

A photograph of a large industrial combustion turbine, identified as CT1, located at the Lodi / Alameda facility. The turbine is a tall, light-colored metal structure with a blue steel frame and stairs. It has a large, rectangular, slatted metal enclosure on its upper section. The unit is situated on a gravel lot under a clear blue sky.

# Combustion Turbine

CT1 – Lodi / Alameda

FY 2017 Proposed Budget

January 13, 2017

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  - Description and Justification of Each Proposed Project
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  - Schedule and Cost
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## Assumptions

- Reference power management price forecast
- Capacity Value \$30/KW-Yr
- Projects Identified Based on 20 Year Operation
  - Projects will be evaluated and recommended on their merits as they come
  - Generator Circuit Breaker planned for this year delayed due to marginal economics
- Maintenance Based on Book recommendations
  - Actual maintenance will vary according to conditions and other means of predictive analysis
  - Expectations are that book recommendations will be extended on analysis
- Permit Limited Operation

# FY 2017– CT1 Budget Assumptions

Maintain for 20 Year Operation

	FY2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	
<b>O &amp; M PROJECTS</b>													
Replace U-Type Bushings			245,000										
MCC Upgrade Study					50,000								
Gas Pipeline Coating Repairs							100,000					100,000	
Ground Grid Mods - Turner Vehicles				40,000									
<b>TOTAL O&amp;M PROJECTS</b>		0	245,000	40,000	50,000	0	100,000	0	0	0	0	100,000	535,000
<b>CAPITAL PROJECTS</b>													
Generator Circuit Breaker Upgrade				100,000	100,000	100,000							
Excitation System Upgrade				250,000	250,000	250,000							
Fire System Upgrade					230,000		230,000						
Gas Line e-Stop				50,000	50,000								
MCC Upgrade						150,000	150,000	150,000					
Switchyard Relay Upgrades						100,000							
<b>TOTAL CAPITAL PROJECTS</b>		0	0	400,000	630,000	600,000	380,000	150,000	0	0	0	0	2,160,000
<b>RESERVE FUND SPENDING</b>													
<b>BEGINNING YEAR BALANCE</b>			250,000	705,000	1,140,000	130,000	360,000	772,000	1,212,000	847,000	1,279,000	254,000	
Annual Outage, Routine Maint			70,000	90,000	185,000	0	68,000	40,000	95,000	45,000	180,000	143,000	
Turner CT and Gen Maint			0	0	0	250,000	0	0	0	0	900,000	350,000	
ALA1 CT and Gen Maint			0	0	225,000	0	0	0	375,000	3,000	350,000	0	
ALA2 CT and Gen Maint			0	0	1,125,000	0	0	0	375,000	0	75,000	0	
<b>TOTAL RESERVE FUND SPENDING</b>	1,082,600	1,074,200	70,000	90,000	1,535,000	250,000	68,000	40,000	845,000	48,000	1,505,000	493,000	7,100,800
ADDITIONAL FUNDING			525,000	525,000	525,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	
<b>END OF YEAR BALANCE</b>		250,000	705,000	1,140,000	130,000	360,000	772,000	1,212,000	847,000	1,279,000	254,000	241,000	
<b>TOTAL O&amp;M, ALL PROJECTS, FUNDING</b>	1,082,600	1,074,200	770,000	965,000	1,205,000	1,080,000	960,000	630,000	480,000	480,000	480,000	580,000	9,795,800
Plan For 2015	1,070,000	1,210,000	915,000	190,000	550,000	630,000	400,000	0	545,000	315,000	1,505,000	493,000	7,823,000



