

Combustion Turbine

CT1 – Lodi / Alameda

FY 2018 Proposed Budget

March 13, 2017

Contents

- Assumptions
- FY2018 Proposed Budget
- Trend, Routine O&M with Labor
- Current Year Actuals
- FY2018 Proposed Projects
 - Overview and Cost Breakdown
 - O&M Projects
 - Capital Projects
 - Maintenance Reserve Projects
 - Description and Justification of Each Proposed Project
- 10-Year Project Forecast
 - Schedule and Cost
 - Trend, Project Expenditures Including Maintenance Reserve

Assumptions

- Capacity Value \$30/KW-Yr
- Projects Identified Based on 10 Year Operation
 - Perform turbine maintenance based on condition only
 - Defer availability projects
- Permit Limited Operation

FY 2018 – CT1 Proposed Budget

	FY 2016 Budget	FY 2016 Actual	FY 2017 Budget	Proposed FY 2018 Budget	Increase/ (Decrease)
Routine Variable Costs					
Variable O&M	\$10,040	\$14,018	\$10,040	\$10,261	\$221
Fuel	\$0	\$219,101	\$173,911	\$189,367	\$15,456
CAISO Charges (Variable)	5,670	50,305	1,030	587	(443)
Total VOM	15,710	283,424	184,981	200,215	15,234
MWHr	0	3,360	1,167	1,514	
\$/MWHr	0	84	159		
Routine Fixed Costs					
Fixed	397,749	416,327	407,140	420,720	13,580
Administration	40,693	43,774	43,285	44,017	732
Mandatory Costs	153,500	137,695	159,818	159,921	103
Inventory	0	0	45,000	45,000	0
Total Routine Fixed Costs	591,942	597,796	655,243	669,659	14,416
Unplanned Expenses	0	133,093	0	0	0
Labor	682,506	871,226	793,990	840,018	46,028
Non-Variable Routine Total	1,274,448	1,602,115	1,449,233	1,509,677	60,444
Total Routine O&M Costs	1,290,158	1,885,539	1,634,214	1,709,891	75,677

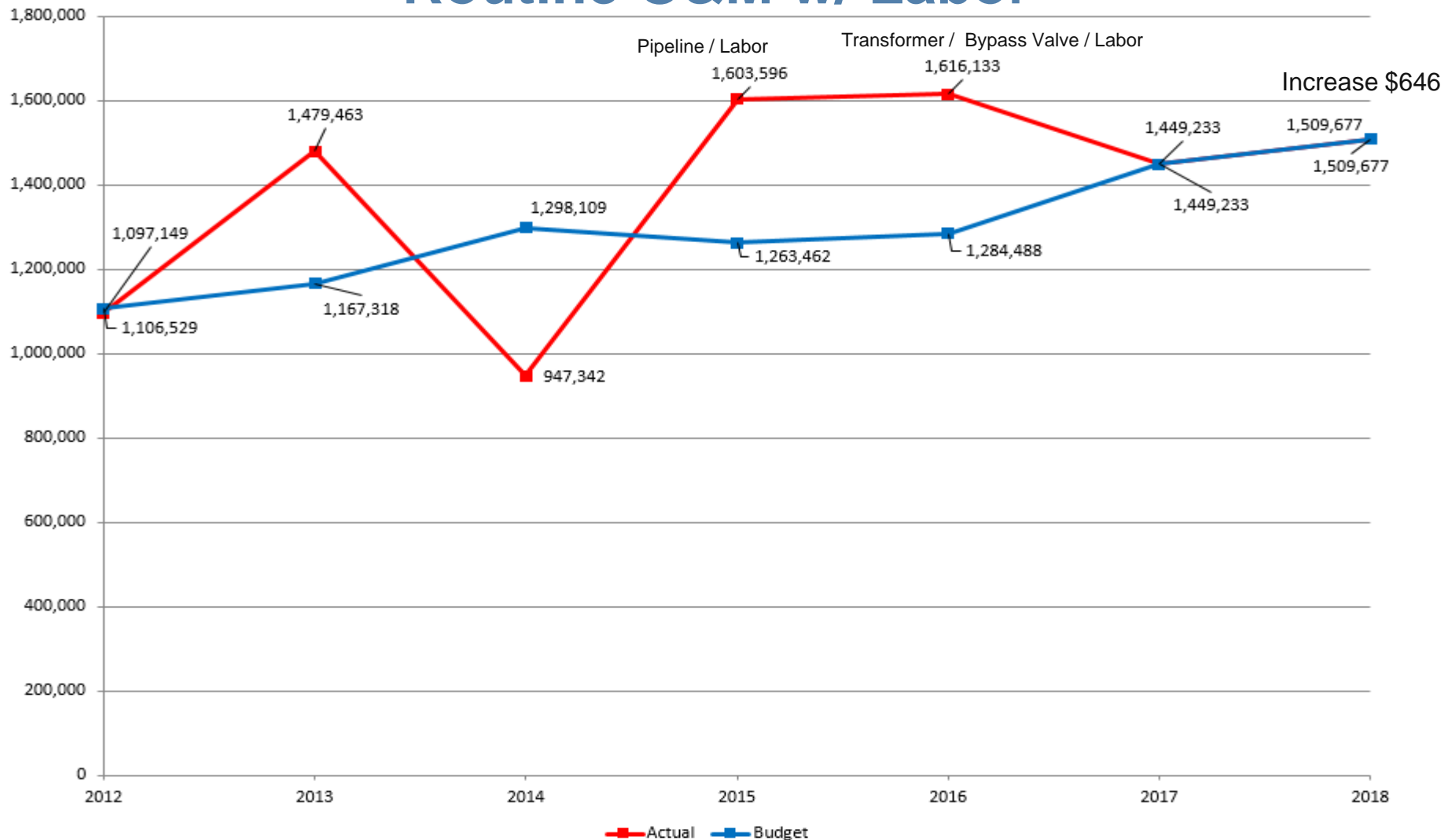
Transformer /
Control Security /
Bypass Valve

