

Metro

*Los Angeles County Metropolitan Transportation Authority
One Gateway Plaza
3rd Floor Board Room*



Metro[®]

Agenda - Final

Thursday, July 20, 2017

9:00 AM

**One Gateway Plaza, Los Angeles, CA 90012,
3rd Floor, Metro Board Room**

Construction Committee

James Butts, Chair

Jacquelyn Dupont-Walker, Vice Chair

Robert Garcia

Janice Hahn

Sheila Kuehl

Carrie Bowen, non-voting member

Phillip A. Washington, Chief Executive Officer

METROPOLITAN TRANSPORTATION AUTHORITY BOARD RULES
(ALSO APPLIES TO BOARD COMMITTEES)

PUBLIC INPUT

A member of the public may address the Board on agenda items, before or during the Board or Committee's consideration of the item for one (1) minute per item, or at the discretion of the Chair. A request to address the Board should be submitted in person at the meeting to the Board Secretary. Individuals requesting to speak on more than three (3) agenda items will be allowed to speak up to a maximum of three (3) minutes per meeting. For individuals requiring translation service, time allowed will be doubled.

Notwithstanding the foregoing, and in accordance with the Brown Act, this agenda does not provide an opportunity for members of the public to address the Board on any Consent Calendar agenda item that has already been considered by a Committee, composed exclusively of members of the Board, at a public meeting wherein all interested members of the public were afforded the opportunity to address the Committee on the item, before or during the Committee's consideration of the item, and which has not been substantially changed since the Committee heard the item.

The public may also address the Board on non-agenda items within the subject matter jurisdiction of the Board during the public comment period, which will be held at the beginning and/or end of each meeting. Each person will be allowed to speak for up to three (3) minutes per meeting and may speak no more than once during the Public Comment period. Speakers will be called according to the order in which the speaker request forms are received. Elected officials, not their staff or deputies, may be called out of order and prior to the Board's consideration of the relevant item.

In accordance with State Law (Brown Act), all matters to be acted on by the MTA Board must be posted at least 72 hours prior to the Board meeting. In case of emergency, or when a subject matter arises subsequent to the posting of the agenda, upon making certain findings, the Board may act on an item that is not on the posted agenda.

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- a. Disorderly behavior toward the Board or any member of the staff thereof, tending to interrupt the due and orderly course of said meeting.
- b. A breach of the peace, boisterous conduct or violent disturbance, tending to interrupt the due and orderly course of said meeting.
- c. Disobedience of any lawful order of the Chair, which shall include an order to be seated or to refrain from addressing the Board; and
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NOTE: ACTION MAY BE TAKEN ON ANY ITEM IDENTIFIED ON THE AGENDA

CALL TO ORDER**ROLL CALL**

- 25 SUBJECT: ENVIRONMENTAL WASTE HANDLING AND ENVIRONMENTALLY RELATED CONSTRUCTION SERVICES

[2017-0298](#)

RECOMMENDATION

AUTHORIZE the Chief Executive Officer to negotiate and execute:

- A. a five-year indefinite quantity/indefinite delivery cost plus fixed fee Contract No. PS20655 to TRC Solutions, Inc., for Environmental Waste Handling and Environmentally Related Construction Services on Task Orders, for a base term of three (3) years, plus two one-year options, in an amount not to exceed \$42,274,495 (Base Contract: \$35,100,495; Option Year 1: \$5,037,000 and Option Year 2: \$2,137,000), subject to the resolution of any timely protest; and
- B. all individual Task Orders and changes within the Board approved contract value.

Attachments: [Attachment A Environmental Waste Handling and Construction Services Contract - FINAL 7 05 17a](#)
[Attachment B Procurement Summary.docx](#)
[Attachment C DEOD Summary.docx](#)

**26 SUBJECT: ALTERNATIVE FINANCING MECHANISM FOR
RENEWABLE ENERGY AND ROOF REPLACEMENT**

[2017-0427](#)

RECOMMENDATION

CONSIDER:

- A. REAFFIRMING the use of a Power Purchase Agreement (PPA) to implement a design-build project at Divisions 9, 11, 14 (Expo Yard), and 22 (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B) including the design, construction and installation of new roofs for Divisions 11 and 22 to be paid for through a PPA; and
- B. FINDING that use of the design-build contracting delivery approach pursuant to Public Utilities Code Section 130242, et. seq. will achieve certain private sector efficiencies in the integration of the design and construction by providing for the award of a design-build contract to the lowest responsive and responsible bidder for the installation of new roofs at Divisions 11 and 22 and installation of solar photovoltaic ("PV") systems at Divisions 9, 11, 14, and 22, which will be solicited through either an Invitation for Bid (IFB) or Request for Proposal (RFP) procurement method.

Attachments: [Attachment A - Renewable Energy Policy \(9-4-2011\).pdf](#)
[Attachment B - Funding and Operating Sustainability-Related Infrastructure Report \(9-18-2014\).pdf](#)
[Attachment C - Report on Design Build November 19 2015.pdf](#)
[Attachment D - Report on Alt Fin Mechanisms for Energy Projs.pdf](#)

**27 SUBJECT: ORAL REPORT OF THE PROGRAM MANAGEMENT
CHIEF OFFICER**

[2017-0470](#)

RECOMMENDATION

RECEIVE oral report by the Program Management Chief Officer.

Attachments: [Oral report by the Program Management Chief Officer -July 2017](#)

Adjournment

Consideration of items not on the posted agenda, including: items to be presented and (if requested) referred to staff; items to be placed on the agenda for action at a future meeting of the Committee or Board; and/or items requiring immediate action because of an emergency situation or where the need to take immediate action came to the attention of the Committee subsequent to the posting of the agenda.



Board Report

File #: 2017-0298, **File Type:** Contract

Agenda Number: 25

**CONSTRUCTION COMMITTEE
JULY 20, 2017**

SUBJECT: ENVIRONMENTAL WASTE HANDLING AND ENVIRONMENTALLY RELATED CONSTRUCTION SERVICES

ACTION: AWARD PROFESSIONAL SERVICES CONTRACT

RECOMMENDATION

AUTHORIZE the Chief Executive Officer to negotiate and execute:

- A. a five-year indefinite quantity/indefinite delivery cost plus fixed fee Contract No. PS20655 to TRC Solutions, Inc., for Environmental Waste Handling and Environmentally Related Construction Services on Task Orders, for a base term of three (3) years, plus two one-year options, in an amount not to exceed \$42,274,495 (Base Contract: \$35,100,495; Option Year 1: \$5,037,000 and Option Year 2: \$2,137,000), subject to the resolution of any timely protest; and
- B. all individual Task Orders and changes within the Board approved contract value.

RATIONALE

Nearly every capital project and all transit projects undertaken by Metro, require evaluation of hazardous substances, contamination, or a need for regulatory compliance under federal, state and local law. Metro must comply with all environmental laws to avoid fines, and civil or criminal liability. The **Environmental Waste Handling and Environmentally Related Construction Services** Contract assist with emergency response for evaluation, hazardous substances abatement, transport and disposal of encountered hazardous and non-hazardous classified soil and liquid wastes which also includes asbestos and lead based paint. The Contract also includes environmental demolition services for Metro owned properties in addition to environmentally related construction services which includes fuel storage tank system upgrades, repairs, removals, replacements in order to remain in regulatory compliance with local, state and federal regulatory requirements. Additional contract requirements include permit assistance, remediation system construction, implementation, and installation; as well as maintenance and operation.

As the need for specific environmental waste handling and construction services arises, staff will

issue Contract Work Orders, Task Orders and changes, from their associated project-specific budgets, considering the information available and applicable time constraints on performance of the work. Most of the work will be negotiated and paid on a fixed price or cost plus fixed fee. Staff will closely monitor the Contractor's budget and schedule using existing project management controls. No funds are obligated until a Task Order is awarded against a valid project. This Contract will replace the existing Environmental Engineering contract, EN077, which expires on December 31, 2017.

Attachment A summarizes the projected costs and associated Projects this contract will be supporting in the next five years. Since this is a multi-year contract, budgeting for future year expenditures that reflect an increase to the award value, will be brought back to the Board for approval.

IMPACTS TO OTHER CONTRACTS

The Contract will continue to support the Metro Purple Line Extension, Crenshaw, Regional Connector and will also be supporting the upcoming Measure M; Large Capital, Highway, Regional Rail and Large Capital Projects in addition to smaller capital projects and the UST/AST Capital Program. The Contract will also support existing projects that because of changed and/or unforeseen site conditions would require the services that are within the scope of work of this Contract.

FINANCIAL IMPACT

As specific environmental waste handling and environmentally related construction services needs arise, Task Orders will be issued and funded from their associated project budgets, upon approval by the responsible Project Managers. The forecasted project efforts from FY18 through FY22 includes support on Environmental Capital Projects related to the environmental demolition of Division 20 Rail Buildings for PLE Section 1 track welding, demolition and remediation of Bus Division 6 TOD and AAA Building for PLE Section 2. In addition this Contract will also be used for the continued management (upgrades due to new regulatory requirements and/or major maintenance repairs) of the Underground Storage Tank systems to current code requirements at all bus and rail divisions and facilities (Project Number 202212). Emergency and Non-Emergency waste handling, transport and disposal services that may be required for the Crenshaw and Regional Connector, Location 61S (Red Line Maintenance of Way), Link US, Redline Portal Widening Projects, and on various capital bus division expansion projects funded through the Site Remediation Project No. 300012.

ALTERNATIVES CONSIDERED

If Contract No. PS20655 is not awarded then Metro could experience increased liability for Contractor claims for delay to schedule completion milestones or risk fines due to violation of order by a regulatory agency. The Metro Board may reject the recommended action and direct staff to do all environmental waste handling and construction support work in house. Metro would have to hire additional staff with expertise in many different subjects, such as waste profiling, trucking and construction crews and laboratory science. Metro would also need to purchase specialized equipment such as loaders, excavators and drill rigs which are not practical or cost effective to acquire or maintain. Metro, in effect, would incur more cost to do the work internally than by employing consultants.

ATTACHMENTS

Attachment A - Forecasted Work, FY18-22

Attachment B - Procurement Summary

Attachment C - DEOD Summary

Prepared by:

Cris B. Liban, Executive Officer, Environmental Compliance/Sustainability

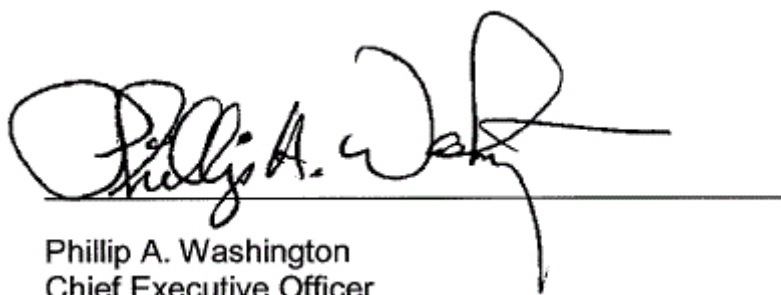
(213) 922-2471

Tom Kefalas, Sr. Director, Environmental Compliance (213) 922-4887

Daniel Robb, Sr. Contract Administrator (213) 922-7074

Reviewed by: Rick Clarke, Chief Program Management Officer (213) 922-7557

Debra Avila, Chief Vendor/Contract Management Officer (213) 418-3051



Phillip A. Washington
Chief Executive Officer

Attachment A. Forecasted Work, FY18-FY22

Contract No. PS20655, Environmental Waste Handling and Construction Services Contract

Future Projects	FY18	FY19	FY20	FY21	FY22	Total Estimated Contract Value
	Total FY Value	Total FY Value	Total FY Value	Total FY Value	Total FY Value	
Contractor Consultancy Only						
a. UST						
1. D1 - UST Upgrades/Repairs			\$ 150,000		\$ 150,000	\$ 300,000
2. D2 - UST Upgrades/Repairs		\$ 249,000		\$ 20,000		\$ 269,000
3. D3 - UST Upgrades/ 1 EG AST Installation	\$ 25,000	\$ 123,495				\$ 148,495
4. D5 - UST Upgrades/Repairs			\$ 100,000	\$ 250,000	\$ 50,000	\$ 400,000
5. D7 - UST Upgrades/Repairs	\$ 200,000		\$ 500,000		\$ 50,000	\$ 750,000
6. D8 - UST Upgrades/Lid Replacements	\$ 974,000			\$ 200,000		\$ 1,174,000
7. D9 - UST Upgrades/OWS repairs		\$ 460,000		\$ 250,000	\$ 20,000	\$ 730,000
8. D10 - UST Upgrades/Repairs	\$ 150,000		\$ 450,000			\$ 600,000
9. D11 - UST Upgrades/Repairs			\$ 200,000			\$ 200,000
10. D15 - UST Upgrades/Repairs			\$ 190,000		\$ 250,000	\$ 440,000
11. D18 - UST Removals	\$ 750,000	\$ 750,000		\$ 500,000		\$ 2,000,000
12. D20,D22,D61 - AST Installs				\$ 500,000		\$ 500,000
13. D99 - UST Upgrades		\$ 50,000	\$ 100,000			\$ 150,000
14. Permitting & CNG Tank	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 500,000
15. Waste Antifreeze& CNG tank replacements (AST)	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 400,000	\$ 800,000
16. Emergency Task Order	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 250,000
b. Compliance						
1. AST SPCC Inspections	\$ 100,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 700,000
2. AST repairs	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 500,000
3. SPCC development/review	\$ 10,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 70,000
4. Third Party Testing	\$ 10,000	\$ 77,000	\$ 77,000	\$ 77,000	\$ 77,000	\$ 318,000
5. Division 6 Abatement and Demo	\$ 3,000,000	\$ -	\$ -	\$ -	\$ -	\$ 3,000,000
6. PLE 1 waste handling remediation	\$ 500,000	\$ 500,000	\$ 400,000	\$ 300,000	\$ 300,000	\$ 2,000,000
7. PLE D20 Abatement and Demo	\$ 3,000,000	\$ 2,000,000				\$ 5,000,000
8. General METRO Haz Waste Handling	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 1,250,000
9. Waste Water and Vault Water Pump Outs	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 375,000
10. Crenshaw	\$ 100,000	\$ 100,000	\$ 100,000			\$ 300,000
11. Regional Connector	\$ 100,000	\$ 100,000	\$ 100,000			\$ 300,000
12. Regional rail		\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 400,000
13. D4 Decommissioning			\$ 2,000,000	\$ 2,000,000		\$ 4,000,000
14. I710		\$ 250,000	\$ 250,000			\$ 500,000
15. D1 Improvements	\$ 2,000,000	\$ 2,000,000				\$ 4,000,000
16. El Monte Busway	\$ 250,000					\$ 250,000
17. Pavement Replacements D7,D8, CMF	\$ 400,000	\$ 250,000	\$ 250,000			\$ 900,000
18. Bus Facilities Deferred Maintenance	\$ 250,000	\$ 250,000				\$ 500,000
19. Div 3 Master Plan		\$ 200,000				\$ 200,000
20. Metro Redline to OL Underpass		\$ 100,000				\$ 100,000
21. 7th and Metro BLOC	\$ 75,000					\$ 75,000
22. d22 Paint and Body Shop		\$ 100,000				\$ 100,000
23. Highways		\$ 100,000	\$ 100,000			\$ 200,000
24. PLE 2 – 8 properties with 6 buildings - ACM/LBP abatement & Foreseen/unforeseen investigation & remediation	\$ 2,500,000	\$ 2,000,000				\$ 4,500,000
25. PLE 3 – 2 properties with 2 buildings - ACM/LBP abatement & Foreseen/unforeseen investigation & remediation		\$ 650,000				\$ 650,000
26. Metro Facilities Roof Replacement Program		\$ 250,000				\$ 250,000
27. Pavement Improvements Phase 2		\$ 200,000				\$ 200,000
28. A13 HVAC System Replacement		\$ 25,000				\$ 25,000
29. New Central Cash Counting Office (Cash Room)		\$ 75,000				\$ 75,000
30. Red/Purple Line Portal Widening		\$ 1,000,000				\$ 1,000,000
31. Expo Supplemental Building		\$ 500,000				\$ 500,000
32. Red Line/Purple Line Warehouse Expansion High Density Storage Equipment		\$ 75,000				\$ 75,000
33. Airport Metro Connector		\$ 750,000				\$ 750,000
Overall ROM	\$ 15,069,000	\$ 14,124,495	\$ 5,907,000	\$ 5,037,000	\$ 2,137,000	\$ 42,274,495

PROCUREMENT SUMMARY

ENVIRONMENTAL WASTE HANDLING AND ENVIRONMENTALLY RELATED
CONSTRUCTION SERVICES / PS20655

1.	Contract Number: PS20655	
2.	Recommended Vendor: TRC Solutions, Inc.	
3.	Type of Procurement (check one): <input type="checkbox"/> IFB <input type="checkbox"/> RFP <input checked="" type="checkbox"/> RFP-A&E <input type="checkbox"/> Non-Competitive <input type="checkbox"/> Modification <input type="checkbox"/> Task Order	
4.	Procurement Dates:	
	A. Issued: 2/03/17	
	B. Advertised/Publicized: 2/03/17	
	C. Pre-Proposal Conference: 2/15/17	
	D. Proposals Due: 3/29/17	
	E. Pre-Qualification Completed: 6/27/17	
	F. Conflict of Interest Form Submitted to Ethics: 4/04/17	
	G. Protest Period End Date: 7/24/17	
5.	Solicitations Picked up/Downloaded: 71	Proposals Received: 4
6.	Contract Administrator: Daniel A. Robb	Telephone Number: (213) 922-7074
7.	Project Manager: Emmanuel Liban	Telephone Number: (213) 922-2471

A. Procurement Background

This Board Action is to approve the award of Contract No. PS20655 issued in support of professional engineering services for environmental waste handling and environmentally related construction services projects. Board approval of contract awards are subject to resolution of any properly submitted protest.

The RFP was issued on February 3, 2017, in accordance with Metro's Acquisition Policy and California Government Code §4525 - 4529.5.

The Contract is a Cost Plus Fixed Fee. The Contract period of performance is three years plus two one-year options.

Two amendments were issued during the solicitation phase of this RFP:

- Amendment No. 1, issued on February 27, 2017, extended the proposal due date.
- Amendment No. 2, issued on March 21, 2017, clarified submittal requirements.

Metro advertised the RFP in the Los Angeles Daily News on February 3, 2017, and, in the Los Angeles Sentinel, Rafu Shimpo, World Journal and La Opinion on February 9, 2017. Metro's Client/Vendor Relations sent out post card notices through

either regular mail or e-mail to firms listed in Metro’s vendor database, notifying them of this procurement. Additionally, the RFP was listed on Metro’s internet website.

On February 15, 2017, a pre-proposal conference was held with 36 representatives from 33 firms in attendance. Seventy one individuals from various firms picked up the RFP.

Metro received four proposals on the March 29, 2017 due date.

1. TRC Solutions, Inc.
2. Burns and McDonnell
3. Arcadis- US., Inc.
3. Parsons Transportation Group, Inc.

B. Evaluation of Proposals

A Proposal Evaluation Team (PET), consisting of staff from Metro’s Environmental Compliance and Sustainability Department (ECSD), was convened and conducted a comprehensive technical evaluation of the proposals received.

The proposals were evaluated based on the following evaluation criteria and weights:

- | | |
|---|------------|
| • Proposer teams capabilities and experience | 26 percent |
| • Role and relevant experiences and capability of the firms on the Prime contractors team | 25 percent |
| • Staff positions identified in the Scope of Services | 25 percent |
| • Project management approach | 20 percent |
| • SBE/DVBE or DBE Contracting Outreach and Mentor Protégé Approach | 4 percent |

The evaluation criteria are appropriate and consistent with criteria developed for other similar Architect and Engineers (A&E) procurements. Several factors were considered when developing the weights, giving the greatest importance to the Proposer team’s capabilities and experience.

This is an A&E, qualifications based procurement; therefore, price cannot be used as an evaluation factor pursuant to state and federal law.

Of the four proposals received, all four were determined to be within the competitive range. The four firms within the competitive range are listed below in alphabetical order:

1. Arcadis - US.,Inc.
2. Burns and McDonnell

3. Parsons Transportation Group, Inc.
4. TRC Solutions, Inc.

On April 26, 2017, the PET conducted oral presentations with the firms. The firms' project managers and key team members had an opportunity to present each team's qualifications and respond to the PET's questions. In general, each team's presentation addressed the requirements of the RFP, experience with all aspects of the required tasks, and stressed each firm's commitment to the success of the project. Also highlighted were staffing plans, work plans, and perceived project issues. Each team was asked questions relative to each firm's proposed alternatives and previous experience.

Qualifications Summary of Recommended Firm:

The evaluation performed by the PET, in accordance with the criteria set forth in the RFP, determined TRC Solutions, Inc. to be the most qualified firm to provide the services. TRC Solutions, Inc. proposal demonstrated the necessary competence and professional qualifications for the satisfactory performance of the services required.

TRC Solutions, Inc. showed a thorough understanding of Metro's processes and demonstrated the capability to perform the services as reflected by their technical training and education. TRC Solutions, Inc. provided a management plan that demonstrated a thorough approach, and comprehensive understanding of the implementation of the Scope of Services.

TRC Solutions, Inc. demonstrated an experienced tank team that shall substantially benefit the agency in installing and managing storage tanks. The proposed tank subcontractor has extensive experience and demonstrated superior capability in the installation and removal of tanks.

TRC Solutions, Inc. demonstrated an established working relationship with subcontractors and emphasized their contributions by explaining in their Management Plan the strong subcontractor integration into the team. TRC Solutions, Inc. provided examples of past teaming efforts with the proposed subcontractors, showing the capability to work well together.

The PET ranked the proposals and assessed strengths, weaknesses and associated risks of each of the Proposers and recommends TRC Solutions, Inc. as the most qualified firm.

1	Firm	Average Score	Factor Weight	Weighted Average Score	Rank
2	TRC Solutions, Inc.				
3	Proposers Team Capabilities and Experience.	86.67	26%	22.53	
4	Role and Relevant Experience and Capability of the firms on the Prime Contractors Team.	85.00	25%	21.25	
5	Staff Positions Identified in the Scope of Services.	84.00	25%	21.00	
6	Project Management Approach	79.33	20%	15.87	
7	SBE/DVBE or DBE Contracting Outreach and Mentor Protégé Approach.	34.43	4%	1.38	
8	Total		100.00%	82.03	1
9	Burns and McDonnell				
10	Proposer's Team Capabilities and Experience.	76.33	26%	19.85	
11	Role and Relevant Experience and Capability of the Firms on the Prime Contractors Team.	76.67	25%	19.17	
12	Staff Positions Identified in the Scope of Services.	73.67	25%	18.42	
13	Project Management Approach	75.00	20%	15.00	
14	SBE/DVBE or DBE Contracting Outreach and Mentor Protégé Approach.	91.89	4%	3.68	
15	Total		100.00%	76.12	2
16	Arcadis-US				
17	Proposers Team Capabilities and Experience.	73.33	26%	19.07	
18	Role and Relevant Experience and Capability of the Firms on the Prime Contractors Team.	75.00	25%	18.75	
19	Staff Positions Identified in the Scope of Services.	73.00	25%	18.25	
20	Project Management Approach	73.33	20%	14.67	
21	SBE/DVBE or DBE Contracting Outreach and Mentor Protégé Approach.	62.16	4%	2.49	
22	Total		100.00%	73.23	3

23	Parsons				
24	Proposers Team Capabilities and Experience.	73.33	26%	19.07	
25	Role and Relevant Experience and Capability of the Firms on the Prime Contractors Team.	73.00	25%	18.25	
26	Staff Positions Identified in the Scope of Services.	71.67	25%	17.92	
27	Project Management Approach.	70.00	20%	14.00	
28	SBE/DVBE or DBE Contracting Outreach and Mentor Protégé Approach.	62.16	4%	2.49	
29	Total		100.00%	71.73	4

C. Cost/Price Analysis

A cost analysis of labor rates, indirect rates and other costs was completed in accordance with Metro's Procurement Policies and Procedures to negotiate a fair and reasonable price. The analysis includes among other things, (1) a comparison with similar firms offering the same services; (2) an analysis of audited rates and factors for labor, equipment and other prices that will comprise the rates upon which the Contractor will base its invoices, and (3) compliance with both the Federal Acquisition Regulation (FAR) guidelines and Generally Accepted Accounting Principles (GAAP). Metro negotiated and established direct labor rates plus provisional indirect rates and a factor for calculating a fixed fee. The pricing for each task order will utilize the rates, plus the negotiated fixed fee factor, to establish a lump sum price or a not-to-exceed cost reimbursable amount plus a fixed fee.

An audit request has been submitted to the Metro Management Audit Services Department (MASD). In order to prevent any unnecessary delay in contract award, provisional rates have been established, subject to retroactive adjustments upon completion of any necessary audits. In accordance with FTA Circular 4220.1.F, if an audit has been performed by any other cognizant agency within the last twelve month period, Metro will receive and accept that audit report for the above purposes rather than perform another audit.

Proposer Name		Proposal Amount*	Metro ICE*	Recommended NTE Amount
TRC Solutions	Base Contract for Years 1-3	N/A	\$35,100,495.00	\$35,100,495.00
	Option for Years 4-5	N/A	\$7,174,000.00	\$7,174,000.00
	Total Contract Value (Base + Option)	N/A	\$42,274,495.00	\$42,274,495.00

***Note:** A proposal amount was not applicable. This is a Cost Plus Fixed Fee (CPFF) Task Order Contract with no definable level of effort for the Scope of Work. As described in the cost analysis section one, hourly labor rates, overhead and fee, were negotiated and determined to be fair and reasonable. The total contract amount shall not be greater than the recommended NTE amount.

D. Background on Recommended Contractor

The recommended firm, TRC Solutions, Inc. is a publicly-traded Irvine, CA based consulting firm that has been providing environmental consulting services for over forty years to clients nationwide. TRC has successfully worked for Metro in the past on projects of a similar size and scope. In addition, TRC provides environmental services to such clients as BNSF Railway, ConocoPhillips Petroleum, Sempra Energy and Kinder Morgan Energy Partners.

DEOD SUMMARY

**ENVIRONMENTAL WASTE HANDLING AND ENVIRONMENTALLY RELATED
CONSTRUCTION SERVICES/ PS20655**

A. Small Business Participation

The Diversity & Economic Opportunity Department established a SBE goal of 30%, inclusive of a 27% SBE and 3% DVBE goal, and a 25% DBE goal. TRC Solutions, Inc.'s (TRC) proposal included Small Business Enterprise (SBE), Disabled Veteran Business Enterprise (DVBE) and Disadvantaged Business Enterprise (DBE) firms without schedules or specific dollar commitments prior to the establishment of the this on-call contract. TRC Solutions exceeded the goal by making a 32% SBE, 3% DVBE and 30% DBE commitment.

This on-call contract has federal, state, and Measure M funding. Overall SBE/DVBE and DBE participation for this on-call contract will be determined based on the funding source and the aggregate of all Task Orders awarded.

Small Business Goal	27% SBE 3% DVBE 25% DBE	Small Business Commitment	32% SBE 3% DVBE 30% DBE
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Prime: TRC Solutions, Inc.

	SBE Subcontractors	% Committed
1.	Acoustics Group	TBD
2.	A-Tech Consulting, Inc.	TBD
3.	Calvada Surveying	TBD
4.	GCAP Services, Inc.	TBD
5.	HTS Environmental Services	TBD
6.	Martini Drilling Corp.	TBD
7.	SunWest Engineering Constructors	TBD
8.	The R.E.M. Engineering Co., Inc.	TBD
9.	The Sanberg Group	TBD
10.	The Sierra Group	TBD
	Total SBE Commitment	32%

	DVBE Subcontractors	% Committed
1.	Calvada Surveying	TBD
2.	The R.E.M. Engineering Co., Inc.	TBD
3.	The Sanberg Group	TBD
	Total DVBE Commitment	3%

	DBE Subcontractors	Ethnicity	% Committed %
1.	A-Tech Consulting	Caucasian Female	TBD
2.	GCAP Services, Inc.	Hispanic American	TBD
3.	Global Probe, Inc.	Hispanic American	TBD
4.	Martini Drilling Corp.	Hispanic American	TBD
5.	SunWest Engineering Constructors	Caucasian Female	TBD
6.	The Sanberg Group	Caucasian Female	TBD
7.	The Sierra Group	Hispanic American Female	TBD
	Total DBE Commitment		30%

B. Contracting Outreach and Mentoring Plan

TRC Solutions, Inc. submitted a Contracting Outreach and Mentoring Plan (COMP) and committed to mentor four (4) firms as required to be responsive.

C. Living Wage and Service Contract Worker Retention Policy Applicability

The Living Wage and Service Contract Worker Retention Policy is not applicable to this Contract.

D. Prevailing Wage Applicability

Prevailing Wage requirements are applicable to this project. DEOD will monitor contractors' compliance with the State of California Department of Industrial Relations (DIR), California Labor Code, and, if federally funded, the U S Department of Labor (DOL) Davis Bacon and Related Acts (DBRA).

E. Project Labor Agreement/Construction Careers Policy

Project Labor Agreement/Construction Careers Policy is not applicable to this Contract.

**Board Report**

File #: 2017-0427, **File Type:** Informational Report

Agenda Number: 26

**CONSTRUCTION COMMITTEE
JULY 20, 2017**

**SUBJECT: ALTERNATIVE FINANCING MECHANISM FOR
RENEWABLE ENERGY AND ROOF REPLACEMENT**

**ACTION: REAFFIRM THE USE OF POWER PURCHASE AGREEMENT TO IMPLEMENT
A DESIGN-BUILD PROJECT AND APPROVE USE OF DESIGN-BUILD
PROJECT DELIVERY METHOD FOR ROOF REPLACEMENTS AND SOLAR
PHOTOVOLTAIC SYSTEMS**

RECOMMENDATION

CONSIDER:

- A. REAFFIRMING the use of a Power Purchase Agreement (PPA) to implement a design-build project at Divisions 9, 11, 14 (Expo Yard), and 22 (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B) including the design, construction and installation of new roofs for Divisions 11 and 22 to be paid for through a PPA; and
- B. FINDING that use of the design-build contracting delivery approach pursuant to Public Utilities Code Section 130242, et. seq. will achieve certain private sector efficiencies in the integration of the design and construction by providing for the award of a design-build contract to the lowest responsive and responsible bidder for the installation of new roofs at Divisions 11 and 22 and installation of solar photovoltaic ("PV") systems at Divisions 9, 11, 14, and 22, which will be solicited through either an Invitation for Bid (IFB) or Request for Proposal (RFP) procurement method.

ISSUE

Pursuant to Metro's Renewable Energy Policy attached as Attachment A, Metro has committed to a 66% renewable energy use goal by 2020. One of the strategies that Metro has employed to achieve that goal is to install solar PV systems on its facilities at various Metro properties (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B). That authority allows the use of Renewable Energy Power Purchase Agreements (PPAs). This mechanism allows for guaranteed revenue to repay the investment of renewable energy systems or rental of land or roof

space to 3rd party providers.

Staff's assessments and evaluation studies conclude that four of the optimal locations among Metro's real property assets for the installation of solar PV systems are Metro Divisions 9, 11, 22, and the Expo Yard. Staff also determined that based on available utility programs at these locations as well as available incentives, use of a PPA (discussed further below) would be appropriate ("**Solar PPA Project**"). The Solar PPA Project would generate energy for Metro's consumption that will offset a portion of the utility-provided energy at such sites, and is projected to result in energy cost savings.

Roof replacement work ("**Roof Replacement Work**") is necessary to support the installation of solar PV equipment at Divisions 11 and 22. The roofs at these Divisions are at the end of their useful life and are already being scheduled to be replaced. Existing structures at these divisions also need to be reinforced to accommodate the future solar PV systems load.

DISCUSSION

As described above, the proposed Roof Replacement Work is necessary in order to facilitate the installation of the Solar PPA Project. This section of the report provides a discussion of how the PPA works as well as the additional details on the justification of the Roof Replacement work.

Solar PPA Project

Staff anticipates that the Solar PPA Project will be implemented by way of a public-private partnership in the form of a solar PV PPA transaction authorized pursuant to Government Code ("GC") Section 4217.10 *et seq.* A PPA transaction is among the various alternative financing strategies that have been identified by staff for project delivery, as described in the attached report on Alternative Financing Mechanisms for Energy Projects dated May 15, 2013, attached as Attachment D. In a PPA transaction, Metro would license or lease its property to a third party solar energy provider ("**Power Provider**"). The Power Provider installs the solar PV system on Metro's property, and Metro purchases solar energy from the Power Provider at a negotiated cost, which cost is projected to be less than the anticipated marginal cost to the agency that would have otherwise been consumed from other sources. The Power Provider, selected through a competitive solicitation process pursuant to the contracting authority sought hereunder, will design, finance, and furnish the solar PV system, and maintain the system for at least twenty (20) years. The amount of energy produced by the solar PV system and the net monetary savings to Metro shall be guaranteed in the form of PPA performance incentives that focus on kilowatt hours to be generated and costs avoided.

Upon completion of the analysis of the best Solar PPA Project, staff will seek Board approval for the award of the PPA contract in compliance with the requirements of GC Section 4217.10 *et seq.*

Roof Replacement Work

The roofs at Divisions 11 and 22 were installed approximately 26 and 21 years ago, respectively. Maintenance service requests files reviewed by staff show repairs made due to roof leaks, drywall repair, repainting, and mold remediation among others. It is therefore timely that the repair of these roofs occurs in conjunction with the Solar PPA Project. The Roof Replacement Work will be conducted according to or consistent with all applicable codes, and furthermore, the technical specifications will require that the roofs have the structural capacity to accommodate solar PV system facilities.

The Roof Replacement Work will be solicited as part of the PPA solicitation and will be installed as part of the awarded contract resulting from the solicitation.

DETERMINATION OF SAFETY IMPACT

This Board action will not have an adverse impact on safety standards for Metro. It will however increase safety for Metro maintenance and contractor personnel that may be required to maintain the PV equipment as well as other projects that should become more energy and operationally efficient.