# FY 2017 – CT1 Proposed Budget

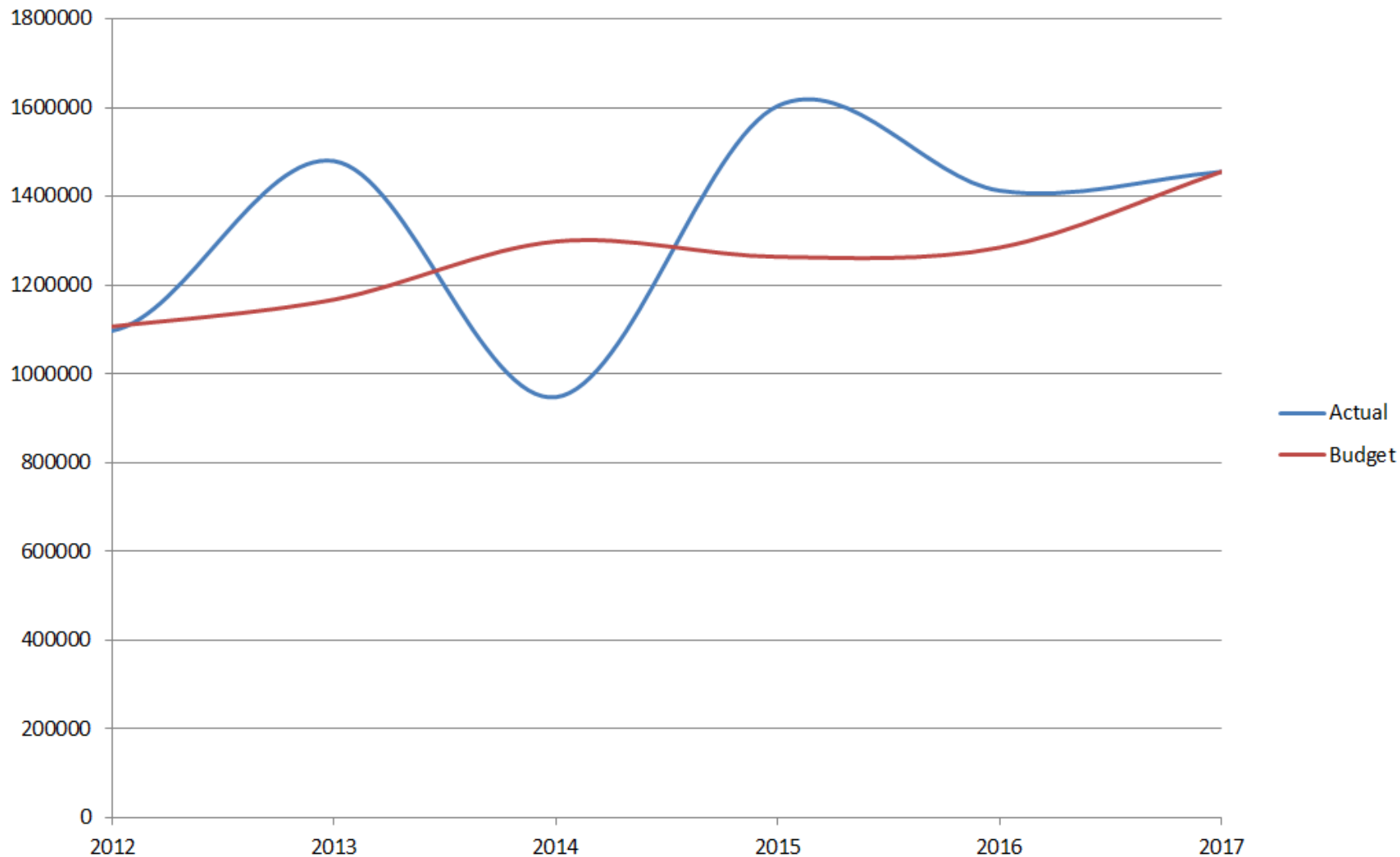
	FY 2015 Budget	FY 2015 Actual	FY 2016 Budget	Proposed FY 2017 Budget	Increase/ (Decrease)
<b>Routine O&amp;M Costs</b>					
Variable	\$10,440	\$19,347	\$10,040	\$10,040	\$0
Fixed	382,261	398,032	400,119	407,140	7,021
Administration	39,650	52,621	33,543	43,285	9,742
Mandatory Costs	163,280	189,262	158,280	159,818	1,538
Inventory	0	0	0	45,000	45,000
<b>Labor</b>	<b>595,631</b>	<b>659,262</b>	<b>601,982</b>	<b>665,283</b>	<b>63,301</b>
<b>Labor</b>	<b>667,831</b>	<b>944,334</b>	<b>682,506</b>	<b>793,990</b>	<b>111,484</b>
<b>Total Routine O&amp;M Costs</b>	<b>1,263,462</b>	<b>1,603,596</b>	<b>1,284,488</b>	<b>1,459,273</b>	<b>174,785</b>
<b>Other Costs</b>					
Debt Service					0
CAISO Charges (Variable)					0
Other Costs					0
Generation Services Shared					0
Administrative & General					0
<b>Total O&amp;M Costs</b>	<b>1,263,462</b>	<b>1,603,596</b>	<b>1,284,488</b>	<b>1,459,273</b>	<b>174,785</b>
<b>Projects</b>					
Operations & Maintenance	1,082,600	1,019,954	1,074,200	245,000	(829,200)
Capital	0	0	0	0	0
Maintenance Reserve	0	0	0	525,000	525,000
<b>Total Projects Costs</b>	<b>1,082,600</b>	<b>1,019,954</b>	<b>1,074,200</b>	<b>770,000</b>	<b>(304,200)</b>
<b>Annual Budget Cost</b>	<b>2,346,062</b>	<b>2,623,550</b>	<b>2,358,688</b>	<b>2,229,273</b>	<b>(129,415)</b>