Increase \$646

FY 2018 – CT1 Proposed Budget

	FY 2016 Budget	FY 2016 Actual	FY 2017 Budget	Proposed FY 2018 Budget	Increase/ (Decrease)	
Total Routine O&M Costs	1,290,158	1,885,539	1,634,214	1,709,891	75,677	
Other Costs						
Debt Service	0	0	0	0	0	
Other Costs	138,678	112,143	116,904	113,442	(3,462)	Decrease \$1,303
Generation Services Shared	61,919	47,978	57,864	60,528	2,664	
Administrative & General	312,360	331,092	314,348	340,009	25,661	Decrease \$10,645
Total Other Costs	512,957	491,213	489,116	513,979	24,863	
Total O&M Costs	1,803,115	2,376,752	2,123,330	2,223,870	100,540	
Projects						
Operations & Maintenance	1,074,200	870,446	0	20,000	20,000	
Capital	0	0	0	0	0	
Maintenance Reserve	0	0	525,000	400,000	(125,000)	Increase \$125,000
Total Projects Costs	1,074,200	870,446	525,000	420,000	(105,000)	
Annual Budget Cost	2,877,315	3,247,198	2,648,330	2,643,870	(4,460)	
Revenue	71,877	597,719	55,906	118,990	63,084	
Net Cost to Members	2,805,438	2,649,479	2,592,424	2,524,880	(67,544)	Decrease \$136,948

Routine O&M w/ Labor



■ FY17 is forecast in the Actual trend line

FY 2018 – CT1 Proposed Projects

O&M Projects	Notes	
Gas Compressor Lubricators	D	20,000
		Total 20,000
Capital Projects	Notes	
		Total 0
Maintenance Reserve	Notes	
Fuel Nozzle Refurbishment		30,000
Gas Line Emergency Stop		50,000
Other (CB Maint, GG Work, Insulator Maint)		50,000
		Total 130,000

FY 2018 – CT1 Gas Compressor Lubricators

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
CT1 Gas Compressor Lubricators	D	\$20,000			\$20,000	

Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	4,130	\$
IRR	8.9%	%
Average Annual Benefits	2,877	\$
Payback	6	Years
Useful Life	10.0	Years
B/C Ratio	1.21	B/C Ratio

- Maintain Critical Lubrication Supply
- Correct High Failure Rate Component
- If probability of failure >10%, economic project.
- 30 years old, one of three has failed.
- 168 hours outage, 2 units



FY 2018 – CT1 Proposed Projects

Maintenance Reserve	Notes	
Fuel Nozzle Refurbishment		30,000
Gas Line Emergency Stop		50,000
Other (CB Maint, GG Work, Insulator Maint)		50,000
Total		130,000

