Mojave and Eastern Slopes - 3	0	0	0	0	0	0	0	0	0	0	0	0	
West Mojave and Eastern Slopes - 4	573	1232019	120	453	0	0	0	0	447	961050	1020	2193069	
West Mojave and Eastern Slopes - 5	420	902538	88	332	254	743342	0	0	166	356900	840	2002780	
West Mojave and Eastern Slopes - 6	384	824730	81	303	0	0	0	0	217	466550	601	1291280	
Grand Total	12036	25877613	2528	9509	3070	8983772	2800	14445200	2417	5195561	20323	54502145	

Appendix F2
MWh and Technology Distribution for Impact Analysis

SUBUNITS of Ecoregion Subareas	Alternative 1											
	TOTAL Solar MW	Solar MWh	Solar Thermal	Solar PV	Wind MW	Wind MWh	Geothermal MW	Geothermal MWh	DG MW	DG MWh	Total MWs	Total MWh
Cadiz Valley and Chocolate Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0
Cadiz Valley and Chocolate Mountains - 2	2762	5939220	580	2182	73	213211	0	0	270	580074	3105	6732505
Cadiz Valley and Chocolate Mountains - 3	13	28004	3	10	0	1326	0	0	1	2576	15	31906
Imperial Borrego Valley - 1	2144	4609947	450	1694	0	646	1313	6775804	305	655224	3763	12041621
Imperial Borrego Valley - 2	2990	6427637	628	2362	8	22077	1477	7620682	476	1023926	4951	15094322
Imperial Borrego Valley - 3	0	0	0	0	0	0	0	0	0	0	0	0
Kingston and Funeral Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0
Mojave and Silurian Valley - 1	592	1272067	124	467	0	0	0	0	133	285099	724	1557165
Mojave and Silurian Valley - 2	0	0	0	0	0	0	9	45361	0	0	9	45361
Owens River Valley - 1	820	1763289	172	648	0	0	0	0	0	0	820	1763289
Panamint Death Valley - 1	0	0	0	0	0	0	0	0	0	0	0	0
Pinto Lucerne Valley and Eastern Slopes - 1	1453	3123295	305	1148	133	389218	0	0	220	472751	1806	3985265
Pinto Lucerne Valley and Eastern Slopes - 2	0	5	0	0	0	1	0	0	0	1	0	6
Piute Valley and Sacramento Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0
Providence and Buillion Mountains - 1	234	502178	49	185	0	0	0	0	44	95451	278	597629
Providence and Buillion Mountains - 2	0	0	0	0	0	0	0	0	0	0	0	0
West Mojave and Eastern Slopes - 1	71	153081	15	56	0	0	0	0	0	0	71	153081
West Mojave and Eastern Slopes - 2	1499	3222552	315	1184	77	224941	0	0	396	851400	1972	4298893
West Mojave and Eastern Slopes - 3	0	0	0	0	0	0	1	3352	0	0	1	3352
West Mojave and Eastern Slopes - 4	799	1718297	168	631	0	0	0	0	396	851400	1195	2569697
West Mojave and Eastern Slopes - 5	1332	2863647	280	1052	107	311742	0	0	176	378648	1615	3554037
West Mojave and Eastern Slopes - 6	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	14708	31623218	3089	11620	398	1163162	2800	14445200	2417	5196550	20323	52428130