Travel to  
Alameda

Gas Comp /  
Turb Parts

Merit,  
Benefit,  
actuarial,  
retirement  
med

## Routine O&M w/ Labor



▪ FY16 is forecast in the Actual trend line

## FY17 Budget to FY15 Actual Variances

- Administration 18% Less due to high travel to Alameda during the FY15 outage
- Mandatory 16% Less due to FY15 installation of emergency shutoff valve on gas pipeline
- Inventory New line item due to need to purchase parts for gas compressor and turbine

## FY 2017 – CT1 Proposed Projects

O&M Projects	Notes	
Replace U-Type Bushings	D	245,000

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Total 245,000

Capital Projects	Notes	
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Total 0

Maintenance Reserve	Notes	
Gas Compressor Maintenance		20,000
Painting		50,000

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Total 70,000



# FY 2017 – CT1 Transformer Bushings

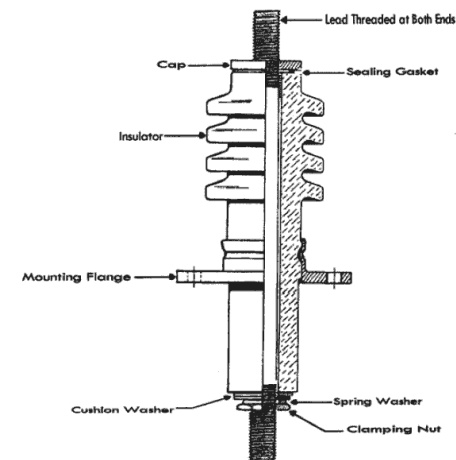
Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
CT1 Transformer Bushing	D	\$245,000		\$245,000		

## Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	101,009	\$
IRR	12.5%	%
Average Annual Benefits	34,601	\$
Payback	5.0	Years
Useful Life	10.0	Years
B/C Ratio	1.41	B/C Ratio

- Mitigate Fire Risk
- Replace U-Type Bushings on CT1 Lodi and both Alameda Transformers
- Assumptions:
  - Avoid Transformer Replacement - \$450k
  - Missed RA Opportunity (6 Months) - \$375k
  - Assume 5% Probable
  - Less than 3.54% probability ~ 0 NPV Break Even