FY 2018 – CT1 Parts Refurbishment

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
CT1 Parts Refurbishment	D	\$30,000			\$30,000	

Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	56,975	\$
IRR	49.7%	%
Average Annual Benefits	8,698	\$
Payback	2.0	Years
Useful Life	10.0	Years
B/C Ratio	2.9	B/C Ratio



1	1	Worn/Wear	Pass	Pass	
2	2	Crack	Pass	Fail	Replace part
3	3	groove	Pass	Pass	Polish Tip O.D.
4	4	Worn/Wear	Pass	Pass	
5	5	Worn/Wear	Pass	Pass	
6	6	Crack	Pass	Fail	Replace part
7	7	Crack	Pass	Fail	Replace part
8	8	Crack	Pass	Fail	Replace part
9	9	Worn/Wear	Worn/Wear	Crack	Pass
10	10	Worn/Wear	Worn/Wear	Crack	Pass

- Required for outage planned in 2020
- Re-Stock Essential Parts
 - (Fuel Nozzle refurbishment
- Back up for U2 which is showing signs of increasing temperature spreads
- Reduce future outage duration as these are 14 weeks for refurbishment
- Saves 7 weeks

FY 2018 – CT1 Gas Line Emergency Stop

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
Emergency Stop	S	\$50,000			\$50,000	

Notes:

D	Discretionary
M	Mandatory
S	Safety

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	0	\$
IRR	5.0%	%
Average Annual Benefits	2,000	\$
Payback	7.0	Years
Useful Life	10.0	Years
B/C Ratio	1.00	B/C Ratio

- No remote method to isolate either Lodi or Alameda plants from gas supply
- Detected leaks would require drive to site to isolate.
- Potentially hazardous situation for employees and may not be able to isolate.



FY 2018 – CT1 Other Maintenance

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
Other Maintenance	D	\$50,000			\$50,000	

Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	0	\$
IRR	5.0%	%
Average Annual Benefits	2,000	\$
Payback	7.0	Years
Useful Life	10.0	Years
B/C Ratio	1.00	B/C Ratio

- Circuit Breaker Maintenance
- Additional Ground Grid lines
- Insulator Maintenance



