Agendum
Oakland University
Board of Trustees Formal Session
October 7, 2013

PUBLIC/PRIVATE PARTNERSHIP
COMBINED HEATING AND POWER CO-GENERATION SYSTEM

A Recommendation

1. **Division and Department:** Finance and Administration Division, Facilities Management Department

2. **Introduction:** This proposed Public/Private Partnership (P3) will provide long term financial benefit and enhance Oakland University's (University) sustainability efforts by designing, building, and financing a combined heat and power co-generation system.

This P3 project will install a co-generation system in the University's existing Central Heating Plant; replacing a 56 year old boiler that has exceeded its life expectancy.

The co-generation system, a "combined heat and power" system, uses a natural gas turbine engine to simultaneously produce hot water and electricity for the campus. The system is projected to provide hot water to meet 100% of the summer need, and 50% of the winter need. In addition, the system is projected to provide electricity to meet 90% of the winter load and 60% of the summer load.

A Request for Proposals (RFP) to select a project developer/private partner was issued in April 2013. Five teams, Cogeneration Consultants; Chevron Energy Solutions; Novi Energy/Walbridge; Honeywell; and DeMaria/Cirque/SSOE/Veolia, replied with proposals in May 2013. Proposals were evaluated based on technical and financial criteria, and experience with similar projects. Three teams, Honeywell; Chevron Energy Solutions; and DeMaria/Cirque/SSOE/Veolia were interviewed in August 2013.

The recommended team is Chevron Energy Solutions with a proposal which includes:

- Project development and design, engineering, permitting, interconnection with DTE, financing, procurement, construction, commissioning, start-up and training, and maintenance management.
- Project implementation without adding debt to the University.
- Financing terms with the lowest interest rates and shortest payback.
- A joint effort to maintain the co-generation system, in addition to the maintenance contract with the turbine manufacturer.
- Work with the University to develop educational components associated with the co-generation system to allow students to obtain classroom training and field experience.

3. **Previous Board Action:** None

4. **Budget Implications:** This project is to be a Public/Private Partnership with no capital cost to Oakland University. Annual payments to Chevron would be equal to or less than the projected annual utility savings over the time of the lease. A capital lease for approximately fifteen years is proposed to be used to finance approximately a $12 million capital expenditure financed by Chevron. Savings in years sixteen and beyond would accrue to the University.

5. **Educational Implications:** Educational opportunities, such as a live dashboard, new clean energy courses, and job shadowing internships, will support the current academic programs by expanding the capabilities of the School of Engineering's Clean Energy Research Center.

6. **Personnel Implications:** None.

7. **University Reviews/Approvals:** This recommendation was formulated by the University's Energy Manager, and reviewed by the RFP review committee, Associate Vice President for Facilities Management, Vice President for Finance and Administration, and President.

8. **Recommendation:**

RESOLVED, that the Board of Trustees approves Chevron Energy Solutions as the Public/Private Partner for project development and construction of a combined heat and power co-generation system; and, be it further

RESOLVED, that the Board of Trustees authorizes the Vice President for Finance and Administration to negotiate and execute all contracts for project development and construction of a combined heat and power co-generation system; and, be it further

RESOLVED, that the contract be reviewed and approved by the Office of the Vice President for Legal Affairs and General Counsel prior to execution, and be in compliance with the law and with University policies and regulations, and conform to the legal standards and policies of the Vice President for Legal Affairs and General Counsel.

9. **Attachments:**

A. Public/Private Partnership Combined Heating and Power Co-Generation System Presentation

Submitted to the President
on 9/26, 2013 by

John W. Beaghan
Vice President for Finance and Administration
and Treasurer to the Board of Trustees

Recommended on 9/29/13, 2013
to the Board of Trustees for Approval by

Betty J. Youngblood, Ph.D.
Interim President

Oakland University

Public/Private Partnership: Combined Heat and Power Co-Generation System

Board of Trustees Presentation

October 7, 2013

Executive Summary

- Install a 4,600 KW natural gas turbine co-generation system in the Central Heating Plant; replacing boiler #4 (56 years old).
- Co-generation is a "Combined Heat and Power" system that simultaneously produces hot water and electricity for the campus.
- Use a Public/Private Partnership (P3) with no capital cost to Oakland University; payments equal to or less than the projected annual utility savings.
- P3 capital expenditure of approximately $12 Million; no affect on OU debt capacity.
- Capital lease for approximately 15 years.
- System capacity, will meet the campus':
  - Hot water load: 100% in summer, 50% in winter
  - Electric load: 90% in winter, 60% in summer