FINANCIAL IMPACT

Funding for staff support of this project will come from Project Number 450003, Miscellaneous Contingency-Capital Construction, in Cost Center 8510. Since the roof is to be funded through the PPA, there will be no additional funding that is required of Metro for capital and operations and maintenance during the life of the solar panels.

Since this is a multi-year capital project, the cost center manager and Chief Program Management Officer and the Executive Officer, Environmental Compliance and Sustainability will be responsible for budgeting in future years.

Impact to Budget

FY18 funding required for this project comes from Proposition A 35% cash/bonds.

The Solar PPA Project and the Roof Replacement Work will be funded and financed by the Power Provider who will be awarded the PPA contract at a later date, following Board approval. Staff will provide additional information at the time that staff seeks Board approval for awarding of the contract for the Roof Replacement Work and Solar PPA Project.

ALTERNATIVES CONSIDERED

Metro has committed to using up to 66% of its energy from renewable energy sources. Installation of

solar panels at our facilities has been employed for some time. We have an opportunity through this project to replace roofs that are at the end of their useful life at Divisions 11 and 22 as an integral part of our renewable energy program.

The Board may reject the request to use the PPA alternative financing mechanism contract for Solar PPA Work and the Roof Replacement Work; and consequently force Metro to simply replace the roof at our own cost and in the future retrofit for the installation future installation of solar panels. This series of steps will have a cumulative effect on our achievement of our renewable energy use goal, protecting employee health, and replacing our infrastructure with as small capital outlay to our agency as possible.

NEXT STEPS

After the recommended Board Action is approved, staff will release an Invitation for Bids (IFB) to solicit a design-build contractor for the PPA and to install the new roofs at Divisions 11 and 22. Upon evaluation of the IFB bids, staff will seek Board approval prior to award of contract.

ATTACHMENTS

- Attachment A - Renewable Energy Policy
- Attachment B - Funding and Operating Sustainability-Related Infrastructure report
dated September 18, 2014
- Attachment C - Report on Design Build, November 19, 2015
- Attachment D - Report on Alternative Financing Mechanisms for Energy Projects
dated May 15, 2013

Prepared by:

Cris B. Liban, EO Environmental Compliance and Sustainability, (213) 922-2471

Reviewed by:

Richard Clarke, Chief Program Management Officer, (213) 922-7557
Debra Avila, Chief Vendor/Contract Management Officer, (213) 418-3051



Phillip A. Washington
Chief Executive Officer

**Metro**Los Angeles County
Metropolitan Transportation AuthorityOne Gateway Plaza
Los Angeles, CA 90012-2952213.922.2000 Tel
metro.net**AD HOC SUSTAINABILITY COMMITTEE
SEPTEMBER 14, 2011****SUBJECT: RENEWABLE ENERGY POLICY****ACTION: ADOPT RENEWABLE ENERGY POLICY****RECOMMENDATION**

Adopt the Los Angeles County Metropolitan Transportation Authority (LACMTA) Renewable Energy Policy to develop and implement renewable energy technology applications, where feasible and practicable, to minimize non-renewable energy use in all of LACMTA capital assets or projects.

ISSUE

Sustainability and energy efficiency is a central LACMTA focus and commitment, cutting across virtually all aspects of the agency's mission, vision, values, and core business goals. We annually spend on average approximately \$26 million for electricity. About \$7 million of this total amount is for operation of bus and rail maintenance facilities, layovers, terminals, and headquarter buildings. The remaining are for propulsion power.

As the years progress, we have seen electricity costs rise due to periodic utility rate adjustments. We believe that in the volatile and costly energy market, embracing sustainability, energy efficiency, conservation, and implementation of renewable energy sources is a primary pathway towards gaining control of, and reducing our energy usage and costs and gaining energy independence.

LACMTA has already deployed and is using over two megawatts of electricity from renewable energy sources (i.e., photovoltaic sources exclusively) at three of our Bus Divisions and the Metro Support Services Center. One megawatt of power can power approximately 800 to 1,000 homes. This current portfolio represents approximately 2% of the energy needs of our agency.

A motion was passed by our Board of Directors in February 2011 calling for the establishment of a "Metro Renewable Energy Policy". The motion recognized that

under Measure R and the 30/10 plan, the projected expansion of the Metro system, including approximately 70 miles of light and heavy rail lines, will have substantial effect upon the projected cost of energy required in order to operate the Metro system.

The motion called for a review of the following elements:

- Assessment of technical feasibility for off-track, and on-track renewable power, including canopies, substations, parking lots and park 'n rides, landscaped areas, utility poles, tunnels, garages, maintenance buildings, etc., as well as creative renewable energy solutions.
- Life-cycle financial considerations including cost (i.e., initial capital as well as maintenance and replacement costs and life-cycle cost analysis).
- Use of creative financing mechanisms (such as Feed-in-Tariff, Power Purchase Agreements, ground leases, Public/Private Partnerships and State and Federal grants).
- Inclusion of life-cycle cost analyses for renewable energy use in awarding construction contracts for new lines.
- Existing industry and government guidelines for evaluating renewable energy and energy efficiency in new transit projects and discussion of their potential application to Metro projects.
- Retrofitting existing light rail, subway and bus rapid transit corridors for solar and other renewable power systems.
- Opportunities to partner with local power utilities.

The motion also called for a proposed plan of action and identification of specific opportunities for incorporating renewable energy (solar and other renewable power systems) and energy efficiency measures into existing and new transit projects. The motion requires that the Renewable Policy and plan should include the installation of a demonstration renewable energy system (preferably but not limited to solar panels) on at least one existing station as a demonstration project.

An amendment to the motion further indicated that the review and study of a proposed agency Policy, plan of action, and identification of specific opportunities be initially assigned to the Ad Hoc Sustainability Committee in order to put a greater focus on the issues during the development period. Once the policy has been developed with a Plan of Action and opportunities identified, the Renewable Energy Policy and project opportunities would return to the Operations Committee for the pursuit of implementation.

DISCUSSION

There have already been a number of staff initiated assessments on the subject of renewable energy such as the completion of a Solar Assessment Feasibility Study for all facilities; the completion of a Wind Energy Feasibility Study for our North San Fernando Valley bus divisions; and the completion of a wind energy study in our subway tunnels. Staff is also currently conducting an on-board energy conservation and technology study for rail vehicles; and an energy efficiency assessment of all Metro facilities to assess utility use and cost baseline as part of a feasibility study on opportunities to deploy energy-efficiency strategies leading to the Leadership in Energy and Environmental Design-Existing Building Operations and Maintenance (LEED®-EBOM) certification of the buildings.

Staff is developing a comprehensive Energy Conservation and Management Plan (Energy Plan) that outlines both our supply and demand strategies to reduce energy use and costs in the maintenance and operation of our overall system. The Energy Plan further provides the guiding principles and implementation procedures in the management of the use and supply of electricity and natural gas, and identifies a proposed management plan to implement the identified energy strategies.

Renewable energy-related pilot or demonstration efforts are currently being planned or underway such as the following:

1. Wind Tunnel Energy – Subway Lines – projected to be installed along Red Line: Staff has conducted tests to understand the feasibility of wind tunnel renewable energy generation at our Red Line subway tunnel. Results indicate the potential of the technology. Staff had recently completed a Transit Investment for Greenhouse Gas and Energy Reduction (TIGGER) grant application for use in a pilot scale demonstration. A related procurement will be carried out to implement the pilot project when TIGGER funds are secured.
2. Solar Panels – Buildings – project selected at El Monte Station on Silver Line: Solar panels will be deployed at the new facility being constructed at our El Monte Station on the Silver Line and procurement will soon be advertised. This project will be used to demonstrate how solar panels are installed on new transit infrastructures.
3. Renewable Energy Project – Transit Facilities/Large Scale – project not yet selected: Following adoption of the proposed policy, LACMTA will begin the evaluation of one or more large-scale demonstration projects. The relatively large size and type of these projects will most likely require the approval of the procurement by the LACMTA Board in advance of issuing a solicitation document. While a potential scope of work has been considered, Metro will need further consultation with our agency's procurement team to better understand the types of proposals that may be feasible for such a comprehensive and large scale renewable energy project. Examples of the

types of parcels where this can be implemented include, but are not limited to: linear right of way corridors; vacant or excess land not currently in use; park and ride lots; and similar types of parcels.

4. Solar Panels – Transit Facilities/Small Scale – project selected along the Blue Line: It has been suggested that the Pico Station be the initial location for this pilot. This project will illustrate implementation of solar installations at relatively small scale structures. However, there is likelihood that the Pico Station would be modified when the proposed football stadium plans are finalized. As this policy will already be in place at that time; along with a requirement to rebuild the Pico Station, there should be a consideration of a much larger cost-neutral renewable energy source at the location. Other locations will be considered for possible implementation of this type of pilot project.

While there is now significant staff initiated momentum in exploring renewable energy sources and implementation of energy efficiency strategies, the adoption of a focused Renewable Energy Policy allows for the strategic implementation and expansion of functional and cost-effective renewable energy technologies within the Metro system. The provisions of the proposed Renewable Energy Policy complement the intent of our existing Environmental Policy and Energy and Sustainability Policy.

Staff further recommends that a measurable goal be incorporated into the Renewable Energy Policy to accomplish the policy's intentions. LACMTA currently uses approximately 20% of its total energy from renewable energy sources. These come from within our own renewable energy portfolio as well as those from the utilities.

There is already a state mandate for California utility companies to procure 33% of their total energy supplies from certified renewable resources by the year 2020. However, factors such as:

- local constraints that includes current and near-term economic conditions;
- decreasing availability and amount of energy rebates;
- viability of incorporating renewable energy projects in the context of accelerated Measure R projects' implementation;
- lack of control over unit costs of energy;
- as well as fast evolving renewable technology advances that may create operations and maintenance challenges if deployment of existing technologies is carried out significantly ahead of more cost-effective ones

altogether present challenges for a non-utility organization like the LACMTA.

Nonetheless, staff recommends a stretch goal of an additional 13% renewable energy use by 2020 above our current usage baseline of 20%. This will be achieved through the continued deployment of applicable, feasible, and practicable renewable energy sources at our sites as well as accounting for the increase in renewable energy portfolios of utilities supplying energy to our agency.

Staff recommends that this renewable energy goal be reviewed every five years to assess the continued viability of such a goal and make adjustments, if needed, to ensure the continued incorporation of renewable energy into Measure R and other agency capital assets and projects.

FINANCIAL IMPACT

Renewable energy project development and deployment requires higher up-front capital investment than conventional energy sources. At the same time, the associated benefits are not necessarily reflected in these project capital costs. Innovative strategies are needed to increase investment, spread cost over the life-cycle, and reflect the multiple benefits of renewable energy and energy efficiency.

Cost is however one of the primary considerations in the selection of appropriate renewable energy technologies that will be considered in any of our capital assets and projects. The Cost criteria examines the cost-competitiveness of the renewable energy technology based upon the cost of constructing the project(s) or retrofitting existing facilities or equipment; their on-going short-term and long-term operation and maintenance; and their overall life-cycle expenses costs relative to the baseline cost of non-renewable energy to achieve the same functional objective. In existing facilities, energy efficiency retrofits and retro-commissioning shall be compared together with renewable energy technology applications for combined life-cycle cost-effectiveness.

Staff will be examining various financial mechanisms, including incentives, subsidies, and deal structures that can aid in the development and deployment of renewable energy projects. Included in the analysis are financial mechanisms that are available to renewable energy developers including incentives and subsidies (feed-in tariffs, rebate programs, state and federal grants, and loans) and deal structures (power purchase agreements, ground leases and public-private partnerships). Any of these mechanisms are applicable and feasible to aid in the development and deployment of renewable energy in any of our capital assets and projects.

No Measure R funds will be used in the implementation of renewable energy projects. Staff will deploy renewable energy projects that will be as close to cost-neutral to the agency as possible.

ALTERNATIVES CONSIDERED

Rejection of the recommended Board action is inconsistent with the intent of the Board approved motion to develop a comprehensive renewable energy policy for Metro. LACMTA will also miss the revenue-generation opportunities that may be associated with some of the incentives or deal structures, for example feed-in-tariffs. Feed-in-tariff

revenue can possibly offset maintenance costs associated with previously deployed renewable energy projects.

NEXT STEPS

After the proposed Renewable Energy Policy is adopted by the LACMTA Board, staff will continue the procurement of the identified pilot or demonstration renewable energy projects. The finalized Energy Plan will also be implemented as the guide to manage our use and management of energy resources in general; including the increase in our renewable energy portfolio.

A Request for Information and Qualification will be developed to solicit interest in developing the most comprehensive renewable energy program that can be implemented at LACMTA both short-term and long-term to achieve our renewable energy goal as close to cost-neutral as possible.

ATTACHMENT

- A. Los Angeles County Metropolitan Transportation Authority Renewable Energy Policy

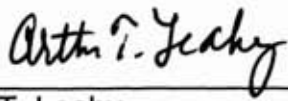
Prepared by: Cris B. Liban, Environmental Compliance and Services Department
Manager



Krishniah N. Murthy
Executive Director, Project Transit Delivery



Lonnie Mitchell
Chief Operations Officer



Arthur T. Leahy
Chief Executive Officer

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
RENEWABLE ENERGY POLICY**

POLICY STATEMENT

The Los Angeles County Metropolitan Transportation Authority (LACMTA) will develop and implement renewable energy technology applications, where feasible and practicable, to reduce non-renewable energy use in all LACMTA capital assets or projects.

PURPOSE

This policy provides guidance in 1) identifying criteria that can be applied to the feasibility, selection and application of a renewable energy technologies; 2) applicability of the Renewable Energy Policy; and 3) collaborative opportunities for funding the implementation of feasible and practicable renewable energy-related projects on or any LACMTA capital asset or project.

COMMITMENT

This Renewable Energy Policy complements the implementation of the LACMTA Environmental Policy and Sustainability and Energy Policy to identify cost-effective solutions to reducing non-renewable energy usage and increasing costs; and to ensure that our current and future energy-related activities would have minimal human health, environmental, and climate change impacts.

The LACMTA also commits to a renewable energy use stretch goal of 13% above its current baseline of 20% by the year 2020. This goal will be measured as the percentage of energy use from any renewable source (including those from the utilities' sources) compared to the amount of total energy used by LACMTA. This goal will be revisited every five years and will be adjusted accordingly to ensure the continued implementation of Measure R projects. Measure R funds will not be used to achieve this goal nor to implement the intent of this policy.

RENEWABLE ENERGY SELECTION CRITERIA

The LACMTA will consider the feasibility, selection, and implementation of applicable, feasible, and practicable renewable energy technologies at any of our capital assets and projects by comparing renewable energy technologies to one another considering the following criteria:

- 1) Cost: Potential renewable energy applications shall be analyzed for cost competitiveness based upon the cost of constructing the project(s) or retrofitting existing facilities or equipment; their on-going short-term and long-

term operation and maintenance; and their overall life-cycle expenses costs relative to the baseline cost of non-renewable energy to achieve the same functional objective. In existing facilities, energy efficiency retrofits and retro-commissioning shall be compared together with renewable energy technology applications for combined life-cycle cost-effectiveness.

- 2) Environmental Benefit: Renewable energy alternatives or low emissions high-efficiency energy applications, shall be analyzed for environmental benefits relative to the baseline utility electricity (or natural gas, for some solar water heat systems) based on greenhouse gas emissions that would be avoided, and as appropriate, environmental and public health and safety benefits.
- 3) Land Use Efficiency: Renewable energy applications shall reflect efficient land use in terms of the area a renewable energy project or system occupies for each unit of power it can generate.
- 4) Peak Shaving Benefit: The ability for renewable energy alternatives to offset peak non-renewable energy consumption shall be quantified.
- 5) Hedging Benefit: Renewable energy alternatives shall have their ability to contribute to or enhance price and supply certainty to LACMTA quantified relative to baseline energy use.
- 6) Local Content Use: Renewable energy applications shall utilize, where cost-effective and appropriate, equipment manufactured within Southern California.

APPLICABILITY

Once the field of possible renewable energy projects have been evaluated and compared to one other and applicable, feasible, and practicable renewable energy technologies are selected, they will be applied to capital assets and projects as follows:

- New Facilities and Transit Corridors and Projects: Selected renewable energy technologies shall be considered in all new projects from the early development, design and procurement stages, where practicable and feasible. Where applicable, feasible, and practicable, the selected project level renewable energy technology shall be combined with energy efficiency technologies.
- Existing Facilities and Capital Assets: Energy efficiency retrofits and retro-commissioning shall precede renewable energy technology applications. Renewable energy technology considerations will only commence after energy use is optimized. The LACMTA recognizes that renewable energy applications may precede energy efficiency retrofits if upfront cost and life-cycle benefits of renewable energy applications significantly outweigh those of energy efficiency retrofits.

In both cases, selected renewable energy technologies shall be compared with baseline energy supply for life-cycle benefits and costs to determine whether to proceed with the renewable energy technology for the project.

FUNDING AND COOPERATIVE OPPORTUNITIES

LACMTA shall work cooperatively with Federal, State, and local jurisdictions, Energy Services Corporations, utility companies, and other third parties to explore, develop, and engage in the innovative financing strategies to increase renewable energy investment and usage, spread cost over the life-cycle, and reflect the multiple benefits of renewable energy and energy efficiency in all LACMTA capital assets and projects. Deployment of any renewable energy technology at any capital asset or project shall be to the maximum benefit of the LACMTA.

QUANTIFICATION AND REPORTING OF RENEWABLE ENERGY USAGE AND BENEFITS

No later than 18 months after policy adoption and annually thereafter, LACMTA shall incorporate in the annual Sustainability Report the information generated from the implementation and operation of this Renewable Energy Policy including:

- 1) A description of the renewable energy projects planned or deployed;
- 2) Quantification of the resulting greenhouse gas emissions, cost savings, and revenue generated (if any) resulting from the use of renewable energy technologies and energy retrofits (in the case of existing buildings, facilities and equipment);
- 3) A description of other appropriate measures of progress;
- 4) A description of implementation challenges; and
- 5) Recommendations for any policy changes.



Metro

Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net

**EXECUTIVE MANAGEMENT COMMITTEE
SEPTEMBER 18, 2014**

**SUBJECT: FUNDING AND OPERATING SUSTAINABILITY-RELATED
INFRASTRUCTURE**

**ACTION: ADOPT METRO SUSTAINABILITY INFRASTRUCTURE
IMPLEMENTATION AND OPERATIONAL PLAN**

RECOMMENDATION

Authorize the Chief Executive Officer (CEO) to:

1. adopt and implement a long-term financial and operational plan for sustainability-related projects to maintain their optimum performance and maximize environmental benefits; and
2. use proceeds from Low Carbon Fuel Standard (LCFS) credits sales along with any cost-savings, utility allowances and incentives, and any interest earned from the investment of these funds that are generated from sustainability-related infrastructure to specifically continue the implementation, operations, and maintenance of Metro's sustainability-related infrastructure.

ISSUE

Metro's ongoing investment in its sustainability-related infrastructure continues an almost decade-long commitment to dedicating resources to further advance resource-saving assets. Since 2005, Metro has completed 37 projects, realizing nearly \$2 million in yearly cost savings from the operation of these assets.

On February 27, 2014, the Metro Board of Directors approved a motion by Director Ridley-Thomas on Sustainability-Related Infrastructure, Operations and Maintenance. This Board Report is a response to Section 2 of the Motion to: a) assess how the current sustainability-related infrastructure (including renewable energy projects, green buildings and related assets) are operated and maintained; and b) develop a long-term financial and operational plan to maintain the optimum performance of sustainability related-infrastructure which includes a plan to use the Low Carbon Fuel Standard (LCFS) credits, along with any cost-savings generated from current and future

sustainability-related infrastructure to specifically continue the implementation, operations, and maintenance of Metro's sustainability-related infrastructure; and a comprehensive implementation plan to ensure that financial, infrastructural, and operational elements of sustainability-related infrastructure are incorporated in all of Metro's activities.

The Board's continued support of our on-going sustainability-related infrastructure demonstrates its confidence in the value that these projects bring to our agency. In addition, these projects reflect Metro's continued commitment to continually reduce the agency's environmental impacts while simultaneously creating cost-effective and resource conserving value to the projects that we are building to expand our current rail and bus system.

All of our best practices are concurrently being documented through the Federal Transit Administration (FTA) initiated Environmental Management System (EMS) under a process of continual improvement. As evidenced by numerous and varied recognitions and financial support from Federal, state and local funding organizations, *Metro has evolved as a world class sustainability and environmental leader in the transit industry.*

Large-scale investments in solar photovoltaic systems dominate our current sustainability-related infrastructure. These are valuable assets that are devoid of any electricity costs and contribute toward meeting Metro's Renewable Energy Policy goals of 33% renewable energy use by 2020. A more recent focus on implementing energy efficiency, energy cost management, and implementation of other utility cost-saving protocols and processes in new and existing buildings has resulted in a more balanced and diversified portfolio of sustainability-related assets. Such a shift allows Metro to implement future cost-savings projects while meeting concurrent Environmental, Energy, Sustainability, and Renewable Energy Policy goals. In addition, staff has also recognized other opportunities in the areas of water conservation, storm water re-use, energy recovery processes, and reduction in waste generation that are being developed (and in many cases already being implemented) as future sustainability assets.

Annual Board authorized funding to implement cost-saving ideas has been the cornerstone of these innovations; and serve to continually feed new feasible construction and operationally cost-effective projects, such as those being built as part of Measure R-funded infrastructure. More importantly, as their implementation are managed through the plan-do-check-act protocol of the EMS, agency-wide barriers are broken down and projects ideally should be conceptualized and planned, constructed or installed, and operated and maintained seamlessly.

The assessment of the existing sustainability-related infrastructure at Metro (Attachment A) identified gaps in the current approach; specifically for maintaining the current asset base to ensure the realization of projected cost-savings. This therefore requires action to address different aspects of current and future sustainability investments and maintain them in a state of good repair. These gaps provide a very clear signal that continued maintenance deferment of sustainability-related infrastructure will reduce and

eventually eliminate the unique benefits that arise from investments made by our agency in these assets.

A sustainability infrastructure implementation and operational plan that details a transparent process to evaluate, implement, and maintain the portfolio of potential future sustainability project investments; and a financial plan for identifying and securing funding for these investments that mitigates the financial impact on our agency are necessary to ensure ongoing implementation and proper operation and maintenance of sustainability-related projects under a comprehensive continual improvement process in an EMS framework.

DISCUSSION

As a public transportation agency, Metro is, at its core, a sustainability asset. Specifically throughout the last ten years, Metro's longstanding commitment to improving operational efficiency and reducing the financial and environmental impact of its operations has also yielded an extensive inventory of assets that must be both maintained and kept in a state of good repair. However, along with other public transportation agencies throughout the country, Metro also faces the challenge of simultaneously addressing:

- Aging infrastructure and deferred maintenance;
- Decreasing operational budgets;
- Expanding system resource demands; and
- Increasing regulations.

Metro's environmental program and organizational sustainability initiatives have operated under an ISO 14001-certified EMS framework and benefited from a comprehensive process of evaluating and implementing value-creating and cost-saving projects. Within this framework, staff at all levels of the organization in any Metro business unit are able to collaboratively provide input for the implementation of innovative ideas that reduce overall Metro environmental impacts from its operations while simultaneously enhancing the safety of our existing and future system. In the past six years since the FTA's technical assistance to establish EMS here at Metro, staff was able to identify and address many of the long-term operational environmental and safety issues through sustainability-related capital improvements and projects. If not for these efforts, many repeatedly identified issues would not have been solved due primarily to the lack of available funding that can be programmed for the forthcoming fiscal year.

Metro's structural deficit is real and implementing cost-saving measures to create greater operational and infrastructural value will further reduce costs to operate the current and future expansion of our system. Identification of a number of resource efficiency and cost saving measures in the past few years through studies, pilots, and audits has enhanced the robustness of our sustainability efforts. We are now able to implement many of these projects initially as pilots, and once proven to be of significant benefit and feasible for agency-wide implementation are rolled out agency-wide into

existing facilities and into new major construction or part of capital improvement projects.

Metro sustainability-related infrastructure includes investments that are made in Metro's facilities, technologies, fleet, people, and processes that:

- directly contribute to the reduction in resource usage beyond an established baseline for electricity, natural gas, other non-renewable fuels, water, hazardous substances, or
- directly reduce greenhouse gas emissions (GHGs), other air emissions, wastewater, solid waste, other environmental impacts, or
- directly increase operational efficiency, staff productivity and well-being, and customer satisfaction beyond standard operations, while maintaining safety and system reliability.

Given the breadth of Metro's sustainability activities in all facets of the organization, we establish boundaries of this definition (for the purposes of the use of available future self-funding mechanisms) to include direct impacts from a capital program, like reduced energy and water usage in operations, and leave out the numerous indirect benefits associated with operating a public transit system.

Metro's list of sustainability-related assets includes, for example, the construction of energy efficient buildings, generation of approximately two megawatts of renewable energy through solar photovoltaic systems, energy recovery and materials recycling projects, water and water-reuse conservation projects (including those that recycle carwash water and store or re-use storm water), and recycling of construction and demolition debris (such as the use of recycled concrete from the I-405 demolition for use as sub-base in the Metro Orange Line Extension). These efforts have reduced energy and resource use, generated operational cost savings, created productive work spaces, and reduced the environmental impacts of Metro's construction and operations. Utility partners have also paid Metro cash incentives to buy down the cost and enhance the region's resource efficiency. Staff continues to explore new and innovative technologies to improve the agency's environmental performance and reduce costs.

Metro contributes to the sustainability of the Los Angeles region by improving air quality, reducing congestion, and providing mobility. In the past few years, the agency has fully developed existing sustainability-related infrastructure that has and continues to generate significant value and cost-savings to our overall operations. Investment in projects that actually reduce operational costs is critical and very important as Metro phases in the forthcoming operation of Measure R projects. Funding for any planned sustainability and sustainability-related projects is approved on an annual basis.

Reporting of our progress in these projects is provided through the annual Sustainability/Energy and Resource Report as well as through the Annual Energy Management Program update. Metro measures itself against metrics that have been developed through the American Public Transportation Association (APTA)

Recommended Practice process. Metro is the first and currently only Platinum Level APTA Sustainability Commitment Recognition awardee in the whole nation. This serves as testament to our excellence in environmental stewardship.

All capital projects are now also required to develop and implement a Sustainability Plan with required reporting to advise Metro of the project's adherence to Metro adopted policies. Such reporting encourages the development and implementation of innovative ideas and tasks within any size construction project; and ensures the steady progression towards the completion of these projects in the most cost-effective way.

The Office of Management and Budget manages Metro's annual capital program to successfully meet the needs of Metro's operations. Staff has conformed to these guidelines in the implementation of sustainability capital projects. Metro's EMS framework provides for a mechanism to regularly monitor and report sustainability infrastructure performance in addition to the identification and implementation of future opportunities. The recently concluded sustainability-related infrastructure assessment identified lower than expected performance from several key sustainability assets such as Metro's solar photovoltaic (PV) systems.

Sustainability-related infrastructure can and will increasingly directly affect operations in ways that may be outside standard operating procedures. New sustainability assets are likely to involve greater technology sophistication and alternative systems and processes. To maximize their benefits, there is a need to ensure that proper maintenance requirements of these assets are also instituted. Metro's solar PV systems represent a primary example of this challenge.

Solar PV systems require a specific set of maintenance procedures to operate properly. Until recently, Metro made limited provisions to provide staff with the appropriate training in this area because the cost and responsibility to do so has not been properly planned and assigned. Metro currently has installed solar PV systems at five locations, with a sixth location at Division 13. Historically, the project costs of all new solar PV systems, with the exception of the Central Maintenance Facility (CMF), only accounted for the upfront cost of construction. The project costs did not allocate funds for future operations and maintenance that falls outside of the standard operations for this new technology.

By way of comparison, the solar PV project at CMF included a Full-Time Equivalent to maintain the system. This system has never underperformed its projected electric generation targets; and is a successful model for Metro's ability to properly maintain this valuable asset.

As sustainability-related investments often bring new technologies and innovative process improvements into the Metro system, staff is proactively addressing the challenges associated with the current maintenance of solar PV systems so future sustainability infrastructure does not suffer similar challenges.

Based on the recently concluded assessment, we observed that more collaborative and detailed upfront project development can allow for proper troubleshooting of issues and execution of preventative maintenance practices. Requiring the incorporation of anticipated future costs and development of skill sets into the project life-cycle is an important first step in mitigating these challenges. Evaluation of these future costs and requirements must occur in close coordination with the division and system-level managers and staff responsible for the future asset maintenance. Metro's EMS framework provides a clear foundation from which to further improve the ongoing maintenance of these valuable assets.

The plan to fulfill this goal is provided as Attachment B. This plan further provides for the opportunity to reinvest resource cost savings in the expanding sustainability-related infrastructure across Metro's system. The plan identifies the combination of cost-savings, utility allowances and incentives, and any interest earned from the investment of these funds with the proceeds of Metro's Low Carbon Fuel Standard credit sales into the Green Fund to support both the implementation of sustainability assets and ongoing activities related to these assets. In other words, the combined funds will be restricted for use in the funding of the implementation and operations and maintenance of sustainability-related capital construction/installation projects deployed on any Metro-controlled sites.

These projects would include, but are not limited to:

- energy conservation and energy efficiency projects,
- renewable energy installation/construction and their operation and maintenance,
- resource management initiatives (e.g., water, air, storm water, industrial wastewater impact and cost-reduction; including waste to energy projects such as those derived for example from non-hazardous/non-human biowaste), and
- any other related cost-saving and process efficiency generating activities that result in carbon footprint reductions and are operated and maintained within a Metro facility.

These assets include those that can be implemented and maintained agency-wide and have already been proven through related pilot projects. These are new, innovative, cost-saving, and environmentally friendly and financially sustainable technologies that are pre-determined to be applicable to Metro's operations; but have not been fully integrated agency-wide.

Cost savings reinvestment is a new approach for Metro. This approach will establish an internal accounting process for identifying and re-allocating savings resulting from sustainability-related infrastructure projects. This accounting model for reinvesting resource savings has many different structures. However, staff proposes to implement a Return on Investment (ROI) model wherein the Green Fund accrues the cost-savings on an annual basis up until the project has reached its simple payback.

DETERMINATION OF SAFETY IMPACT

This Board action will not have an impact on safety standards for Metro. The execution of the proposed action will assist in increased safety as new and existing sustainability-related infrastructure will require an integrated operations and maintenance element to maximize use and benefit throughout the life cycle of the asset.

FINANCIAL IMPACT

The initial funding for this project are included in the FY15 budget under Project Number 450004 – Carbon Emissions and Greenhouse, Cost Center 8420 Environmental Compliance and Services, Account 50316 Professional And Technical Services. The initial funding provided under Project Number 450004 will be reimbursed once program funds, as described below, are generated and available. Since this is a multi-year project, the cost center manager and Executive Director, Engineering & Construction will be responsible for budgeting in future fiscal years.

Impact to Budget

There will be no net impact to Bus and Rail Operating Budgets. The initial source of funds for this project is the General Fund which can be used to fund Bus and Rail Operations. The quantification of the amount of savings to be allocated on an annual basis will be predetermined and approved prior to installation or construction of the sustainability-related infrastructure. The verification of the magnitude of an asset's projected savings will be monitored throughout the life-cycle of the project until such time that the asset's full value is achieved by the cost-savings.

Thereafter, the program funds can be designated as self-funded utilizing the combination of other project cost-savings in an amount up to the pre-determined and approved costs associated with implementing sustainability-related infrastructure projects, ongoing operations and maintenance cost for the life of the asset, and cost for periodic measurement and verification of the asset; utility allowances and incentives; any interest earned from the investment of these funds; and combined with the proceeds of Metro's LCFS credits sales to support both the implementation of sustainability assets and ongoing activities related to these assets.

As sustainability-related infrastructure projects are identified, criteria identified under the Sustainability Infrastructure Financial and Operations Implementation and Management Plan (Attachment B) will be used to initially identify classification of the project as a potential sustainability-related infrastructure. Thereafter, Metro's capital selection processes will be used to initiate and request utilization of the modified Green Fund for this purpose. A portion of operations and maintenance costs for existing sustainability related infrastructure installations such as green buildings, renewable energy, and energy efficiency projects can also be drawn from these funds to maintain the infrastructures in a state of good repair.

For example, the cost savings realized from the implementation of the sustainability-related infrastructure assets will be allocated to the Green Fund up to the dollar amount needed for project implementation, ongoing operation and maintenance (O&M), and other related costs. In the example below, the Funding Requirements - Sample Project section identifies the project costs, estimated ongoing O&M and measurement and verification (M&V) costs while the Funding Source section identifies potential funding sources, which adds up to the cost of the project. The total cost of the project (installation, O&M, and M&V) will equal the amount to be recovered from the cost savings. All of the cost estimates in the example below account for the time value of money in the calculation.

Funding Requirements - Sample Project	Lighting Retrofit at Division X	
Project First Costs	\$225,000	one-time
Ongoing O&M Costs	\$500	annual
M&V Costs	\$1,000	every 4 years
Expected Useful Life	20	Years
Total Life Project Cost (nominal)	\$240,000	
Funding Sources		
OMB FY16 Capital Program	\$175,000	one-time
Green Fund	\$50,000	one-time
Green Fund	\$10,000	\$500/yr x 20 yrs
Alternative Financing Mechanism	\$500	utility incentive
Total Funding Identified	\$240,000	

ALTERNATIVES CONSIDERED

If the Board chooses not to approve the sustainability infrastructure financial and operations plan and the re-investment of related cost-savings to the implementation and operations and maintenance of the sustainability-related infrastructure project, the agency will effectively continue with the status quo. That is, sustainability-related infrastructure will continually be completed to fulfill the requirements and objectives of Metro Board policies on environment and sustainability. However, full benefits of these investments will be limited given the lack of integrated and consistent process and funding to maintain and operate the infrastructure throughout its life-cycle.

Not combining cost-savings, utility allowances and incentives, and any interest earned from the investment of these funds with the proceeds of Metro's LCFS credits sales will introduce a pronounced vulnerability of a self-funding mechanism to operate and maintain sustainability-related infrastructure over asset life-cycle.