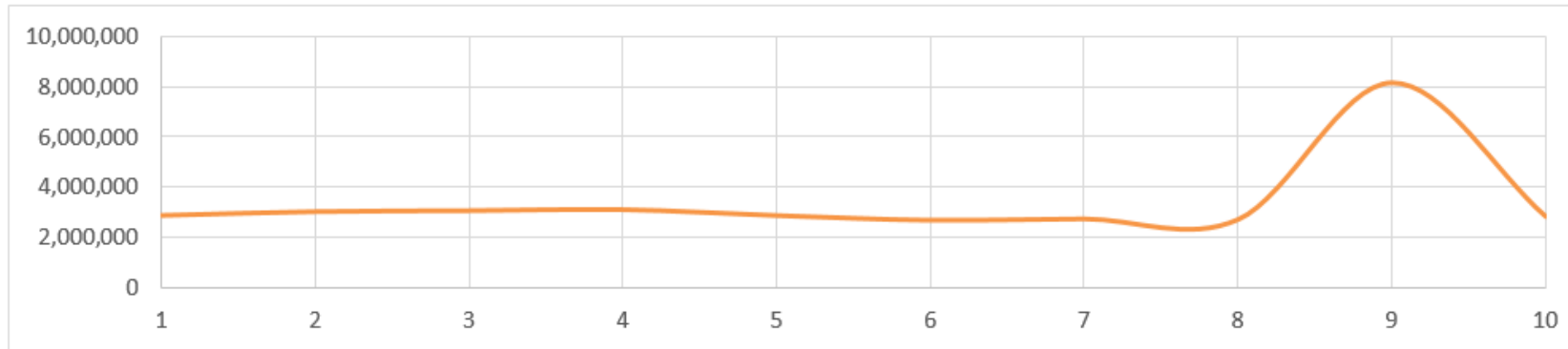
FY 2018– CT1 Project Forecast

Operate until 2025, Option to Continue

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
O & M PROJECTS										
Gas Compressor Lubricators	20,000									
TOTAL O&M PROJECTS	20,000	0	0	0	0	0	0	0	0	0
CAPITAL PROJECTS										
TOTAL CAPITAL PROJECTS	0	0	0	0	0	0	0	0	0	0
RESERVE FUND SPENDING										
BEGINNING YEAR BALANCE	460,000	855,000	965,000	1,245,000	-28,000	527,000	750,000	750,000	740,000	740,000
Annual Outage, Routine Maint	130,000	280,000	125,000	553,000	0	0	0	0	2,458,830	0
Turner CT and Gen Maint	0	10,000	75,000	75,000	0	10,000	0	10,000	1,250,000	10,000
ALA1 CT and Gen Maint	0	0	75,000	75,000	0	0	0	0	1,250,000	0
ALA2 CT and Gen Maint	0	0	0	1,125,000	0	0	0	0	450,000	0
TOTAL RESERVE FUND SPENDING	130,000	290,000	275,000	1,828,000	0	10,000	0	10,000	5,408,830	10,000
ADDITIONAL FUNDING	525,000	400,000	555,000	555,000	555,000	233,000	0	0	5,408,830	10,000
END OF YEAR BALANCE	855,000	965,000	1,245,000	-28,000	527,000	750,000	750,000	740,000	740,000	740,000
TOTAL O&M, ALL PROJECTS, FUNDING	545,000	400,000	555,000	555,000	555,000	233,000	0	0	5,408,830	10,000

FY 2018– CT1 10 Year Net Cost to Member

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
O&M Projects	20,000	0	0	0	0	0	0	0	0	0
Capital Projects	0	0	0	0	0	0	0	0	0	0
Maintenance Reserve Funding	400,000	525,000	525,000	525,000	233,000	0	0	0	5,408,830	10,000
O&M Costs	1,929,677	1,968,270	2,007,635	2,047,788	2,088,744	2,130,519	2,173,129	2,216,592	2,260,924	2,306,142
A&G	513,979	524,259	534,744	545,439	556,347	567,474	578,824	590,400	602,208	614,252
Revenues	9,645	12,658	21,644	33,534	29,003	35,869	39,172	116,717	109,816	126,846
Net Cost to Members	2,854,011	3,004,870	3,045,735	3,084,693	2,849,088	2,662,124	2,712,781	2,690,275	8,162,146	2,803,549
Capacity Cost (\$/KW-Yr)	38	40	41	41	38	35	36	36	109	37



Combustion Turbine

CT2 – STIG

FY 2018 Proposed Budget

March 13, 2017

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CT2 Assumptions

- Capacity \$30/KW-Yr
- Debt paid in 2026
- Air New Zealand expects to service LM5000 until 2018
- Expected STIG will retire in 2026 or shortly thereafter
- Repower Options
 - Estimate \$50mm +100%
 - NPV -\$38mm
 - IRR -4.1%
- Decommissioning, no estimates at this time
- Maintenance / Project Plan based on 9 remaining years

FY 2018 – CT2 Proposed Budget

	FY 2016 Budget	FY 2016 Actual	FY 2017 Budget	Proposed FY 2018 Budget	Increase/ (Decrease)
Routine Variable Costs					
Variable O&M	\$84,300	\$83,646	\$86,700	\$88,607	\$1,907
Fuel & Pipeline Net Transport	\$489,583	\$14,535	\$521,052	(\$3,467)	(\$524,519)
CAISO Charges (Variable)	1,241	39,595	2,289	463	(1,826)
Total VOM	575,124	137,776	610,041	85,603	-524,438
MWHr	688	3,299	2,339	1,196	
\$/MWHr	836	42	261	72	
Routine Fixed Costs					
Fixed	412,367	550,241	433,425	444,801	\$11,376
Administration	53,545	32,502	53,178	54,276	\$1,098
Mandatory Costs	71,200	59,137	79,235	79,389	\$154
Inventory	0	0	15,000	15,000	\$0
Total Routine Fixed Costs	537,112	641,880	580,838	593,466	12,628
Unplanned Expenses	0	0	0	0	\$0
Labor	639,061	659,452	745,364	788,793	43,429
Non-Variable Routine Total	1,176,173	1,301,332	1,326,202	1,382,259	56,057
Total Routine O&M Costs	1,751,297	1,439,108	1,936,243	1,467,862	-468,381

