CONSTRUCTION COMMITTEE
JULY 21, 2012

SUBJECT:  WAYSIDE ENERGY STORAGE SUBSTATION (WESS) PILOT PROJECT

ACTION:  AWARD CONTRACT FOR PILOT PROJECT

RECOMMENDATION

A. Adopt a Life-of-Project (LOP) budget increase of $700,000 resulting in a new LOP budget of $5,166,000.

B. Authorize the Chief Executive Officer to award a 3 year firm fixed price contract under Request for Proposal No. C0964R to Vycon, Inc. a Wayside Energy Storage Substation (WESS) for a firm fixed price of $3,593,330 inclusive of sales tax.

ISSUE

Wayside Energy Storage has proposed a methodology to reduce rail transit operating costs. This Board action is to a design and furnish equipment in support of the Wayside Energy Storage Substation (WESS) project under the Transit Investments for Greenhouse Gas and Energy Reduction –TIGGER Program.

DISCUSSION

Metro annually spends approximately $26 million to $29 million for electricity with about $20 million for propulsion power. The remaining amount is for operation of bus and rail maintenance facilities, layovers, terminals, and headquarter buildings.

As the years progress, Metro has seen electricity costs rise due to periodic utility rate increases. Staff believes that in the volatile and costly energy market, embracing sustainability, energy efficiency, conservation, and installation of renewable energy sources is a primary pathway towards gaining control of, and reducing Metro’s energy usage and costs and gaining energy independence.
In our Board-adopted Renewable Energy Policy, Metro committed to a stretch goal of an additional 13% renewable energy use by 2020 above Metro's current usage baseline of 20%. This will be achieved through the continued deployment of applicable, feasible, and practicable renewable energy sources at Metro sites.

Metro has already deployed over two-megawatts of electricity from renewable energy sources (i.e., photovoltaic sources) in the last five years. Metro is currently installing additional photovoltaics at Metro’s El Monte Station and at the Metro Orange Line Extension, and developing proof of concept protocols to harvest wind at Metro’s subway tunnels for energy. Later in the year Metro will release a procurement document to map out a comprehensive renewable energy program consistent with the plans outlined in Metro’s Energy Conservation and Management Plan.

Simultaneous with these efforts is the continuing emergence of funding opportunities to install pilot projects at Metro’s facilities such as those coming from federal, state, and other sources. These funding sources assist in the fulfillment of Metro’s renewable portfolio expansion using minimum Metro financial resources.

One such opportunity is the availability of funds through a FTA Grant to install a Wayside Energy Storage System pilot at Metro’s Red Line McArthur Park Station. This grant allows for the design, manufacture, installation, testing, and monitoring of a 2MW wayside energy storage system for the LACMTA Red Line.

**Background**

Metro will procure an initial base system with a capacity of 2MW, with future provisions to upgrade the system to 6MW. This will allow Metro to reach the maximum projected capacity of 6MW when Metro’s operation also reaches full capacity with the implementation of the Measure R Projects.

The intent of this project is to install a complete and fully operational WESS that utilizes high-speed flywheel technology as a means of recycling energy on the Metro rail system, and shall be fully integrated with all of Metro’s operational systems. The WESS will have a capacity of 2MW, compatible with the operation of the line for most of the daily schedule, alternating two or four car trains during off-peak hours. The system would be “expansion ready” for up to 6MW, through seamless additions of flywheel units for compatibility with the expansion of Metro’s operations, upon implementation of the Measure R Projects.

By integrating the WESS with the rail traction power system, braking energy is captured as a train enters a station, converted and stored as kinetic energy, and later regenerated into clean, instant power to accelerate a train leaving a station. In addition, the flywheels provide voltage support to increase capacity in the system and improve the voltage regulation along the track. The result of this technology
significantly reduces electrical power consumption, improves train performance, decreases resistor bank heating (wasted energy), and minimizes carbon emissions.