solar sub-totals are not counted in total MW

Appendix F2
MWh and Technology Distribution for Impact Analysis

MWh and Technology Distribution for Impact Analysis	Alternative 2												
	SUBUNITS of Ecoregion Subareas	TOTAL Solar MW	Solar MWh	Solar Thermal	Solar PV	Wind MW	Wind MWh	Geothermal MW	Geotherma l MWh	DG MW	DG MWh	Total MWs	Total MWH
Cadiz Valley and Chocolate Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadiz Valley and Chocolate Mountains - 2	1929	4147956	405	1524	1438	4209000	0	0	270	581271	3638	8938227	
Cadiz Valley and Chocolate Mountains - 3	3	6006	1	2	47	138220	0	0	1	1379	51	145605	
Imperial Borrego Valley - 1	812	1746167	171	642	23	66749	971	5011582	381	820159	2188	7644657	
Imperial Borrego Valley - 2	1334	2868513	280	1054	94	275453	1615	8332032	400	858991	3443	12334989	
Imperial Borrego Valley - 3	723	1553452	152	571	1072	3137718	0	0	0	0	1795	4691171	
Kingston and Funeral Mountains - 1	193	415327	41	153	109	318462	0	0	0	0	302	733789	
Mojave and Silurian Valley - 1	145	311631	30	115	0	10	0	0	40	85060	185	396700	
Mojave and Silurian Valley - 2	216	464713	45	171	274	802418	6	30714	0	0	496	1297845	
Owens River Valley - 1	125	267916	26	98	96	281814	207	1068602	0	0	428	1618333	
Panamint Death Valley - 1	102	219443	21	81	28	82152	0	0	0	0	130	301595	
Pinto Lucerne Valley and Eastern Slopes - 1	631	1357112	133	499	928	2716222	0	0	294	632230	1854	4705564	
Pinto Lucerne Valley and Eastern Slopes - 2	84	181643	18	67	411	1203387	0	0	3	6863	499	1391893	
Piute Valley and Sacramento Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	
Providence and Buillion Mountains - 1	189	405474	40	149	294	859147	0	0	16	34268	498	1298888	
Providence and Buillion Mountains - 2	0	0	0	0	0	0	0	0	0	0	0	0	
West Mojave and Eastern Slopes - 1	571	1227709	120	451	6	18931	0	0	76	162800	653	1409440	
West Mojave and Eastern Slopes - 2	1180	2537249	248	932	678	1982781	0	0	290	624481	2148	5144510	
West Mojave and Eastern Slopes - 3	356	765696	75	281	0	0	0	2270	96	206097	452	974063	
West Mojave and Eastern Slopes - 4	346	744421	73	274	46	135468	0	0	429	921820	821	1801709	
West Mojave and Eastern Slopes - 5	269	579407	57	213	264	772128	0	0	99	212307	632	1563841	
West Mojave and Eastern Slopes - 6	87	186565	18	69	0	0	0	0	23	48824	109	235389	
Grand Total	9296	19986400	1952	7344	5810	17000060	2800	14445200	2417	5196550	20323	56628210	

solar sub-totals are not counted in total MW

Appendix F2
MWh and Technology Distribution for Impact Analysis

SUBUNITS of Ecoregion Subareas	Alternative 3											
	TOTAL Solar MW	Solar MWh	Solar Thermal	Solar PV	Wind MW	Wind MWh	Geothermal MW	Geothermal MWh	DG MW	DG MWh	Total MW	Total MWh
Cadiz Valley and Chocolate Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0
Cadiz Valley and Chocolate Mountains - 2	2651	5700170	557	2094	236	689528	0	0	270	580645	3157	6970344
Cadiz Valley and Chocolate Mountains - 3	9	19802	2	7	1	2615	0	0	1	2005	11	24422
Imperial Borrego Valley - 1	1668	3586570	350	1318	6	16848	985	5082171	192	413029	2851	9098619
Imperial Borrego Valley - 2	2800	6019264	588	2212	13	39470	1590	8205228	589	1266121	4993	15530082
Imperial Borrego Valley - 3	190	409079	40	150	49	144407	0	0	0	0	240	553486
Kingston and Funeral Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0
Mojave and Silurian Valley - 1	468	1006976	98	370	0	0	0	0	84	180303	552	1187279
Mojave and Silurian Valley - 2	0	0	0	0	0	0	6	32281	0	0	6	32281
Owens River Valley - 1	300	644223	63	237	0	0	218	1123134	0	0	517	1767357
Panamint Death Valley - 1	265	570609	56	210	0	0	0	0	0	0	265	570609
Pinto Lucerne Valley and Eastern Slopes - 1	1340	2881404	281	1059	427	1248148	0	0	262	562704	2028	4692255
Pinto Lucerne Valley and Eastern Slopes - 2	0	3	0	0	0	1	0	0	0	1	0	5
Piute Valley and Sacramento Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0
Providence and Buillion Mountains - 1	268	576863	56	212	0	0	0	0	45	96755	313	673618
Providence and Buillion Mountains - 2	0	0	0	0	0	0	0	0	0	0	0	0
West Mojave and Eastern Slopes - 1	46	98200	10	36	0	0	0	0	0	0	46	98200
West Mojave and Eastern Slopes - 2	2057	4422703	432	1625	199	581548	0	0	396	851035	2652	5855286
West Mojave and Eastern Slopes - 3	0	0	0	0	0	0	0	2386	0	0	0	2386
West Mojave and Eastern Slopes - 4	724	1556091	152	572	102	298375	0	0	396	851765	1222	2706231
West Mojave and Eastern Slopes - 5	826	1775750	173	652	180	526424	0	0	134	288696	1140	2590870
West Mojave and Eastern Slopes - 6	281	603619	59	222	0	0	0	0	48	103491	329	707110
Grand Total	13894	29871327	2918	10976	1212	3547364	2800	14445200	2417	5196550	20323	53060441