NEXT STEPS

After Board approval of this action, staff will implement the sustainability infrastructure financial and operations plan using identified current and potential resources.

ATTACHMENTS

- A. 2014 Metro Sustainability-Related Infrastructure Assessment
- B. Metro Sustainability Infrastructure Implementation and Operational Plan

Prepared by: Cris B. Liban, DEO, Environmental Compliance and Services, (213)
922-2471

Bryan Pennington

Bryan Pennington
Executive Director, Engineering & Construction

Arthur T. Leahy

Arthur T. Leahy
Chief Executive Officer

ATTACHMENT A
2014 Metro Sustainability-Related Infrastructure Assessment

2014 Metro Sustainability-Related Infrastructure Assessment

Executive Summary

The February 27, 2014 Los Angeles County Metropolitan Transportation Authority's (Metro) Board motion on Metro's "Sustainability-Related Infrastructure, Operations and Maintenance" directed staff to perform an assessment of the operation and maintenance of Metro's current sustainability-related infrastructure, and requested the development of long-term financial and operational and comprehensive implementation plans for sustainability-related infrastructure.

The comprehensive sustainability-related infrastructure at Metro consists of individual sustainability assets that Metro has installed and implemented to meet environmental, energy, and sustainability goals and objectives. For the purpose of this assessment report, and for future Metro planning, implementation, and ongoing operations and maintenance procedures, the term **sustainability-related assets** are defined as follows:

Investments made in facilities, technologies, fleet, people, and processes that:

- 1) *directly contribute to the reduction in resource usage beyond an established baseline for: electricity, natural gas, other non-renewable fuels, water, hazardous substances, or*
- 2) *directly reduce greenhouse gas emissions (GHGs), other air emissions, wastewater, solid waste, other environmental impacts, or*
- 3) *directly increase operational efficiency, staff productivity and well-being, and customer satisfaction beyond standard operations, while maintaining safety and system reliability.*

The term **sustainability-related assets** is intended to include only those investments made or actions taken by Metro to meet internal operational and policy objectives and goals and where Metro operates and oversees the maintenance of the asset over its useful life.

Assessment of sustainability-related assets, as defined above, will occur within the context of Metro's agency-wide mission, vision, and Environmental Policy to operate an efficient transit system by reducing, re-using and recycling all internal resources while reducing greenhouse gas emissions.¹

This sustainability-related infrastructure assessment of existing and under-construction projects intends to support future activities and decision-making related to internal investments in sustainability-related assets. Metro recognizes that external

¹ <http://www.metro.net/about/agency/mission/>

sustainability objectives and projects, such as those addressed under the Countywide Sustainability Planning Policy, are vitally important in the development of a strategic sustainability program. Ongoing coordination between the Environmental Compliances and Services Department (ECSD) and Countywide Planning will continue to take place in support of those goals.

The foundation of Metro's sustainability commitment began with the Board's adoption of the 2007 Energy and Sustainability Policy. In 2008, the Board adopted the Metro Sustainability Implementation Plan to further prioritize project planning and funding. In the years since, Metro has adopted several more policies, plans, and initiatives that support investments in new sustainability infrastructure. These guiding documents lay the framework for strategic sustainability planning and investment across Metro. The management framework for the implementation of Metro's Environmental Policies is structured according to ISO 14001 Environmental Management System (EMS) standards. This assessment has incorporated the resulting projects from each guiding document wherever feasible. Key sustainability guiding documents for Metro include:

- Construction and Demolition Debris Recycling and Reuse Policy
- Energy and Sustainability Policy
- Renewable Energy Policy
- Environmental Policy
- Environmental Liabilities Assessment and Reporting
- Green Construction Policy
- Water Use and Conservation Policy
- Countywide Sustainability Planning Policy.

This report builds upon the foundation laid through the adoption of these policies and plans. In response to the requirements of the February 27, 2014 Board motion, this report includes the following components:

- Inventory of Metro's current sustainability assets
- Assessment of current asset operations and maintenance
- Calculated project level cost benefit analysis from current sustainability assets
- List of potential future sustainability-related projects.

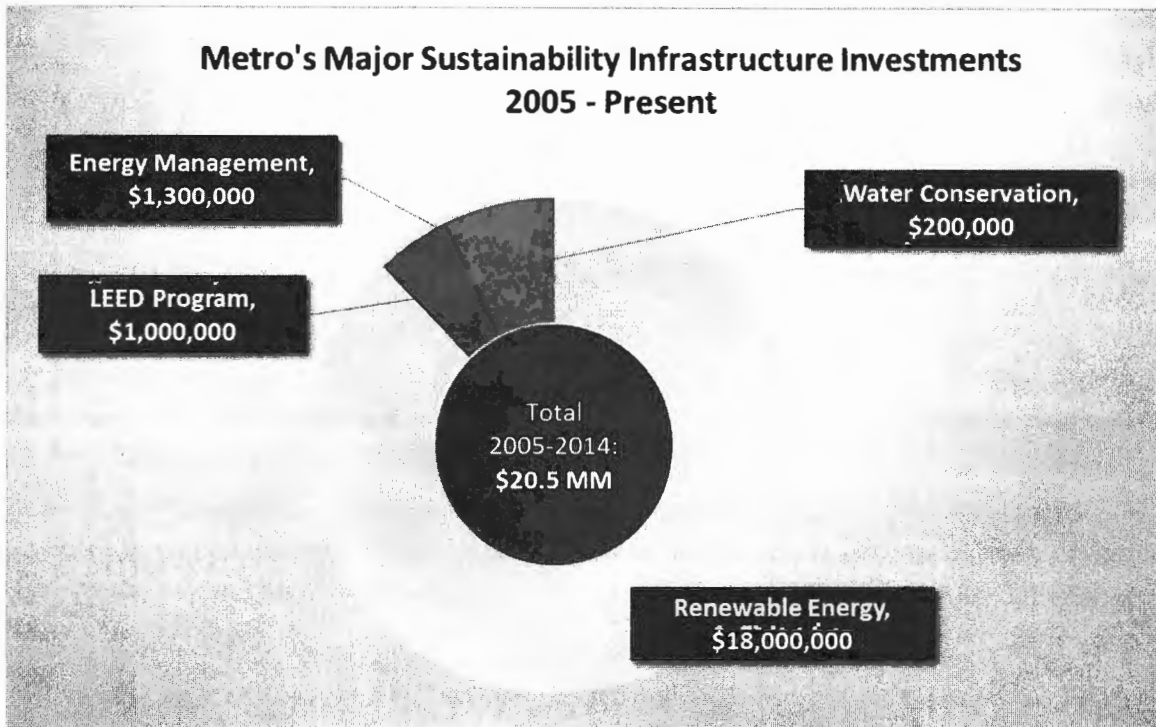
Attachment B: Sustainability Infrastructure Implementation and Operational Plan, describes the structure and process for future planning, development, implementation, and maintenance of sustainability assets, and details a long-term financial management approach for current and future sustainability-related assets.

Summary of Findings

This 2014 assessment report on Metro's sustainability-related infrastructure examined four major program areas managed through the ECSD and in conjunction Metro's agency-wide EMS. These include:

- **Renewable Energy Program** – Includes projects that contribute to meeting Metro’s Renewable Energy Policy Goals and includes the planning, deployment and management of renewable energy technologies. Renewable energy technologies reduce Metro’s electricity purchasing costs.
- **Energy Management Program** – Includes projects that contribute toward meeting Metro’s Energy and Sustainability Policy goals. This program area targets projects that reduce the cost and consumption of fuel and power required to carry out core Metro operations.
- **Leadership in Energy and Environmental Design (LEED™) Program** – Includes projects that contribute to meeting the Energy and Sustainability Policy requirement to achieve U.S. Green Building Council’s LEED Silver Certification or better for Metro facilities. Projects implemented in this program area are designed to achieve LEED Certification for existing and new facilities. LEED Certified Green Buildings operate efficiently and can result in both energy and water usage reduction with resultant cost savings.
- **Water Conservation Program** – Includes projects that contribute toward meeting Metro’s Water Use and Conservation Policy. These projects support the implementation of the Water Action Plan and other projects intended to reduce water use resulting in lower water costs.

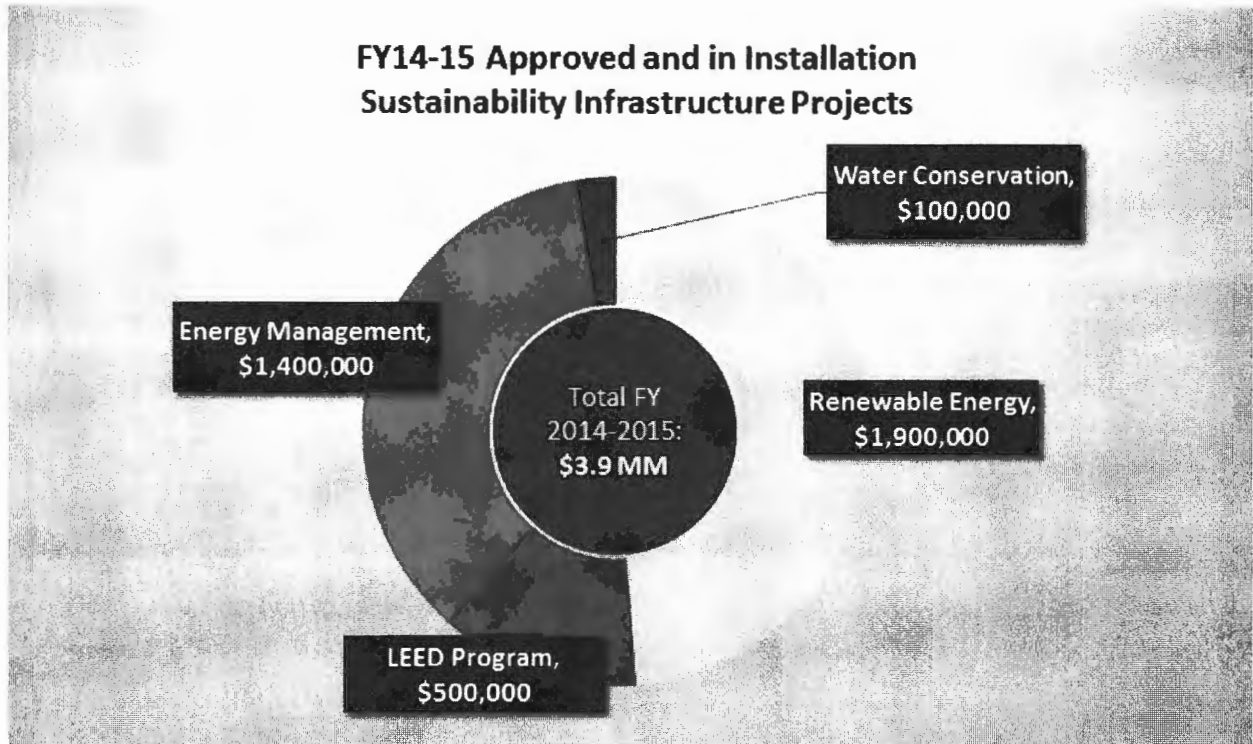
Within each of these programs, Metro has made targeted and strategic investments in sustainability-related assets (projects) that collectively represent the current sustainability-related infrastructure. Metro’s investments in sustainability-related assets predates formal adoption of Environmental Policies and shows the long term interest and commitment of executive leadership and staff to develop a sustainable transit system. Since the first solar PV system installation in 2005, investments in these four program areas have increased to meet Metro’s sustainability policy objectives, while at the same time providing long-term financial returns. ES Figure 1 shows the over \$20 million in major sustainability investments Metro has made since 2005 by program area. Metro’s utility partners have supported the adoption of renewable energy and energy efficiency by offering incentives to buy down the cost of the projects. The projects below received a total of \$6.5 million (about 33% of original capital costs) in utility incentive funding lowering the net costs to \$13.5 million.



ES Figure 1: Metro's Major Sustainability Infrastructure Investments Since 2005

Historically, the costs of the Renewable Energy Program's solar PV systems far exceeded the expenditures in other program areas. In the current fiscal year, the planned expenditures by program area are more diversified across program areas indicating a shift toward cost saving projects such as energy efficiency.

As of August 2014, an additional \$3.9 million of sustainability-related projects are under construction or approved as shown by program area in ES Figure 2. The largest investments within the approved and under construction portfolio are in energy efficiency projects which yield immediate resource cost savings and the installation of a solar PV system at Division 13 which yields avoided electricity purchases. Metro has reserved over \$450,000 of utility incentives for the in-progress projects in ES Figure 2. These incentives decrease the total project implementation costs by nearly 12% to just under \$3.5 million.



ES Figure 2: FY14 - 15 Approved and in Installation Sustainability Infrastructure Projects

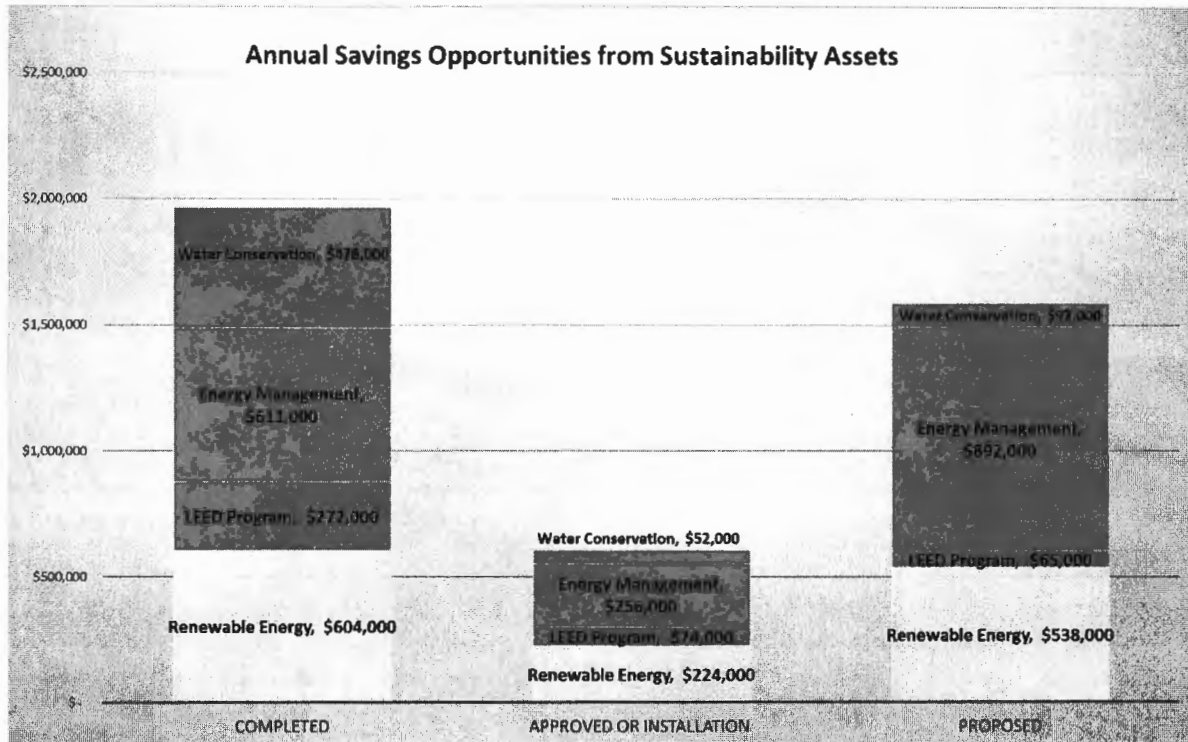
Metro has a robust pipeline of potential future sustainability projects with over \$18 million of proposed projects. The projects are awaiting evaluation, approval and funding and are shown by program area in ES Figure 3. Metro has identified external grants and utility incentives to directly reduce the implementation costs of these resource-saving projects and minimize budget impacts across Metro operations. Metro's utility service providers have already authorized nearly \$7 million of incentives to support the installation of all proposed projects. In addition, ECSD staff is actively pursuing alternative financing mechanisms to avoid capital expenditures by Metro and take advantage of public-private partnerships.



ES Figure 3: FY15 Proposed Sustainability Infrastructure Projects by Program Area

Many of the investments in sustainability assets provide direct costs savings to Metro through the reduced use of energy and water resources, which Metro would otherwise pay for in utility bills. Additionally, once installed, some assets can directly reduce air pollution and greenhouse gas emissions that may fall under tighter State and Regional regulation compliance requirements in the future. LEED Certification of Metro facilities contributes to cost savings through automation of data collection, reducing administrative burdens and enhancing the operability of HVAC systems through Retro-Commissioning processes. Many other benefits such as increased recycling, increasing supply of fresh outdoor air and natural daylighting all produce healthy and more productive work environments.

Metro realizes approximately \$2 million in current annual cost savings from existing sustainability-related assets. ES Figure 4 shows these savings by program area. The savings estimates from approved and current installation projects bring the annual savings estimates to \$2.6 million. Metro has identified an additional annual resource cost savings opportunity of \$1.6 million from the currently proposed projects.



ES Figure 4: Metro's Annual Cost Savings from Sustainability Assets

With a growing and well-maintained sustainability-related infrastructure, the annual aggregate cost savings directly reduces the impact of the upfront investments in future sustainability-related assets. Consideration of green attributes and progress towards meeting sustainability policy objectives further augments the value of these real and measureable cost efficiencies. As the sustainability-related infrastructure is not static, the savings estimates can vary with the varied expected useful life of assets within the portfolio. Maintaining and managing these resources is critical to capturing the long-term savings opportunities from these investments.

By their very nature, sustainability-related assets tend to include technology-based and innovative approaches, which can differ from standard operating procedures. As part of this comprehensive assessment of Metro's sustainability-related infrastructure, staff evaluated the current process of funding, management, and training required to maintain sustainability assets in a state of good repair. The analysis identified key opportunities to update the current processes, such as staff training and a preventative maintenance program that will result in the appropriate resources and skills development for the successful management of current and new sustainability assets. The recent rollout of Metro's EMS with a defined process of continual improvement will provide the foundation on which to build a successful management and oversight approach to ongoing operation and maintenance of these assets. The EMS framework brings together relevant stakeholders to execute the new process and provide oversight into the future.

Attachment B: Metro Sustainability Infrastructure Implementation and Operational Plan, includes a transparent sustainability infrastructure investment plan and an operations

process to effectively manage these unique resources in order to allow Metro to realize their long-term cost and resource savings benefits.

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Introduction

In response to Sections 2a and 2b of Metro Board Motion 57, carried by the Board on February 27, 2014, this report provides an assessment of the sustainability-related infrastructure currently installed and under-construction at Metro. The Board approved Item 48 in May 2014 and represents the formal response to Sections 1a and 1b of Board Motion 57. This document (as well as that of Attachment B) provides the requested additional insight into the maintenance and operations of the existing sustainability-related assets at Metro and to establish implementation and operational plans for investing and managing future sustainability assets.

This document outlines the results of an evaluation that complements the annual agency-wide review of sustainability metrics “Moving Towards Sustainability”. It is intended to evaluate the specific infrastructure investment in projects that result in the creation of “sustainability-related assets” rather than the system aggregate sustainability performance.²

Given the inherent inclusiveness of the term sustainability, it is important to identify what infrastructure at Metro would qualify as a sustainability-related asset versus a non-sustainability-related asset (e.g., code compliance vs high efficiency). In order to make this determination, and to distinguish scope of this assessment, the term **sustainability-related asset** is defined as follows:

Investments made in facilities, technologies, fleet, people, and processes that:

- 1) directly contribute to the reduction in resource usage beyond an established baseline for: electricity, natural gas, other non-renewable fuels, water, hazardous substances, or*
- 2) directly reduce greenhouse gas emissions (GHGs), other air emissions, wastewater, solid waste, other environmental impacts, or*
- 3) directly increase operational efficiency, staff productivity and well-being, and customer satisfaction beyond standard operations, while maintaining safety and system reliability.*

With this definition, the individual sustainability-related asset investments that have been approved and implemented within existing Metro operations to meet Metro’s environmental, energy and sustainability goals and objectives, collectively comprise Metro’s comprehensive sustainability-related infrastructure.

Building a Sustainable Infrastructure at Metro

As a public transportation agency, Metro, is, at its core, a sustainability asset. However, Metro’s longstanding commitment to improving operational efficiency and reducing the

² http://media.metro.net/projects_studies/sustainability/images/Sustainability_Report_2013.pdf

impact of its operations on the environment has already yielded an extensive infrastructure of assets that reduce costs and increase environmental performance.

Along with public transportation agencies throughout the country, Metro faces the challenge of simultaneously addressing:

- Aging infrastructure and deferred maintenance;
- Decreasing operational budgets;
- Expanding system resource demands; and
- Increasing regulations.

In 2010, U.S. transit agencies spent \$16.6 billion on capital investments, of which Federal funding represented only 26.6 percent, with a one-time Federal American Recovery and Reinvestment Act making up another 14.5 percent of the total.³ As a result, passenger fares and other State and local sources must cover nearly 60 percent of the funding for system preservation and expansion capital projects.⁴ Investment in sustainability-related assets offers one potential avenue to achieve both improved performance and significant cost savings over the life of the asset. *However, this only occurs when these assets receive proper maintenance and operate in a state of good repair, ensuring that the investment will reap the full lifecycle benefits.*

This report provides a comprehensive inventory and assessment of Metro's sustainability-related infrastructure. The results will serve as a baseline from which to enhance existing processes, or establish new processes to maintain and effectively manage these valuable resources going forward. To this end, Attachment B: Sustainability Infrastructure Implementation and Operational Plan contains a process and funding mechanism to support the ongoing development and management of Metro's Sustainability Program assets.

This assessment is limited to an internal examination of those investments made under the direct influence or management of Metro's resources. These assets largely resulted from investment decisions aimed at achieving internal sustainability, energy, and environmental policy objectives. At this time, this assessment does not extend to the large scale expansion of the Metro system, Metro Countywide Planning Policy Implementation activities, or wider collaborative efforts that Metro has made with community and partner stakeholders; nor to projects funded by Metro but have not been operated by the agency.

Metro's Road to Sustainability

The current sustainability initiatives at Metro are a result of years of efforts, which primarily stem from two parts of the agency: the Environmental Compliance and Services Department (ECSD) and the Countywide Sustainability Planning (CSP). With

³ <http://www.fhwa.dot.gov/policy/2013cpr/es.htm>

⁴ <http://www.fhwa.dot.gov/policy/2013cpr/es.htm>

complementary approaches, both ECSD and CSP are working to achieve Metro's Vision and Mission for Sustainability, adopted in 2008⁵:

Vision: *We will be the leader in maximizing sustainability efforts and its benefits to Los Angeles County's people, finances, and environment.*

Mission: *We will provide leadership in sustainability within the Los Angeles region without compromising our core mission of moving people efficiency and effectively.*

As Figure 1 illustrates, CSP focuses on the long-range sustainability planning and the necessary external community engagement to achieve large scale and longer term goals. ECSD focuses on the development of sustainability opportunities within Metro's day-to-day operations. ECSD's efforts in evaluating and either directly implementing, or facilitating the implementation of sustainability investments, occur in accordance with multiple core department responsibilities, which include:

- Resource management (air quality, water, energy and waste)
- Climate response (mitigation, adaptation, and resiliency)
- Environmental management (Environmental Management System (EMS), green building, training, storm water and industrial wastewater, and site remediation)



Figure 1: Metro's Sustainability Program Components

Metro's existing sustainability infrastructure was constructed through the work and management of the Engineering & Construction Division. The development of future assets and their ongoing management are now being fully integrated into the EMS framework and includes input and feedback from across the organization.

⁵ Metro Sustainability Implementation Plan, June 17, 2008
http://media.metro.net/about_us/sustainability/images/Sustainability.pdf

Since 2010, Metro has been comprehensively assessing its overall path to sustainability in the annual *Moving Towards Sustainability* and *Energy and Resource Report*, and uses APTA recommended metrics to monitor performance year-over-year.

This 2014 sustainability asset assessment report builds on this effort by providing a targeted analysis into the specific investments made toward meeting Metro's sustainability objectives for those projects that qualify as sustainability assets. The goals of this assessment are to:

- 1) Compile a comprehensive inventory of existing sustainability assets,
- 2) Evaluate the current approach to managing the operation and maintenance of current assets, and
- 3) Present opportunities for expanding Metro's existing sustainability infrastructure.

The result of this assessment informed the development of Attachment B: Sustainability Infrastructure Implementation and Operational Plan, which aims to improve visibility, funding management, and ongoing management of future implementation efforts.

The Sustainability-Related Asset

This assessment is a detailed review of the operating status and the existing processes for maintaining sustainability related infrastructure. Going forward, ECSD is recommending an annual review of sustainability-related assets, as detailed in Attachment B: Metro Sustainability Infrastructure Implementation and Operational Plan.

A Metro sustainability-related asset is defined for this assessment to allow for a clear determination of which investments qualify for inclusion in this assessment, and which investments are part of standard Metro operations. Given the breadth of potential sustainability activities, it is useful to establish boundaries that only include "direct" impacts, such as reduced energy and water usage in operations, and leave out the numerous indirect benefits associated with operating a public transit system.

There are several different types of assets that can fall under the above definition.

Table 1 provides the definitions for the three asset types in this assessment that categorize Metro's investments. Distinguishing between these definitions recognizes that there is considerable variety in sustainability-related asset types. No single solution or approach will, on its own, work for implementing and maintaining future assets. Categorizing asset types in this way affords a better understanding of how sustainability-related investments are improving the existing Metro facility infrastructure and processes.

Table 1: Asset Type Definition

Asset Type	Definition	Example
<i>New Asset</i>	Equipment added to a Metro facility or a new process that was not there previously	Solar PV system, reclaimed water system connection, wayside energy storage system
<i>Process Improvement</i>	Project that improves efficiency/sustainability of an existing process. Can be asset-based or administrative. May change the O&M requirements for existing process.	Air dryer redesign, Domestic Hot Water energy recovery, Heating Ventilation and Air Conditioning (HVAC) redesign, water reclamation
<i>Existing Asset Replacement</i>	Project that replaces existing equipment with a more sustainable option	Boiler replacement, HVAC replacement, lighting retrofit

Historically, investments in the Renewable Energy Program area have resulted in new assets for Metro, whereas the Water Conservation and Energy Management Programs have typically led to process improvements resulting resource cost savings. Replacement projects, while not considered new assets for Metro, upgrade the current infrastructure with an asset that operates more efficiently to reduce resource usage.

Current Sustainability-Related Infrastructure

This section provides results for the assessment of current sustainability infrastructure including assets installed or under construction, and follows this order:

- Overview of Metro’s major sustainability assets that make up the current infrastructure
- Description of the current asset management approach
- Estimation of the cost and resource savings attributable to these assets .

Figure 2 shows the four major program areas that ECSD is managing to support the development of Metro’s sustainability infrastructure.

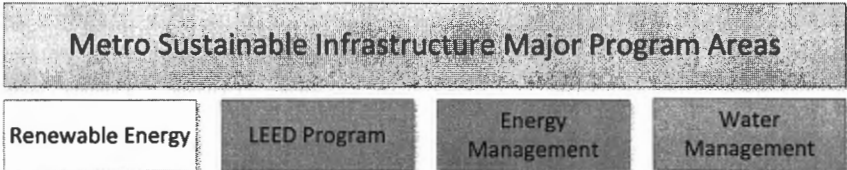


Figure 2: Sustainable Infrastructure Program Areas

Metro’s investments in each of these program areas support existing policy goals and objectives as follows:

Table 2: Metro Sustainability Program Areas

Renewable Energy	Currently consists of only solar photovoltaic systems, but would include any future wind or other renewable energy investments. This program area supports Metro’s Renewable Energy Policy goals.
LEED Program	Includes all investments made to achieve certification of Metro facilities under the U.S. Green Building Council’s LEED green building program. This program area supports Metro’s Energy and Sustainability Policy goals.
Energy Management	Includes energy efficiency and conservation measures and process improvement projects to reduce energy use at Metro facilities. This program area represents Metro’s implementation of the Energy Conservation and Management Plan and supports the Energy and Sustainability Policy goals.
Water Conservation	Includes all investments made to reduce and recycle water used in operations. This program area supports Metro’s Water Use and Conservation Board policy goals.

Since the first solar PV system installation in 2005, Metro has invested over \$20 million in additional sustainability-related projects. The investments in solar panels, facilities upgrades, green building certifications, and water conservation collectively make up the existing sustainability infrastructure at Metro. Figure 3 shows the breakdown of major

investments in sustainability assets since 2005 by program area. With an early focus on solar PV, the large solar investments dwarfed the other program area investments, representing nearly 90 percent of expenditures to date. Metro expects that future expenditures and associated resource cost savings for the sustainability-related infrastructure will achieve more balance across the program areas.

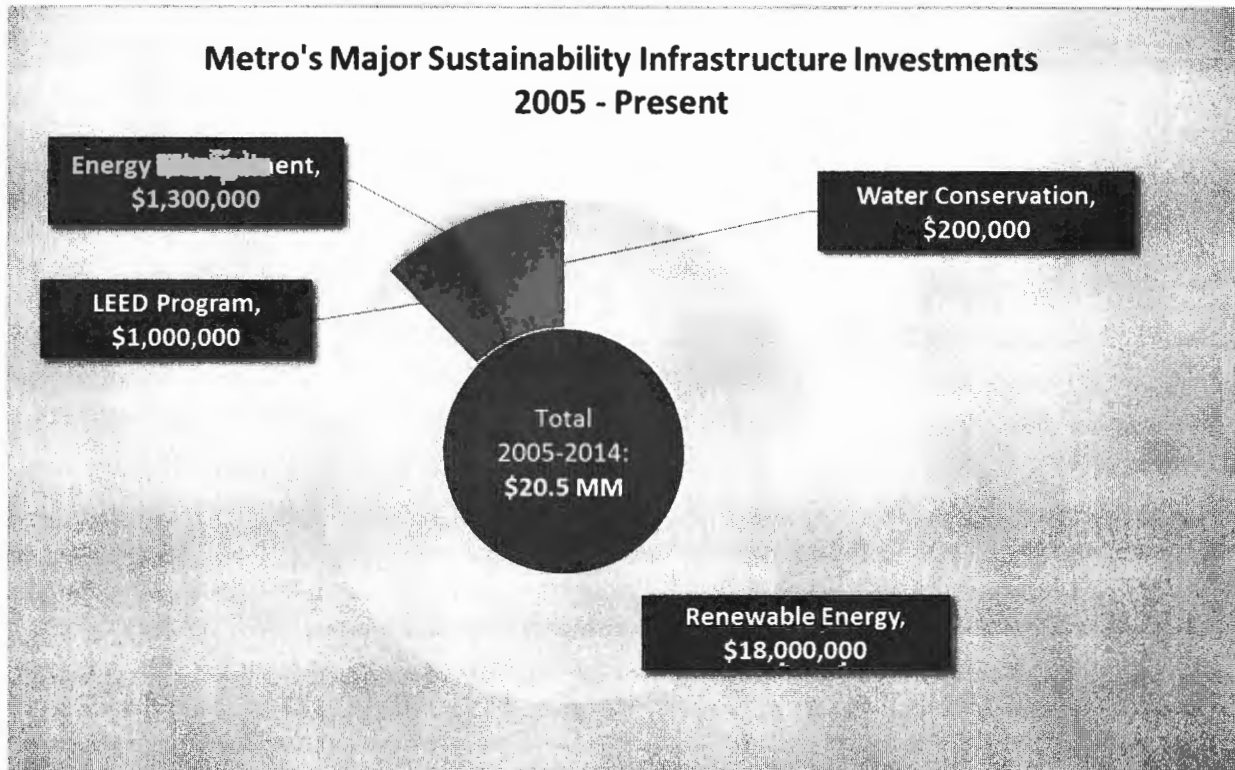


Figure 3: Metro's Major Sustainability Infrastructure Investments Since 2005

Current Sustainability-Related Asset Inventory

Table 3 through Table 6 list Metro's current sustainability-related infrastructure assets by program area. Current sustainability-related assets are those investment projects that are either in the installation phase or completed and operational. Projects listed as "approved" have been funded and approved but have not begun installation. Any projects still in the proposed or design phase are listed as potential future sustainability-related assets.

Table 3: Renewable Energy Assets Completed, Under Construction and Planned

Renewable Energy Assets		
Project Name	Location	Status
Solar PV Project	Division 08	Completed
Solar PV Project	Division 15	Completed
Solar PV Project	Division 18	Completed
Solar PV Project	Location 30	Completed

Renewable Energy Assets (continued)		
Project Name	Location	Status
Solar PV Project	Terminal 19	Completed
Solar PV Project	Division 13	Installation
Wayside Energy Storage	Gold Line	Installation
Wayside Energy Storage	Red Line	Installation

Investments in solar photovoltaics (PV) come at a high price, but provide directly attributable and measureable avoided costs and provide long-term value to Metro. As energy prices increase the yearly benefits increase and provide a strategy for hedging price volatility. Additionally, solar PV is a major infrastructure asset that can receive support from a variety of finance mechanisms, including direct ownership and power-purchase agreements, which have the potential to result in resource cost saving benefits while minimizing the impact Metro's capital budgets. The systems currently in place or under construction represent an important and highly visible opportunity for Metro to meet its sustainability objectives. Collectively, the installed systems are contributing \$604,000 in yearly cost savings. The ECSD team is actively evaluating future opportunities to incorporate more advanced systems to expand solar PV as a mechanism for achieving the Renewable Energy Policy goals within Metro's operations.