## FY 2017 – CT1 Proposed Projects

O&M Projects	Notes	
Replace U-Type Bushings	D	245,000

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Total 245,000

Capital Projects	Notes	
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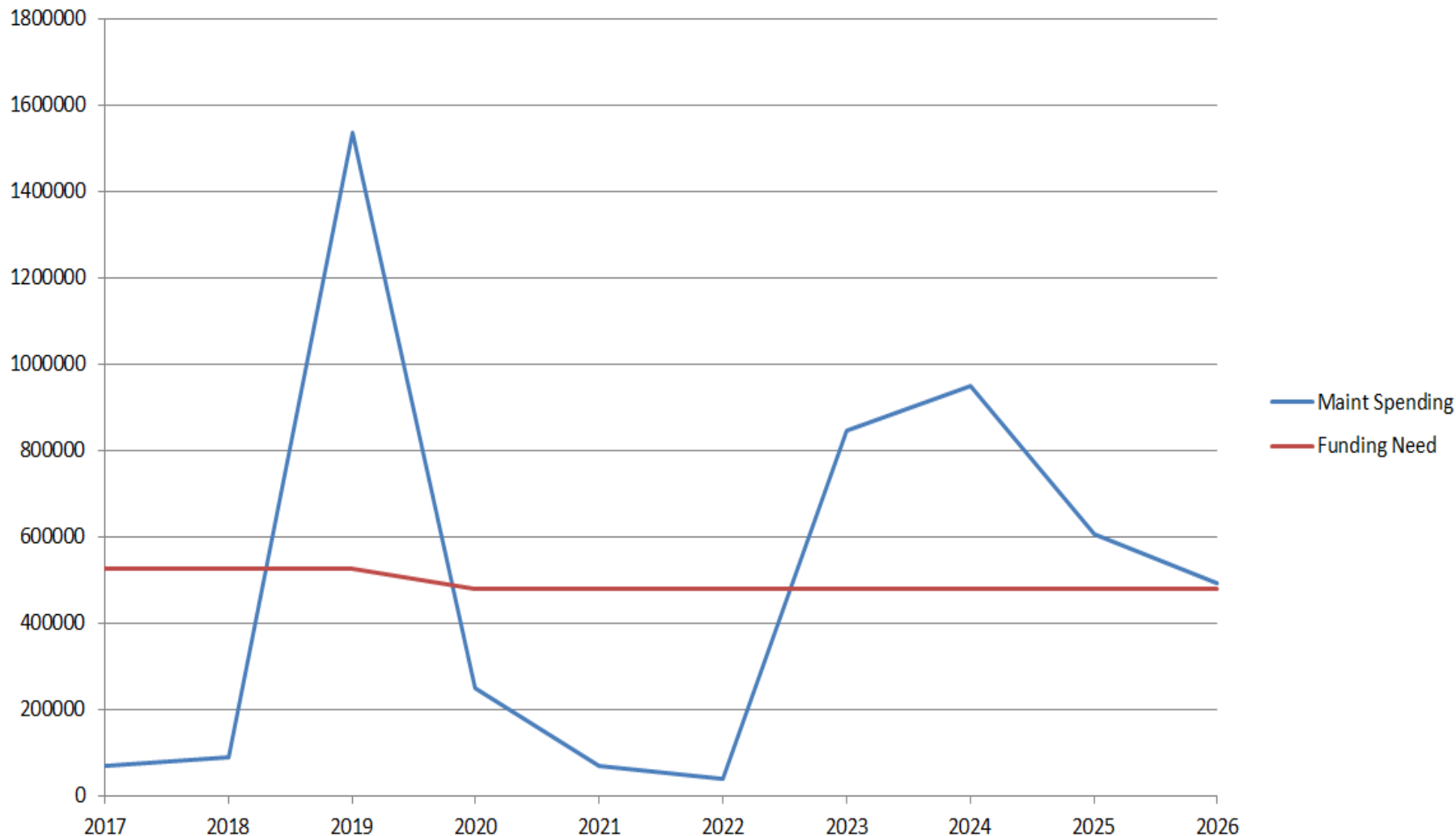
Total 0

Maintenance Reserve	Notes	
Gas Compressor Maintenance		20,000
Painting		50,000

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Total 70,000

# Maintenance Reserve Concept



# FY 2017 – CT1 Maintenance Reserve

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
<b>RESERVE FUND SPENDING</b>											
<b>BEGINNING YEAR BALANCE</b>	<b>250,000</b>	<b>705,000</b>	<b>1,140,000</b>	<b>130,000</b>	<b>360,000</b>	<b>772,000</b>	<b>1,212,000</b>	<b>847,000</b>	<b>1,279,000</b>	<b>254,000</b>	
Annual Outage, Routine Maint	70,000	90,000	185,000	0	68,000	40,000	95,000	45,000	180,000	143,000	
Turner CT and Gen Maint	0	0	0	250,000	0	0	0	0	900,000	350,000	
ALA1 CT and Gen Maint	0	0	225,000	0	0	0	375,000	3,000	350,000	0	
ALA2 CT and Gen Maint	0	0	1,125,000	0	0	0	375,000	0	75,000	0	
<b>TOTAL RESERVE FUND</b>	<b>70,000</b>	<b>90,000</b>	<b>1,535,000</b>	<b>250,000</b>	<b>68,000</b>	<b>40,000</b>	<b>845,000</b>	<b>48,000</b>	<b>1,505,000</b>	<b>493,000</b>	
ADDITIONAL FUNDING	525,000	525,000	525,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	
<b>END OF YEAR BALANCE</b>	<b>250,000</b>	<b>705,000</b>	<b>1,140,000</b>	<b>130,000</b>	<b>360,000</b>	<b>772,000</b>	<b>1,212,000</b>	<b>847,000</b>	<b>1,279,000</b>	<b>254,000</b>	<b>241,000</b>

