

Estimated Capacity Savings on losses from Palo Verde- Devers 2 500 kV line

Control Area	Total Losses on Transmission Lines (MW)		Saving in Losses (MW)	*Capacity Cost Per MW (M\$)	Capacity Savings (M\$)
	Pre-project	Post- Project			
WECC	3820	3725	95	1	\$95.00
California ISO (3 PTO's)	1209	1153	56		\$56.00
Southwest (Areas < 30)	1279	1196	83		\$83.00

*Based on the California Energy Commission Report to the Governor - Potential Peaking Power Plant Sites in California, Appendix A February 2001

**Estimated Energy Savings on losses from Palo Verde - Devers 2 500 kV line
(8000 MW EOR Flow)**

Transmission Line	Line Resistance (p.u)	Pre-project				Post-Project				Energy Savings (MWh)	**Cost Per MWh (\$)	Energy Saving (M\$)
		Average Power Flow (MW)	Time (%)	Average Power Loss (MWh)	Total Power Loss (MWh)	Average Power Flow (MW)	Time (%)	Average Power Loss (MWh)	Total Power Loss (MWh)			
Palo Verde-Devers 1 & 2	0.0022	2200	10	93276	620221	3000	10	86724	582587	37635	43	\$1.62
		2050	30	242972		2800	30	226639				
		1800	30	187324		2475	30	177080				
		1450	20	81039		2000	20	77088				
		900	10	15610		1250	10	15056				
Hassyampa - N. Gila	0.0012	1750	10	32193	192606	1600	10	26911	157430	35176	43	\$1.51
		1550	30	75765		1350	30	57474				
		1300	30	53296		1250	30	49275				
		1100	20	25439		975	20	19986				
		750	10	5913		600	10	3784				
N. Gila - Imperial Valley	0.0008	1700	10	20253	117003	1525	10	16298	92974	24029	43	\$1.03
		1475	30	45740		1275	30	34177				
		1250	30	32850		1175	30	29026				
		1025	20	14726		900	20	11353				
		700	10	3434		550	10	2120				
Imperial Valley - Miguel	0.0008	2125	10	31646	196136	2000	10	28032	180364	15772	43	\$0.68
		1850	40	95940		1800	40	90824				
		1625	20	37011		1475	30	45740				
		1350	20	25544		1200	10	10092				
		925	10	5996		900	10	5676				
Mohave - Lugo	0.0017	1225	10	22347	140031	1150	10	19695	116167	23864	43	\$1.03
		1150	30	59084		1075	30	51629				
		1000	30	44676		850	30	32278				
		650	20	12584		625	20	11634				

		300	10	1340		250	10	931				
El Dorado - Lugo	0.0017	1200	10	21444	134614	1125	10	18848	113142	21472	43	\$0.92
		1125	30	56543		1050	30	49255				
		975	30	42470		850	30	32278				
		650	20	12584		625	20	11634				
		325	10	1573		275	10	1126				
McCullough-Victorville 1&2	0.0016	1050	40	61811	96859	975	40	53296	87653	9207	43	\$0.79
		850	20	20253		875	20	21462				
		650	20	11844		600	20	10092				
		400	10	2243		400	10	2243				
		225	10	710		200	10	561				
Market Place- Adelanto	0.0012	1200	10	15137	90292	1200	2	3027	79011	11281	43	\$0.49
		1125	30	39913		1075	38	46162				
		950	30	28461		875	30	24145				
		550	20	6360		500	20	5256				
		200	10	420		200	10	420				
El Dorado- Mohave	0.0006	1200	30	22706	51305	1100	30	19079	43786	7519	43	\$0.32
		1100	30	19079		1000	30	15768				
		825	20	7155		800	20	6728				
		600	10	1892		575	10	1738				
		300	10	473		300	10	473				
Lugo - Mira Loma #2	0.0003	1600	10	6728	28665	1400	20	10302	21775	6890	43	\$0.30
		1250	30	12319		950	30	7115				
		900	30	6386		650	30	3331				
		700	20	2575		500	10	657				
		500	10	657		375	10	370				
Lugo - Mira Loma #3	0.0003	1600	10	6728	28665	1400	20	10302	21775	6890	43	\$0.30
		1250	30	12319		950	30	7115				
		900	30	6386		650	30	3331				
		700	20	2575		500	10	657				
		500	10	657		375	10	370				
Lugo- Serrano #1	0.0005	1200	10	6307	22894	1100	10	5300	17383	5511	43	\$0.24
		875	30	10060		750	30	7391				
		600	30	4730		500	30	3285				
		400	20	1402		375	20	1232				
		300	10	394		200	10	175				
Victorville - Lugo #1	0.0001	2400	6	3027	22918	2400	2	1009	18403	4515	43	\$0.19
		2150	24	9718		1975	28	9567				
		1600	30	6728		1400	30	5151				
		1100	30	3180		975	30	2498				
		550	10	265		450	10	177				
		1175	10	4838		1050	10	3863				