Table 4: LEED Program Assets Completed, Under Construction and Planned

LEED Program Assets		
Project Name	Location	Status
LEED-New Construction (NC) Certification – Maintenance Annex	Division 03	Completed
LEED-NC Certification – Maintenance Building Renovation	Division 03	Completed
Sub-metering system	Division 07	Completed
Sub-metering system	Division 08	Completed
Sub-metering system	Division 09	Completed
LEED-NC Certification – Transportation Building	Division 09	Completed
LEED-Existing Building Operation & Maintenance (EBOM) Certification – Division-wide	Division 10	Completed
Sub-metering system	Division 10	Completed
Sub-metering system	Division 15	Completed
Sub-metering system	Division 20	Completed
LEED-NC Certification – Bauchet St. Warehouse	Division 30	Completed
Sub-metering system	Division 30	Completed
Sub-metering system	Location 61	Completed
Sub-metering system	Location 99	Completed
LEED-EBOM Certification – Gateway Building	Location 99	Completed

LEED Program Assets (continued)		
Project Name	Location	Status
LEED-NC Certification – El Monte Terminal	Terminal 19	Completed
LEED-EBOM Certification – Division-wide	Division 07	Installation
Sub-metering system	Division 21	Installation
LEED-EBOM Certification – Division-wide	Division 30	Installation
LEED - EAc3.2 – HVAC System Retro-Commissioning	Division 30	Installation
LEED-NC – Maintenance Building	Expo Maintenance	Installation

Metro’s Energy and Sustainability Policy established the goal to pursue LEED certification in all new construction projects larger than 10,000 square feet. This commitment to green building practices is also facilitating LEED Certification at existing maintenance facilities. The assets produced from these efforts include the acquired certification of the green building or division, installed sub-metering systems, and projects carried out as required for certification such as improvements to HVAC systems through retro-commissioning and low or no-cost energy process improvements.

Typically, LEED Certified Green Buildings contribute cost savings to Metro as result of process improvement implementation. Process improvements may include improved visibility into resource usage through sub-metering system installation, low flow water fixture installations and implementing HVAC system retro-commissioning to optimize their operation and controls. To date, completed projects within the LEED Program contribute \$272,000 in total operational cost savings annually. Additionally, many of the benefits and drivers of the LEED Program are non-financial such as the testing and improvement of outdoor air delivery, increasing recycling rates, use of green cleaning chemicals and improved pest management and irrigation practices. Each contribute to certifying the building as a nationally recognized green building and providing a healthy, productive and efficiently operating working spaces for Metro’s biggest asset, its employees.

The LEED Program supports an ongoing effort to comply with Metro’s Energy and Sustainability Policies, and will remain part of an established ongoing plan to expand Metro’s green building infrastructure.

Table 5: Energy Management Program Assets Completed, Under Construction and Planned

Energy Management Program Assets		
Project Name	Location	Status
High Bay Lighting Retrofit	Division 09	Completed
Tire Shop LED Lighting Upgrades	Division 10	Completed
Bus Wash Air Dryer Process Improvement	Division 10	Completed
Maintenance Building Lighting Upgrades	Division 15	Completed
Maintenance Building T5 Retrofits	Division 18	Completed
Shop Lighting Upgrades	Division 20	Completed
Lighting Retrofits	Location 30	Completed
Compressed Air	Location 30	Completed
Package Unit	Location 30	Completed
Building Management System	Location 30	Completed
Cooling Tower Replacement	Location 99	Completed
3rd Floor LED Lighting Upgrades	Location 99	Completed
Boiler Replacement	Location 99	Completed
RCx Chilled Water Reset	Location 99	Completed
TOU 8 Tariff switch	Division 09	Completed
Interior & Exterior Lighting Upgrades	Division 02	Installation
Interior and Exterior Lighting Upgrades	Division 05	Installation
LED Fixtures & Daylight sensors	Division 07	Installation
HVAC RCx	Division 07	Installation
T8 and LED Retrofits	Division 11	Installation
High Bay Lighting Retrofit	Division 22	Installation
Wireless Lighting Control System	Division 22	Installation
Blue Line 5th Street Station Lighting Retrofit	Blue Line Stations	Installation
Blue Line 1st Street Station Lighting Retrofit	Blue Line Stations	Installation
Blue Line Downtown Long Beach Station Lighting Retrofit	Blue Line Stations	Installation
Blue Line Pacific Av Station Lighting Retrofit	Blue Line Stations	Installation
Blue Line Anaheim Station Lighting Retrofit	Blue Line Stations	Installation
Blue Line Willow Street Station Lighting Retrofit	Blue Line Stations	Installation
Phase II - Full Site Lighting Retrofit	Division 07	Approved
Domestic Hot Water Energy Recovery	Location 99	Approved

The Energy Management Program activities have significantly increased as a result of the implementation of the 2011 Energy Conservation and Management Plan. ECSD has implemented a robust facility audit effort to proactively identify sustainability projects using the EMS framework. Lighting projects represent an immediate opportunity to achieve resource savings, and will continue to do so into the future. However, comprehensive energy efficiency is needed to pull out all opportunities and maximize energy savings and overall energy performance. The volume of potential energy management projects included in this assessment is a direct result of the focused effort on one of the most cost-effective sustainability infrastructure opportunities available to Metro. Installed energy efficiency project savings are already outpacing renewable energy investments with \$611,000 in yearly energy savings, with multiple projects being completed each year.

Table 6: Water Conservation Assets Completed, Under Construction and Planned

Water Conservation Assets		
Project Name	Location	Status
Steam Rack - Water Recycling	Division 09	Completed
Reclaimed Water Project	Division 03	Installation
Div 13 - Water Cistern	Division 13	Installation
Reclaimed Water Project	Orange Line	Installation
Linear Kinetic Cell Project	Division 03	Approved
Linear Kinetic Cell Project	Division 05	Approved
Linear Kinetic Cell Project	Division 08	Approved
Steam Rack Water Recycling	Division 18	Approved

The current water conservation assets represent investments in projects not already included in the other Program activities. In addition to the projects listed in Table 6, Metro has installed low-flow water conservation devices, which were driven and therefore accounted for in LEED Program metrics. Metro anticipates that this program will present the largest growth in opportunities for future sustainability projects, as the agency has not yet addressed the low-hanging fruit for water conservation projects. The annual cost savings Metro currently realizes from completed projects in the four program areas is \$2 million, as Figure 4 shows.



Figure 4: Annual Cost Savings from Current Sustainability-Related Infrastructure

Current Approach to Managing Sustainability Assets

The Office of Management and Budget manages Metro's annual capital program to successfully meet the needs of Metro's capital program and operations. Sustainability-related capital projects have been following this same process, which has led to many successful implementations. Metro's EMS framework provides for oversight to regularly monitor and report sustainability-related infrastructure performance in addition to the identification and implementation of future opportunities. Annual reporting of progress through the EMS framework identified lower than expected performance from several key sustainability assets such as Metro's solar PV systems. This section provides an assessment for how the current sustainability-related infrastructure is operated and maintained.

Metro identifies and implements capital projects to meet day-to-day operational needs. Typical projects may include division expansion, process equipment replacement, or new equipment installation or rotation (e.g., buses). In these cases, the operational state of the installed equipment directly impacts staff's ability to perform the core functions of the organization. Consequently, staff is able to quickly identify, prioritize, and address equipment and maintenance issues. Metro has a well-established process to plan and budget for maintenance support.

Sustainability assets can and will increasingly directly affects operations in ways that may be outside standard operating procedures. New sustainability assets are likely to involve greater technology sophistication and alternative systems and processes.

When this occurs, staff often does not have the budget, training, available time or necessary oversight to effectively address the maintenance requirements of assets outside of standard operations. Metro's solar PV systems represent a primary example of this challenge.

Solar PV systems require a specific set of maintenance procedures to operate properly. Until recently, Metro made limited provisions to provide staff with the appropriate training in this area because the cost and responsibility was have been properly planned and assigned. Metro currently has installed solar PV systems at five locations. Historically, the project costs of all new solar PV systems, with the exception of the Central Maintenance Facility (CMF), only accounted for the upfront cost of construction. The project costs did not allocate funds for future operations and maintenance that falls outside of the standard operations for this new technology. The facilities maintenance resources now responsible for solar PV system operations and maintenance (for most Metro systems) are already over-burdened and must prioritize those projects that support day-to-day operations rather than those that reduce energy and operational costs. In these cases, this assessment marked a decrease in the performance of these installed solar PV systems. The investment of these assets were based on realizing their full cost reducing potential, which are now in jeopardy.

By way of comparison, the solar PV project at CMF included a Full-Time Equivalent to maintain the system. This system has never underperformed its projected electric generation targets and is a successful model for Metro's ability to properly maintain this valuable asset.

As sustainability investments often bring new technologies and innovative process improvements into the Metro system, staff is proactively addressing the challenges associated with the current maintenance of solar PV systems so future sustainability infrastructure does not suffer similar shortfalls.

Based on this assessment, we observed that more collaborative and detailed upfront project development can allow for proper troubleshooting of issues and execution of preventative maintenance practices. Requiring the incorporation of anticipated future costs and development of skill sets into the project lifecycle is an important first step in mitigating these challenges. Evaluation of these future costs and requirements must occur in close coordination with the division-level managers and staff responsible for the future asset maintenance. Metro's EMS framework provides a clear foundation from which to further improve the ongoing maintenance of these valuable assets.

Standardized sustainability project development, implementation, and ongoing oversight through process changes or centralization can provide a clear path towards maintaining a state of good repair for the life of installed equipment. Attachment B: Sustainability Infrastructure Implementation and Operational Plan outlines a step by step implementation process that meets the desire for a long term operational plan for incorporating these recommendations into the current development and ongoing management of future sustainability assets.

Sustainability-Related Asset Cost Savings Estimates

This assessment reports the resource cost savings based on measured savings whenever possible, and includes an estimated cost savings for other assets. Going forward and as described in Attachment B: Sustainability Infrastructure Implementation and Operational Plan, specific measurement and verification (M&V) protocols are recommended for different types of sustainability investments that will allow Metro to regularly track and report on performance of these assets.

Figure 5 shows the overall cost savings on an annual basis for Metro's four major program areas. Annually, the completed assets yield nearly \$2 million in resource cost savings. With the addition of the FY 14-15 approved projects and those currently in the installation phase, the aggregate annual savings resulting from these projects increases to nearly \$2.6 million.

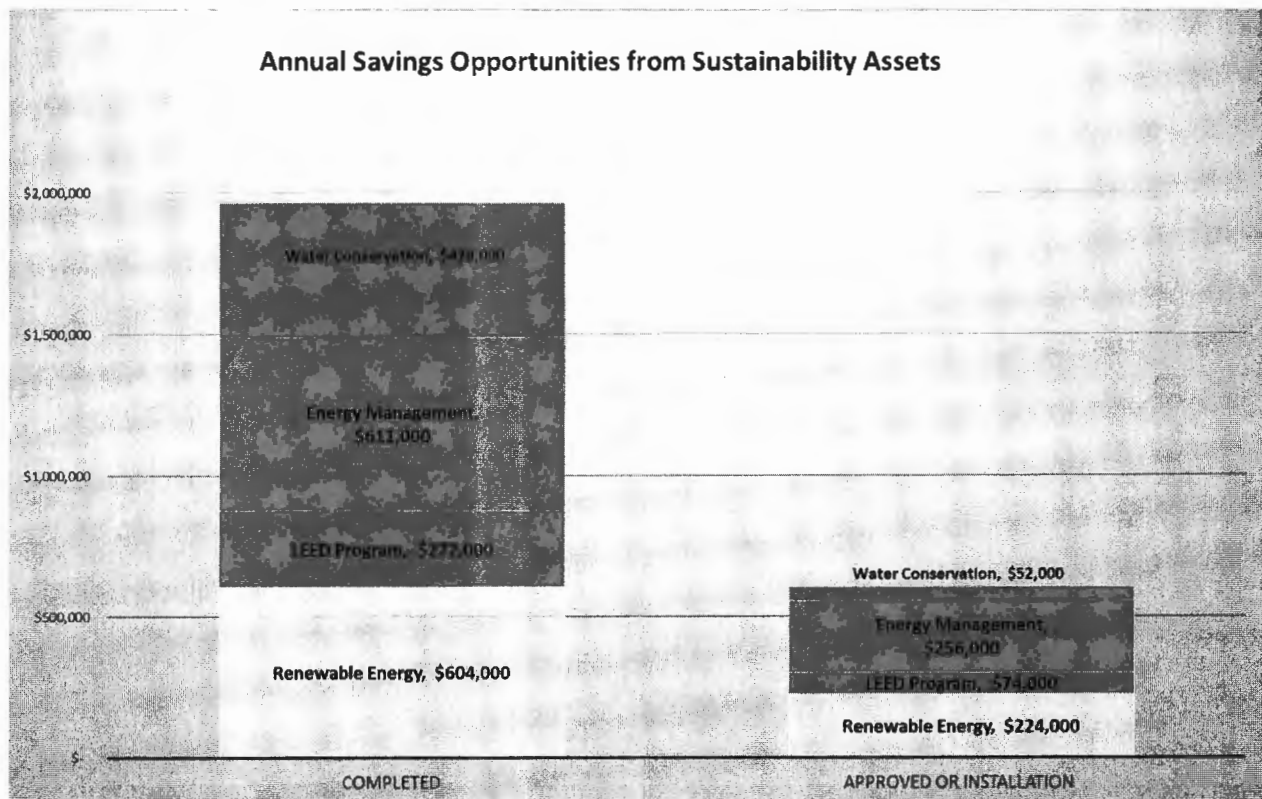


Figure 5: Annual Resource Cost Savings from Metro's Existing Sustainability-Related Infrastructure

Beyond the annual resource cost savings allocated to the various Metro sustainability-related asset investments, these projects secured \$7 million in incentives. Figure 6 and Figure 7 show the incentives secured for all projects that are designated approved, installation or completed. Incentives help reduce future infrastructure investments capital expenditures while still providing attractive annual resource cost savings. Metro will continue to receive utility incentives as revenue to the organization and incorporate these net costs into annual reporting and proposed project metrics.

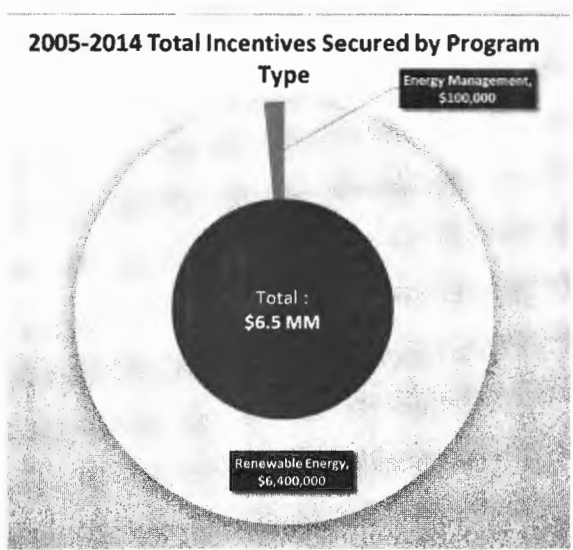


Figure 6: Incentives Received or Reserved for Projects from 2005-2014

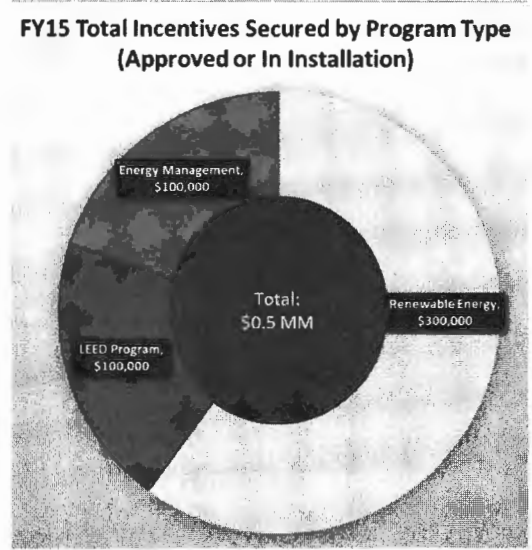


Figure 7: Reserved Incentives for Approved or in Installation Projects

Annual cost savings from the implementation of sustainability-related assets provides a significant benefit to Metro. Figure 8 quantifies the cumulative cost savings realized to date and anticipated by the end of the current fiscal year.

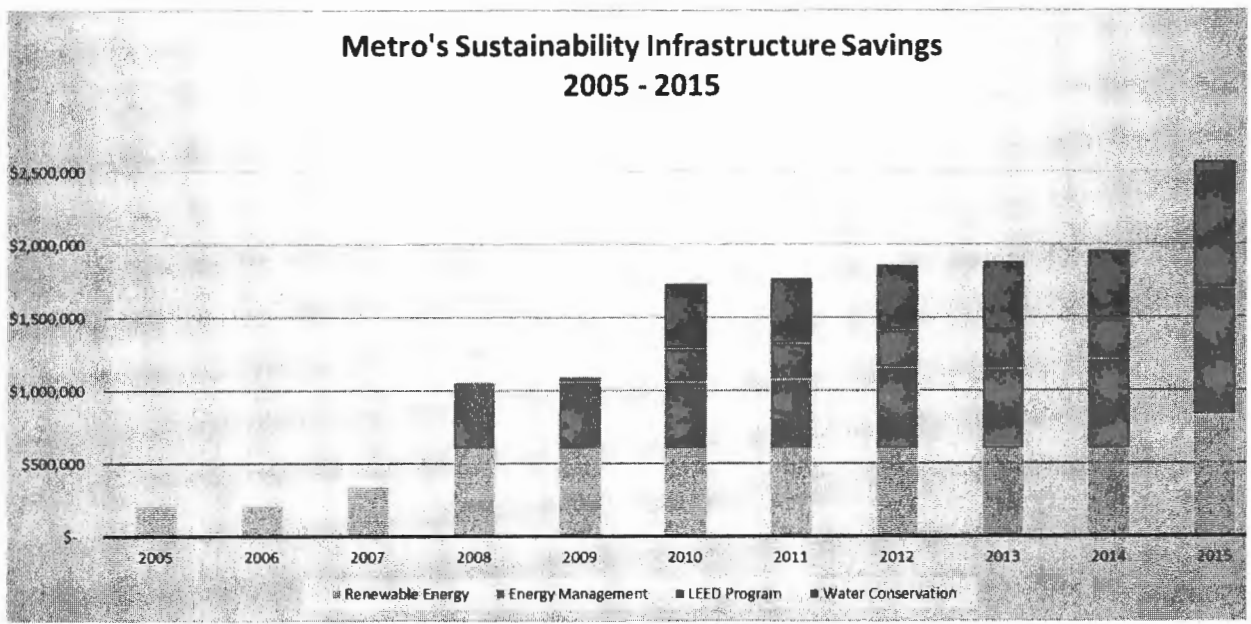


Figure 8: Resource Cost Savings to Date by Program

As a portfolio of assets with varying useful lives and resource savings values, the cumulative benefits from these investments needs to be effectively managed to maintain the cost savings over time. As with any physical asset, degradation and depreciation over time will decrease and ultimately can eliminate the cost savings resulting from that asset. Attachment B: Sustainability Infrastructure Implementation and

Operational Plan shows how the EMS process will support the planning, implementation and oversight of Metro’s existing and future sustainability infrastructure.

Potential Future of Sustainability-Related Assets

Metro’s sustainability and environmental policies ultimately direct the identification and development of projects that comprise the listing potential future sustainability assets. Figure 9 and Figure 10 display the costs and benefits of the range of potential future projects by Program. These projects have been vetted by Metro staff and several have funding and alternative financing mechanisms identified to support their implementation but have not yet been fully approved. All identified projects fall within the definition of a Metro sustainability-related asset and represent only a subset of the potential projects Metro could implement in future years. For example, we have identified Energy Management Program projects through energy audits at only six divisions. These projects represent an average 12% cost reduction at each facility with the opportunity for greater resource cost savings across other Metro facilities.

There is variety in the size, scale and complexity of the potential future sustainability assets but all are designed to result in cost effective reductions in both Metro operating costs and Metro’s impact on the environment.

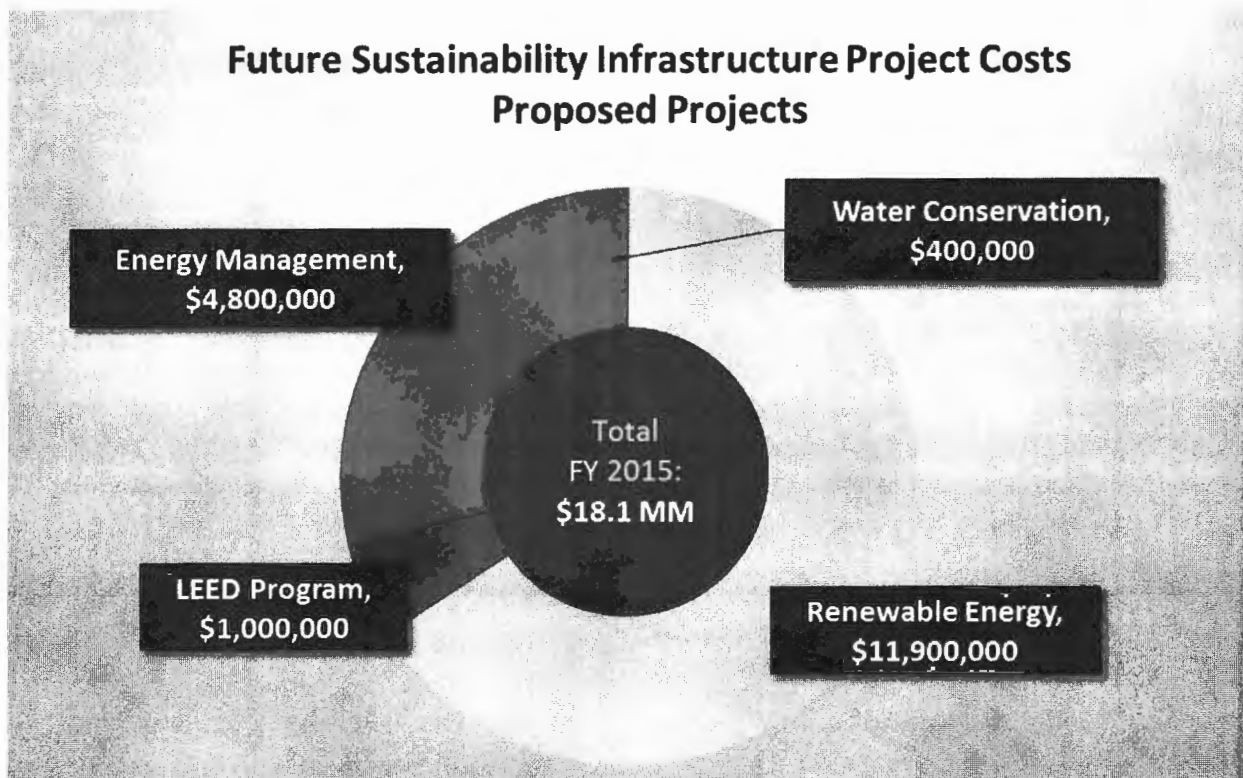


Figure 9: Proposed Sustainability Infrastructure Project Costs by Program

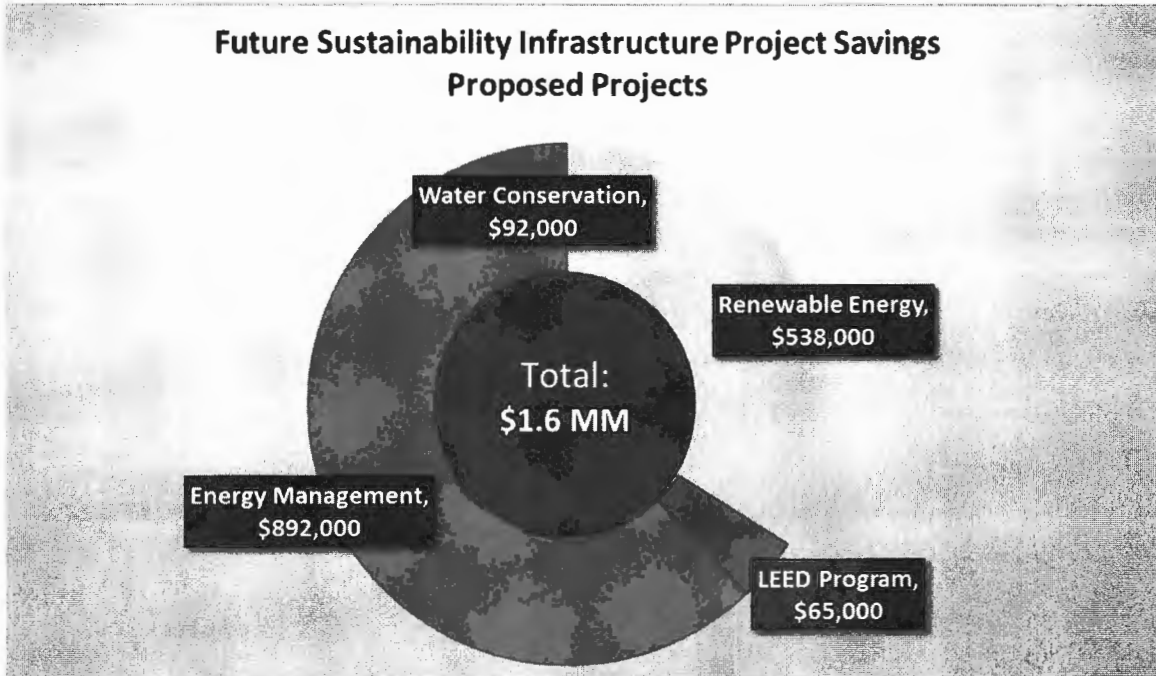


Figure 10: Proposed Sustainability-Related Infrastructure Project Savings by Program

Proposed future projects are geographically distributed and Figure 11 below shows the number of identified projects at each site. The average project cost by program differs greatly but there are performance improvement opportunities at all sites.

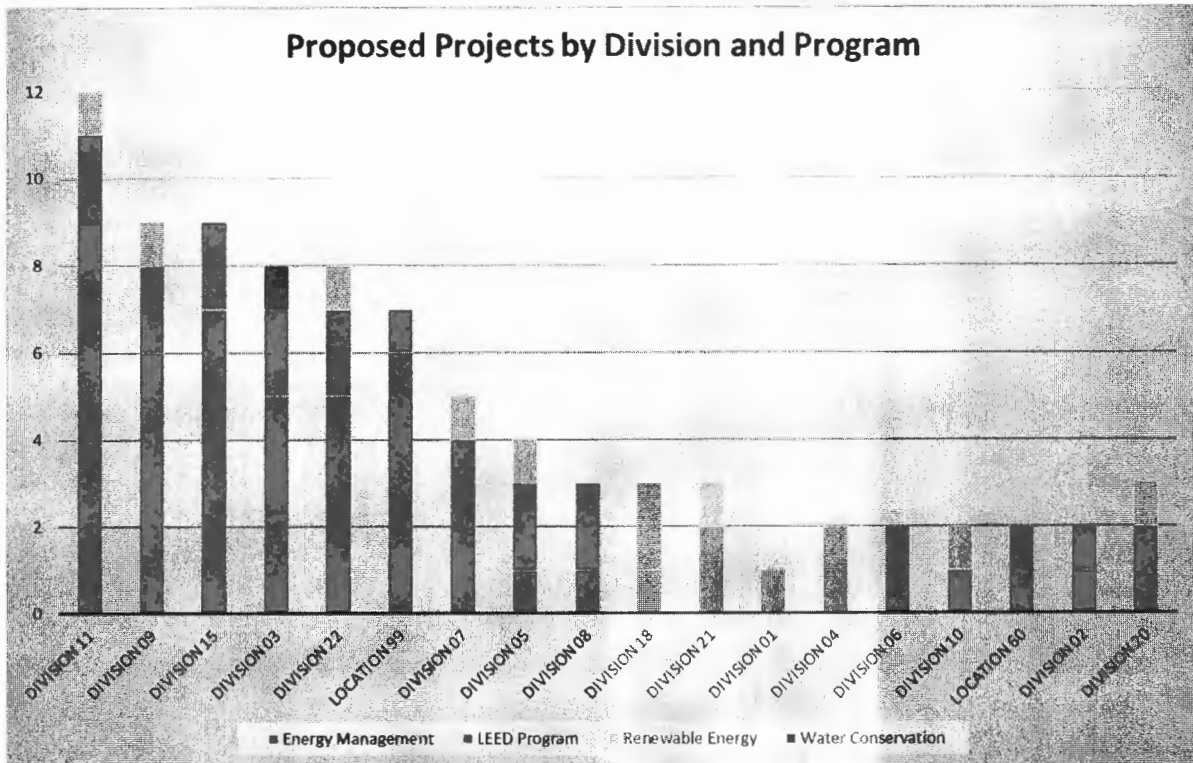


Figure 11: Proposed Project Count by Location

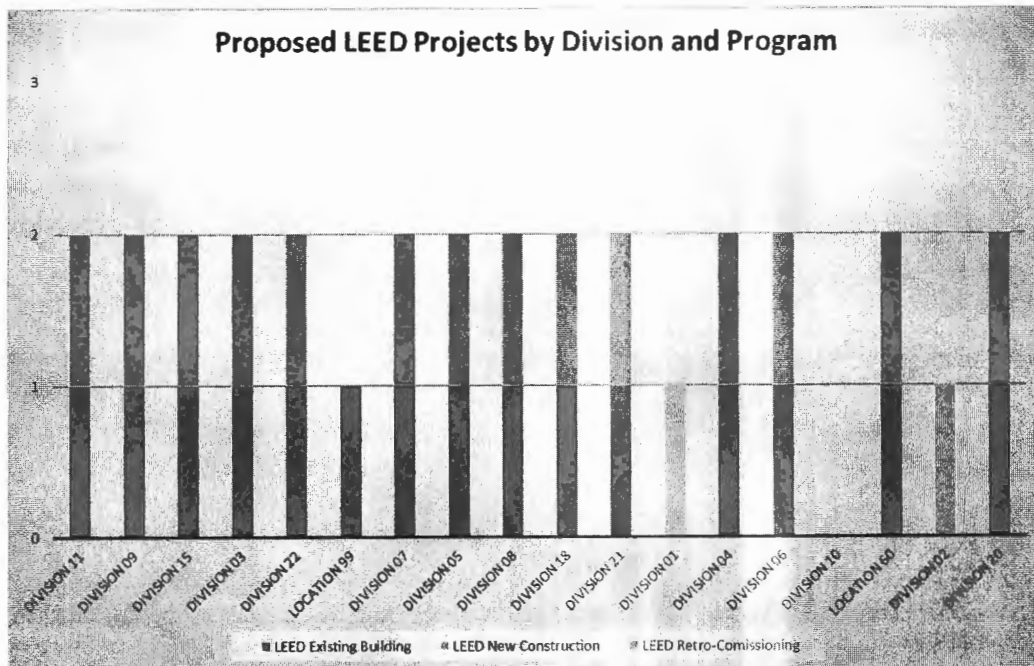
Table 7 shows an inventory of the Future Renewable Energy projects that make up the nearly \$12 million of investment opportunity. Metro has analyzed all potential PV system locations and selected these eight sites as the most cost effective candidates for large scale deployment. Implementation of all systems in Table 7 would increase the existing PV system capacity by 150%.

Table 7: Proposed Future Renewable Energy Projects

Future Renewable Energy Projects		
Project Name	Location	Status
Parking Structure PV Installation	Division 07	Proposed
Solar PV System	Division 09	Proposed
Solar PV System	Division 10	Proposed
Solar PV System	Division 11	Proposed
Solar PV System	Division 22	Proposed
Solar PV System	Division 20	Proposed
Solar PV System	Division 05	Proposed
Solar PV System	Division 21	Proposed

Over the coming years the LEED Program, through the EMS process, will continue to aggressively pursue LEED strategies to fulfill the intent of Metro’s Environmental Policy and Energy and Sustainability Policy. All existing buildings will perform retro-commissioning to optimize HVAC system operation. The collection of no- and low-cost process improvement projects implemented through the LEED strategy implementation will ultimately result in more comfortable and efficient buildings.

Table 8: Proposed Future LEED Program Projects



Metro's most cost-effective option for reducing its resource costs and GHG emissions is through the implementation of energy conservation and efficiency projects. The Energy Management Program projects can be broken down into the building systems affected by a given project. For example, in Metro facilities energy is used for the following purposes:

- Lighting
- Domestic Hot Water (DHW)
- Heating, Ventilating & Air Conditioning (HVAC)
- Compressed Natural Gas (CNG)
- Plug Loads
- Process Equipment (Tools and Machines).

Figure 12 displays the number of projects proposed to date within each of these asset types. Projects range in complexity from full air conditioning system replacement to a light bulb replacements and everything in between. We are continuing to conduct facility audits of existing facilities to identify energy savings projects and expect a three-fold increase in the number of energy efficiency projects for Metro to consider. Figure 13 shows a breakdown of the total Energy Management Program savings for proposed projects by specific project type.