# FY 2017 – CT1 Gas Compressor

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

## Notes:

D	Discretionary
M	Mandatory
MR	Draw from Maintenance Reserve

- Improve Reliability
- Most Significant cause of missed or delayed starts
- Lubricator Valving



# FY 2017 – CT1 Painting

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
CT1 Gas Compressor	MR	\$50,000		\$50,000		

## Notes:

D	Discretionary
M	Mandatory
MR	Draw from Maintenance Reserve

- Corrosion and Rust affected by marine environment.
- Thinning Walls
- Interior corrosion flakes off and goes downstream





# Combustion Turbine

## CT2 – STIG

FY 2017 Proposed Budget

January 13, 2017

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## CT2 Assumptions

- Capacity \$30/KW-Yr
- Debt paid in 2026
- Air New Zealand expects to service LM5000 until 2026
- 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

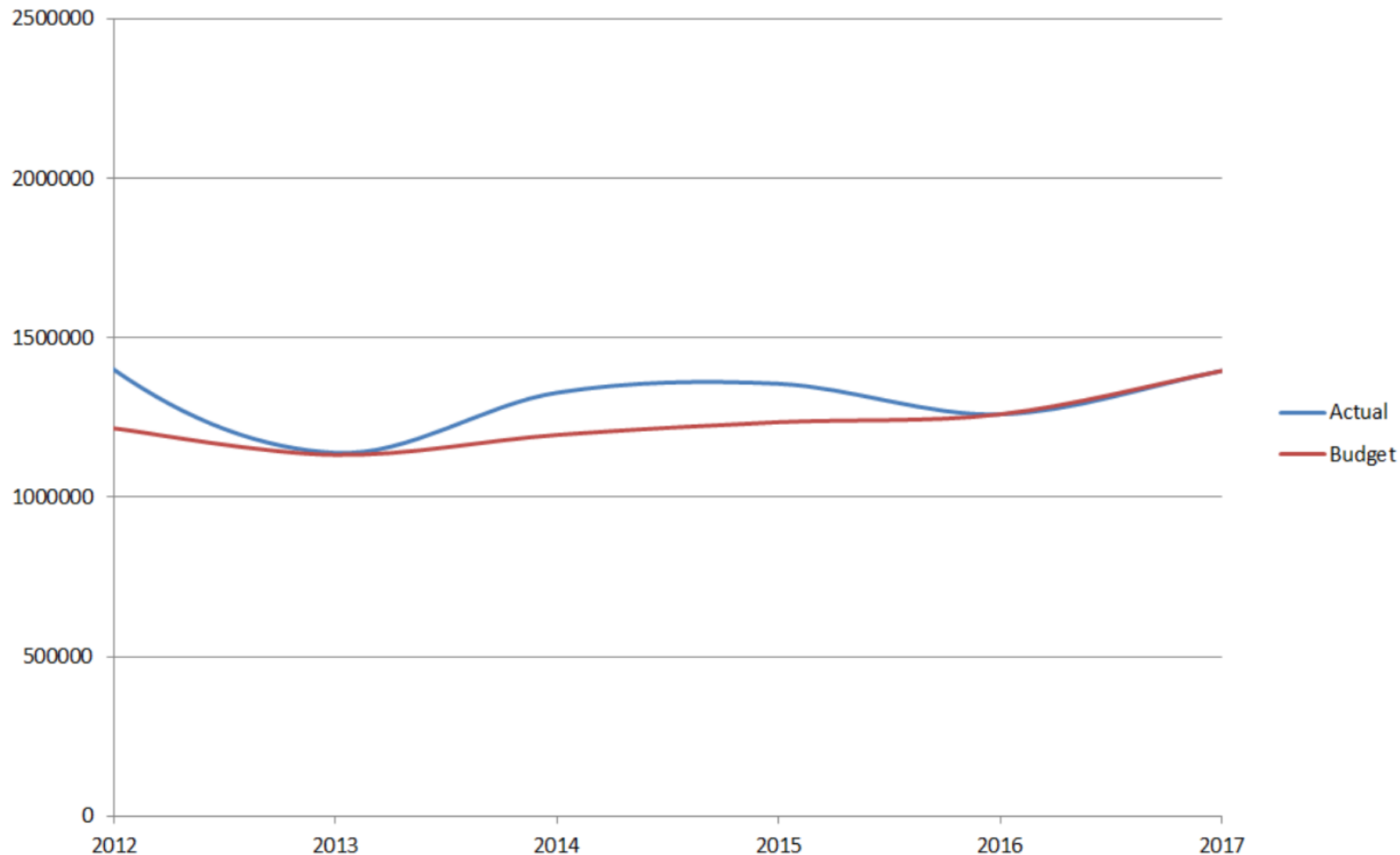
# FY 2017 – CT2 Proposed Budget

	FY 2015 Budget	FY 2015 Actual	FY 2016 Budget	Proposed FY 2017 Budget	Increase/ (Decrease)
<b>Routine O&amp;M Costs</b>					
Variable	\$92,500	\$72,187	\$84,300	\$86,700	\$2,400
Fixed	403,245	477,049	412,367	430,295	17,928
Administration	56,606	44,178	53,545	53,178	(367)
Mandatory Costs	57,500	66,360	71,200	79,235	8,035
Inventory	0	0	0	15,000	15,000
<b>Labor</b>	<b>609,851</b>	<b>659,774</b>	<b>621,412</b>	<b>664,408</b>	<b>42,996</b>
<b>Labor</b>	<b>625,764</b>	<b>696,247</b>	<b>639,061</b>	<b>745,364</b>	<b>106,303</b>
<b>Total Routine O&amp;M Costs</b>	<b>1,235,615</b>	<b>1,356,021</b>	<b>1,260,473</b>	<b>1,409,772</b>	<b>149,299</b>
<b>Other Costs</b>					
Debt Service					0
CAISO Charges (Variable)					0
Other Costs					0
Generation Services Shared					0
Administrative & General					0
<b>Total O&amp;M Costs</b>	<b>1,235,615</b>	<b>1,356,021</b>	<b>1,260,473</b>	<b>1,409,772</b>	<b>149,299</b>
<b>Projects</b>					
Operations & Maintenance	143,500	97,071	80,060	30,000	(50,060)
Capital	0	0	0	193,780	193,780
Maintenance Reserve	416,525	416,525	0	0	0
<b>Total Projects Costs</b>	<b>560,025</b>	<b>513,596</b>	<b>80,060</b>	<b>223,780</b>	<b>143,720</b>
<b>Annual Budget Cost</b>	<b>1,795,640</b>	<b>1,869,617</b>	<b>1,340,533</b>	<b>1,633,552</b>	<b>293,019</b>

Gas  
Compressor  
Parts

Merit,  
Benefit,  
actuarial,  
retirement  
med

# Routine O&M w/ Labor



■ FY16 is forecast in the Actual trend line

## FY17 Budget to FY15 Actual Variances

- Inventory New line item due to need to purchase parts for gas compressor and turbine



## FY 2017– CT2 Proposed Projects

O&M Projects	Notes	
DCS Software Upgrade (Contract Yr 3 of 3)	M	30,000
Total		30,000
Capital Projects	Notes	
Ammonia Risk Reduction (15.13% shared)	S	90,780
BOP Battery Replacement	M	103,000
Total		193,780
Maintenance Reserve	Notes	
Total		0

# FY 2017 – 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 Complete, HMI Installation Successful
- FY2017-18, 2<sup>nd</sup> of 3<sup>rd</sup> Year Agreement

# FY 2017 – Ammonia Risk Reduction

Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
Ammonia Risk Reduction	D	\$600,000		\$90,780 (STIG Share)		

## Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

AFE Financial Measurements	Value	Units
NPV @ Discount Rate	39,744,231	\$
IRR	349.3%	%
Average Annual Benefits	1,344,808	\$
Payback	0.0	Years
Useful Life	30.0	Years
B/C Ratio	67.24	B/C Ratio

- CH2MHILL Security Study Noted Ammonia Release Highest Risk (\$100M Liability based on recent litigation events in California utilities, \$22M Revenue/Asset Losses, \$500k Environmental Damage, and Unquantifiable Public Safety Risks
- Other Options Explored
- B&V Study Recommends Enclosing Tank and/or Other Options.
- Feasibility and Construction.



# FY 2017 – CT2 BOP Battery Replacement

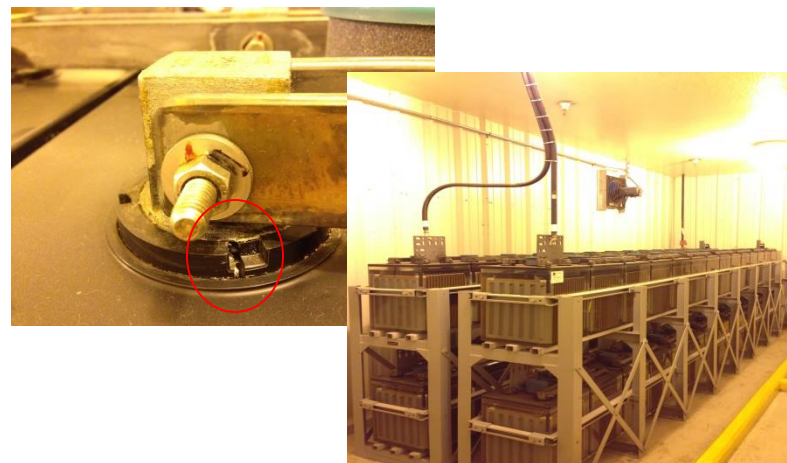
Project	Notes	Total Cost	FY 2016	FY 2017	FY 2018	FY 2019
CT2 BOP Battery Replacement	D	\$103,000		\$103,000		

## Notes:

D	Discretionary
M	Mandatory
CR	Annual deposit to the Capital Reserve

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

- Generator and Control, Station Battery Bank
- Installed 1994, ~20 Year Life
- Going into 22 Years
- Post Swelling and beginning to crack Battery Tops
- Maintain NERC Compliance



## FY 2017– CT2 Proposed Projects

O&M Projects	Notes	
DCS Software Upgrade (Contract Yr 3 of 3)	M	30,000
Total		30,000
Capital Projects	Notes	
Ammonia Risk Reduction (15.13% shared)	S	90,780
BOP Battery Replacement	M	103,000
Total		193,780
Maintenance Reserve	Notes	
Total		0

# FY 2017– CT2 Total Routine & Project Forecast

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
<b>O &amp; M PROJECTS</b>											
DCS Software Upgrade		30,000									
High Energy Pipe Inspection						15,000					17,500
DS416 Breaker Repair											
Repack HRSG Bellows			50,000								
STIG 480V MCC Breaker Maintenance			30,000					35,000			
ARC Flash Mitigation											
Ammonia System Major Maintenance						30,000					6,000
Water Plant VFDs				30,000							
<b>TOTAL O&amp;M PROJECTS</b>	<b>0</b>	<b>30,000</b>	<b>80,000</b>	<b>30,000</b>	<b>0</b>	<b>45,000</b>	<b>0</b>	<b>35,000</b>	<b>0</b>	<b>0</b>	<b>23,500</b>
<b>CAPITAL PROJECTS</b>											
Ammonia Risk Reduction (15.13% shared)		90,780									
BOP Battery Replacement		103,000									
<b>TOTAL CAPITAL PROJECTS</b>	<b>0</b>	<b>193,780</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>RESERVE FUND SPENDING</b>											
<b>BEGINNING YEAR BALANCE</b>	<b>500,000</b>										
Annual Outage, Routine Maint											
Turner CT and Gen Maint											
ALA1 CT and Gen Maint											
ALA2 CT and Gen Maint											
<b>TOTAL RESERVE FUND SPENDING</b>											
<b>ADDITIONAL FUNDING</b>											
<b>END OF YEAR BALANCE</b>	<b>500,000</b>										
<b>TOTAL O&amp;M, ALL PROJECTS, FUNDING</b>	<b>0</b>	<b>223,780</b>	<b>80,000</b>	<b>30,000</b>	<b>0</b>	<b>45,000</b>	<b>0</b>	<b>35,000</b>	<b>0</b>	<b>0</b>	<b>23,500</b>