Palo Verde - Westwing 1 & 2	0.0004	1075	30	12148	29725	950	30	9487	22347	7378	43	\$0.63
		900	30	8515		750	30	5913				
		700	20	3434		600	20	2523				
		475	10	791		400	10	561				
Jojoba - Kyrene	0.0004	1720	12	12439	56964	1720	10	10366	51173	5791	43	\$0.25
		1475	28	21345		1525	20	16298				
		1200	30	15137		1175	30	14513				
		950	20	6325		900	30	8515				
		700	10	1717		650	10	1480				
Palo Verde - Rudd	0.0003	1350	10	4790	22410	1275	14	5981	19615	2795	43	\$0.12
		1150	20	6951		1000	26	6833				
		925	30	6746		750	30	4435				
		650	30	3331		600	20	1892				
		475	10	593		425	10	475				
Devers - Valley	0.0004	1250	10	5475	34499	1650	20	19079	65306	-30807	43	-\$1.32
		1175	30	14513		1550	20	16837				
		1000	30	10512		1400	30	20604				
		725	20	3684		1050	20	7726				
		300	10	315		550	10	1060				
Perkins- Mead	0.001	1240	4	5388	64767	1025	10	9203	45453	19314	43	\$0.83
		1100	26	27559		875	30	20121				
		900	30	21287		700	30	12877				
		600	30	9461		375	20	2464				
		350	10	1073		300	10	788				
Navajo - Crystal	0.0019	1750	10	50972	312491	1625	10	43951	262029	50463	43	\$2.17
		1600	30	127826		1450	30	104982				
		1350	30	91001		1250	30	78019				
		1050	20	36700		950	20	30042				
		600	10	5992		550	10	5035				
Moenkopi - El Dorado	0.002	1850	10	59962	354375	1725	10	52133	304925	49450	43	\$2.13
		1675	30	147464		1550	30	126275				
		1400	30	103018		1300	30	88826				
		1050	20	38632		975	20	33310				
		550	10	5300		500	10	4380				

** Average cost of energy and ancillary services for year 2002 per CAISO Department of Market Analysis

Total Energy Savings from Palo Verde -Devers 2 (\$ Million) = \$14.22

**Estimated Energy Savings on losses from Palo Verde - Devers 2 500 kV line
(9000 MW EOR Flow)**

Transmission Line	Line Resistance (p.u)	Pre-project				Post-Project				Energy Savings (MWh)	**Cost Per MWh (\$)	Energy Saving (M\$)
		Average Power Flow (MW)	Time (%)	Average Power Loss (MWh)	Total Power Loss (MWh)	Average Power Flow (MW)	Time (%)	Average Power Loss (MWh)	Total Power Loss (MWh)			
Palo Verde-Devers 1 & 2	0.0022	2300	10	101949	646287	3050	20	179278	621974	24313	43	\$1.05
		2075	30	248934		2825	30	230704				
		1850	30	197875		2350	30	159644				
		1450	20	81039		1900	10	34786				
		925	10	16490		1350	10	17562				
Hassyampa - N. Gila	0.0012	1900	10	37948	208322	1675	10	29493	168251	40070	43	\$1.72
		1600	30	80732		1450	30	66304				
		1350	30	57474		1225	30	47324				
		1100	20	25439		1000	20	21024				
		800	10	6728		625	10	4106				
N. Gila - Imperial Valley	0.0008	1850	10	23985	125465	1625	10	18506	103508	21957	43	\$0.94
		1525	30	48894		1400	30	41207				
		1275	30	34177		1175	30	29026				
		1025	20	14726		950	20	12649				
		725	10	3684		550	10	2120				
Imperial Valley - Miguel	0.0008	2240	4	14065	197247	2100	10	30905	183237	14010	43	\$0.60
		1950	36	95933		1800	40	90824				
		1650	30	57238		1475	30	45740				
		1300	20	23687		1200	10	10092				
		950	10	6325		900	10	5676				
Mohave - Lugo	0.0017	1275	10	24209	146947	1175	10	20560	123566	23380	43	\$1.01
		1200	30	64333		1100	30	54058				
		975	30	42470		900	30	36188				
		700	20	14594		625	20	11634				
		300	10	1340		275	10	1126				
El Dorado - Lugo	0.0017	1250	10	23269	143354	1160	10	20039	121581	21774	43	\$0.94
		1175	30	61681		1085	30	52594				
		975	30	42470		900	30	36188				
		700	20	14594		625	20	11634				
		300	10	1340		275	10	1126				
McCullough-Victorville 1&2	0.0016	1075	40	64789	106057	1025	40	58902	93741	12317	43	\$1.06
		925	20	23985		875	20	21462				
		700	20	13736		625	20	10950				
		450	10	2838		350	10	1717				