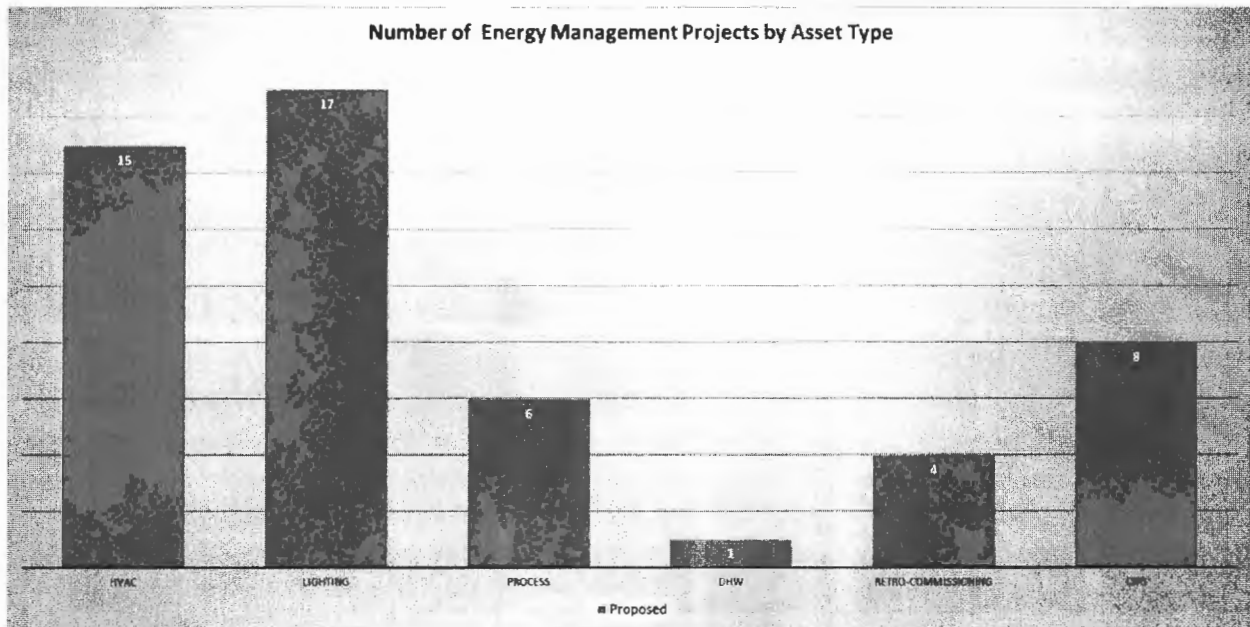


Figure 12: Proposed Energy Management Program Projects by Project Type

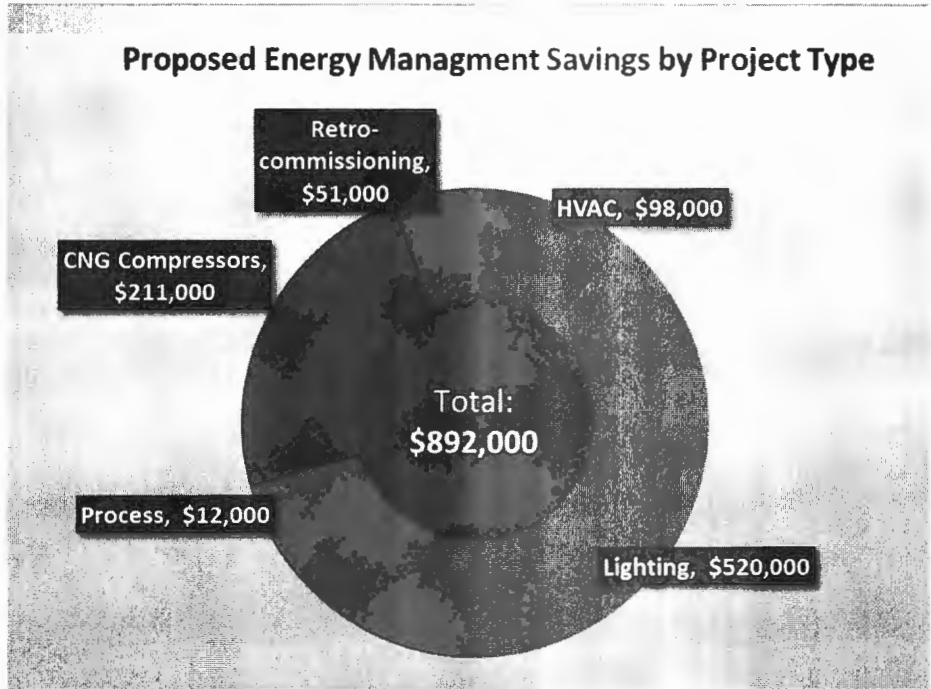


Figure 13: Proposed Energy Management Program Project Savings by Project Type

Water Conservation Program projects aim to reduce the water usage throughout Metro operations. Given the current drought conditions, the importance of these projects is increasing by the day. Metro’s EMS will be focusing intently on increasing the number of water conservation projects.

Table 9: Proposed Future Water Conservation Projects

Future Water Conservation Projects		
Project Name	Location	Status
Bus Wash Recycled Water System Project	Division 01	Proposed
Recycled Water System	Division 03	Proposed

Conclusions

Metro's ongoing investment in its sustainability-related infrastructure continues a decade-long commitment to dedicating resources to further advance resource-saving assets. Since 2005, Metro has completed over thirty-seven projects, realizing nearly \$2 million in yearly cost savings from these assets and \$6.4M in cash rebates from utility partners. The organization is identifying additional projects for implementation through the agency-wide EMS, which is advancing sustainability goals and employee engagement across and at all levels. Continued support for the growth of Metro's Sustainability-Related Infrastructure will continue the implementation of operational cost reduction strategies as evidenced by the targeting of an additional \$1.6M in yearly cost savings.

Large-scale investments in solar PV systems dominate the current infrastructure. These are valuable assets that are devoid of any electricity costs and contribute toward meeting Metro's Renewable Energy Policy goals. A more recent focus on the Energy Management and LEED Program areas has resulted in a more balanced and diversified portfolio of sustainability-related assets, which will allow Metro to implement future cost-savings projects while meeting Energy, Sustainability, and Renewable Energy Policy goals. ECSD also recognizes an opportunity for expansion of the Water Conservation Program area to include future sustainability projects.

This assessment identified gaps in the current approach for maintaining the current asset base. If Metro does not maintain these assets appropriately, the agency will not benefit from the resource cost savings that uniquely arise from investments in sustainability-related assets. Attachment B: Metro Sustainability Infrastructure Implementation and Operational Plan provides a detailed operational plan for a transparent process to evaluate, implement, and maintain the portfolio of potential future sustainability project investments, and a financial plan for identifying and securing funding for these investments that mitigates the financial impact on the Metro organization.

ATTACHMENT B
Metro Sustainability Infrastructure Implementation and Operational Plan

Metro Sustainability Infrastructure Implementation and Operational Plan

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Introduction

Over the past decade, the Los Angeles County Metropolitan Transportation Authority (Metro) has invested in a growing number of capital and operating improvements to improve the long-term environmental sustainability of the agency. Maximizing the benefits of Metro's sustainability infrastructure requires ongoing attention to maintain a state of good repair across the agency, and careful consideration of future sustainability improvements. This plan integrates wherever possible with existing systems to provide a financial and operational process for establishing oversight and identifying financial resources to maintain existing and future sustainability asset performance, along with guidance for identifying needed investment in additional sustainability assets that will benefit Metro into the future.

In the context of this plan, Metro sustainability assets include operational *investments made in Metro facilities, technologies, fleet, people, and processes that:*

- 1) directly contribute to the reduction in resource usage beyond an established baseline for electricity, natural gas, other non-renewable fuels, water, hazardous substances, or*
- 2) directly reduce greenhouse gas emissions (GHGs), other air emissions, wastewater, solid waste, other environmental impacts, or*
- 3) directly increase operational efficiency, staff productivity and well-being, and customer satisfaction beyond standard operations, while maintaining safety and system reliability.*

This sustainability infrastructure implementation and management plan provides for the selection and implementation of sustainability-related investments and the ongoing measurement and verification of investment performance. This plan also identifies an approach for Metro to establishing the necessary funding and ongoing operations and maintenance requirements for sustainability assets prior to implementation.

Sustainability Infrastructure Management

The Environmental Compliance and Services Department (ECSD), within the Engineering & Construction Division in working with key Metro internal stakeholders, will use established procedures and processes to facilitate:

- Sustainability project selection, development, and implementation;
- Measurement and verification of sustainability asset performance;
- Long-term planning (financial and operational);
- Sustainability project-related training;
- Sustainability reporting on infrastructure for Board, Management, and Metro Sustainability Report; and
- Necessary stakeholder engagement related to the sustainability asset management activities (internal and external coordination)

The implementation and management of sustainability-related assets will support the reduction of operational costs over time by increasing operational efficiency and will support the implementation of Metro's Environmental Policies. Metro's ISO 14001 Environmental Management System (EMS) provides the framework for coordinating and organizing the reduction of Metro's impact on the environment. EMS procedures and processes will be used to manage and document the implementation and management of Metro's sustainability infrastructure.

Figure 14 outlines the cross-functional process for the future development of new sustainability-related assets at Metro. The primary Metro groups involved in the implementation and management of sustainability infrastructure are listed in the left column and include existing ECSD staff, Metro Management, Operations (Facilities Maintenance), Office of Management and Budget (OMB), Engineering & Construction, and Procurement Departments.

Roles and Responsibilities

The sustainability infrastructure implementation and management plan will be implemented and managed using existing staff, processes and management systems. This plan calls for a coordinated approach for the continual operations and maintenance of Metro's sustainability assets. The administrative and technical requirements outlined herein will be executed using existing Environmental Compliance and Services Department (ECSD) staff. Management and budget estimates for supporting the implementation of this effort will be considered as part of the ECSD annual budget projections. Such activities will be facilitated through the EMS Admin Team who will have the responsibility of aligning implementation with overall environmental and organizational goals and objectives at the frontline level. This diverse group, as well as the internal stakeholders outlined in Figure 1, will be critical to the success of this plan and long term operation and maintenance of Metro's sustainability-related infrastructure. Numerous variables, including the total number of projects, their complexity, and the rate at which they undergo implementation, will determine the level of effort required.

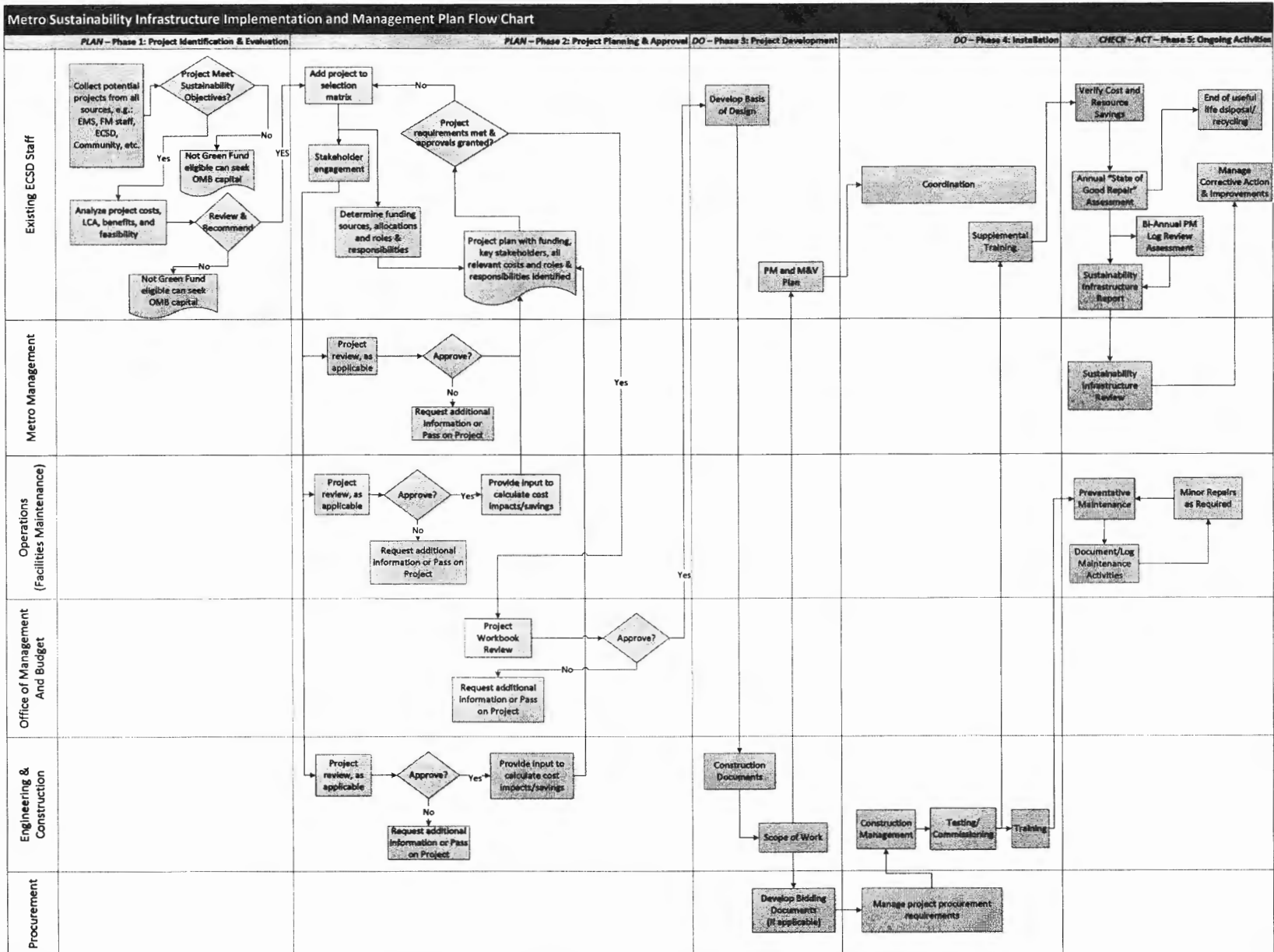


Figure 14: Sustainability Infrastructure Implementation and Management Plan Flow Chart

Sustainability Infrastructure Implementation and Management Plan

The sustainability infrastructure implementation and management plan is designed to be a transparent and collaborative approach. Successful sustainability projects require cross-Agency coordination that begins with initial planning and carries through long-term operations and maintenance. Metro’s agency-wide EMS framework is a proven and successful process for engaging stakeholders across the organization and will be utilized in the support and ongoing management of sustainability assets. The execution of this plan will help Metro anticipate and address challenges throughout each project’s useful life.

The sustainability infrastructure development and management process follows five phases that generally align with Metro’s current capital project planning and conforms to the EMS plan-do-check-act (PDCA) model of continual improvement. Due to the nature of sustainability projects, additional considerations at each phase are highlighted in Table 10. Each phase is described in detail below.

Table 10: Sustainability Infrastructure Implementation and Management Plan Phases and Considerations

	Implementation Phases	Project Considerations
PLAN	Phase 1: Project Identification and Evaluation	<ul style="list-style-type: none"> Potential projects are collected from across the agency through the EMS and not limited by facility location, bus or rail projects Projects undergo basic life-cycle analyses at the outset
	Phase 2: Project Planning & Approval	<ul style="list-style-type: none"> Agency-wide stakeholder engagement as necessary to seek support and buy-in for new projects Detailed costs, savings and ongoing management costs are developed and incorporated Funds identified and allocated through capital program approval process
DO	Phase 3: Project Development	<ul style="list-style-type: none"> Inclusion of preventative maintenance, operations and maintenance (O&M) and measurement and verification (M&V) plans Assignment of roles and responsibilities
	Phase 4: Installation	<ul style="list-style-type: none"> Additional training for assets as required
CHECK – ACT	Phase 5: Ongoing Activities and Continual Improvement	<ul style="list-style-type: none"> Implementing O&M and M&V plans according to approved project plan Savings reinvestment opportunity, state of good repair assessments

Metro's Sustainability Long-Term Financial and Operational Plan

Sustainability Infrastructure Funding Sources

Metro allocates funding for the implementation of sustainability-related assets from a variety of different sources, with the primary funding coming from OMB's annual Capital Program. The existing sources of funding the implementation of sustainability-related infrastructure include:

- **Office of Management & Budget Annual Capital Program:** These allocations have funded most of Metro's existing sustainability infrastructure to date. Represents Metro's annual and off-cycle capital approval process.
- **Sustainability Implementation Program:** This is a capital program that allocates funds annually for sustainability pilot projects.
- **Alternative Financing Mechanisms:** Sustainability projects are often eligible to receive external grants or may enter into cost-sharing arrangements with entities external to Metro. This funding is project-based and can vary widely from year to year. However, it can fund large portions of individual sustainability infrastructure projects.

Metro is seeking to support sustainability project development, maintenance, and operations through the "Green Fund" established as part of the approval of Item 48 of the June 2014 Board meeting. The fund, as described in detail at the end of this document, would have three funding sources in addition to the interest generated from their investment. These include:

- **Low Carbon Fuel Standard (LCFS) Credit Proceeds:** This potential funding source comes from the sale of Metro-earned LCFS credits through a market based system. As requested by the Board during the February 2014 Item 57 Board Motion, Metro has developed a revenue optimization plan for the LCFS credit sales to maximize the potential funding opportunity to maintain sustainability investments. This is a relatively new and small market with highly variable market prices for credits and a potential sunset in year 2020; estimated proceeds range from \$300,000 to \$3M annually. Metro recognizes the inherent volatility of this funding source. This plan presumes that this new source of funding is available for budget planning and will remain so as long as Metro generates credits and the market for these credits continues to operate.
- **Sustainability-Related Infrastructure Cost Savings Reinvestment:** This potential funding source reinvests cost savings generated from the operation of sustainability assets in future projects and the ongoing operation of existing sustainability-related infrastructure. The savings contribution value of each project would be identified as part of an approved project plan explained in Phase 3 and executed in Phase 5 of this plan. Agreed upon and verified savings values would be applied through an internal budget reallocation mechanism.

- **Utility Incentive and Rebate Reinvestment:** Metro’s utility partners are incentivized by the California Public Utility Commission to buy down the cost of the equipment described herein as sustainability-related infrastructure. Nearly \$6.5M of such funding has come in the form of cash revenue to Metro since 2005. Future funding would be applied through an internal deposit or allocation mechanism upon receipt of incentive checks.

Asset (Project) Implementation Funding

The assets included in the 2014 Sustainability Infrastructure Assessment Report represent current assets and a list of identified and proposed future assets. Phase 5: Ongoing Activities and Continual Improvement includes discussion on financial planning for the existing assets. This section details how a potential project becomes a Metro sustainability asset. Table 2 details the three different types of assets and an example of existing Metro examples of each. Asset Types classify the operation and maintenance requirement approach required to ensure it brings desired benefits throughout its useful life.

Table 11: Asset Type Definition

Asset Type	Definition	Examples
<i>New Asset</i>	Equipment added to a Metro facility or a new process that did not previously exist.	<ul style="list-style-type: none"> • Solar photovoltaic (PV) system • Domestic Hot Water Heat Recovery System
<i>Process Improvement</i>	Project that improves efficiency/sustainability of an existing process: can be asset-based or administrative, may change the operations and maintenance (O&M) requirements for existing process.	<ul style="list-style-type: none"> • Bus dryer redesign • Heating Ventilation and Cooling (HVAC) redesign • Control systems • Water Recycling System
<i>Existing Asset Replacement</i>	Project that replaces existing equipment with a more sustainable option.	<ul style="list-style-type: none"> • Boiler replacement • HVAC replacement • Lighting retrofit

Metro’s sustainability project implementation process consists of five iterative phases, each with a corresponding financial decision to inform movement to the next phase. Each phase consists of project review and approval, allowing for transparency and coordination throughout the process. Figure 15 outlines each phase and the corresponding, required decision.

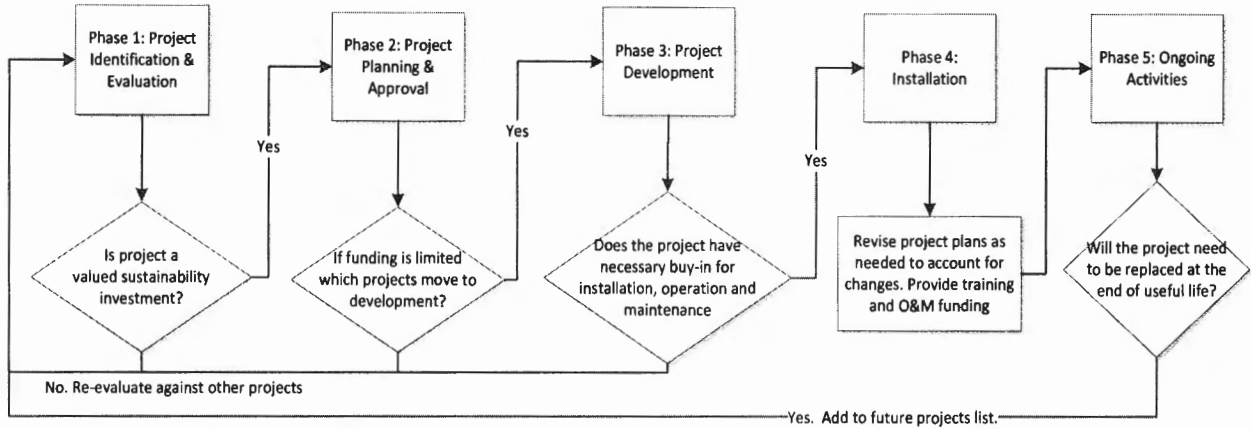
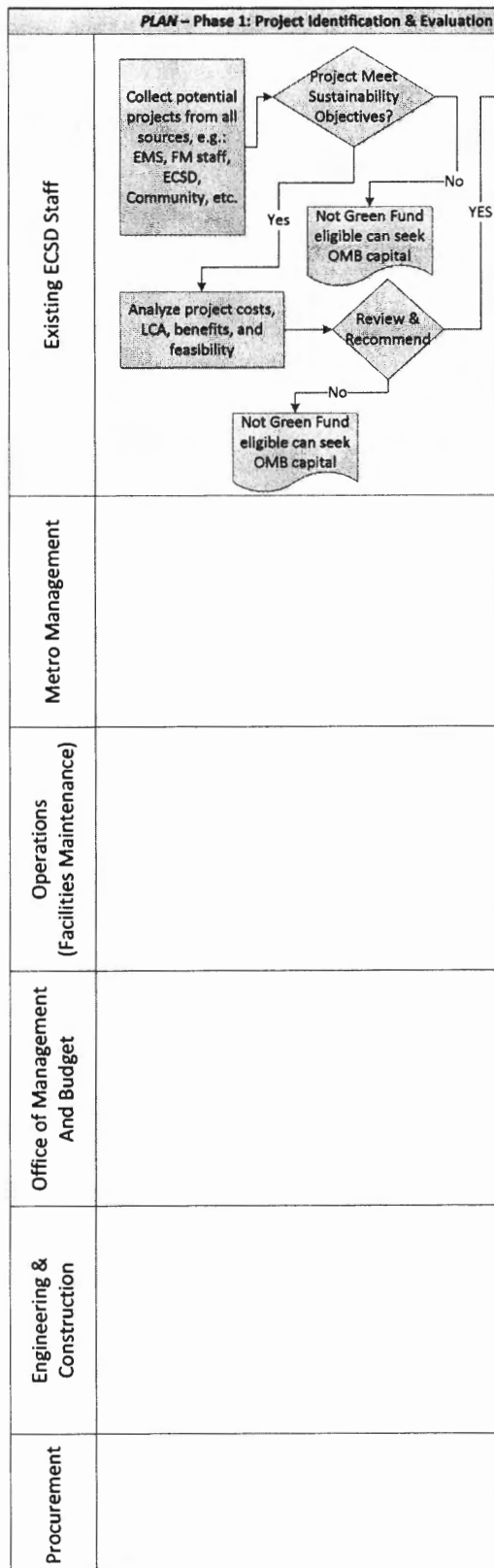


Figure 15: Funding decision flow within implementation and management plan

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Phase 1: Project Identification and Evaluation



In this phase, a list of potential sustainability-related infrastructure projects will be created as they are identified. To include a potential project on the list, staff will verify that the project meets, at a minimum, the definition of a Metro sustainability asset. This early evaluation of potential projects will reveal anticipated results, however a full accounting of the potential costs and benefits of the project investment is not necessary until later in the process.

Potential sustainability projects at Metro can come from several sources including but not limited to:

- initiatives from EMS Administrative Team or Facility EMS Core Teams;
- suggestions from other internal Metro departments (solicited);
- results of energy and resource audits;
- projects requiring additional funding to upgrade from standard to sustainable;
- end-of-useful-life replacement; and
- unsolicited proposals from internal stakeholders and third parties.

Projects will be collaboratively evaluated to determine whether or not the proposed projects will enhance Metro’s sustainability-related infrastructure. The initial evaluation of potential projects will consider both quantitative (e.g., resource cost savings) and qualitative (e.g., fulfillment of policy mandates). For example, will the potential project reduce an environmental impact, increase resource efficiency or generate renewable energy that contributes to meeting the Renewable Energy Policy goals?

At this phase in the process, some evaluation questions may not have sufficient answers. Staff will seek out additional information as needed to determine an expected overall (quantitative and qualitative) project value. Potential projects shall remain in the evaluation phase until enough

information exists to answer the key decision for this phase:

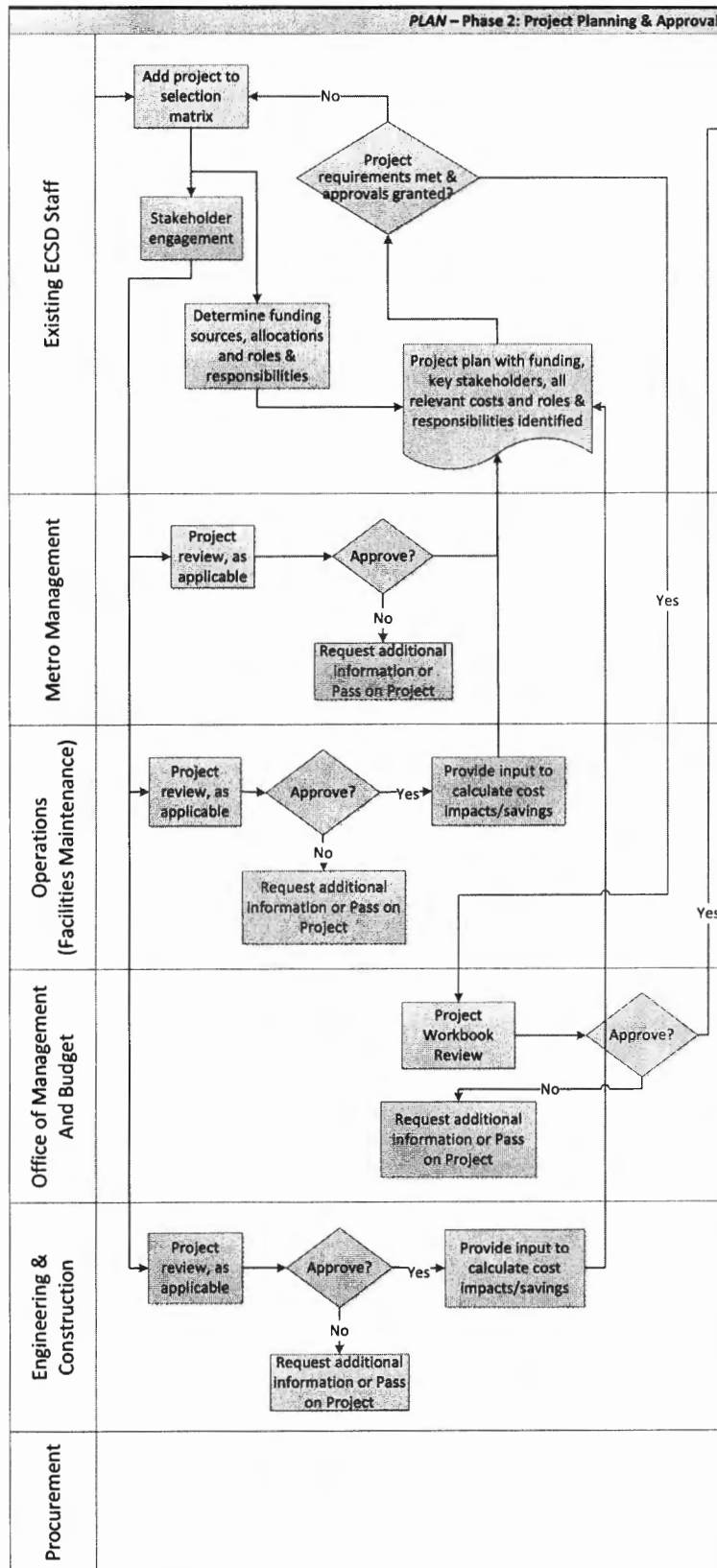
Is this project a valued sustainability investment for Metro?

If the answer is “yes,” then the project is eligible to be moved on to Phase 2: Project Planning and Approval. If the answer is “no”, then the project can either return to the tracking list or removed from further consideration.

ECSD staff will maintain a comprehensive list of potential projects passing through to Phase 2, and will make this list available to Metro internal stakeholders using the existing project dashboard database to allow for easy viewing and ad hoc reporting. The projects on this list are under active consideration for implementation. However, the listing does not indicate that any projects have received budgeting or approval. Phase 2, below, outlines how staff will compare the potential projects against one another for funding consideration that is available in a given fiscal year.

PLAN-DO-CHECK-ACT

Phase 2: Project Planning and Approval



Potential projects that move into Phase 2 will begin the more rigorous planning and budgeting process, including a life-cycle cost evaluation and initial stakeholder assessment to provide a more thorough and comprehensive evaluation. A selection team will be convened to apply standardized project evaluation metrics across all potential projects to allow for accurate comparison of financial performance including cost, savings and ongoing operation. After collecting and evaluating key project information, potential assets will combine to develop a portfolio of projects that most cost-effectively meet Policy and EMS stated objectives and targets. The team will employ a Project Portfolio Management approach to determine which proposed projects move to Phase 3 (Project Development). The key financial question to move through this phase is:

If funding is limited, which projects will move to development?

Project Budgeting

Each project team will develop a detailed project budget and plan, consisting of specific proposed funding sources, and expected time frames for development and installation based on standardized forms and methods. Cost analysis will

incorporate the entire useful life of the equipment. As Table 12 shows, Metro's sustainability-related infrastructure projects face several project funding scenarios that allow for project implementation within specific Metro parameters. In collaboration with other Department sponsors/Project Managers, ECSD staff will seek to identify opportunities to offset Metro's project cost requirement for sustainability-related infrastructure through rebates and other alternative financing mechanisms whenever possible, up to full cost of the proposed project.

Table 12: Internal Metro Project Cost Responsibility Scenarios

Funding Scenarios	Green Fund	Other Funding
<i>Full Cost Responsibility</i>	100% of project costs associated with development, installation and ongoing O&M	None
<i>Cost Share</i>	Partially fund project implementation. Examples could include additional design and commissioning costs, cost of purchasing more efficient equipment, or percentage splits based on budget shortfall	Partial funding for project implementation derived from the use of capital funds as allocated by OMB
<i>No Cost Responsibility</i>	Basic review to gather project information and ensure proper evaluation of O&M costs	100% of project implementation derived from the use of capital funds as allocated by OMB

Working other Department sponsors/Project Managers, ECSD staff will provide support to identify the anticipated project lifecycle cost requirements, available funding sources, and project leads for key roles as part of the overall project plan. Direct input from across the organization will be included to allow for appropriate checks and balances on both project costs and feasibility. As the section below describes, key identified metrics such as cost savings will have supporting documentation. Information will be centrally located for all stakeholders to access and review.

Table 13 presents an example of a Phase 2 level project budget with major costs, funding sources, and project leads identified. Note that project-level leads are project specific, can represent different departments, and do not necessarily assume ongoing asset management responsibilities. The time value of money has been considered in this example.

Table 13: Example Project Budget

Example Project		Lighting Retrofit at Division X	
Project First Costs	\$225,000	one-time	
Ongoing O&M Costs	\$500	annual	
M&V Costs	\$1,000	every 4 years	
Expected Useful Life	20	Years	
Total Life Project Cost (nominal)	\$240,000		
Funding Sources			
OMB FY16 Capital Program	\$175,000	one-time	
Green Fund	\$50,000	one-time	
Green Fund	\$10,000	\$500/yr x 20 yrs	
Alternative Financing Mechanism	\$500	utility incentive	
Total Funding Identified	\$240,000		
Project Leads			
Metro Project Manager	Project Staff		
Environmental Compliance and Services Lead	ECSD Staff		
Facility Maintenance Lead	FM Staff		
Operations Lead	Division Staff		
Procurement Lead	Procurement Staff		

Proposed sustainability project budgets will be approved and funded through the existing capital projects process. Not all potential projects will be sent to OMB for approval. The sustainability project portfolio selection process will prioritize projects that best meet Metro’s financial and sustainability objectives. The selection process explained below is designed to provide a transparent method for determining which projects are eligible for sustainability funds and best meet Metro’s overarching policy and agency-wide EMS goals.

Sustainability Project Portfolio Selection

Relying on the principles of portfolio management, the EMS Admin Team and existing ECSD staff will employ a standardized selection approach for potential sustainability-related investments. Companies and organizations use many different models to apply similar principles to maximize benefit and minimize risk for their asset investments. The approach for Metro’s future sustainability assets is designed using a pillar of portfolio management theory: Matrix Scoring. Consistent with the EMS process, matrix scoring takes the most important project attributes as determined by the desired outcomes such as cost savings and meeting sustainability goals. Those attributes are weighted to account for their relative importance. A portfolio of potential sustainability-related investment projects will be scored in each project criteria to arrive at a final score. Those scoring the best to represent those projects that minimize risk, whether financial, technology, or customer-based and maximize benefits. This approach will provide additional transparency for accountability, compliance, and other requirements Metro faces as a publicly agency.

As with Metro's Annual Capital Program, there are several key criteria to consider when making portfolio decisions. This section describes a proposed approach based on interviews and analysis. Collectively, the following criteria are intended to provide a thorough review of the expected financial and organizational costs and benefits of the sustainability investment portfolio.

- **Return on Investment (ROI):** This criterion aligns with Metro's capital budgeting process and represents the financial value to Metro. Standard Metro assumptions will be documented and used including discount rates, depreciation, tax and other rates used to calculate sustainability project ROI. Sustainability related ROI calculations will also consider the long-term O&M and M&V costs for managing the assets throughout their useful life.
- **Life-cycle Cost-Savings:** This criterion is a calculated estimate of the long-term, or useful life period, cost-savings resulting from the investment in the sustainability project. Staff will use industry-recognized standards along with other protocols for calculating project savings to determine the value for this criterion. Calculations will include all costs associated with O&M, oversight and verification of project savings.
- **Technology Viability:** This criterion is a qualitative measure of the risk of investing in a new technology, system or process. The Project Team shall consider stakeholder support or opposition and any internal and external opportunities and barriers when scoring this criterion.
- **Probability of Success:** This criterion is a qualitative measure of the probability that the project will move to installation, will be operate properly, and will receive appropriate maintenance throughout its useful life. The project team shall consider stakeholder support or opposition and any internal and external opportunities and barriers when scoring this criterion.
- **Sustainability Policy Objectives:** This criterion is a measure of the degree to which the project meets Metro's approved sustainability policy objectives. (e.g., GHG reductions, water conservation, solid waste reduction). Metro's EMS selects similar objectives and targets that will also impact the relative importance of the project in relation to others.
- **Mission Criticality:** This criterion captures Metro's need for the project to be implemented. Projects with a higher project priority value represent immediate or critical infrastructure projects needed to avoid negative operational impacts.