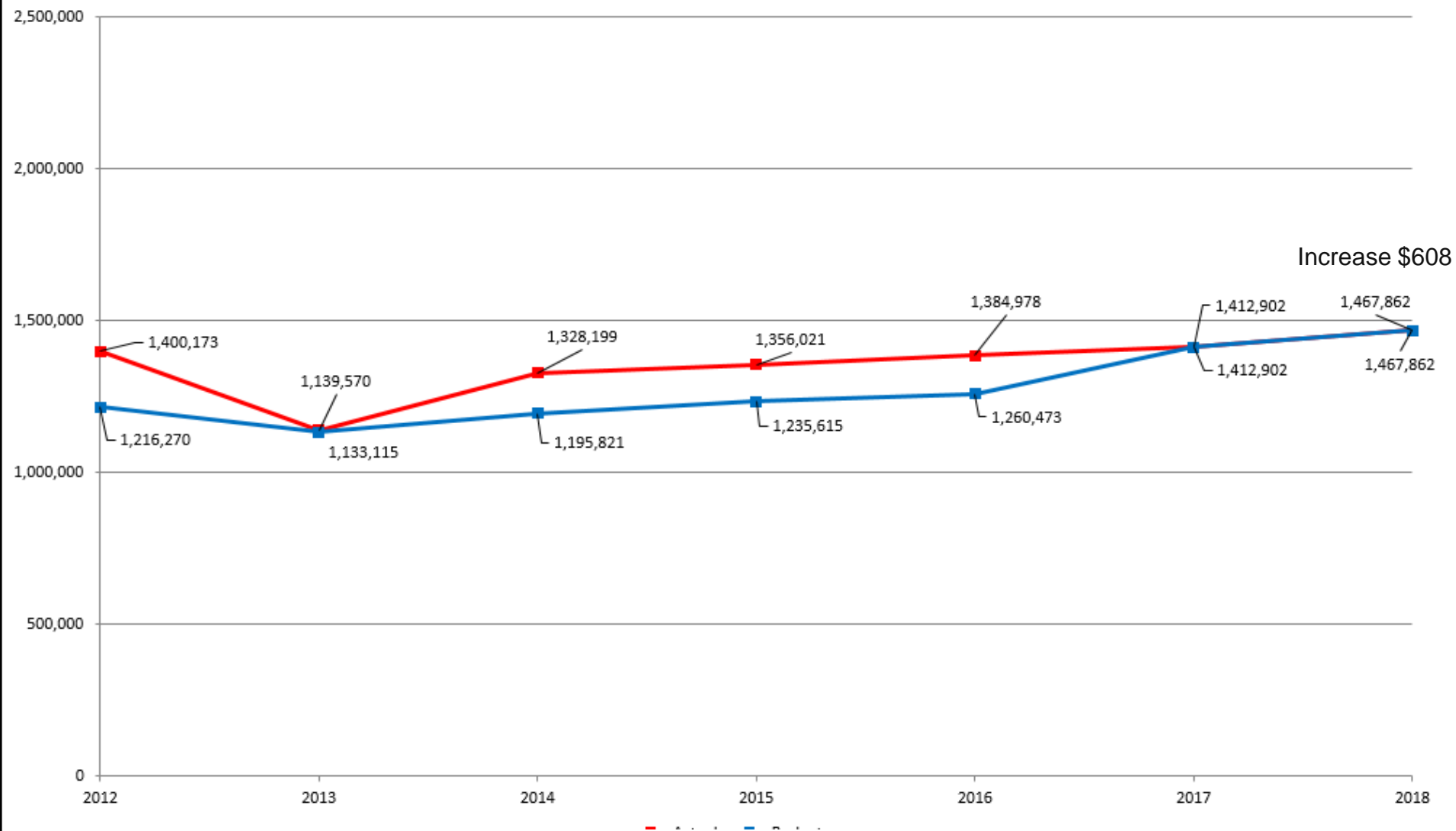
Increase \$608



FY 2018 – CT2 Proposed Budget

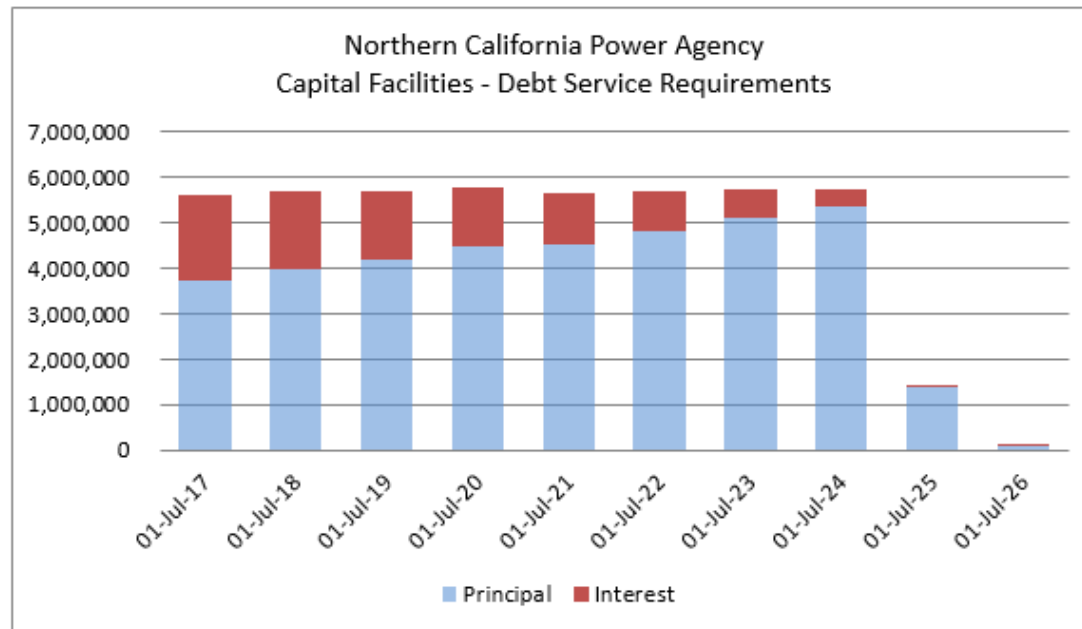
	FY 2016 Budget	FY 2016 Actual	FY 2017 Budget	Proposed FY 2018 Budget	Increase/ (Decrease)	
Total Routine O&M Costs	1,751,297	1,439,108	1,936,243	1,467,862	-468,381	
Other Costs						
Debt Service	5,679,515	5,679,515	5,625,568	5,692,922	67,354	
Other Costs	105,415	114,518	87,033	85,351	(1,682)	
Generation Services Shared	57,980	36,615	54,249	56,745	2,496	Decrease \$1,221
Administrative & General	293,365	280,230	336,127	360,310	24,183	Increase \$68,048
Total Other Costs	6,136,275	6,110,878	6,102,977	6,195,328	92,351	
Total O&M Costs	7,887,572	7,549,986	8,039,220	7,663,190	(376,030)	
Projects						
Operations & Maintenance	80,060	90,042	30,000	121,348	91,348	
Capital	0	0	103,000	0	(103,000)	
Maintenance Reserve	0	0	0	0	0	
Total Projects Costs	80,060	90,042	133,000	121,348	(11,652)	
Annual Budget Cost	7,967,632	7,640,028	8,172,220	7,784,538	(387,682)	
Revenue	70,820	304,120	300,297	131,724	(168,573)	
Net Cost to Members	7,896,812	7,335,908	7,871,923	7,652,814	(219,109)	
Capacity Cost (\$/KW-Yr)	158	147	157	153		

Routine O&M w/ Labor



■ FY17 is forecast in the Actual trend line

Debt Service Requirements



PERIOD ENDING	PRINCIPAL	INTEREST	TOTAL
7/1/2017	3,752,500	1,873,068	5,625,568
7/1/2018	3,975,417	1,717,505	5,692,922
7/1/2019	4,178,333	1,538,375	5,716,708
7/1/2020	4,465,417	1,331,004	5,796,421
7/1/2021	4,545,000	1,107,733	5,652,733
7/1/2022	4,834,167	880,483	5,714,650
7/1/2023	5,125,833	627,638	5,753,471
7/1/2024	5,370,000	358,531	5,728,531
7/1/2025	1,375,000	76,606	1,451,606
7/1/2026	84,167	4,419	88,585
	<u>\$37,705,833</u>	<u>\$9,515,363</u>	<u>\$47,221,196</u>

FY 2018– CT2 Proposed Projects

O&M Projects	Notes	
DCS Software Upgrade (Contract Yr 3 of 3)	M	30,000
PG&E / NCPA Share Relay Replacement	M	11,348
Rebuild Bellows	S	50,000
STIG 480V MCC Breaker Maintenance (15.13%)	M	30,000
Total		121,348