Michigan Universities with Co-Generation Systems

- University of Michigan
- Michigan State University
- Eastern Michigan University
- Western Michigan University
- Central Michigan University
- Ferris State University

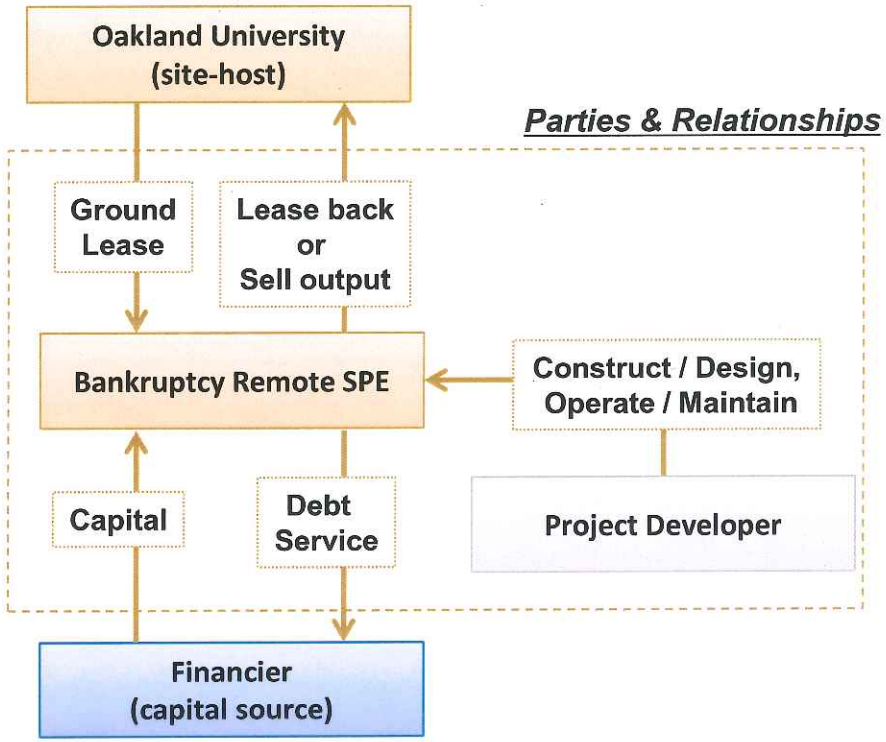
P3 Selection Criteria

- Experience and qualifications of firm/key people in implementing Combined Heat and Power Co-generation systems
- References
- Schedule and timeline
- Project financing terms
- Cost effectiveness of the P3 relationship
- Project proforma and payback analysis
- Ability to integrate business with education

Project Finance Structure

- Finance without OU debt
  - OU leases project back or purchases utility plant commodities
  - Special Purpose Entity (SPE) debt secured with revenue pledge
  - Compare taxable / tax exempt financing
  - SPE is "bankruptcy remote"
  - Capital lease on OU's books
  - Property reverts to OU at end of lease

- OU leases the "space" to the SPE to construct the co-gen plant



Recommendation

- Chevron Energy Solutions is recommended as the Public/Private Partner for development and implementation of the co-generation system based on:
  - Experienced, qualified project team
  - Excellent references
  - Manageable schedule and timeline
  - A leading energy company
  - Most attractive financing, proformas, and payback analysis
  - Ability to integrate the system into educational opportunities

Chevron's Co-Generation Experience

- Installed over 50 co-generation systems in the United States.
- From as small as 250 MBH to as large as 1,680,000 MBH. OU anticipates needing 60,000 MBH of hot water.
- From as small as 60 KW to as large as 580,000 KW. OU anticipates needing 4,600 KW of electricity.