The selection criteria above (and proposed weighting as shown in Figure 3 below) will be used to screen and validate proposed projects' relative importance to both sustainability and overall organizational goals. A re-evaluation of these criteria will take place periodically to allow for the realignment of the project selection process to respond to any key changes in Metro's sustainability related objectives and priorities.

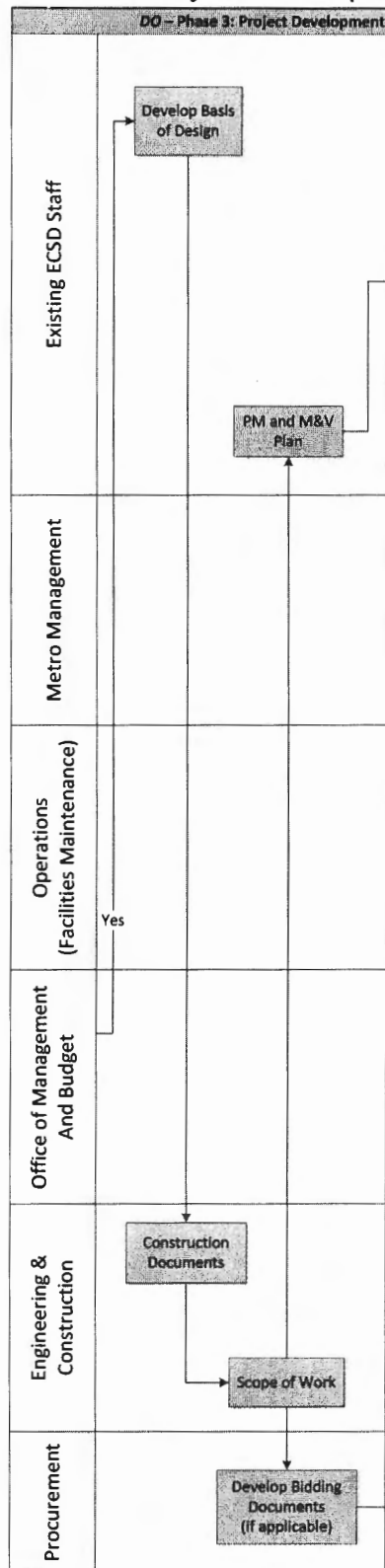
On a rolling basis throughout the year, at least quarterly, the portfolio can accept newly-identified or high-priority projects as available funds allow. An example of the proposed quantitative scoring approach is shown in Figure 3 below. This is an illustrative example of the proposed evaluation and selection matrix. The transparency will minimize confusion and maximize the use of each dollar spent to achieve desired goals. Ranking the potential projects in order of total score from high to low identifies Metro's priorities and an order in which to release funding. Using the results of this evaluation, only the highest impact projects will be submitted for OMB approval using the newly available funds. Projects receiving full implementation budgets will move to Phase 3: Project Development.

<i>Example Criteria Weighting</i>		25%	25%	15%	15%	20%				
Example Project List	Total Budget	Return on Investment	Lifecycle Cost Savings	Technology Viability	Probability of Success	Mission Criticality	Total Score	Remaining Budget Total	Selected?	
Project 1	\$ 25,000	7	7	10	10	10	85	\$ 4,975,000	YES	
Project 2	\$ 575,000	5	5	10	5	5	57.5	\$ 4,400,000	YES	
Project 3	\$ 2,800,000	2	2	10	7	7	49.5	\$ 1,600,000	YES	
Project 4	\$ 1,000,000	5	5	1	5	5	44	\$ 600,000	YES	
Project 5	\$ 80,000	5	5	10	1	5	51.5	\$ 520,000	YES	
Project 6	\$ 650,000	1	3	5	10	2	36.5	\$ (130,000)	NO	
Project 7	\$ 165,000	5	5	5	5	1	42	\$ (295,000)	NO	
Total FY Funds Required	\$ 5,295,000									
FY available funds	\$ 5,000,000	10 = \$\$\$\$	10 = \$\$\$\$	10 = Common Practice	10 = High	10 = Time of essence				
Difference	(\$295,000)	5 = \$\$	5 = \$\$	5 = Emerging but tested	5 = Medium	5 = Future critical need				
		1 = \$	1 = \$	1 = New / untested	1 = Low	1 = No material difference				

Figure 16: Example of Potential Sustainability Infrastructure Portfolio Selection Matrix

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Phase 3: Project Development



The project development phase will align with the existing Metro Capital Project Approval processes. At the conclusion of this phase, funding requirements will be finalized from implementation through the ongoing operations and maintenance.

The following core deliverables for this phase are common to all best practice construction projects:

- Project Basis of Design
- Construction Documents
- Scope of Work

Given the non-standard equipment necessary for some sustainability-related assets, the next set of deliverables under the project development process clearly identifies project requirements and a plan for the operation and maintenance throughout the equipment’s expected useful life:

- Preventative Maintenance Plan
- M&V Plan
- End of Useful Life Assessment.

Preventative Maintenance Plan

The Preventative Maintenance Plan will provide a forum to plan for the incorporation of the proposed asset into day-to-day Metro operations. The project team will use the Metro EMS program framework to identify maintenance, training, safety and other requirements that can be tracked using EMS documentation. This phase will incorporate feedback from stakeholders through existing EMS Core Teams, such as maintenance and operational staff. Different assets will require varying levels of sophistication in the development of this plan. ECSD staff will facilitate the development of technical and financial resource requirements to implement the Preventative Maintenance Plan for the life of the asset within the upfront project costs requiring approval.

Recent work between Facilities Maintenance and ECSD related to existing solar PV systems, demonstrates how

this approach can be successful. Upfront identification and assignment of responsibility provides transparency and accountability in the ongoing maintenance of Metro's existing solar systems. Each asset will have a unique Preventative Maintenance Plan with appropriate staff resources assigned. Future projects will benefit from similar projects already completed and are familiar with the process.

Measurement and Verification (M&V) Plan

The M&V plan will detail the process for measuring and verifying the efficient operation and cost savings of the proposed project. The section below, titled M&V Asset Savings Determination, details the varying approaches that will vary slightly by project depending on variables such as complexity, size or repeatability.

The costs of implementing the approved M&V approach will be finalized by developing this plan as part of the project's development. At this point in the process, the proposed budget includes the estimated level of M&V anticipated. The development of the M&V Plan will finalize the approach and appropriate resource requirements for each specific project. ECSD staff will facilitate through the EMS the execution of the proposed M&V plan as written during this phase of the project's development.

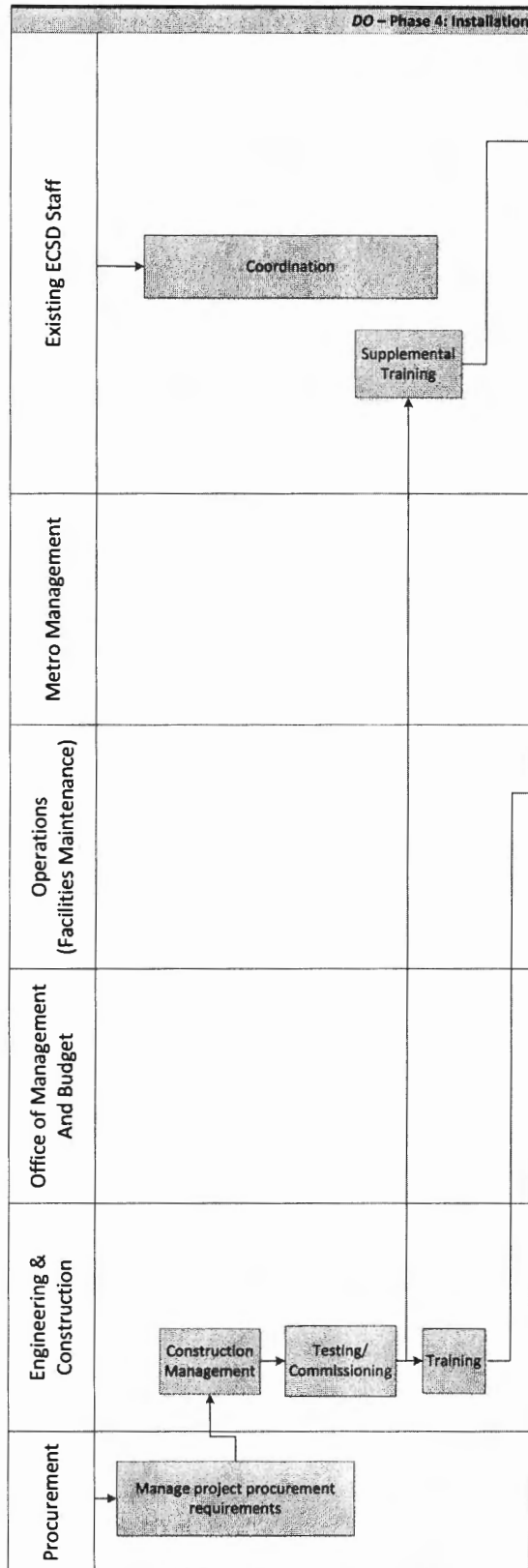
End of Useful Life Assessment

To plan, budget and account for the end-of-useful-life disposal or recycling requirements, the project will follow a life-cycle assessment approach. The expected life-cycle of installed assets will provide a general time horizon for the planning for future projects. An annual state of good repair assessment and funding availability will determine the proper and opportune time to decommission an asset. Sustainability-related assets will continue through the same implementation process outlined above, but may receive priority over the implementation of new assets as project needs warrant.

Project development activities for sustainability-related projects, as well as co-funding of enhanced design or efficient equipment, will be facilitated through ECSD. OMB management's review and approval of the complete project plan documentation represents the completion of Phase 3 activities.

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Phase 4: Installation



Identified project team members will collaborate on the required level of involvement depending on the project delivery mechanism. In many cases existing project delivery approaches and departments will have primary responsibility for the procurement, construction, and commissioning activities needed to implement sustainability assets.

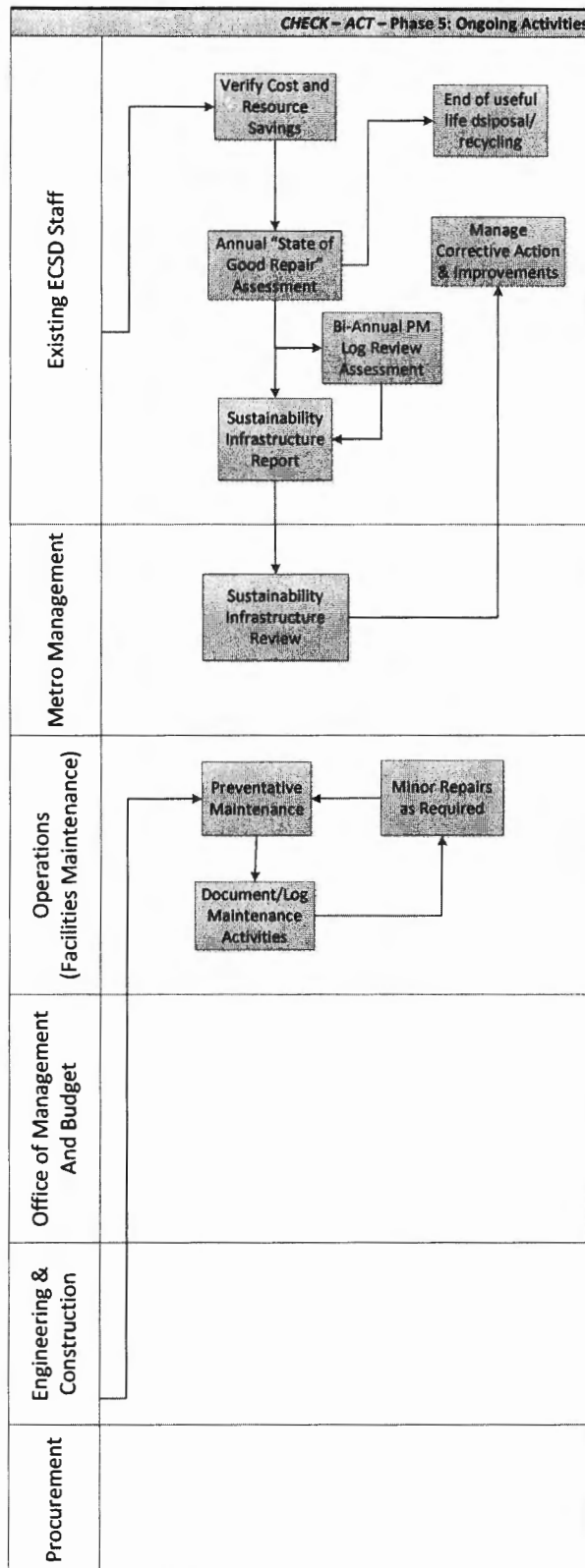
The project team will evaluate any opportunities for alternative financing and delivery mechanisms for sustainability-related projects. However, as with non-sustainability projects at Metro, the Office of Management and Budget will provide project approval and funding while Metro's Procurement department will administer the bidding and purchasing requirements for sustainability projects. This aligned structure provides continuity and affords a series of checks and balances to support transparency throughout the process.

Similar to other capital projects, the primary financial and management hurdles associated with the installation phase is the funding and management of scope changes or project overruns that may occur during the installation, construction, and commissioning of a sustainability project.

ECSD staff will coordinate closely with the implementation team to manage resource needs and changes during this phase. Finally, the EMS Document Control Procedure will guide any necessary changes to project documentation such as those previously developed as part of Phase 3: Project Development.

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Phase 5: Ongoing Activities and Continual Improvement



After a new sustainability-related asset goes through installation and commissioning, it becomes part of Metro’s sustainability infrastructure. An asset remains in this phase through the remainder of its useful life.

Phase 5: Ongoing Activities and Continual Improvement covers the operation of the implemented project and the execution of both the Preventative Maintenance and M&V Plan. ECSD staff will work with internal stakeholders to carry out these plans and continually evaluate their contents to improve future projects and current plans.

The EMS has a strongly documented and controlled process for Monitoring and Measuring environmental performance. This framework will be used to document the following process. Working with Metro Operations, on an annual basis, ECSD will conduct a high-level assessment of the state of good repair requirements for Metro’s existing sustainability asset base. On a two-year rolling basis, the team will review the preventative maintenance performance logs and necessary documentation for the installed portfolio. The documented results can be reviewed by the EMS Admin Team as part of the Check and Act framework. In the case that assets are not maintained in a good state of repair, as could be identified through audits, spec evaluations or corrective action requests, ECSD will conduct a more detailed review of the O&M operations in conjunction with the lead Facilities Maintenance and Operations staff. If this process identifies new projects, those will be added to the future projects list in Phase 1. Table 14 describes the proposed

assessment scale that this process will use which may involve either on-site inspections or surveys with personnel operating the assets for their intended purpose.

Table 14: State of Good Repair Assessment Values by Sustainability Asset Type

Asset Category	1 Poor	2 Marginal	3 Adequate	4 Good	5 Excellent	Assessment Type
Solar PV	<40%	41%-60%	61%-75%	76%-90%	> 91%	of panels + inverter + storage + monitoring equipment in good working order (visual equipment inspection)
Lighting	<40%	41%-60%	61%-75%	76%-90%	> 91%	of lamps, ballasts, controls in good working order (visual equipment inspection)
HVAC	<40%	41%-60%	61%-75%	76%-90%	> 91%	of affected personnel report "good working order" (requires survey)
LEED - Green Buildings	<40%	41%-60%	61%-75%	76%-90%	> 91%	of affected personnel report "good working order" (requires survey)
Water-conservation Devices	<40%	41%-60%	61%-75%	76%-90%	> 91%	of devices in good working order (visual equipment inspection)
Process Improvements	<40%	41%-60%	61%-75%	76%-90%	> 91%	of affected personnel report "good working order" (requires survey)

Installed assets remain in the Ongoing Activities and Continual Improvement phase throughout their useful life or until a new project related to this asset will be identified and sent back to Phase 1 of this process. This can be triggered by a failed state of good repair assessment or when one of the following occur:

- A major maintenance requirement exceeds typical O&M requirements
- A process improvement opportunity is identified
- A partial retrofit is required
- A full-asset replacement is required (due to failure, technology improvement, or other cause)
- End-of-useful life disposal/recycling required
- Other circumstances requiring a change in the status quo.

When one of these conditions are identified, appropriate staff will receive notification so that a new project can be developed and added to the list in Phase 1 of this iterative planning process.

Metro's Green Fund

This plan provides for the opportunity to reinvest resource cost savings into the expanding sustainability infrastructure across Metro's system. The Green Fund is one of several funding sources for supporting both the implementation of sustainability assets and ongoing activities as described in Phase 5: Ongoing Activities and Continual Improvement. The establishment of the Green Fund came with the approval of Item 48 during the May 2014 Board Meeting in response to the first part of the February 2014 Item 57 Motion. The intent of this fund is to support implementation and ongoing management of sustainability assets while minimizing the financial and budgetary impacts on the rest of Metro's operations.

Metro's Green Fund will be funded from the following sources:

1. Any proceeds from the sale of LCFS credits (per the LCFS revenue optimization plan)
2. Savings reinvestment allocations from internal Metro accounting
3. Any up-front capitalized O&M or M&V funds
4. Incentives received for sustainability projects (e.g. utility incentives)
5. Interest earned on Green Fund investments.

The Green Fund will be used for funding the O&M of sustainability-related capital construction/installation projects deployed on any Metro-controlled sites. These projects would include, but are not limited to:

- (a) energy conservation and energy efficiency projects;
- (b) renewable energy installation/construction and their operation and maintenance;
- (c) resource management initiatives (e.g., water, air, stormwater, industrial wastewater impact and cost-reduction; including waste to energy projects such as those derived for example from non-hazardous/non-human biowaste); and
- (d) any other related cost-saving and process efficiency generating activities that has a positive carbon footprint reducing benefit.

Cost Savings Reinvestment to Green Fund

The sustainability asset reinvestment is a new approach for Metro. This approach will establish an internal accounting process for identifying and re-allocating savings resulting from sustainability-related projects. While the actual implementation of the accounting and tracking practices is more complex, the figure below illustrated the basic components.



This accounting model for reinvesting resource savings has many different structures. Metro is seeking to implement a Return on Investment (ROI) model as shown in Figure 17. In the ROI model, the fund accrues savings on an annual basis up until the project has reached its simple payback. Stated another way, savings will accrue until the fund receives the net cost of the project.

The quantification of the amount of savings to be allocated on an annual basis will be pre-determined and approved prior to installation. The verification that an asset's approved savings values are being achieved throughout the approved period will be executed as described in each project's M&V Plan.

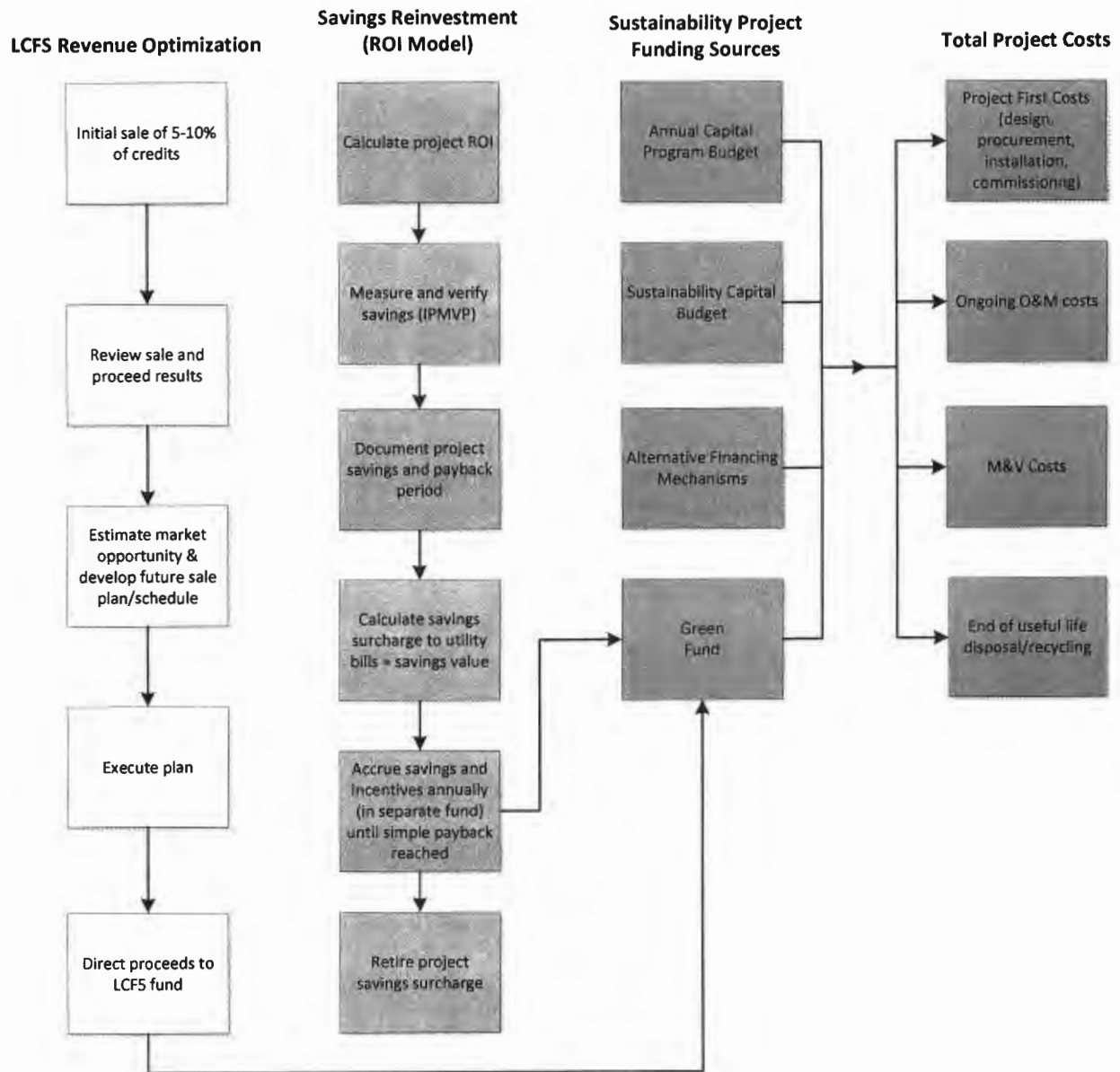


Figure 17: Sustainability Infrastructure Funding Mechanisms

M&V Asset Savings Determination

M&V savings determinations are an important factor in the long-term success of Metro's Sustainability Infrastructure Implementation and Management Plan. Resource cost savings from projects will go through the M&V process and the results will represent the verified savings values that are eligible for reinvestment into the Green Fund. To provide accurate and supported determinations for re-allocation of savings, consistent M&V protocols and international industry established techniques will justify the proposed values.

Project costs may absorb the costs associated with the necessary M&V through the initial purchase of monitoring equipment or through a separate cost incurred throughout the life of the asset. During Phase 2, the project team will estimate these costs and further refine them as applicable in Phase 3, and will include them in the final approved M&V Plan and project budget.

International Performance Measurement and Verification Protocol

Metro's determination of asset savings will be governed by the established International Performance Measurement and Verification Protocol (IPMVP®).⁶ This is an established methodology for estimating and calculating savings of energy and water resources with varying levels of complexity for different types of projects. Both energy and water industries have used and refined the M&V approach to determine resource savings over the last two decades. Accurate and reliable financial accounting for measuring and reporting savings from efficiency projects is critical for continued buy-in and support for energy and water saving projects. In California, the California Public Utilities Commission, California Energy Commission and all the investor owned utilities rely upon the IPMVP as the industry standard to determine resource savings values and progress to efficiency goals. Further, California established the existence of the Database Energy Efficiency Resource (DEER), which lists average savings for thousands of efficiency improvements that are researched, tested and updated regularly. ECSD plans to use these established approaches to determine savings with the IPMVP being the preferred approach.

The IPMVP includes different M&V approaches, or Options. Option A is the simplest method for calculating savings, while Option D is the most complex. The relative level of effort required to conduct the measurement and verification of savings typically aligns with the complexity of the approach. **Error! Reference source not found.** provides an overview of the IPMVP Options A through D, along with an example of how to use each option to measure a current asset.

⁶http://www.evo-world.org/index.php?view=download&alias=641-overviewsummary-of-ipmvp-28-38&option=com_docman&Itemid=1585&lang=en

Table 15: IPMVP Options with Metro Asset Examples

IPMVP Options	Short Description	Savings methodology	Current Asset Example
Option A	Retrofit Isolation	Field measurement of key parameters, estimates for non-key parameters	Gateway Building Low Flow Toilet and Waterless Urinal Retrofit; Division 7 Maintenance Bay Lighting Retrofit
Option B	All parameter measurement	Field measurement of all parameters	Division 8 Solar PV
Option C	Whole Facility	Field measurement and monitoring of the entire facility	Division 10 LEED Certification/Green Building
Option D	Calibrated Simulation	Computer simulation calibrated to the specific conditions of the facility	Gold Line Wayside Energy Storage

During Phase 3 project development activities, the project lead must select an IPMVP Option, or a similarly proven alternative, for any projects seeking to reinvest cost savings during the operational phase of that asset's life. The option selected for an asset should provide a reasonable level of savings estimation assurance for accounting, while maintaining a level-of-effort in-line with the project savings value to Metro. Frequency of performance will depend on the life of the asset combined with its complexity and amount of claimed savings. At a minimum, after initial commissioning and M&V of a new asset, a review of asset conditions will occur as part of the annual state of repair assessment.



File #: 2015-1593, Version: 1

**CONSTRUCTION COMMITTEE
NOVEMBER 19, 2015**

**SUBJECT: ROOF REPLACEMENT IN CONJUNCTION WITH SOLAR POWER
PURCHASE AGREEMENT PROJECT**

**ACTION: APPROVE USE OF DESIGN-BUILD CONTRACTING DELIVERY APPROACH
FOR ROOF REPLACEMENTS**

RECOMMENDATION

A. FINDING that utilizing design-build delivery pursuant to Public Utilities Code (“PUC”) Section 130242 will achieve private sector efficiencies in the **integration of the design, project work, and components related to the construction and installation of new roofs at Divisions 11 and 22 to later enable the installation of solar photovoltaic (“PV”) systems at Divisions 9, 11, 22 and the Expo Yard;**

(REQUIRES TWO-THIRDS VOTE)

B. AUTHORIZING the Chief Executive Officer to solicit a design-build contract for **design, construction and installation of new roofs for Divisions 11 and 22**, pursuant to PUC Section 130242

C. INCREASING the Life of Project Budget for the **Lighting Retrofit at two Rail Divisions project** (CP#204801) from \$1,557,000 by \$2,648,100 to include design and construction of new roofs for Divisions 11 and 22; the new LOP amount will be \$4,205,100.

ISSUE

Pursuant to Metro’s Renewable Energy Policy attached as Attachment A, Metro has committed to a 66% renewable energy use goal by 2020. One of the strategies that Metro has employed to achieve that goal is to install solar PV systems on its facilities at various Metro properties (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B). Staff has conducted assessment and evaluation studies to determine optimal locations among Metro’s real property assets for the installation of solar PV systems. As a result of such studies, Metro Divisions 9, 11, 22, and the Expo Yard have been proposed as the sites for the future installation of rooftop solar PV systems by a third party, to be selected through a competitive solicitation process (such proposed project will be referred to in this report as the “Solar PPA Project”). The solar PV systems would generate energy for Metro’s consumption that will offset a portion of the utility-provided energy

at such sites, and result in energy cost savings.

During the investment study conducted at Divisions 9, 11, 22, and the Expo Yard, it was determined that roof replacement (“Roof Replacement Work”) is necessary to support the installation of PV equipment at Divisions 11 and 22. This is necessary for two reasons: 1) the roofs at these Divisions are nearing their end of useful life and are already being scheduled to be replaced and 2) existing structures need to be reinforced to accommodate the future solar PV systems load.

Metro is authorized to enter into design-build contracts pursuant to PUC Section 130242, which requires that the Board make a finding that the work will achieve private sector efficiencies, which is why staff are seeking to use the DB method of construction. As discussed further in this report, staff is seeking Board authority to solicit a design-build contract for the Roof Replacement Work at Divisions 11 and 22, in order to ready these two sites for the future installation of the solar PV systems

DISCUSSION

As described above, the proposed Roof Replacement Work is necessary in order to facilitate the installation of the Solar PPA Project. The Solar PPA Project (and related Roof Replacement Work) is consistent with the agency’s intent to reduce the cost of energy as outlined in Metro’s Environmental Policy and Energy Conservation and Management Plan. Completion of the Solar PPA Project will allow Metro to get closer to fulfilling our renewable energy goals, decrease our carbon footprint, increase our energy independence, and reduce our operational costs. An estimate of projected energy cost savings to be realized from the Solar PPA Project is provided in Attachment C. In order to facilitate the Solar PPA Project, staff will need to issue two concurrent solicitations, one for the Roof Replacement Work (via a design-build contracting delivery approach) and one for the Solar PPA Project (via a power purchase transaction with ancillary property license agreement). This section of the report provides a discussion of these two proposed means of project delivery.

Solar PPA Project

Staff anticipates that the Solar PPA Project will be implemented by way of a public-private partnership in the form of a solar PV Power Purchase Agreement (“PPA”) transaction authorized pursuant to Government Code (“GC”) Section 4217.10 *et seq.* GC Section 4217.10 *et. seq.* permits public agencies (including Metro) to (i) develop energy conservation, cogeneration, and alternate energy supply sources on the public agency’s property, provided that certain findings are met under the statute, and (ii) request proposals from qualified persons for energy conservation projects and award such contracts through a competitive best value Request for Proposal (RFP) selection process that may take into account, among other things, the experience of the contractor, the type of technology employed by the contractor, and the cost to the agency. A PPA transaction is among the various alternative financing strategies that have been identified by staff for project delivery, as described in the attached report on Alternative Financing Mechanisms for Energy Projects dated May 15, 2013, attached as Attachment D. In a PPA transaction, Metro would license or lease its property to a third party solar energy provider (“Power Provider”). The Power Provider installs the solar PV system on Metro’s property, and Metro purchases solar energy from the Power Provider at a negotiated cost, which cost is projected to be less than the anticipated marginal cost to the agency

that would have otherwise been consumed from other sources. The Power Provider, selected through a competitive solicitation process pursuant to Section 4217.10 *et. seq.*, will design, finance, and furnish the solar PV system, and maintain the system for at least twenty (20) years. The amount of energy produced by the solar PV system and the net monetary savings to Metro shall be guaranteed in the form of PPA performance incentives that focus on kilowatt hours to be generated and costs avoided.

Upon completion of the analysis of the best solar PV system/PPA, staff will seek Board approval for the award of the PPA contract compliance with the requirements of GC Section 4217.10 *et seq.*

Roof Replacement Work

The roofs at Divisions 11 and 22 were installed 26 and 21 years ago, respectively. Maintenance service requests files reviewed by staff show repairs made due to roof leaks, drywall repair, repainting, and mold remediation among others. It is therefore timely that the repair off these roofs occur in conjunction with the Solar PPA Project. The Roof Replacement Work will be conducted according to or consistent with all applicable codes, and furthermore, the technical specifications will require that the roofs have the structural capacity to accommodate solar PV system facilities.

The Roof Replacement Work will be solicited via a design-build contracting delivery approach. Utilization of a design-build process is allowed under Public Utilities Code Section 130242, which provides for award of a design-build contract to the lowest responsive and responsible bidder. The primary benefit of the design-build process is a shortened project schedule where the design-builder is able to start demolition/construction while the design is being completed as well as including additional efficiencies in project management, administration and coordination, all of which benefits, facilitate, and expedite project completion.

The design-build contracting delivery approach was selected for the Roof Replacement Work based on the following considerations:

- A single point of responsibility for design and construction will increase the time and management efficiency on the implementation of the projects;
- Staff project development resources are limited, so more budgeted projects can be accomplished by adding design-build capability;
- Metro's design risks are shifted to design-builder, while changes related to design are minimized;
- The project requires standard or minimal design effort and is therefore more conducive to being implemented by design-build contractors with general engineering and contracting capacity.

Approval of the action described in this report would allow staff to proceed with a solicitation utilizing the design-build contracting delivery approach pursuant to Public Utilities Code Section 130242 for the Roof Replacement Work.

DETERMINATION OF SAFETY IMPACT

This Board action will not have an adverse impact on safety standards for Metro. It will however increase safety for Metro maintenance and contractor personnel that may be required to maintain the PV equipment as well as other projects that should become more energy and operationally efficient.

FINANCIAL IMPACT

The current FY16 budget for this project is \$554,000. The FY16 \$1,000,000 funding increase for this project will partially come from Project Number 450003, Miscellaneous Contingency-Capital Construction, in Cost Center 8510. The additional \$1,648,100 will be included as part of the FY17 Capital Program for a total project budget of \$2,648,100.

Since this is a multi-year capital project, the cost center manager and Executive Director, Program Management and the Executive Officer, Environmental Compliance and Sustainability will be responsible for budgeting in future years.

Impact to Budget

The initial \$1,000,000 source of FY16 funds for this project will come from Project 450003, Miscellaneous Contingency-Capital Construction and the Green Fund which is used to support the execution of sustainability-related infrastructure projects. The balance of the FY16 funding required for this project comes from Proposition A 35% cash/bonds. The additional future funding for the LOP increase will also be Proposition A 35% cash / bonds which impacts Rail Operating and Capital budgets.

The Solar PPA Project will be funded and financed by the Power Provider who will be awarded the PPA contract at a later date, following Board approval. Staff will provide additional information at the time that staff seeks Board approval for awarding of the contract for the Roof Replacement Work and Solar PPA Project.

ALTERNATIVES CONSIDERED

Metro has committed to using up to 66% of its energy from renewable energy sources. Installation of solar panels at our facilities has been employed for some time. We have an opportunity through this project to replace roofs that are at the end of their useful life at Divisions 11 and 22 as an integral part of our renewable energy program.

The Board may reject the request to contract for the Roof Replacement Work; and consequently force Metro to wait until an unknown future time that the roofs are replaced before we can install any solar PV systems. This will have a cumulative effect on our achievement of our renewable energy use goal.