		225	10	710		225	10	710				
Market Place- Adelanto	0.0012	1200	20	30275	94523	1200	6	9082	85774	8749	43	\$0.38
		1125	30	39913		1125	34	45234				
		900	20	17029		900	30	25544				
		550	20	6360		500	20	5256				
		300	10	946		250	10	657				
El Dorado- Mohave	0.0006	1200	30	22706	52077	1100	30	19079	43372	8705	43	\$0.37
		1100	30	19079		1000	30	15768				
		850	20	7595		775	20	6314				
		625	10	2053		575	10	1738				
		350	10	644		300	10	473				
Lugo - Mira Loma #2	0.0003	1625	10	6940	27492	1400	20	10302	21510	5982	43	\$0.26
		1200	30	11353		950	30	7115				
		900	30	6386		625	30	3080				
		650	20	2221		475	10	593				
		475	10	593		400	10	420				
Lugo - Mira Loma #3	0.0003	1625	10	6940	27492	1400	20	10302	21510	5982	43	\$0.26
		1200	30	11353		950	30	7115				
		900	30	6386		625	30	3080				
		650	20	2221		475	10	593				
		475	10	593		400	10	420				
Lugo- Serrano #1	0.0005	1200	10	6307	22779	1100	10	5300	15951	6827	43	\$0.29
		825	30	8943		700	30	6439				
		650	30	5552		475	30	2965				
		425	20	1582		350	20	1073				
		300	10	394		200	10	175				
Victorville - Lugo #1	0.0001	2400	5	2523	22927	2400	1	505	17156	5771	43	\$0.25
		2100	25	9658		1900	29	9171				
		1650	30	7155		1375	30	4969				
		1125	30	3326		950	30	2372				
		550	10	265		400	10	140				
Palo Verde - Westwing 1 & 2	0.0004	1200	10	5046	30590	1075	10	4049	22605	7985	43	\$0.69
		1100	30	12720		950	30	9487				
		900	30	8515		750	30	5913				
		700	20	3434		600	20	2523				
		500	10	876		425	10	633				
Jojoba - Kyrene	0.0004	1720	13	13476	57205	1720	10	10366	51797	5409	43	\$0.23
		1475	27	20583		1525	20	16298				
		1175	30	14513		1200	30	15137				
		975	20	6662		900	30	8515				
		750	10	1971		650	10	1480				
		1375	10	4969		1200	20	7569				

Palo Verde - Rudd	0.0003	1150	20	6951	22915	975	20	4996	19064	3850	43	\$0.17
		925	30	6746		750	30	4435				
		675	30	3592		550	20	1590				
		500	10	657		425	10	475				
Devers - Valley	0.0004	1300	10	5922	36006	1750	20	21462	70809	-34803	43	-\$1.50
		1200	30	15137		1650	20	19079				
		1000	30	10512		1450	30	22101				
		750	20	3942		1000	20	7008				
		375	10	493		575	10	1159				
Perkins- Mead	0.001	1240	12	16163	69084	1150	10	11585	50419	18664	43	\$0.80
		1100	28	29679		950	30	23718				
		825	30	17887		700	30	12877				
		475	20	3953		300	20	1577				
		400	10	1402		275	10	662				
Navajo - Crystal	0.0019	1850	10	56964	338653	1775	10	52439	293465	45188	43	\$1.94
		1675	30	140090		1550	30	119962				
		1400	30	97867		1300	30	84385				
		1050	20	36700		975	20	31644				
		650	10	7032		550	10	5035				
Moenkopi - El Dorado	0.002	1900	10	63247	375092	1850	10	59962	335815	39278	43	\$1.69
		1725	30	156399		1625	30	138791				
		1450	30	110507		1375	30	99371				
		1050	20	38632		975	20	33310				
		600	10	6307		500	10	4380				

** Average cost of energy and ancillary services for year 2002 per CAISO Department of Market Analysis

Total Estimated Energy Savings from Palo Verde -Devers 2 (\$ Million) = \$13.15