solar sub-totals are not counted in total MW

Appendix F2
MWh and Technology Distribution for Impact Analysis

MWh and Technology Distribution for Impact Analysis	Alternative 4												
	SUBUNITS of Ecoregion Subareas	TOTAL Solar MW	Solar MWh	Solar Thermal	Solar PV	Wind MW	Wind MWh	Geotherm al MW	Geotherm al MWh	DG MW	DG MWh	Total MWs	Total MWh
Cadiz Valley and Chocolate Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadiz Valley and Chocolate Mountains - 2	4863	10455275	1021	3842	1090	3188527	0	0	541	1163312	6494	14807114	
Cadiz Valley and Chocolate Mountains - 3	7	15808	2	6	1	3162	0	0	1	1988	9	20958	
Imperial Borrego Valley - 1	974	2094022	205	769	0	1205	1124	5798114	390	839320	2489	8732661	
Imperial Borrego Valley - 2	1623	3489205	341	1282	15	44916	1422	7336103	391	839830	3451	11710054	
Imperial Borrego Valley - 3	0	11	0	0	0	0	0	0	0	0	0	11	
Kingston and Funeral Mountains - 1	91	195147	19	72	0	0	0	0	0	0	91	195147	
Mojave and Silurian Valley - 1	324	696438	68	256	0	0	0	0	84	180673	408	877111	
Mojave and Silurian Valley - 2	0	0	0	0	0	0	7	36552	0	0	7	36552	
Owens River Valley - 1	239	514159	50	189	0	0	247	1271729	0	0	486	1785888	
Panamint Death Valley - 1	118	252658	25	93	0	0	0	0	0	0	118	252658	
Pinto Lucerne Valley and Eastern Slopes - 1	737	1585187	155	582	360	1051927	0	0	70	149598	1166	2786713	
Pinto Lucerne Valley and Eastern Slopes - 2	0	3	0	0	0	1	0	0	0	0	0	5	
Piute Valley and Sacramento Mountains - 1	0	0	0	0	0	0	0	0	0	0	0	0	
Providence and Buillion Mountains - 1	124	266707	26	98	0	0	0	0	28	59802	152	326509	
Providence and Buillion Mountains - 2	0	0	0	0	0	0	0	0	0	0	0	0	
West Mojave and Eastern Slopes - 1	41	88034	9	32	0	0	0	0	0	0	41	88034	
West Mojave and Eastern Slopes - 2	1856	3990087	390	1466	524	1532861	0	0	340	730245	2719	6253194	
West Mojave and Eastern Slopes - 3	0	0	0	0	0	0	1	2701	0	0	1	2701	
West Mojave and Eastern Slopes - 4	882	1896083	185	697	0	0	0	0	452	972555	1334	2868638	
West Mojave and Eastern Slopes - 5	668	1435431	140	527	212	620572	0	0	55	119151	935	2175154	
West Mojave and Eastern Slopes - 6	358	769257	75	283	0	0	0	0	65	140075	423	909332	
Grand Total	12904	27743512	2710	10194	2202	6443171	2800	14445200	2417	5196550	20323	53828434	

solar sub-totals are not counted in total MW

NOTES

Calculation of % Solar Thermal vs Solar PV

Percent is based on evaluation of projects proposed in Plan Area from 2008 to present:

-- 21 percent of MW were solar thermal and 79 percent of MW were solar PV.

-- The Alternatives contain between 1,952 MW and 3,089 MW of solar thermal, and the Preferred Alternative has 2,528 MW of solar thermal and 9,509 MW of solar PV

Calculation of MWh from MW

$$h = \text{GWh} * 1000 / \text{MW}$$

From 2013 IEPR Draft Lead Commissioner Report at: <http://www.energy.ca.gov/2013publications/CEC-100-2013-001/CEC-100-2013-001-LCD.pdf>

See Table 19

2022 numbers

Solar = 2246 hrs per MW

Wind = 2781 hrs per MW

Geothermal = 7216 hrs per MW

Table 18

2012 numbers

Solar = 2150 hrs per MW

Wind = 2926 hrs per MW

Geothermal = 5159 hrs per MW

Note - the IEPR provides two hrs per MW numbers, one for 2012 and one for 2022. The MW numbers for 2012 were used for this estimate.

Note - IEPR included only one GWh amount for solar technology - they did not differentiate between solar technologies.