NEXT STEPS

After the recommended Board Action is approved, staff will release an Invitation for Bids (IFB) to solicit a design-build contractor to install the new roofs at Divisions 11 and 22. In parallel, staff will also release an RFP to solicit a Power Provider to install, operate and maintain the solar PV systems at Divisions 9, 11, 22 and the Expo Yard. Upon evaluation of the IFB bids and RFP proposals for each respective solicitation, staff will seek Board approval prior to awarding or the two contemplated contracts. Approval of the two contracts will include determinations of compliance with the requirements of PUC Section 13242 (for the Roof Replacement Work) and GC Section 4217.10 *et seq.* (for the Solar PPA Project).

ATTACHMENTS

Attachment A - Renewable Energy Policy

Attachment B - Funding and Operating Sustainability-Related Infrastructure report dated September 18, 2014

Attachment C - Solar PPA Estimated Energy and Operational Costs Avoided Over 25- years

Attachment D - Report on Alternative Financing Mechanisms for Energy Projects dated May 15, 2013

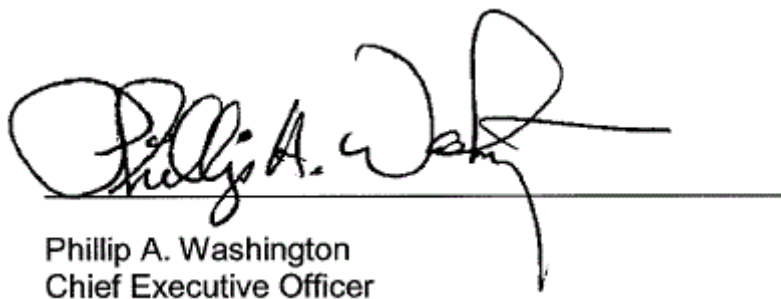
Prepared by:

Cris B. Liban, EO, Environmental Compliance and Sustainability (213) 922-2471

Bryan Pennington, Deputy Executive Director, Program Management (213) 922-7449

Reviewed by:

Richard Clarke, Executive Director, Program Management (213) 922-7557



Phillip A. Washington
Chief Executive Officer

**Metro**Los Angeles County
Metropolitan Transportation AuthorityOne Gateway Plaza
Los Angeles, CA 90012-2952213.922.2000 Tel
metro.net**FINANCE, BUDGET AND AUDIT COMMITTEE
MAY 15, 2013****SUBJECT: ALTERNATIVE FINANCING MECHANISMS FOR ENERGY PROJECTS****ACTION: AUTHORIZE CEO TO UTILIZE ALTERNATIVE FINANCING TO
ACCELERATE ENERGY PROJECTS****RECOMMENDATION**

- A. Authorize the Chief Executive Officer (CEO) to Apply Utility-Related Financing in Accelerating Energy Program Implementation; and
- B. Authorize the CEO to use Project Number 450001 funds for administration of projects developed using Utility-Related Financing.

ISSUE

On March 20, 2013, Metro staff presented to the Finance, Budget and Audit Committee its findings from a comprehensive survey of the various alternative financing strategies and identified specific funding mechanisms that can be available for energy and sustainability-related capital projects potentially available to the agency. The Committee responded favorably towards the presentation of alternative financing opportunities and encouraged the pursuit of these opportunities that are easily implemented.

DISCUSSION

Management of the agency's energy and resource consumption and efficiency matters is handled by the Environmental Compliance and Services Department (ECSD). In this capacity, Metro ECSD is working closely with our utility service providers, through the formation of Metro's Energy Blue Ribbon Collaborative (Energy BRC). The Energy BRC is chaired by Metro's CEO and currently consists of executives from the Los Angeles Department of Water and Power, Southern California Edison, Southern California Gas Company and a professor from UCLA's Luskin Institute.

Among other things, the Energy BRC has been working to identify incentives, rebates, and other financing mechanisms to promote the agency's energy efficiency projects. It is also designed to ensure seamless cooperation on all identified energy-related collaborative efforts that simultaneously support regional energy as well as individual Energy BRC member goals. The Energy BRC work is very important to Metro as staff anticipates a significant increase in energy use and most importantly cost (up to 100% increase) during this time of transit and facility expansion. The Energy BRC work is aligned with staff's internal sustainability program.

As presented to the Finance, Budget and Audit Committee, the following are some of the alternative financing opportunities available for energy related projects:

- **On Bill Financing (OBF) / Repayment Programs** – some utilities offer low to no interest "On Bill Financing" to their customers. On Bill Financing or similar financing mechanisms help to fund qualifying energy efficiency projects by providing loans that are repaid as a line item on monthly bills. Qualifying equipment funded through OBF is then eligible for incentives through the rebate programs described above. Some of the anticipated projects noted under the Energy Efficiency Incentive Programs category, may also be eligible for this financing mechanism. These may include:
 - Retrofit of lighting systems
 - Replacement of outdated, inefficient building systems
 - Completion of retro-commissioning activities on energy systems

- **Renewable Energy Programs** – There are three main types of renewable Energy Programs or Financing Structures. Incentive programs like described above offer on time revenue and would be realized if and when LACMTA installs its own renewable energy systems. Project support can be in the form of Renewable Energy Power Purchase Agreements. This mechanism allows for guaranteed revenue to repay the investment of renewable energy systems or rental of land or roof space to 3rd party providers. Feed in Tariff Programs allow for guaranteed revenue from the utility to repay the investment of renewable energy systems that Metro would need to finance. Anticipated projects eligible for this financing mechanism include:
 - Installation of solar (PV) panels as part of the construction of Division 13, a new bus maintenance in the downtown Los Angeles area
 - Installation of solar (PV) panels at two locations as part of the Energy Efficiency and Renewable Energy projects submitted for funding under the FY14 Capital Program

- **Grants and Other Opportunities** – Metro diligently searches for and prepares grant applications to pursue new innovative energy efficiency ideas that may lead to an expanded project that will reap greater energy saving benefits. Some of these grant opportunities are done in partnership with entities who have secured

grants for installation of value-creating or cost-saving projects along our system. Projects currently using this financing mechanism include:

- Metro Red Line Westlake/MacArthur Park Station Wayside Energy Storage System (FTA: \$4.5M)
- Metro Gold Line Wayside Energy Storage System (SCAQMD: \$800,000)
- Metro Electric Vehicle Charger Stations (CEC: \$180,000)

Authorization to use these alternate financing mechanisms will contribute to funding for energy efficiency projects that will increase savings realized from a reduction in energy consumption and an accelerated payback period due to offset of project costs.

In conjunction with the Energy BRC, Metro staff is developing project packages for lighting retrofit and other energy-related projects; and will explore grant opportunities. The energy audits, cost estimates, cost-benefit analysis efforts are intended to identify priority locations to implement all of these anticipated projects.

DETERMINATION OF SAFETY IMPACT

This program will have no impact on safety.

FINANCIAL IMPACT

Administrative funding for these projects are included in the FY13 budget in cost center 8420, Environmental Compliance and Services, under project number 450001, Task Order 1.01.

Since these are going to be multi-year project, the cost center manager and Executive Director, Transit Project Delivery will be accountable for budgeting the cost in future years.

Source of funds

As specific energy-related projects are identified that are associated with utility-related financing, Capital Project workbooks will be developed and request for funding will be requested from the annual capital funding program or if already associated with a capital project, from their associated project budget, upon approval by the responsible Project Manager. If the technology is innovative and a pilot is needed, Board approved Sustainability Capital funding will be used to commence project. Examples of projects that have already been identified in FY13 to FY14 are included in Attachment A.

Impact to Budget

There will be no net impact to the Bus and Rail Operating and Capital Budgets. There will initially be an impact to the budgets from this action as qualifying equipment will be more expensive than lowest cost options. Utility-related financing require better

performing products that command a premium but cost savings over project life cycle will offset these added costs.

ALTERNATIVES CONSIDERED

Rejection of the recommended Board action will reduce staff's ability to pursue alternative financing options that will otherwise be available to Metro. Rejection of the staff recommendation is also inconsistent with the provisions of our Board adopted Environmental Policy, Sustainability and Energy Policy, and Renewable Energy Policy that specifically commits to specific actions in pursuing all available options to reduce energy costs, meet agency-wide renewable energy use of 33% by 2020, and enhance energy performance in all existing facilities.

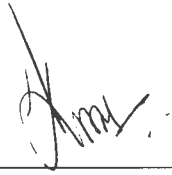
NEXT STEPS

After Board approval of this action; 1) discuss proposed energy efficiency projects with our Energy BRC partners to identify alternative financing opportunities; 2) prepare project workbooks to establish project budgets; and 3) initiate energy related projects using alternative financing mechanism.

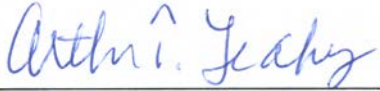
ATTACHMENT

A. Example of Energy-Related Projects

Prepared by: Cris B. Liban, DEO, Environmental Compliance and Services, (213) 922-2471



Krishniah N. Murthy
Executive Director, Transit Project Delivery



Arthur T. Leahy
Chief Executive Officer

Example of Energy-Related Projects

Natural Gas Projects	Facility	Est. Annual Gas Savings (Therms)	Estimated Project Cost	Estimated Annual Cost Savings	Incentive Amount
Boiler Replacement	Gateway Bldg	21,183	\$370,644	\$13,769	\$6,000
RCx: Increase Deadband	Gateway Bldg	2,711	\$8,000	\$1,762	\$2,711
RCx: Boiler Lockout	Gateway Bldg	29,596	\$40,000	\$19,238	\$29,596
New Construction—Comprehensive	Expo Phase II	3,944	\$113,300	\$28,743	\$3,944
		57,434	\$531,944	\$63,512	\$42,251
Electricity Projects	Facility	Est. Annual Electricity Savings (kWh)	Estimated Project Cost	Estimated Annual Cost Savings	Incentive Amount
High Bay Lighting Retrofit	Division 7	638,122	\$226,219	\$70,193	\$19,144
High Bay Lighting Retrofit	Division 9	115,328	\$54,373	\$13,839	\$3,460
Office Retrofit	Division 18	62,862	\$1,660	\$7,229	-
Full Building Lighting Retrofit	Division 11	2,235,832	\$915,088	\$245,942	\$67,075
Full Building Lighting Retrofit	Division 22	1,530,276	\$636,873	\$168,330	\$45,908
Full Building Lighting Retrofit	Division 7	58,473	\$35,888	\$6,432	\$1,754
Full Building Lighting Retrofit	Division 9	682,007	\$332,198	\$75,021	\$20,460
New Construction—Comprehensive	Expo Phase II	117,138	\$267,900	\$28,743	\$59,761
Full Building Lighting Retrofit	Gateway Bldg	1,343,966	\$829,452	\$147,836	\$103,140
Parking Structure Lighting Retrofits	Gateway Bldg	538,600	\$431,800	\$62,700	
Cooling Tower VFD	Gateway Bldg		\$60,000		
3rd Floor RC	Gateway Bldg	3,698	\$30,000	\$444	
HHW VFD - Boiler Replacement	Gateway Bldg		\$22,000		
RCx: Increase Deadband	Gateway Bldg	29,837	\$6,000	\$3,282	\$2,387
RCx: Supply Duct Static Pressure Reset	Gateway Bldg	62,941	\$37,000	\$6,923	\$5,035
RCx: Boiler Lockout	Gateway Bldg	86,667	\$6,000	\$9,533	\$6,933
RCx: Chilled Water Reset	Gateway Bldg	45,693	\$4,000	\$5,026	\$3,655
RCx: Condensor Water Supply Temp. Reset	Gateway Bldg	157,529	\$12,500	\$17,328	\$12,602
Office Retrofit	Division 15	24,866	\$1,545	\$2,984	-
		7,733,835	\$3,910,496	\$871,786	\$351,315
Solar (PV) Panel Projects	Facility	Est. Annual Electricity Production (kWh)	Estimated Project Cost	Est. Annual Cost Savings	Incentive Amount
Rooftop PV Installation - Main Shop	Division 20	1,132,603	\$2,331,829	\$117,677	\$732,860
Rooftop PV Installation - Maintenance Bldg	Division 10	407,316	\$958,392	\$42,320	\$263,558
		1,539,919	\$3,290,221	\$159,998	\$996,418



Board Report

File #: 2017-0427, File Type: Informational Report

Agenda Number: 26

CONSTRUCTION COMMITTEE JULY 20, 2017

**SUBJECT: ALTERNATIVE FINANCING MECHANISM FOR
RENEWABLE ENERGY AND ROOF REPLACEMENT**

**ACTION: REAFFIRM THE USE OF POWER PURCHASE AGREEMENT TO IMPLEMENT
A DESIGN-BUILD PROJECT AND APPROVE USE OF DESIGN-BUILD
PROJECT DELIVERY METHOD FOR ROOF REPLACEMENTS AND SOLAR
PHOTOVOLTAIC SYSTEMS**

RECOMMENDATION

CONSIDER:

- A. REAFFIRMING the use of a Power Purchase Agreement (PPA) to implement a design-build project at Divisions 9, 11, 14 (Expo Yard), and 22 (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B) including the design, construction and installation of new roofs for Divisions 11 and 22 to be paid for through a PPA; and
- B. FINDING that use of the design-build contracting delivery approach pursuant to Public Utilities Code Section 130242, et. seq. will achieve certain private sector efficiencies in the integration of the design and construction by providing for the award of a design-build contract to the lowest responsive and responsible bidder for the installation of new roofs at Divisions 11 and 22 and installation of solar photovoltaic ("PV") systems at Divisions 9, 11, 14, and 22, which will be solicited through either an Invitation for Bid (IFB) or Request for Proposal (RFP) procurement method.

ISSUE

Pursuant to Metro's Renewable Energy Policy attached as Attachment A, Metro has committed to a 66% renewable energy use goal by 2020. One of the strategies that Metro has employed to achieve that goal is to install solar PV systems on its facilities at various Metro properties (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B). That authority allows the use of Renewable Energy Power Purchase Agreements (PPAs). This mechanism allows for guaranteed revenue to repay the investment of renewable energy systems or rental of land or roof

space to 3rd party providers.

Staff's assessments and evaluation studies conclude that four of the optimal locations among Metro's real property assets for the installation of solar PV systems are Metro Divisions 9, 11, 22, and the Expo Yard. Staff also determined that based on available utility programs at these locations as well as available incentives, use of a PPA (discussed further below) would be appropriate ("**Solar PPA Project**"). The Solar PPA Project would generate energy for Metro's consumption that will offset a portion of the utility-provided energy at such sites, and is projected to result in energy cost savings.

Roof replacement work ("**Roof Replacement Work**") is necessary to support the installation of solar PV equipment at Divisions 11 and 22. The roofs at these Divisions are at the end of their useful life and are already being scheduled to be replaced. Existing structures at these divisions also need to be reinforced to accommodate the future solar PV systems load.

DISCUSSION

As described above, the proposed Roof Replacement Work is necessary in order to facilitate the installation of the Solar PPA Project. This section of the report provides a discussion of how the PPA works as well as the additional details on the justification of the Roof Replacement work.

Solar PPA Project

Staff anticipates that the Solar PPA Project will be implemented by way of a public-private partnership in the form of a solar PV PPA transaction authorized pursuant to Government Code ("GC") Section 4217.10 *et seq.* A PPA transaction is among the various alternative financing strategies that have been identified by staff for project delivery, as described in the attached report on Alternative Financing Mechanisms for Energy Projects dated May 15, 2013, attached as Attachment D. In a PPA transaction, Metro would license or lease its property to a third party solar energy provider ("**Power Provider**"). The Power Provider installs the solar PV system on Metro's property, and Metro purchases solar energy from the Power Provider at a negotiated cost, which cost is projected to be less than the anticipated marginal cost to the agency that would have otherwise been consumed from other sources. The Power Provider, selected through a competitive solicitation process pursuant to the contracting authority sought hereunder, will design, finance, and furnish the solar PV system, and maintain the system for at least twenty (20) years. The amount of energy produced by the solar PV system and the net monetary savings to Metro shall be guaranteed in the form of PPA performance incentives that focus on kilowatt hours to be generated and costs avoided.

Upon completion of the analysis of the best Solar PPA Project, staff will seek Board approval for the award of the PPA contract in compliance with the requirements of GC Section 4217.10 *et seq.*

Roof Replacement Work

The roofs at Divisions 11 and 22 were installed approximately 26 and 21 years ago, respectively. Maintenance service requests files reviewed by staff show repairs made due to roof leaks, drywall repair, repainting, and mold remediation among others. It is therefore timely that the repair of these roofs occurs in conjunction with the Solar PPA Project. The Roof Replacement Work will be conducted according to or consistent with all applicable codes, and furthermore, the technical specifications will require that the roofs have the structural capacity to accommodate solar PV system facilities.

The Roof Replacement Work will be solicited as part of the PPA solicitation and will be installed as part of the awarded contract resulting from the solicitation.

DETERMINATION OF SAFETY IMPACT

This Board action will not have an adverse impact on safety standards for Metro. It will however increase safety for Metro maintenance and contractor personnel that may be required to maintain the PV equipment as well as other projects that should become more energy and operationally efficient.

FINANCIAL IMPACT

Funding for staff support of this project will come from Project Number 450003, Miscellaneous Contingency-Capital Construction, in Cost Center 8510. Since the roof is to be funded through the PPA, there will be no additional funding that is required of Metro for capital and operations and maintenance during the life of the solar panels.

Since this is a multi-year capital project, the cost center manager and Chief Program Management Officer and the Executive Officer, Environmental Compliance and Sustainability will be responsible for budgeting in future years.

Impact to Budget

FY18 funding required for this project comes from Proposition A 35% cash/bonds.

The Solar PPA Project and the Roof Replacement Work will be funded and financed by the Power Provider who will be awarded the PPA contract at a later date, following Board approval. Staff will provide additional information at the time that staff seeks Board approval for awarding of the contract for the Roof Replacement Work and Solar PPA Project.

ALTERNATIVES CONSIDERED

Metro has committed to using up to 66% of its energy from renewable energy sources. Installation of

solar panels at our facilities has been employed for some time. We have an opportunity through this project to replace roofs that are at the end of their useful life at Divisions 11 and 22 as an integral part of our renewable energy program.

The Board may reject the request to use the PPA alternative financing mechanism contract for Solar PPA Work and the Roof Replacement Work; and consequently force Metro to simply replace the roof at our own cost and in the future retrofit for the installation future installation of solar panels. This series of steps will have a cumulative effect on our achievement of our renewable energy use goal, protecting employee health, and replacing our infrastructure with as small capital outlay to our agency as possible.

NEXT STEPS

After the recommended Board Action is approved, staff will release an Invitation for Bids (IFB) to solicit a design-build contractor for the PPA and to install the new roofs at Divisions 11 and 22. Upon evaluation of the IFB bids, staff will seek Board approval prior to award of contract.

ATTACHMENTS

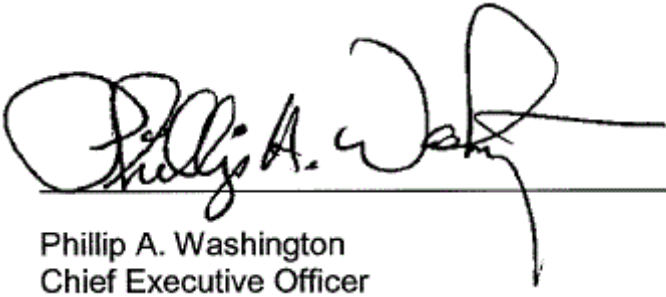
- Attachment A - Renewable Energy Policy
- Attachment B - Funding and Operating Sustainability-Related Infrastructure report
dated September 18, 2014
- Attachment C - Report on Design Build, November 19, 2015
- Attachment D - Report on Alternative Financing Mechanisms for Energy Projects
dated May 15, 2013

Prepared by:

Cris B. Liban, EO Environmental Compliance and Sustainability, (213) 922-2471

Reviewed by:

Richard Clarke, Chief Program Management Officer, (213) 922-7557
Debra Avila, Chief Vendor/Contract Management Officer, (213) 418-3051



Phillip A. Washington
Chief Executive Officer

**Board Report**

File #: 2017-0427, **File Type:** Informational Report

Agenda Number: 26

**CONSTRUCTION COMMITTEE
JULY 20, 2017**

**SUBJECT: ALTERNATIVE FINANCING MECHANISM FOR
RENEWABLE ENERGY AND ROOF REPLACEMENT**

**ACTION: REAFFIRM THE USE OF POWER PURCHASE AGREEMENT TO IMPLEMENT
A DESIGN-BUILD PROJECT AND APPROVE USE OF DESIGN-BUILD
PROJECT DELIVERY METHOD FOR ROOF REPLACEMENTS AND SOLAR
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RECOMMENDATION

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- A. REAFFIRMING the use of a Power Purchase Agreement (PPA) to implement a design-build project at Divisions 9, 11, 14 (Expo Yard), and 22 (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B) including the design, construction and installation of new roofs for Divisions 11 and 22 to be paid for through a PPA; and
- B. FINDING that use of the design-build contracting delivery approach pursuant to Public Utilities Code Section 130242, et. seq. will achieve certain private sector efficiencies in the integration of the design and construction by providing for the award of a design-build contract to the lowest responsive and responsible bidder for the installation of new roofs at Divisions 11 and 22 and installation of solar photovoltaic ("PV") systems at Divisions 9, 11, 14, and 22, which will be solicited through either an Invitation for Bid (IFB) or Request for Proposal (RFP) procurement method.

ISSUE

Pursuant to Metro's Renewable Energy Policy attached as Attachment A, Metro has committed to a 66% renewable energy use goal by 2020. One of the strategies that Metro has employed to achieve that goal is to install solar PV systems on its facilities at various Metro properties (see Funding and Operating Sustainability-Related Infrastructure report, attached as Attachment B). That authority allows the use of Renewable Energy Power Purchase Agreements (PPAs). This mechanism allows for guaranteed revenue to repay the investment of renewable energy systems or rental of land or roof

space to 3rd party providers.

Staff's assessments and evaluation studies conclude that four of the optimal locations among Metro's real property assets for the installation of solar PV systems are Metro Divisions 9, 11, 22, and the Expo Yard. Staff also determined that based on available utility programs at these locations as well as available incentives, use of a PPA (discussed further below) would be appropriate ("**Solar PPA Project**"). The Solar PPA Project would generate energy for Metro's consumption that will offset a portion of the utility-provided energy at such sites, and is projected to result in energy cost savings.

Roof replacement work ("**Roof Replacement Work**") is necessary to support the installation of solar PV equipment at Divisions 11 and 22. The roofs at these Divisions are at the end of their useful life and are already being scheduled to be replaced. Existing structures at these divisions also need to be reinforced to accommodate the future solar PV systems load.

DISCUSSION

As described above, the proposed Roof Replacement Work is necessary in order to facilitate the installation of the Solar PPA Project. This section of the report provides a discussion of how the PPA works as well as the additional details on the justification of the Roof Replacement work.

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Upon completion of the analysis of the best Solar PPA Project, staff will seek Board approval for the award of the PPA contract in compliance with the requirements of GC Section 4217.10 *et seq.*

Roof Replacement Work

The roofs at Divisions 11 and 22 were installed approximately 26 and 21 years ago, respectively. Maintenance service requests files reviewed by staff show repairs made due to roof leaks, drywall repair, repainting, and mold remediation among others. It is therefore timely that the repair of these roofs occurs in conjunction with the Solar PPA Project. The Roof Replacement Work will be conducted according to or consistent with all applicable codes, and furthermore, the technical specifications will require that the roofs have the structural capacity to accommodate solar PV system facilities.

The Roof Replacement Work will be solicited as part of the PPA solicitation and will be installed as part of the awarded contract resulting from the solicitation.

DETERMINATION OF SAFETY IMPACT

This Board action will not have an adverse impact on safety standards for Metro. It will however increase safety for Metro maintenance and contractor personnel that may be required to maintain the PV equipment as well as other projects that should become more energy and operationally efficient.

FINANCIAL IMPACT

Funding for staff support of this project will come from Project Number 450003, Miscellaneous Contingency-Capital Construction, in Cost Center 8510. Since the roof is to be funded through the PPA, there will be no additional funding that is required of Metro for capital and operations and maintenance during the life of the solar panels.

Since this is a multi-year capital project, the cost center manager and Chief Program Management Officer and the Executive Officer, Environmental Compliance and Sustainability will be responsible for budgeting in future years.

Impact to Budget

FY18 funding required for this project comes from Proposition A 35% cash/bonds.

The Solar PPA Project and the Roof Replacement Work will be funded and financed by the Power Provider who will be awarded the PPA contract at a later date, following Board approval. Staff will provide additional information at the time that staff seeks Board approval for awarding of the contract for the Roof Replacement Work and Solar PPA Project.

ALTERNATIVES CONSIDERED

Metro has committed to using up to 66% of its energy from renewable energy sources. Installation of

solar panels at our facilities has been employed for some time. We have an opportunity through this project to replace roofs that are at the end of their useful life at Divisions 11 and 22 as an integral part of our renewable energy program.

The Board may reject the request to use the PPA alternative financing mechanism contract for Solar PPA Work and the Roof Replacement Work; and consequently force Metro to simply replace the roof at our own cost and in the future retrofit for the installation future installation of solar panels. This series of steps will have a cumulative effect on our achievement of our renewable energy use goal, protecting employee health, and replacing our infrastructure with as small capital outlay to our agency as possible.

NEXT STEPS

After the recommended Board Action is approved, staff will release an Invitation for Bids (IFB) to solicit a design-build contractor for the PPA and to install the new roofs at Divisions 11 and 22. Upon evaluation of the IFB bids, staff will seek Board approval prior to award of contract.

ATTACHMENTS

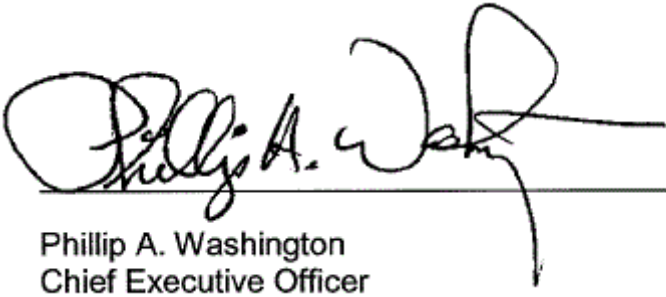
- Attachment A - Renewable Energy Policy
- Attachment B - Funding and Operating Sustainability-Related Infrastructure report
dated September 18, 2014
- Attachment C - Report on Design Build, November 19, 2015
- Attachment D - Report on Alternative Financing Mechanisms for Energy Projects
dated May 15, 2013

Prepared by:

Cris B. Liban, EO Environmental Compliance and Sustainability, (213) 922-2471

Reviewed by:

Richard Clarke, Chief Program Management Officer, (213) 922-7557
Debra Avila, Chief Vendor/Contract Management Officer, (213) 418-3051



Phillip A. Washington
Chief Executive Officer



Board Report

File #: 2017-0470, File Type: Oral Report / Presentation

Agenda Number: 27

CONSTRUCTION COMMITTEE JULY 20, 2017

**SUBJECT: ORAL REPORT OF THE PROGRAM MANAGEMENT
CHIEF OFFICER**

RECOMMENDATION

RECEIVE oral report by the Program Management Chief Officer.

DISCUSSION

- A. Update report covering the month of July 2017 by the Program Management Chief Officer; and
- B. At the January 2017 meeting, the Board authorized a one-year pilot program authorizing the CEO to negotiate and execute project-related agreements, including contract modification(s) up to the authorized Life of Project budget, to streamline project management of the four (4) major transit corridor projects (Crenshaw/LAX, Regional Connector, Westside Purple Line Extension Section 1 and 2 projects). In addition, staff was directed to provide monthly reports, that would include any pending project-related agreements, change orders/contract modifications and any significant changes to contingency.

Pursuant to the Board motion, staff has developed and begun reporting on cost contingency and contract change activity starting in the February 2017 Monthly Update to the Construction Committee. This new report includes a project cost contingency drawdown curve and allows the Board to see project-related and change activity. This report can be found in Attachment A.

At the conclusion of the one-year pilot program in January 2018, staff will report back to the Board on the time saved as result of this pilot program, and any lessons learned, and recommendations for the Board review and further direction.

- C. Program Management is continuously improving project delivery through innovation and application of best practices. Attachment A summarized the progress achieved in FY2017.

ATTACHMENTS

Attachment A - Program Management Chief Officer's Report - JULY 2017

Prepared by:

- **Crenshaw/LAX** - Charles Beauvoir, Deputy Executive Officer, Project Mgmt., (213) 299-3095
- **Regional Connector** - Gary Baker, Deputy Executive Officer, Project Mgmt., (213) 893-7191
- **Westside Purple Line Ext 1** - James Cohen, DEO Project Mgmt., (213) 922-7911
- **Westside Purple Line Ext 2** - Michael McKenna, EO Project Mgmt., (213) 312-3132
- **Patsaouras Plaza Busway Station** - Timothy Lindholm, EO Project Engr., (213) 922-7297
- **Willowbrook/Rosa Park Station** - Timothy Lindholm, EO Project Engr., (213) 922-7297
- **Blue Line Projects** - Androush Danielians, DEO Project Mgmt.(Interim)., (213) 922-7598
- **Presentation** - Yohana Jonathan, Departmental System Analyst, (213) 922-7592

Program Management Chief Officer's Report

Project Status Report

Presented By

Richard Clarke

Chief Program Management Officer













July 2017

Construction Committee

Los Angeles County Metropolitan Transportation Authority



PROJECT BUDGET & SCHEDULE STATUS SUMMARY CHART

Project	Cost Performance	Schedule Performance	Comments
Crenshaw/LAX			The remaining cost contingency is below the 3% of total project budget reserve (\$43 million in contingency remains). Contractor implementing schedule mitigations to maintain planned revenue service in October 2019.
Regional Connector			Project is proceeding consistent with schedule forecast and revised LOP budget as approved by the Board in January 2017.
Westside Purple Line Extension-Section 1			Project is 20% complete, no significant issues.
Westside Purple Line Extension-Section 2			Notice to Proceed for the Design/Build Contract C1120 was issued on April 26, 2017.
Patsaouras Plaza			Schedule negotiations in progress regarding revised substantial completion date of November 2018.
Willowbrook/Rosa Parks Station			Design activities progressing to 100% complete. Life of Project (LOP) budget approval scheduled for September Board meeting.

July 2017



On target



Possible problem



Major issue



Metro 2

Construction Committee

Los Angeles County Metropolitan Transportation Authority

CRENSHAW/LAX TRANSIT PROJECT

◇ BUDGET	Current	Forecast
TOTAL COST	\$2,058M	\$2,058M

◇ SCHEDULE	Current	Forecast
REVENUE OPERATION	Oct 2019	Oct 2019

- Overall project progress is 66% complete with contractor maintaining schedule by mitigating any potential schedule delays.
- Contractor continues trackwork installation along southern area of alignment.
- All below, at-grade and aerial structures are on schedule.
- Continuing critical street and utility work in Park Mesa Heights area.
- Southwestern Yard contractor on schedule with work continuing on main shop pits and foundation.



Completed deck concrete placement for I-405 bridge structure.



Installation of rebar for UG#4 south of Leimert Park Station.

July 2017



On target



Possible problem



Major issue



Metro 3

Construction Committee

Los Angeles County Metropolitan Transportation Authority

REGIONAL CONNECTOR TRANSIT CORRIDOR



BUDGET

	Current	Forecast
TOTAL COST	\$1,810M	\$1,810M

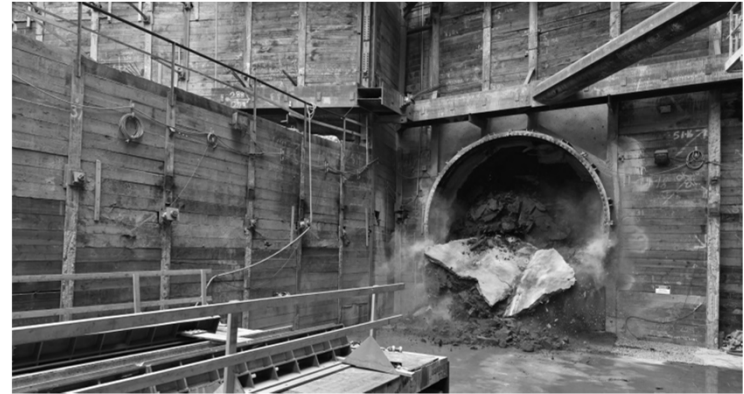
* Includes Board approved LOP plus Finance costs.



SCHEDULE

	Current Dec 2021	Forecast Dec 2021
REVENUE OPERATION		

- Overall Project Progress is 36%.
- TBM breakthrough at Grand Av Arts/Bunker Hill Station occurred June 1st.**
- TBM relaunched on June 14th to mine from Grand Av Arts/Bunker Hill Station toward the 4th/Flower TBM Retrieval Shaft.
- Successfully implemented temporary 6th Street Closure.
- Tie-back installation, station excavation, and utility hanging continue at Broadway Station.
- Preparation for LA County storm drain (Hobas) pipe installation continues at Broadway Station.
- Pile installation, excavation/lagging and utility hanging continue under Flower Street decking.
- Left tunnel eye installation at TBM Retrieval Shaft underway, in preparation to receive TBM.
- 6th/Flower power asset relocation designs advancing through collaborative efforts.



TBM breaking through Grand Av Arts/Bunker Hill Station



TBM in Grand Av Arts/Bunker Hill Station preparing for relaunch

July 2017



On target



Possible problem



Major issue

Construction Committee

Los Angeles County Metropolitan Transportation Authority



Metro 4

WESTSIDE PURPLE LINE EXTENSION – SECTION 1

OK BUDGET

	Current	Forecast
TOTAL COST*	\$3,154M	\$3,154M

* Includes Board approved LOP plus Finance costs.