Capital Projects	Notes	
Total		0

Maintenance Reserve	Notes	
Total		0

FY 2018 – CT2 DCS Operating System

Project	Notes	Total	FY 2016	FY 2017	FY 2018	FY 2019
		Cost to Complete	Current Budget			
DCS Operating System	D	\$150,000	90,000	30,000	30,000	0

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	13,593	\$
IRR	7.8%	%
Average Annual Benefits	15,938	\$
Payback	3.0	Years
Useful Life	10.0	Years
B/C Ratio	1.09	B/C Ratio

Notes:

- D Discretionary
- M Mandatory
- Annual deposit to the Capital
- CR Development Reserve

- Approved Project in 2015
- FY16/17 Complete, HMI Installation Successful
- FY2017-18, Final Year Agreement

FY 2018 – PGE Relay Replacement

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
PG&E Relay Upgrade	D	\$75,000			\$75,000	
Shared (CT2 = \$11,347; LEC=\$63,653)						

Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	(75,000)	\$
IRR	0.0%	%
Average Annual Benefits	0	\$
Payback	30.0	Years
Useful Life	30.0	Years
B/C Ratio	0.00	B/C Ratio

- PGE Replacement Program for obsolete, unsupported Relays.
- Equipment type is demonstrating high failure rates on their system.
- Fault clearing too slow.
- Construction (demolition, installation)
- Commissioning (relay testing and PGE witness testing)



FY 2018 – CT2 Rebuild Bellows

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
CT2 Repack Bellows	S	\$50,000			\$50,000	

Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate		0 \$
IRR		0 %
Average Annual Benefits		0 \$
Payback		0 Years
Useful Life		0 Years
B/C Ratio		0 B/C Ratio

- Repack Bellows and Mitigate Hot Gas Leak
- Fabric has deteriorated



FY 2018 – CT2 Breaker Maintenance

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
CT2 480 Breaker Maintenance	S	\$30,000			\$30,000	

Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate		0 \$
IRR		0 %
Average Annual Benefits		0 \$
Payback		0 Years
Useful Life		0 Years
B/C Ratio		0 B/C Ratio

- 480 VAC Breaker Maintenance
- Maintenance to ensure proper operation of breakers to eliminate
 - Faulting
 - Arcing
 - Hot spots / fire
 - Shock



FY 2017– CT2 Project Forecast

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
O & M PROJECTS										
High Energy Pipe Inspection				15,000					17,500	
Repack HRSG Bellows	50,000									
STIG 480V MCC Breaker Maintenance	30,000					35,000				
Ammonia System Major Maintenance				30,000					6,000	
Water Plant VFDs		30,000								
TOTAL O&M PROJECTS	80,000	30,000	0	45,000	0	35,000	0	0	23,500	0
CAPITAL PROJECTS										
Project Closure										12,600,000
TOTAL CAPITAL PROJECTS	0	0	0	0	0	0	0	0	0	12,600,000
RESERVE FUND SPENDING										
BEGINNING YEAR BALANCE	500,000									
Annual Outage, Routine Maint										
Turner CT and Gen Maint										
ALA1 CT and Gen Maint										
ALA2 CT and Gen Maint										
TOTAL RESERVE FUND SPENDING										
ADDITIONAL FUNDING										
END OF YEAR BALANCE	500,000									
TOTAL O&M, ALL PROJECTS, FUNDING	80,000	0	0	0	0	0	0	0	0	0

10 Year Net Cost to Members

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
O&M Projects	80,000	30,000	0	45,000	0	35,000	0	0	23,500	0
Capital Projects	0	0	0	0	0	0	0	0	0	12,600,000
Maintenance Reservice Funding	0	0	0	0	0	0	0	0	0	0
O&M /Debt Costs	7,196,529	7,340,460	7,487,269	7,637,014	7,789,754	7,945,550	8,104,461	8,266,550	8,431,881	0
A&G	502,406	512,454	522,703	533,157	543,820	554,697	565,791	577,107	588,649	
Revenues (net)	4,043	4,382	5,732	7,564	6,970	6,594	7,706	13,005	13,856	11,336
Net Cost to Members	7,774,892	7,878,532	8,004,240	8,207,607	8,326,605	8,528,652	8,662,546	8,830,651	9,030,174	12,588,664
Capacity Cost (\$/KW-Yr)	155	158	160	164	167	171	173	177	181	252