RFP C0964R is the second solicitation to successfully procure the WESS. After the first procurement failed, a WESS action plan was implemented by staff to identify technical elements that could be modified to increase the likelihood of a successful procurement. This re-procurement contains those revisions from the original solicitation that provides for incremental configurations of 2MW, 4MW, and 6MW systems, as well as a shift in primary responsibility of certain elements of the work scope from the contractor, to Metro. The shift in work, risk and cost is intended to help reduce contractor costs. Following is a listing of the key modifications implemented for the re-procurement:

1. Reduce the extended warranty from five years to one year and procure the spare parts kits.
2. Eliminate requirements for the Performance and Payment Bonds.
3. Metro will perform the installation work in-house.
4. Eliminate the requirements for structural calculations, based on an in-house determination in accordance with the applicable Design Criteria.
5. Eliminate the requirements for ventilation studies utilizing an internal evaluation based on the applicable Design Criteria.
6. Metro will provide remote access to the facilities via Virtual Private Network (VPN) or Digital Subscriber Line (DSL) for data collection.
7. Metro will perform several tests with its own staff and instrumentation, in accordance with the designer’s procedures, supervision, and evaluation of the results.

This project is anticipated to be completed within a 3 year timeframe at a cost of $5,166,000.

Installation
Metro Wayside will perform the entire installation of the system, including the flywheel units, connecting cables, switchgear, auxiliary power, SCADA connections and integration into existing systems. Such installation will be expansion-ready to accommodate additional flywheels up to a 6MW system including previously allocated space as required.

Cost-Benefit
The latest studies which were performed for assessment of size change shows that 2MW unit, with 33.3% of the baseline capacity, will capture and save 8.64kWh per train departure and is linearly scaled compared to savings of the 6MW units. This initial capacity of 2MW is consistent with the current levels of service using two and four car trains during non peak hours, which corresponds to most of the daily operational time.
Most importantly, a deployment of 2MW WESS will demonstrate that the WESS technology is innovative, expandable, proven in high cycling, heavy-duty application, and suitable for transit use. With the current level of service, average (weekday/weekend) consisting 160 departures per day, the energy saving will be approximately 1.38MWh. This means that during the full year of operation the 2MW flywheel will save over 400MWh.

Using Metro's 2011 electrical billing data, the average electricity unit rate is $0.128/kilowatt hour. This means Metro's average projected savings using this technology at this one location could be as much as $52,000 per year.

The additional potential benefits of the WESS as installed on the Red Line can potentially include:

- Elimination of slowdowns and stop/starts by correcting low voltage occurrences
- Increasing system reliability through greater power capacity
- Redundancy in power source for adjacent substation outage or emergencies.

**System Impacts**

Metro staff has reviewed the conceptual design of Vycon's proposed project and will be actively involved in the final design, installation, commissioning and testing of the WESS to eliminate system impacts. Metro staff will actively seek to ensure the integrity of the Red Line operations prior to, during and conclusion of this pilot project.

**Comparison to the SCAQMD funded WESS Gold Line Project**

There are a small but growing number of companies providing energy storage systems for electrified rail applications. The technologies include flywheels, ultracapacitors, and battery based systems. Flywheels are mechanical kinetic energy storage devices and not based on complex electro-chemical processes. The flywheels identified for use in this pilot have the benefit of 20-year lifecycles and the ability to complete over 1,000 charge-discharge cycles per day without performance deterioration. For these reasons, Metro staff selected flywheel energy storage technology for a light rail pilot project on the Gold Line. This pilot project is being funded by South Coast Air Quality Management District (SCAQMD).

The WESS for this FTA/Metro funded project is also intended to demonstrate the suitability of this energy storage technology in a heavy rail application compared to the light rail on the Gold Line SCAQMD project. In addition, the fundamental purpose of this application is energy recovery and savings in contrast to voltage stabilization in the SCAQMD project for the Metro Gold Line. Through this project Metro will be able to validate the benefits of energy storage on Metro's transit systems in general; and specifically the advantages of using flywheels as a WESS.
Once this WESS project is completed, and if successful, Metro will pursue flywheel WESS installations on both heavy rail and light rail systems that are optimized for energy savings and voltage stabilization, respectively.