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Chevron's Co-Gen List of Projects

Generation Table					
	Cogeneration Site	Location	ELE Output kW	Thermal Output MBH	Prime Mover Technology or Renewable Component
1	Detroit Arsenal	Detroit, MI	300	2000	Cummins Reciprocating Engine
2	Carson City Aquatic Center	Carson City, NV	140	250	Natural gas recip engine
3	Casa Dorinda	Santa Barbara, CA	200	450	Natural gas recip engine
4	Fairfield Civic Center	Fairfield, CA	1300	8000	Cogeneration
5	City of Richmond	Richmond, CA	60	250	Microturbine
6	City of South Gate	South Gate, CA	60	250	Microturbine
7	Coalinga	Coalinga, CA	38000	220000	GE Frame 6B Gas Turbine, HRSG
8	College of San Mateo	San Mateo, CA	560	5000	Natural gas recip engine
9	College of the Canyons	Santa Clarita, CA	100	250	Microturbine Cogeneration
10	Data Center	Concord, CA	3000	12000	Natural gas reciprocating engines
11	Black Mountain	Las Vegas, NV	85000	200000	3 GE LM2500 Gas Turbines,
12	Exar Semiconductor Company	Fremont, CA	940	5000	Cogeneration
13	Foothill-De Anza CCD	Foothill College, CA	240	450	Microturbine Cogeneration
14	Garnet Valley	Las Vegas, NV	85000	285000	GELM2500 Gas Turbine
15	General Chemical	Richmond, CA	1300	7000	Natural gas recip engine
16	Inergy Services	Tupman, CA	1200	5000	Gas-fired turbine with waste heat recovery
17	Irvine Valley CC	Irvine, CA	240	450	Microturbine Cogeneration
18	Kern River	Bakersfield, CA	300000	1680000	4 GE Frame 7EA Combustion Turbines, HRSG
19	Kings County	Kings County, CA	600	5000	Natural gas recip engine
20	Laramie County SD	Cheyenne, WY	90	250	Microturbine Cogeneration
21	MCLB	Albany, GA	2000	25000	LFG GE Jenbacher Recip, HRSG
22	Mid-Set	Fellows, CA	38000	220000	GE Frame 6B Gas Turbine, HRSG
23	Moscone Center	San Francisco, CA	360	3000	Microturbine Cogeneration
24	Mount San Antonio CC	Walnut, CA	1400	8000	Gas-fired turbine with waste heat recovery
25	Network Appliance	Sunnyvale, CA	1100	3000	Natural gas recip engine
26	North Island Credit Union	San Diego, CA	400	3000	Natural gas recip engine

Chevron's Co-Gen List of Projects

Generation Table (cont.)					
	Cogeneration Site	Location	ELE Output kW	Thermal Output MBH	Prime Mover Technology or Renewable Component
27	Oaks Christian School	Westlake Village, CA	870	6000	Gas-fired turbine with waste heat recovery
28	Pacific Choice	Fresno, CA	140	250	Natural gas recip engine
29	Salinas River	San Ardo, CA	36000	210000	Enhanced oil recovery cogeneration
30	Mesa College	San Diego, CA	60	250	Microturbine Cogeneration
31	Miramar College	San Diego, CA	550	5000	Reciprocating Engine Cogeneration
32	Sargent Canyon	San Ardo, CA	36000	210000	Enhanced oil recovery cogeneration
33	Skyline College	San Bruno, CA	375	3000	Natural gas reciprocating engines
34	Solana College	Solano County, CA	2850	16000	Combustion Turbine
35	Spa Casino	Palm Springs, CA	1400	8000	Natural gas recip engine
36	Sunkist Growers Inc.	Tipton, CA	2700	17000	Natural gas recip engine
37	Sycamore	Bakersfield, CA	300000	1680000	GE Frame 7EA Combustion Turbine
38	TRM Manufacturing	Corona, CA	1400	8000	Reciprocating Engine Cogeneration
39	University of Utah	Salt Lake City, UT	6500	100000	Solar Taurus SoLoNox
40	VQS Enterprises	Vista, CA	200	450	Microturbine Cogeneration
41	Woodland USD	Woodland, CA	240	450	Microturbine Cogeneration
42	Santa Rita Jail Microgrid	Dublin, CA	2500	14000	1 MW Fuel Cell, 1.2 MW PV-Solar, 1 MW Wind
43	Fort Detrick Central Utility Plant	Frederick, MD	22000	200000	14MW Cummins Flywheel UPS, 8MW Standby
44	NAS Kingsville Renewable Energy	Kingsville, TX	650	NA	Solar
45	Hornsby Bend Biosolids	Austin, TX	2000	4600	LFG Reciprocating Engine
46	Broward County WTP	Popano Beach, FL	2000	7500	LFG Reciprocating Engine
47	Picatinny Arsenal	Dover, NJ	NA	55000	Natural Gas & Fuel Oil Fired Boilers
48	Sunrise Power	Fellows, CA	580000	1100000	2 GE Frame 7 FA gas turbines, HRSG, stm turbine
49	Richmond Refinery	Richmond, CA	NA	150000	Solar-to-Steam Concentrating Solar Plant
50	Western Digital Fremont	Fremont, CA	10000	NA	Central Utility Plant
51	Darajat Unit III Geothermal Plant	Indonesia	260000	NA	Geothermal Energy Plant
52	Hudson Ranch Power I	Salton Sea, CA	50000	NA	Geothermal Energy Plant