OK SCHEDULE

	Current	Forecast
REVENUE OPERATION	Oct 2024	Nov 2023
	FFGA	

- Overall Project Progress is 20% complete.
- Excavation for the Wilshire/La Brea Station commenced on October 12, 2016 and continues beneath the deck panels. First level walers and struts are complete and second level excavation, waler and strut installation is on going. Station excavation is scheduled to complete by December 2017.
- The Wilshire/Fairfax pile installation operation completed on February 8, 2017. Street decking commenced on the weekend of February 11, 2017, and completed on June 19, 2017. Steady-state traffic control is anticipated in mid-July 2017.
- The Wilshire/La Cienega Station piling operation, which commenced on March 20, 2017, continues. Stage 1 piling along the south side of Wilshire Boulevard is complete. The traffic switch to the north side of Wilshire Boulevard for Stage 2 piling occurred on June 24, 2017.
- The jet grouting operation along Wilshire Boulevard at the cross passages continues. This work along the tunnel section from Wilshire/La Brea to Wilshire/Western is scheduled to continue through October 2017.
- Tunnel Boring Machines (TBMs) are being fabricated for delivery at the end of 2017. Tunneling is planned to start in 2018.



Under Deck Excavation at Wilshire/La Brea Station



Decking Operation at Wilshire/Fairfax Station

July 2017



On target



Possible problem



Major issue

Construction Committee

Los Angeles County Metropolitan Transportation Authority



Metro 5

WESTSIDE PURPLE LINE EXTENSION – SECTION 2

OK BUDGET

	Current	Forecast
TOTAL COST*	\$2,530M	\$2,530M

* Includes Board approved LOP and Finance charges.

OK SCHEDULE

	Current	Forecast
REVENUE OPERATION	Dec 2026	Aug 2025
	FFGA	

- Contract C1120 Design Build Contractor began final design.
- Construction of the telecom joint trench is proceeding in Century City. Duct bank work planned completion is June 2017 and subsequent cable pulling/splicing is anticipated for completion in September 2017.
- Los Angeles Department of Water and Power utility relocations began at the Century City Constellation Station in May 2017 for both water and power.
- Negotiations with the City of Beverly Hills for a Memorandum of Agreement governing utility work began in March 2017 and is continuing.
- Beverly Hills City Council approval for the construction permit is anticipated in June 2017.
- Advanced utility relocations are anticipated to begin at the Wilshire/Rodeo Station in July 2017.



LADWP water relocation work in Century City

July 2017



On target



Possible problem



Major issue


Construction Committee


Los Angeles County Metropolitan Transportation Authority



Metro 6

PATSAOURAS PLAZA BUSWAY STATION

 BUDGET		
	Current	Forecast
TOTAL COST	\$39.7M	\$39.7M

 SCHEDULE		
	Current	Forecast
SUBSTANTIAL COMPLETION	Nov 2018	Nov 2018

- All drilled foundations will be completed in July 2017. Column construction is ongoing.
- False work on south side of bridge has started, north side will start July 2017
- Sanitary sewer relocation completed May 2017, storm drain relocation ongoing and will be complete July 2017.
- Ramirez Street closure was implemented June 2017. Vignes Street on/off-ramp will open Sept. 2017.
- Schedule negotiations in progress for revised substantial completion date due to delayed start from weather.



Aerial view of site



Completed bridge column



False work on south side

July 2017



On target



Possible problem



Major issue

Construction Committee

Los Angeles County Metropolitan Transportation Authority



Metro 7

WILLOWBROOK/ROSA PARKS STATION

OK	BUDGET	
	Current	Forecast
TOTAL COST	N/A	\$92.4M

OK	SCHEDULE	
	Current	Forecast
SUBSTANTIAL COMPLETION	Dec 2020	Dec 2020

- Early Start Phase (Project E) in procurement – scheduled to break ground 11/17
- Phase A and C at 100% design completion. Phase A in review by County, Phase C with Caltrans
- Pedestrian grade crossing documents submitted to UP and PUC
- Phase B at 100% design completion and in early coordination for PEER review with CalTrans
- Consideration of proposed project LOP Budget planned for September 2017 board meeting



South Platform Improvements

Central Plaza & Bus Bays

Main Plaza

July 2017



On target



Possible problem



Major issue



Metro 8

Construction Committee

Los Angeles County Metropolitan Transportation Authority

METRO BLUE LINE PROJECTS

<u>Project Name</u>	Budget	Percent Completed	Forecast Completion	Status
• Station Refurbishment	\$30.4M	100%	Completed	OK
• Pedestrian Gates	\$30.2M	85%	Oct 2017	OK
• City of Long Beach Fare Gates Design (PE)	\$7M*	85%(PE)	Aug 2017	OK
• Blue Line Rehabilitation (OCS, Signals, Div. 11)	\$119M*		Aug 2021**	
Total: \$186.6M				



*Budget Estimate **Project Closeout

July 2017



On target



Possible problem



Major issue



Metro

Construction Committee

Los Angeles County Metropolitan Transportation Authority

Crenshaw/LAX Transit Project

Change Activity

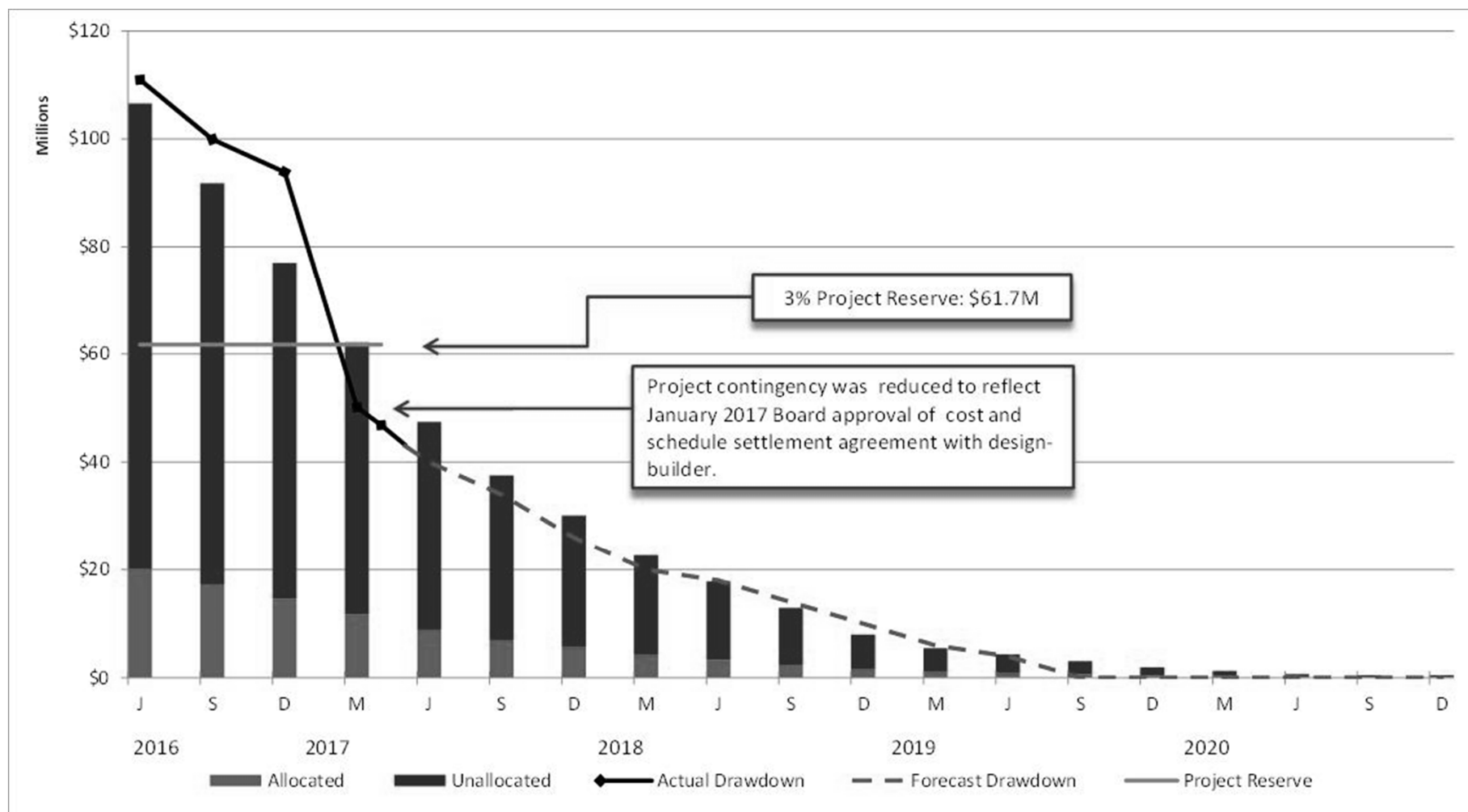
May 2017

Change Notice #	Description	Mod/ Change Orders	Cost Value
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS AND APPROVED CHANGE ORDERS		288	\$ 69,520,730.00
TOTAL PENDING MODIFICATIONS AND CHANGE ORDERS ROUGH ORDER OF MAGNITUDE COST		14	\$ 589,907.00
CONTRACT C0988			
MOD 00256	Black Diamond Vault 5436 Crenshaw Bl		Less than \$1 million
MOD 00271	Clarify Integration with MGL-Design		Less than \$1 million
MOD 00272	Expo Park and Ride Lot Deletion-Dsgn		Less than \$1 million
MOD 00276	TPSS #3 Redesign for SCE Power		Less than \$1 million
CO 00163	Added Crsovr N. Arbor Vitae-Spcl Track		Less than \$1 million
MOD 00234	LADOT Fiber Optic Cable Betterment		Less than \$1 million
MOD 00269	Remove Trees over MWD Easement		Less than \$1 million
MOD 00270	Unit Rates for Incidental Const Work		Less than \$1 million
CO 00129	Elimination Crosver Sta 56+57.50		Credit Less than \$1 million
CO 00136	Relocate Qwest Pullbox at Hindry Ave		Less than \$1 million
CO 00140	Disp Remove Contam. Soil STA 182+25		Less than \$1 million
CO 00164	DWPPS Power Feed to TPSS #8		Less than \$1 million
CO 00169	Unforeseen Concrete at 104th Bridge		Less than \$1 million
CO 00170	Update Sta Cstmr Signge Dir-CONSTR		Less than \$1 million
TOTAL MODIFICATIONS AND CHANGE ORDERS		302	\$ 70,110,637.00
PROFESSIONAL SERVICES CONTRACT			
CONTRACT E0117			
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS AND APPROVED CHANGE ORDERS		42	\$ 59,217,720.00
TOTAL PENDING MODIFICATIONS AND CHANGE ORDERS ROUGH ORDER OF MAGNITUDE COST		0	\$ -
Design Support Services During Construction			
TOTAL MODIFICATIONS AND CHANGE ORDERS		42	\$ 59,217,720.00
CONTRACT MC069			
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS AND APPROVED CHANGE ORDERS		16	\$ 53,350,394.00
TOTAL PENDING MODIFICATIONS AND CHANGE ORDERS ROUGH ORDER OF MAGNITUDE COST		0	\$ -
Construction Management Support Services			
TOTAL MODIFICATIONS AND CHANGE ORDERS		16	\$ 53,350,394.00

Crenshaw/LAX Transit Project

Project Cost Contingency Drawdown

May 2017

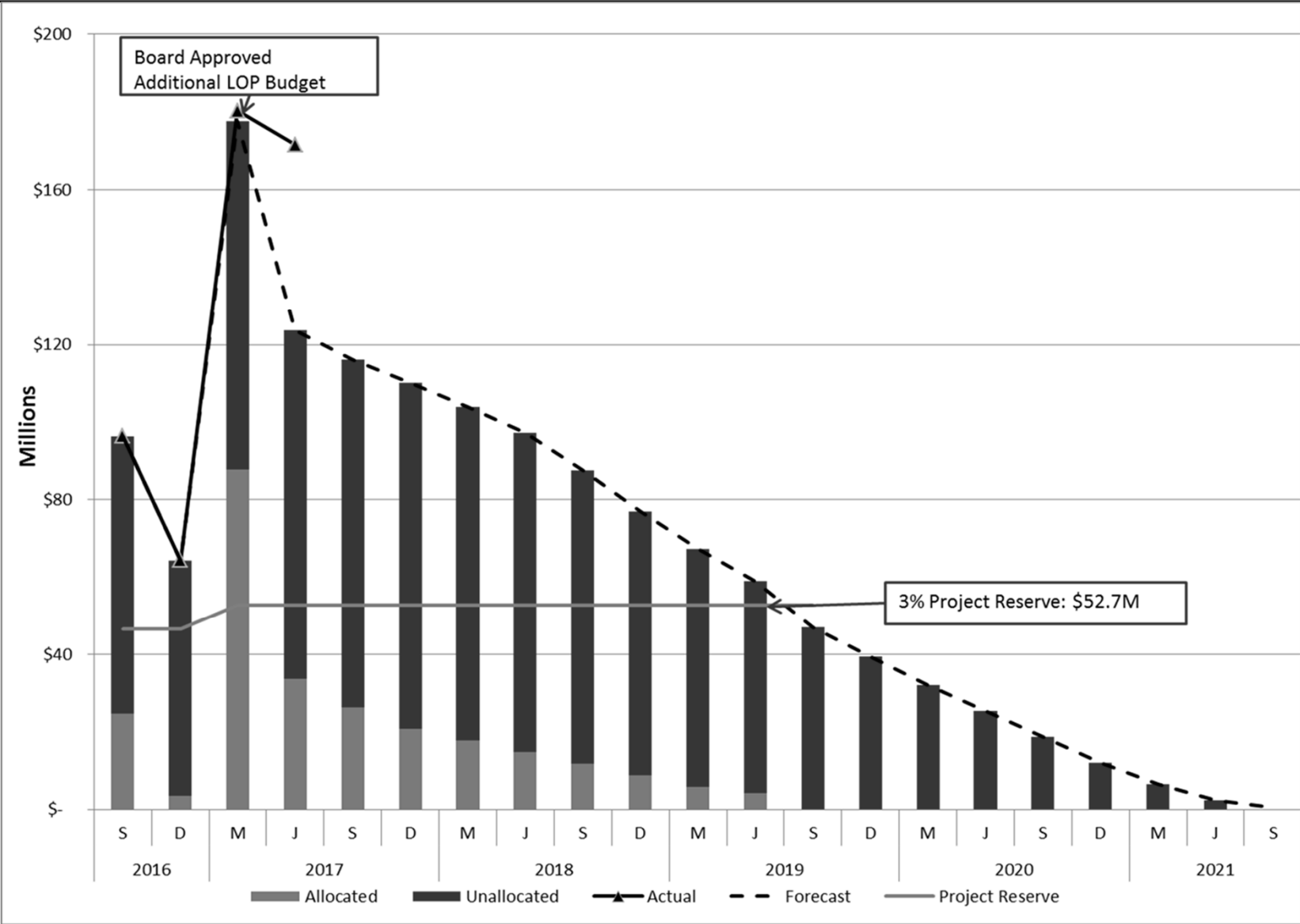


Regional Connector Change Activity

May 2017

Change Notice #	Description	Number of Mod/Change Orders	Cost Value
DESIGN BUILD CONTRACT			
TOTAL VALUE OF ALL EXECUTED CONTRACT MODIFICATIONS AND CHANGE ORDERS:		85	\$ 136,510,197
TOTAL PENDING MODIFICATIONS AND CHANGE ORDERS ROUGH ORDER OF MAGNITUDE COST:		30	\$ 75,216,784
	1st/Alameda Bumpout (Construction)		Less Than \$1 Million
TBD	Flower Street Modification: future 2-way Traffic /Bumpout/Ped Lighting (Construction Only)		Between \$1 and \$5 Million
TBD	Revise Metro Rail Station Signage and Incorporate Metro Underground Station Signage (Construction)		Less Than \$1 Million
TBD	Add Wye Junction Fan Plant - Construction		Between \$10 and \$15 Million
TBD	Fully Coupled Dynamic Analysis for SEM Cavern		Less Than \$1 Million
50.0	Revisions to TPIS Requirements -Construction		Less Than \$1 Million
66.0	Commonwealth Agreement Provisions		Less Than \$1 Million
68.0	Flower Street Zanja Additional Potholing		Less Than \$1 Million
78.0	ATT Ductbank Relocation @ Hewitt		Less Than \$1 Million
79.0	Deputy Grading Inspector 2nd/Broadway Station SOE		Less Than \$1 Million
86.0	Flower Maintenance of Traffic (MOT) West Piles		Less Than \$1 Million
87.0	Support Veolia 24" Chilled Water Pipes at 2nd/Hope Station		Less Than \$1 Million
99.0	Option 3 Pedestrian Bridge Revisions / Broad Coordination (Construction)		Between \$1 and \$5 Million
103.0	1st/Central Station HMI Units for Escalator Controllers		Less Than \$1 Million
TBD	Add One Add 1 VHF Radio Operational Channel - Construction		Less Than \$1 Million
105.0	Revise Flower SOE to Construct TBM Retrieval Pit (Construction)		Between \$1 and \$5 Million
106.0	Revisions to Metro Optical Network Switch		Less Than \$1 Million
TBD	Revise Communication Radio System SOW (Construction)		Less Than \$1 Million
TBD	Infrastructure for Insite Wireless in Tunnels		Less Than \$1 Million
TBD	Add Perforated Metal Dropped Ceiling at 2nd/Hope Station Plaza - Construction		Less Than \$1 Million
107.0	Delays and schedule mitigation measures, electrical and water utility relocation costs, add 1 fire life safety engineering and other design and construction changes		More than \$15 Million
111.0	Spray-on Acoustical Finishes Additional Quantities		Between \$1 and \$5 Million
113.00	Waterline Alignment Modifications on Flower		Less Than \$1 Million
TBD	Revised Emergency Walkways at Curves (30" to 35") - Construction		Less Than \$1 Million
119.0	Metro Board Adopted Station Names		Less Than \$1 Million
121.00	Utility Conflicts during Decking at 4th & Flower St		Less Than \$1 Million
122.00	Asbestos Abatement on Flower St thru May 2017		Less Than \$1 Million
124.00	Blue Light Stations		Less Than \$1 Million
125.00	2nd/Broadway & Mangrove Environmental Changes		Less Than \$1 Million
127.00	2nd Gantry Crane at Mangrove Yard		Less Than \$1 Million
TOTAL MODIFICATIONS AND CHANGE ORDERS		115	\$ 211,726,981
PROFESSIONAL SERVICES CONTRACT			
Design Support Services During Construction			
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS		11	\$ 44,629,810
TOTAL PENDING MODIFICATIONS ROUGH ORDER OF MAGNITUDE COST		1	\$ 0
28.0	No Cost - Period of Performance Extension thru 06/30/2018		\$ 0
TOTAL MODIFICATIONS		12	\$ 44,629,810
Construction Management Support Services			
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS		4	\$ 35,630,672
TOTAL PENDING MODIFICATIONS ROUGH ORDER OF MAGNITUDE COST		1	\$ 0
11.0	No Cost - Period of Performance Extension of CMSS thru 06/30/2018		\$ 0
TOTAL MODIFICATIONS		5	\$ 35,630,672

Regional Connector Project Cost Contingency Drawdown



Westside Purple Line Extension – Section 1 Change Activity

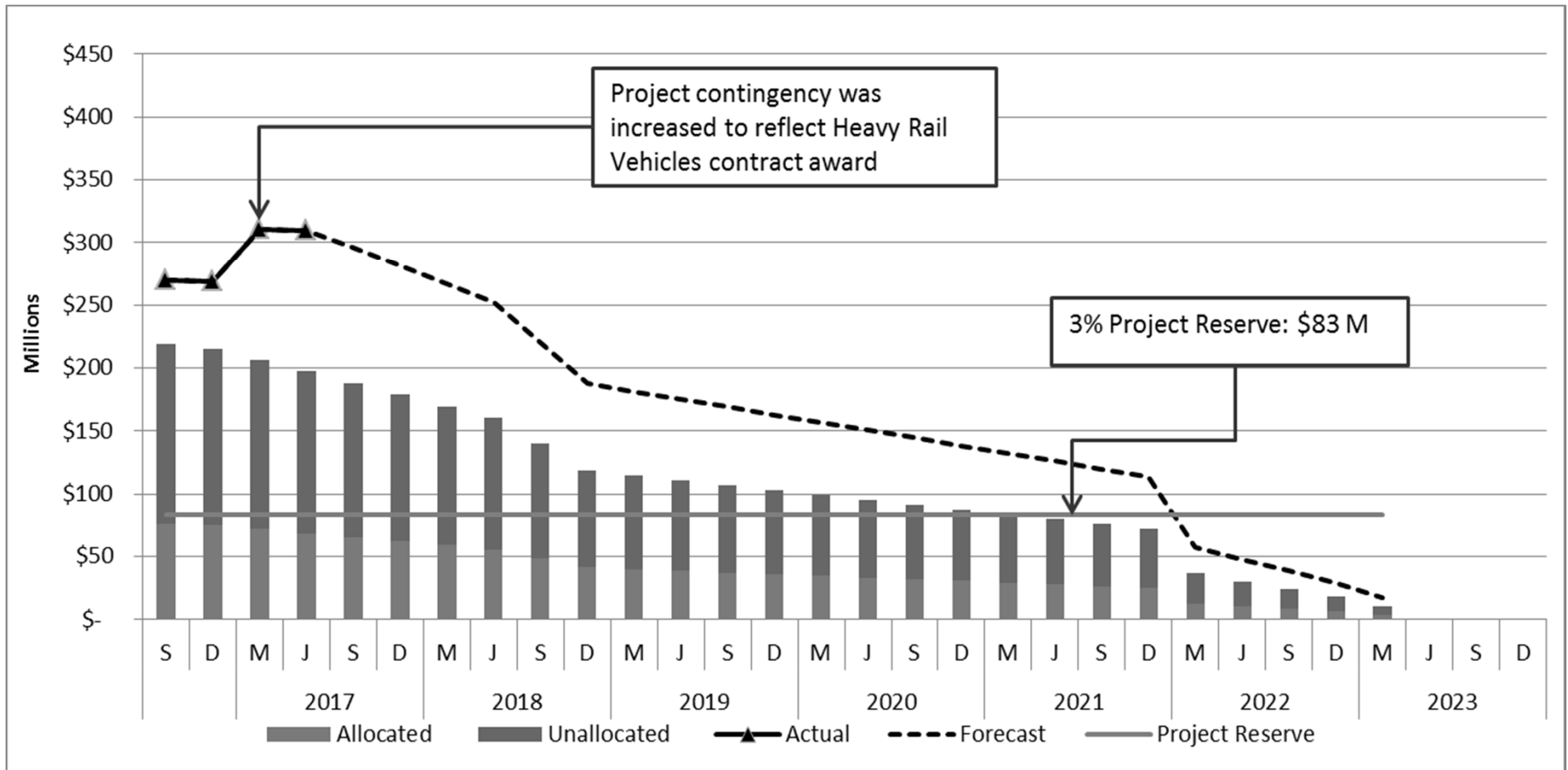
May 2017

Change Notice #	Description	Number of Mod/Change Orders	Cost Value
TOTAL VALUE OF ALL EXECUTED CONTRACT MODIFICATIONS AND CHANGE ORDERS:		137	\$ 11,884,245
TOTAL PENDING MODIFICATIONS AND CHANGE ORDERS ROUGH ORDER OF MAGNITUDE COST:		34	More than \$15M
DESIGN/BUILD CONTRACT C1045			
		23	
CN-25.2	Revisions to Transit Passenger Information System (TPIS) Requirements		Less Than \$1 Million
CN-26	Betterment City of Beverly Hills - Median Reconstruction at San Vicente Blvd		Less Than \$1 Million
CN-32	Pin Station (Identifier) Changes		Less Than \$1 Million
CN-37.2	Revisions to Metro Optical Network		Less Than \$1 Million
CN-39.1	Revision to Metro Station Signage		Less Than \$1 Million
CN-42.3	Radio Subsystem Redundancy		Less Than \$1 Million
CN-43.2	Isolate Track Circuits at Wilshire/Western		Less Than \$1 Million
CN-47.1	Stainless Steel Enclosure for TVM and PTEL		Less Than \$1 Million
CN-56	Implement City of Beverly Hills Memorandum of Agreement (MOA)		Between \$10M - \$15M
CN-57.1	Additional Geotech Monitoring at La Cienega (Support of Deviation Request)		Less Than \$1 Million
CN-63	La Brea- Additional Instrumentation Requested by BOE		Less Than \$1 Million
CN-64.1	Additional SOE Design Work - La Brea Station		Less Than \$1 Million
CN-65.1	Additional SOE Design Work for Fairfax Station Due to Deviation Request for Building Settlement		Less Than \$1 Million
CN-66	La Brea - Dewatering Changes		Less Than \$1 Million
CN-67	Tactile Guidance - Construction Effort and Material Change		Less Than \$1 Million
CN-68	Increased Ventilation of Station Ancillary Rooms		Less Than \$1 Million
CN-72	Stations - Art Related Changes		Less Than \$1 Million
CN-76	Additional SOE Design Work for La Cienega Station Due to Deviation Request for Building Settlement		Less Than \$1 Million
CN-77	Additional Interpretation for Building Settlement		Less Than \$1 Million
CN-78	Fairfax - DWP Ductbank Conflict with Deck Beams		Less Than \$1 Million
CN-79	Western - Property Status Change (FEE TO TCE) Impacts, Parcel W-0103		Less Than \$1 Million
CN-80	La Cienega - Emergency Generator Enclosure		Less Than \$1 Million
TBD	Fairfax - Piling Obstructions, Conflicts, Delays		Less Than \$1 Million
DESIGN/BUILD CONTRACT C1078			
		11	
CO5/CN-10	Revised Building Construction Impacts		Between \$1M - \$5M
CN-11	Schedule Impacts Due to Third Party		Less Than \$1 Million
CN-12	Betterment - Motorized Sliding Gate for the City of LA		Less Than \$1 Million
CN-8	Relocation of 8-inch Sanitary Sewer		Less Than \$1 Million
TBD	Betterment City of LA - Install Street Lights, Trees and Drip Irrigation		Less Than \$1 Million
TBD	Support of Building Art Work		Less Than \$1 Million
TBD	Betterment City of LA - 6th Street Viaduct - Site RE-gragind, Ornamental Fence, etc.		Less Than \$1 Million
TBD	Hazardous Materials - Chalmers Pan Handle		Less Than \$1 Million
TBD	Storm Drain - Differing Site Conditions		Less Than \$1 Million
CN-13	AST Leak Detection and Remote Lubrication Fill/Extract Station		Less Than \$1 Million
TBD	Building Improvements - Increased Foot Print, Larger Rooms		Less Than \$1 Million
TOTAL MODIFICATIONS AND CHANGE ORDERS		171	
PROFESSIONAL SERVICES CONTRACTS			
Design Support Services During Construction - CONTRACT PS43502000			
TOTAL VALUE OF ALL EXECUTED CONTRACT MODIFICATIONS:		21	\$ 80,391,662
TOTAL PENDING MODIFICATIONS		1	
CN-61	Continuation of Design Support During Construction		Between \$5M - \$10M
TOTAL MODIFICATIONS AND CHANGE ORDERS		22	
Construction Management Support Services - CONTRACT MC071			
TOTAL VALUE OF ALL EXECUTED CONTRACT MODIFICATIONS:		3	\$ 39,731,796
TOTAL PENDING MODIFICATIONS		1	
CN-5	Continuation of Construction Management Support Services		More Than \$15 Million
TOTAL MODIFICATIONS AND CHANGE ORDERS		4	

Westside Purple Line Extension – Section 1

Project Cost Contingency Drawdown

May 2017



Westside Purple Line Extension Section 2 Project Change Activity

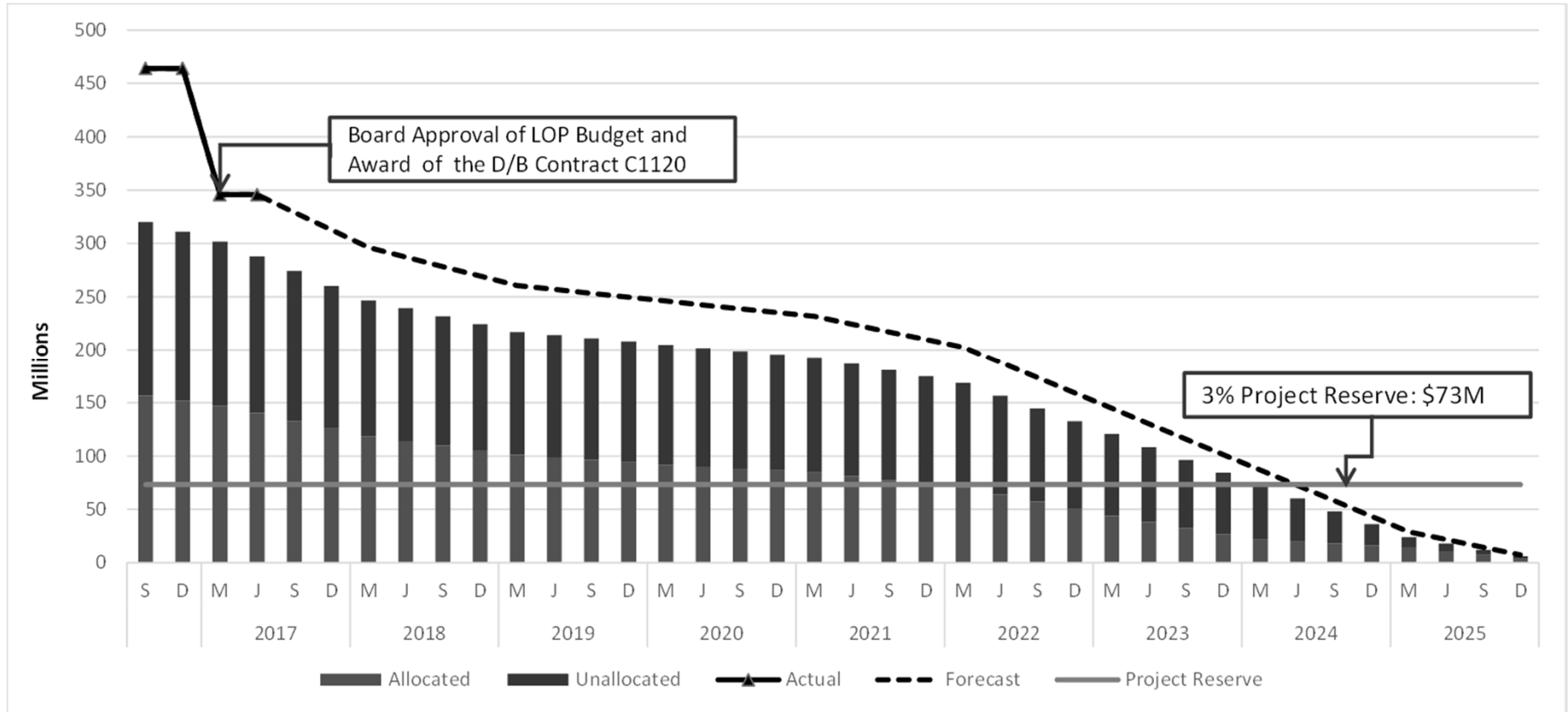
May 2017

Change Notice #	Description	Number of Mod/Change Orders	Cost Value
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS AND APPROVED CHANGE ORDERS		0	\$ -
TOTAL PENDING MODIFICATIONS		5	\$ -
DESIGN/BUILD CONTRACT C1120			
CN-1.1	Century City Constellation Station West Ancillary & OPE Reconfiguration (Design)		Less Than \$1 Million
CN-2	Geotechnical and Environmental Investigation Program		Less Than \$1 Million
CN-3	Century City Constellation Station: Main Entrance (Design)		Less Than \$1 Million
CN-4	Third Party Utility Final Design		Less Than \$1 Million
CN-X	AT&T Building Demolition		Between \$1 and \$5 Million
TOTAL MODIFICATIONS AND CHANGE ORDERS		5	\$ -
PROFESSIONAL SERVICES CONTRACT			
Design Support Services During Construction			
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS		0	\$ -
TOTAL PENDING MODIFICATIONS		0	\$ -
TOTAL MODIFICATIONS AND CHANGE ORDERS		0	\$ -
Construction Management Support Services			
TOTAL VALUE OF EXECUTED CONTRACT MODIFICATIONS		0	\$ -
TOTAL PENDING MODIFICATIONS		0	\$ -
TOTAL MODIFICATIONS AND CHANGE ORDERS		0	\$ -

Westside Purple Line Extension – Section 2

Project Cost Contingency Drawdown

May 2017



IMPLEMENT BEST PRACTICES TO PROJECT DELIVERY

- Deliver the nation's largest transportation capital program
- OIG's Capital Project Construction Management Best Practices Study
- Implement strategies in the Program Management Plan approved by the Board
- Commit to achieving continuous improvement in project delivery through innovation, application of best practices and high standards

IMPLEMENT BEST PRACTICES TO PROJECT DELIVERY

Implement tools bringing improved planning, consistency, transparency, and discipline to project delivery:

- Establish more reliable Life-of-Project budgets
- Conduct Annual Program Evaluation (APE) of Metro's capital program
- Implement Board-approved Pilot LOP Budget Program on Major Transit Projects
- Engage a robust Program Management Support Services (PMSS) consulting team to support delivery of multiple large and complex projects on-time and within budget

IMPLEMENT BEST PRACTICES TO PROJECT DELIVERY

- Change Control Procedure
- Project Readiness Procedure
- Project Delivery Selection Procedure
- Program Management Leadership Institute
- Risk Management Program
- Lessons Learned Report and Program

July 2017

Construction Committee

Los Angeles County Metropolitan Transportation Authority

IMPLEMENT BEST PRACTICES TO PROJECT DELIVERY

Lessons Learned:


- Contract Administration and Change Order Control
- Establishing and Managing Reliable Budget Baselines & Life-of-Projects
- Engage Third Parties Early
- Uniform Enforcement of Scheduling Specification
- Advancing Projects Beyond 30% Design Prior to Design-Build Procurement
- Claims Avoidance
- Estimate Preparation for Change Negotiations
- Right of Way Acquisition
- Use of Contractual Monetary Incentives
- Operations and Maintenance Requirements Coordination with Design Specifications
- Adequate Project Support Resources
- Standardizing Contract Languages

July 2017

Construction Committee

Los Angeles County Metropolitan Transportation Authority

PROJECT MANAGEMENT

 One side of the triangle cannot be changed without affecting the other sides:

