

Detailed Results from LBNL WREZ Analysis

Detailed Results from LBNL Analysis of Western Renewable Energy Zones. See full report for more details on assumptions and definitions of scenarios.

Mills, A., A. Phadke, and R. Wiser. 2010. *Exploration of Resource and Transmission Expansion Decisions in the Western Renewable Energy Zone Initiative*. Berkeley, CA: Lawrence Berkeley National Laboratory, February.
<http://eetd.lbl.gov/ea/emp/reports/lbnl-3077e.pdf>.

Base Case												
Load Zone	Resource Name	Transmission Distance (mi)	Bus Bar Cost (\$/MWh)	Transmission and Losses Cost (\$/MWh)	Delivered Cost (\$/MWh)	Integration Cost (\$/MWh)	Capacity Value (\$/MWh)	Energy Value (\$/MWh)	Adjusted Delivered Cost (\$/MWh)	Nameplate Capacity (MW)	Annual Energy (TWh/yr)	Cummulative Energy (TWh/yr)
Albuquerque	NM_EA_W_3	86	92.2	9.7	101.9	5.0	7.7	58.4	40.8	2,243	6.2	6.2
	WY_NO_W_2	307	74.5	25.5	100.0	5.0	7.5	51.7	45.8	60	0.2	0.2
Billings	WY_EA_W_2	391	71.8	33.8	105.6	5.0	7.9	53.7	49.1	732	2.6	2.8
	WY_NO_W_3	307	81.0	27.7	108.7	5.0	8.2	56.2	49.3	975	3.1	5.8
Boise	WY_EC_W_2	229	72.5	17.7	90.1	5.0	14.1	62.9	18.1	1,406	4.9	4.9
	WY_EC_W_3	229	79.4	19.3	98.7	5.0	15.4	68.9	19.3	1,093	3.5	8.4
Calgary	MT_NW_W_2	233	73.6	21.3	94.9	5.0	25.8	69.5	4.7	1,451	5.0	5.0
	MT_NW_W_3	233	80.1	23.3	103.4	5.0	28.1	75.6	4.7	3,745	11.9	16.9
	MT_NE_W_3	391	81.5	39.5	120.9	5.0	26.0	73.8	26.2	1,536	4.9	21.8
	AB_EA_W_5	108	116.9	12.4	129.3	5.0	27.4	73.7	33.2	1,319	4.0	25.8
	AB_EC_W_5	160	116.3	16.8	133.0	5.0	27.4	73.7	36.9	700	2.1	28.0
	AB_SE_W_6	143	121.1	15.4	136.5	5.0	27.4	73.7	40.4	2,111	6.5	34.4
Casper	WY_NO_W_3	40	81.0	4.9	85.9	5.0	6.5	50.1	34.2	2,027	6.3	6.3
Denver	WY_EA_W_2	173	71.8	16.7	88.5	5.0	5.4	53.2	34.9	1,774	6.3	6.3
	WY_SO_W_3	105	85.2	12.3	97.5	5.0	6.4	59.0	37.0	1,241	3.7	10.0
	WY_EA_W_3	173	79.9	18.6	98.5	5.0	6.0	59.2	38.3	3,346	10.6	20.6
El Paso	TX_W_3	0	96.7	0.1	96.8	5.0	7.1	55.1	39.5	128	0.4	0.4
	NM_SE_W_3	110	90.9	11.3	102.2	5.0	8.1	58.2	40.9	1,035	2.9	3.3
Las Vegas	AZ_NW_W_4	41	103.1	6.4	109.5	5.0	5.6	66.7	42.1	207	0.5	0.5
	NV_SW_W_3	104	98.7	12.0	110.6	5.0	6.1	63.2	46.3	56	0.1	0.7
	NV_SW_W_4	104	103.2	12.5	115.7	5.0	6.4	66.2	48.1	177	0.4	1.1
	AZ_NW_S_DNI7	41	157.7	4.8	162.5	-	39.2	74.7	48.7	496	1.7	2.8
	AZ_NW_S_DNI6	41	160.5	4.9	165.4	-	39.4	74.6	51.4	2,259	7.6	10.4
	CA_WE_W_3	66	90.1	7.8	97.9	5.0	8.3	69.9	24.7	862	2.4	2.4
Los Angeles	CA_WE_W_4	66	101.8	8.8	110.6	5.0	9.3	79.1	27.2	290	0.7	3.1
	CA_CT_W_3	104	97.6	11.9	109.6	5.0	7.0	66.7	40.8	495	1.3	4.4
	CA_CT_W_4	104	102.7	12.5	115.2	5.0	7.4	70.2	42.6	916	2.3	6.7
	CA_NE_W_3	155	96.9	18.7	115.7	5.0	8.4	69.0	43.2	89	0.2	6.9
	CA_SO_W_3	176	94.1	20.0	114.1	5.0	7.8	67.3	44.0	463	1.2	8.1
	CA_NE_W_4	155	102.9	19.8	122.7	5.0	8.9	73.3	45.5	476	1.2	9.3
	CA_CT_S_DNI6	104	157.0	9.7	166.7	-	39.9	79.5	47.4	866	3.0	12.3
	CA_SO_S_DNI7	176	149.9	16.1	166.0	-	38.6	79.6	47.8	50	0.2	12.5
	CA_SO_W_4	176	103.1	22.0	125.0	5.0	8.5	73.7	47.8	250	0.6	13.1
	CA_EA_S_DNI7	184	150.1	16.7	166.9	-	38.6	79.6	48.7	106	0.4	13.5
	CA_SO_S_DNI6	176	151.0	16.3	167.3	-	38.9	79.7	48.7	282	1.0	14.5
	CA_EA_W_3	184	99.7	22.1	121.8	5.0	6.8	70.8	49.2	76	0.2	14.6
	CA_EA_W_4	184	102.9	22.8	125.6	5.0	7.1	73.0	50.6	161	0.4	15.0
	CA_SO_S_DNI5	176	152.7	16.5	169.2	-	39.1	79.5	50.6	1,160	4.1	19.1
	CA_NE_S_DNI7	155	154.9	15.0	169.9	-	39.4	79.5	51.0	600	2.1	21.2
	CA_EA_S_DNI5	184	152.8	17.1	169.9	-	38.9	79.4	51.5	1,120	3.9	25.1
	CA_CT_S_DNI7	104	160.0	9.8	169.9	-	38.7	79.2	51.9	910	3.1	28.2
	CA_EA_S_DNI6	184	154.6	17.2	171.7	-	39.1	79.4	53.2	1,455	5.1	33.3
	CA_NE_S_DNI5	155	158.6	15.4	173.9	-	39.9	79.4	54.6	1,272	4.3	37.6
	Phoenix	AZ_WE_S_DNI7	54	155.0	5.7	160.7	-	41.7	72.0	47.0	1,652	5.7
AZ_WE_S_DNI6		54	156.2	5.8	162.0	-	42.0	72.2	47.8	5,389	18.6	24.3
Portland	OR_WE_W_3	0	93.8	0.0	93.9	5.0	25.6	64.8	8.5	301	0.8	0.8
	WA_SO_W_3	111	97.5	12.5	110.0	5.0	28.0	63.1	24.0	1,312	3.4	4.2
	WA_SO_W_4	111	102.8	13.2	116.0	5.0	29.5	66.5	25.0	1,950	4.8	9.0
	OR_NE_W_3	220	97.2	25.0	122.3	5.0	26.7	64.5	36.0	1,277	3.3	12.4
	OR_SO_W_3	249	92.8	24.0	116.8	5.0	24.1	60.2	37.5	184	0.5	12.9
	OR_NE_W_4	220	102.5	26.4	128.9	5.0	28.2	68.0	37.7	56	0.1	13.0
	OR_SO_W_4	249	103.8	26.9	130.7	5.0	27.0	67.4	41.3	337	0.8	13.8
	ID_SW_W_4	462	104.0	56.2	160.2	5.0	28.9	66.3	70.0	917	2.3	16.1
Reno	NV_NO_G_4a	0	104.4	0.0	104.4	-	12.2	67.2	25.0	148	1.0	1.0
	NV_NO_B_4	0	117.7	0.0	117.8	-	17.8	67.8	32.2	128	1.0	2.0
	NV_EA_B_4	256	110.4	10.6	121.0	-	17.8	67.8	35.4	41	0.3	2.3
	NV_WE_G_4	148	110.1	6.7	116.8	-	11.6	67.2	38.1	116	0.8	3.1
	NV_NO_G_5	0	125.1	0.0	125.1	-	11.4	67.1	46.6	92	0.6	3.7

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Load Zone	Resource Name	Transmission Distance (mi)	Bus Bar Cost (\$/MWh)	Transmission and Losses Cost (\$/MWh)	Delivered Cost (\$/MWh)	Integration Cost (\$/MWh)	Capacity Value (\$/MWh)	Energy Value (\$/MWh)	Adjusted Delivered Cost (\$/MWh)	Nameplate Capacity (MW)	Annual Energy (TWh/yr)	Cumulative Energy (TWh/yr)
Sacramento	CA_WE_W_2	283	73.0	21.9	94.9	5.0	6.0	55.7	38.2	198	0.7	0.7
	CA_WE_W_3	283	90.1	27.1	117.1	5.0	7.4	68.7	46.0	1,736	4.8	5.5
	CA_WE_S_DNI5	283	168.9	25.5	194.4	-	44.8	76.3	73.3	120	0.4	5.9
Salt Lake City	UT_WE_G_3	241	91.7	11.0	102.7	-	11.9	61.8	29.0	90	0.6	0.6
	UT_WE_B_4	241	108.2	10.7	118.9	-	17.8	62.8	38.3	87	0.6	1.3
	NV_EA_B_4	243	110.4	10.9	121.3	-	17.8	62.8	40.6	92	0.7	2.0
	ID_EA_B_4	155	115.4	6.8	122.2	-	17.8	62.8	41.6	211	1.6	3.5
	WY_EC_W_2	386	72.5	32.2	104.6	5.0	5.1	60.7	43.8	96	0.3	3.9
	UT_WE_G_4	241	108.4	11.3	119.7	-	11.9	61.8	46.0	65	0.5	4.3
	ID_EA_W_3	155	97.3	16.7	114.0	5.0	9.1	60.0	49.9	126	0.3	4.7
	ID_EA_W_4	155	102.9	17.6	120.5	5.0	9.6	63.4	52.5	591	1.5	6.1
	WY_SO_W_2	528	72.8	42.8	115.6	5.0	5.6	57.1	58.0	699	2.4	8.5
	UT_WE_W_3	241	99.6	27.0	126.6	5.0	8.4	58.2	65.0	123	0.3	8.9
NM_CT_B_4	559	122.4	25.6	148.0	-	17.8	62.8	67.4	60	0.4	9.3	
UT_WE_W_4	241	104.5	28.3	132.8	5.0	8.8	61.1	67.9	641	1.6	10.9	
San Diego	CA_SO_S_DNI5	87	152.7	8.1	160.9	-	41.0	78.6	41.3	1,913	6.7	6.7
San Francisco/Bay Area	OR_SO_G_3a	356	91.6	15.6	107.2	-	12.9	70.4	23.9	384	2.7	2.7
	CA_SO_G_4	582	98.6	25.0	123.6	-	17.8	71.0	34.8	1,170	9.2	11.9
	OR_SO_G_4	356	104.5	15.9	120.4	-	13.5	70.5	36.4	64	0.4	12.4
	CA_SO_G_3	582	87.8	27.2	115.0	-	8.5	70.1	36.5	232	1.6	14.0
	CA_WE_B_4	340	110.8	14.7	125.5	-	17.8	71.0	36.7	74	0.6	14.5
	OR_SO_B_4	356	113.4	15.4	128.8	-	17.8	71.0	40.0	118	0.9	15.4
	NV_NO_B_4	573	117.7	25.2	142.9	-	17.8	71.0	54.1	0	0.0	15.4
	ID_SW_B_4	684	118.0	31.4	149.4	-	17.8	71.0	60.7	98	0.7	16.2
	AZ_NE_B_4	882	111.8	41.9	153.7	-	17.8	71.0	64.9	257	1.9	18.1
	CA_WE_S_DNI7	340	159.7	30.4	190.1	-	43.0	76.1	71.1	1,219	4.1	22.2
CA_WE_S_DNI6	340	166.7	31.7	198.4	-	43.0	76.4	79.0	1,325	4.3	26.4	
CA_WE_S_DNI5	340	168.9	32.1	201.0	-	44.9	76.3	79.7	386	1.2	27.7	
Seattle	WA_SO_H_1	320	27.1	19.9	47.1	-	20.1	64.5	-37.6	544	2.5	2.5
	NV_NO_G_3b	675	81.7	27.9	109.6	-	18.4	59.3	31.9	268	2.0	4.6
	OR_WE_B_4	209	114.1	9.6	123.7	-	17.8	64.7	41.2	102	0.8	5.3
	WA_SO_B_4	320	109.1	14.7	123.8	-	17.8	64.7	41.3	75	0.6	5.9
	MT_CT_W_2	617	74.1	53.7	127.8	5.0	27.1	62.3	43.4	509	1.7	7.6
	NV_WE_G_3	823	91.4	37.6	129.0	-	20.5	64.4	44.1	132	0.9	8.6
	MT_CT_W_3	617	79.4	57.4	136.8	5.0	29.0	66.7	46.1	1,392	4.5	13.0
	OR_NE_B_4	422	110.2	18.7	128.9	-	17.8	64.7	46.5	388	2.9	15.9
	NV_NO_G_4	675	106.8	31.2	138.0	-	20.5	64.3	53.2	200	1.4	17.3
	MT_NE_W_3	816	81.5	78.6	160.1	5.0	25.6	65.6	74.0	760	2.4	19.7
	MT_CT_B_5	617	127.5	29.0	156.5	-	17.8	64.7	74.0	77	0.6	20.3
	NV_NO_G_5a	675	127.0	32.2	159.2	-	19.9	64.3	74.9	200	1.4	21.7
ID_SW_G_5	664	130.1	32.7	162.8	-	19.2	64.3	79.2	90	0.6	22.3	
WY_EA_W_2	1061	71.8	94.9	166.7	5.0	26.8	62.9	82.0	1,404	5.0	27.3	
Spokane	MT_CT_W_3	395	79.4	35.8	115.2	5.0	30.0	66.7	23.5	629	2.0	2.0
OR_NE_W_4	200	102.5	22.1	124.6	5.0	29.4	68.0	32.2	716	1.8	3.8	
Tucson	AZ_SO_S_DNI6	0	162.1	0.0	162.1	-	32.6	71.8	57.7	2,456	8.2	8.2
Vancouver, Canada	OR_WE_G_3	309	77.8	12.9	90.6	-	17.8	71.7	1.1	315	2.5	2.5
	BC_WC_G_3	100	102.4	4.3	106.8	-	17.8	71.7	17.2	180	1.4	3.9
	BC_WC_H_5	100	118.8	7.3	126.0	-	14.7	77.2	34.1	907	3.9	7.8
	NV_NO_G_3a	775	92.3	35.6	127.9	-	20.5	71.9	35.5	109	0.8	8.6
	MT_NW_B_4	795	111.7	36.6	148.3	-	17.8	71.7	58.8	60	0.4	9.1
	BC_SW_B_4	140	143.5	6.4	149.9	-	17.8	71.7	60.4	150	1.1	10.2
	BC_WC_B_5	100	147.5	4.8	152.3	-	17.8	71.7	62.7	127	0.9	11.1
	BC_SO_B_4	133	148.5	6.2	154.7	-	17.8	71.7	65.1	109	0.8	11.9
	BC_SE_B_4	312	147.1	14.4	161.5	-	17.8	71.7	72.0	60	0.4	12.4
	BC_WE_B_5	237	156.0	10.7	166.7	-	17.8	71.7	77.2	53	0.4	12.8
	BC_WC_H_7	100	159.8	7.4	167.3	-	14.4	75.6	77.3	1,365	6.1	18.8
	BC_WE_W_6	237	134.0	23.9	157.9	5.0	21.8	63.5	77.6	200	0.6	19.4
	BC_NE_B_4	565	142.6	26.7	169.3	-	17.8	71.7	79.8	91	0.7	20.1
	BC_CT_B_4	440	148.6	20.7	169.3	-	17.8	71.7	79.8	122	0.9	21.0
	BC_NO_B_4	491	147.2	22.9	170.0	-	17.8	71.7	80.5	78	0.6	21.5
	BC_NE_H_5	565	134.0	38.7	172.7	-	20.2	72.0	80.5	900	4.2	25.7
	BC_SW_W_6	140	136.6	15.1	151.7	5.0	19.7	56.2	80.8	214	0.6	26.3
	BC_SO_W_7	133	151.3	16.2	167.5	5.0	23.4	65.2	83.9	359	0.9	27.2
	AB_EC_B_4	723	140.8	34.3	175.1	-	17.8	71.7	85.6	122	0.9	28.1
	BC_WE_W_7	237	149.3	26.5	175.9	5.0	24.3	70.7	85.8	83	0.2	28.3