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RFP Evaluation – Summary Table

	Measures	Chevron ES	Honeywell	DeMaria SSOE	Cogeneration Consultants	Walbridge Novi Energy
1	Combined Heating and Power Co-generation Equipment Purchase cost ($/KW) for systems between 3,500 KW to 5,500 KW:	$1,174	$1,600	$1,500	$1,158	$1,700
2	Combined Heating and Power Co-generation project installation cost ($/KW) for systems between 3,500 KW to 5,500 KW:	$1,153	$700	$1,000	$1,549	$1,500
3	Project Cost ($/KW) Equipment Purchase and Installation Cost for systems between 3,500 KW to 5,500 KW: (Row 1 + Row 2)	$2,327	$2,300	$2,500	$2,707	$3,200
4	Proposed Co-generation unit size (KW):	4,600	4,600	4,600	4,600	4,600
5	Equipment Purchase and Installation Cost: (Row 3 x Row 4)	$10,704,200	$10,580,000	$11,500,000	$12,452,292	$14,720,000
6	Lump Sum Engineering Fee to develop project:	$78,000	$210,000	$235,000	$35,900	$165,000
7	Total Project Cost based on a 4,600 KW unit: (Row 5 + Row 6)	$10,782,200	$10,790,000	$11,735,000	$12,488,192	$14,885,000
8	Interest Rate for a 15 year term, if the project is implemented today:	3.75%	4.70%	4.94%	4.00%	5.00%

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Life Cycle Cost / Cash Flow Analysis
Scenario: 15 Years @ 3.75%

Financial Aspects of Performance Based Energy Program for
Oakland University-Co-Gen (Centaur 50, 4,600 KW)
Rochester, MI

Implementation Cost	$10,782,200
Interest Rate	3.75%
Term	15 year
Construction Period Interest	$567,484
Total Amount Financed	**$11,349,684**

1	2	3	4	5	6	7
Year	Co-Generation Savings	Operational and Maintenance Cost	Avoided Capital Cost Savings	Total Program Savings	Payment to Lessor	Net Savings
1	$1,835,118	($360,000)	$166,667	$1,641,785	$1,003,039	$638,746
2	$1,835,118	($370,800)	$171,667	$1,635,985	$1,003,039	$632,946
3	$1,835,118	($381,924)	$176,817	$1,630,011	$1,003,039	$626,972
4	$1,835,118	($393,382)	$182,121	$1,623,857	$1,003,039	$620,818
5	$1,835,118	($405,183)	$187,585	$1,617,520	$1,003,039	$614,481
6	$1,835,118	($417,338)	$193,212	$1,610,992	$1,003,039	$607,953
7	$1,835,118	($429,858)	$199,009	$1,604,269	$1,003,039	$601,230
8	$1,835,118	($442,754)	$204,979	$1,597,343	$1,003,039	$594,304
9	$1,835,118	($456,037)	$211,128	$1,590,209	$1,003,039	$587,170
10	$1,835,118	($469,718)	$217,462	$1,582,862	$1,003,039	$579,823
11	$1,835,118	($483,810)	$223,986	$1,575,294	$1,003,039	$572,255
12	$1,835,118	($498,324)	$230,706	$1,567,500	$1,003,039	$564,461
13	$1,835,118	($513,274)	$237,627	$1,559,471	$1,003,039	$556,432
14	$1,835,118	($528,672)	$244,756	$1,551,202	$1,003,039	$548,163
15	$1,835,118	($544,532)	$252,098	$1,542,684	$1,003,039	$539,645
Totals	$27,526,770	($6,695,606)	$3,099,819	$23,930,983	$15,045,586	$8,885,397

Notes By Column:

(1) Years after implementing system

(2) Co-Generation Savings include additional natural gas consumption and are escalated by 0% to account for inflation.

(3) Operational and Maintenance Costs are estimated and increased annually for inflation.

(4) Avoided Capital Costs ($2.5M boiler #4 replacement) are escalated by 3% to account for inflation.

(5) Total Program Savings are the sum of Columns (2), (3) and (4)

(6) Payment to Lessor is based on an annual interest rate of 3.75%, 15 year term. Actual rate to be determined at closing.

(7) Net Savings to OU equals Total Program Savings less Payment to Lessor, Columns (5) - (6).

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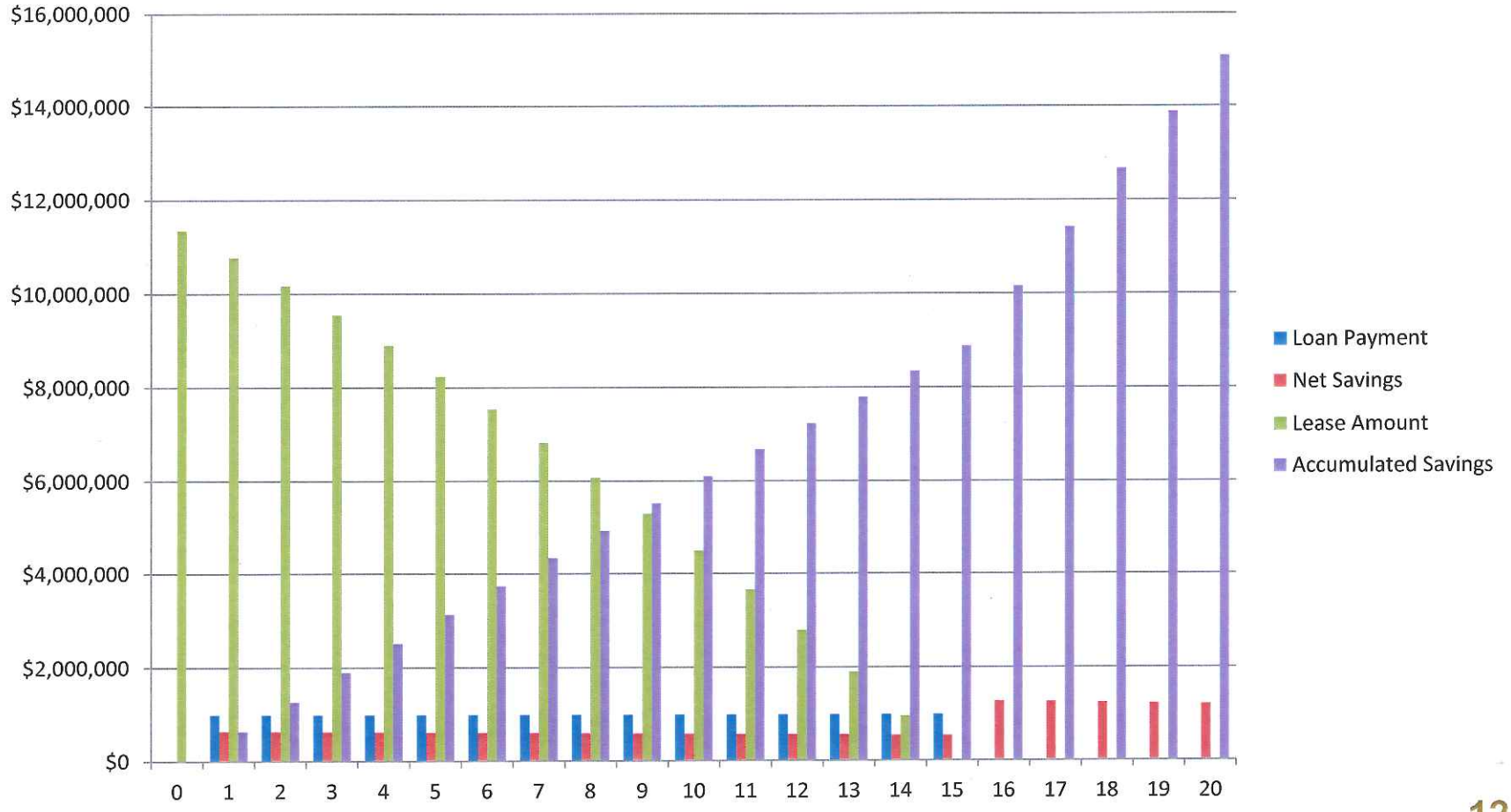
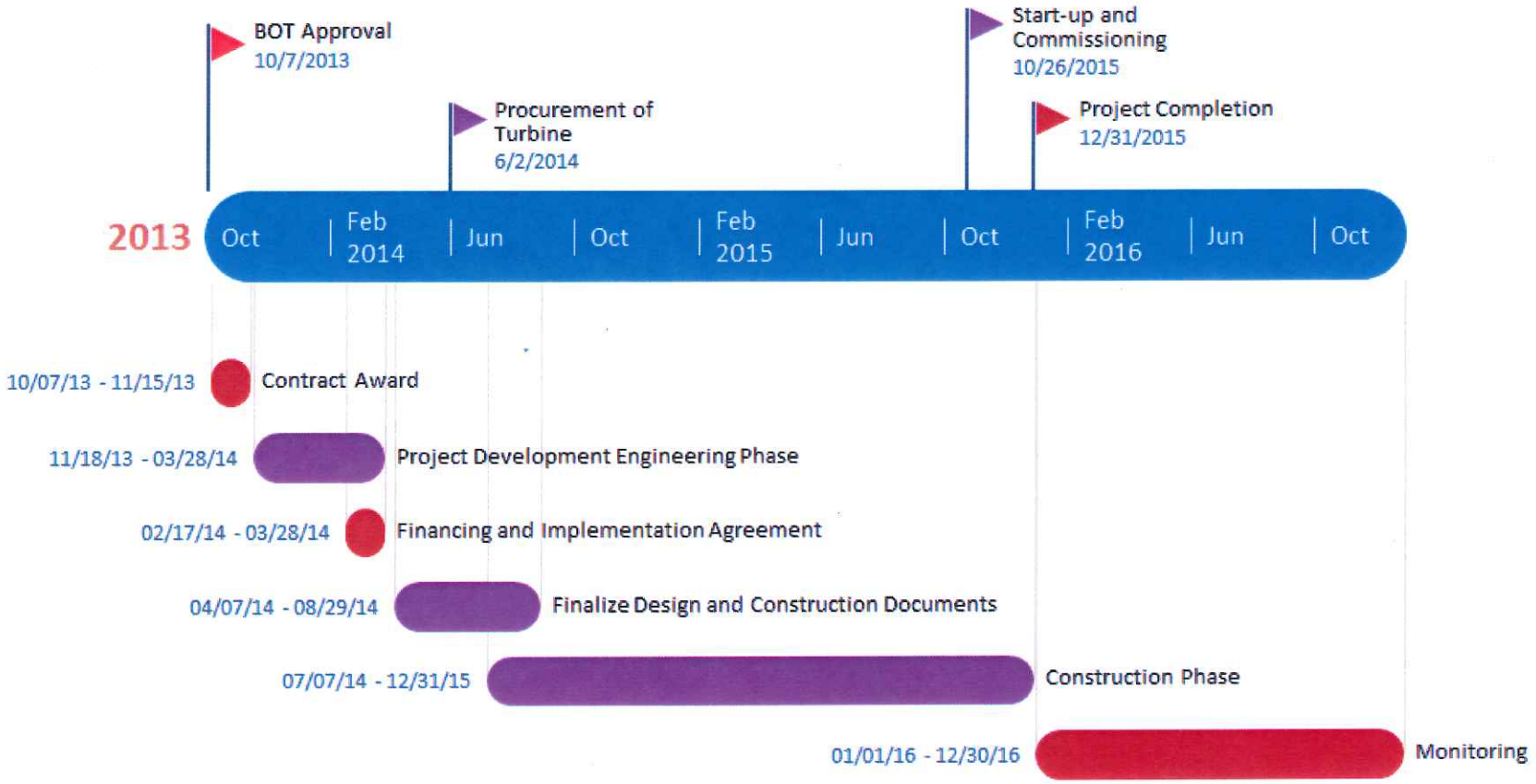
20 Year Cash Flow Based on Chevron's Project Cost, 15 Year Term and 3.75 % Interest Rate



Project Timeline



Project Benefits

- Upgrades the Central Heating Plant
- Avoids capital investment to replace Boiler #4 ($2.5 Million)
- Lowers utility costs
- Provides an immediate positive cash flow and continues over the life of the co-gen system (50 years)
- Educational opportunities to support academic programs
- Enhances Oakland's sustainability efforts