**DETERMINATION OF SAFETY IMPACT**

There is no impact on safety as a result of this contract award.

**FINANCIAL IMPACT**

The adopted LOP budget for this project was originally established at $4,446,000 an increase of $700,000 is required to fulfill the project scope resulting in a new LOP of $5,166,000. The WESS will be partially funded through the Federal Transit Administration (FTA) Grant Award of $4,466,000. Of this grant amount, $238,000 has already been used by Metro for research, preliminary engineering, specification & contract development including a prior procurement effort.

The additional cost of $700,000 will be provided by local funding sources and will be used for Metro Labor including engineering support, construction support, monitoring and, testing.

Since this is a multi-year contract/project, the Executive Director, Transit Project Delivery will be accountable for budgeting the cost in future years, including any option exercised.

**Impact to Budget**

**A. Source of funds:**


2) Local funds Prop A 35% transferred out of the project 450001 Environmental’s energy management initiative project.

**B. Impact to Rail operating budget:**

The local funds for the LOP increase are eligible for Metro Bus and Rail Capital expenses. Installation and testing of the WESS will not impact ongoing operations budget. The LOP increase will be funded from a budget transfer from an ongoing local funded Project 450001 – Energy Conservation Initiative: Task 03.01 WESS.
At the conclusion of the WESS project, Metro will determine if acceptable goal parameters were achieved and decide upon the removal or retention of the installed equipment. If sufficient energy savings were realized, Metro will investigate the merits of further upgrades up to a 6Mw system.

ALTERNATIVES CONSIDERED

Metro can choose not to award this contract, but staff recommends otherwise. Metro has previously benefited from the execution of small projects such as this one. Metro has recently proven that the development and implementation of large scale programs usually emerge from the results of small pilot efforts.

In the past, we have missed out on opportunities like this pilot project because a majority of our limited human resources are typically allocated for the development of major projects.

Rejection of the recommended Board action would also result in an opportunity lost to avail of the implementation of emerging technologies and infrastructure that can accelerate the fulfillment of the stretch goal stated in the Board-adopted Renewable Energy Policy.

NEXT STEPS

After the recommended Board Action is approved, staff will complete the process to award C0964R.

ATTACHMENTS

A. Procurement Summary
B. Funding/Expenditure Plan

Prepared by: Michael Ratnasingham, Director of Systems Engineering
             Leonid Bukhin, Supervising Engineer
Michelle Lopes Caldwell  
Chief Administrative Services Officer

Krishniah N. Murthy  
Executive Director, Transit Project Delivery

Arthur T. Leahy  
Chief Executive Officer
ATTACHMENT A

PROCUREMENT SUMMARY

METRO REDLINE WAYSIDE ENERGY STORAGE SUBSTATION PROJECT

1. Contract Number: C0964R
2. Recommended Vendor: Vycon, Inc.
3. Type of Procurement (check one): □ IFB □ RFP □ RFP–A&E □ Non-Competitive □ Modification □ Task Order
4. Procurement Dates:
   A. Issued: 12.19.11
   B. Advertised/Publicized: 11.28.11
   C. Pre-proposal/Pre-Bid Conference: 1.11.12
   D. Proposals/Bids Due: 1.30.12
   E. Pre-Qualification Completed: 5.3.12
   F. Conflict of Interest Form Submitted to Ethics: 6.19.12
   G. Protest Period End Date: 7.24.12
5. Solicitations Picked Bids/Proposals Received:
   up/Downloaded: 52
   Bids/Proposals Received: 3
   Telephone Number: (213)922-7466
7. Project Manager: Leonid Bukhin
   Telephone Number: (213)922-7218

A. Procurement Background

This Board action is to a design and furnish equipment in support of the Wayside Energy Storage Substation (WESS) project under the Transit Investments for Greenhouse Gas and Energy Reduction – TIGGER Program.

Prior Procurement
Metro had previously attempted to contract for the WESS technology. The original solicitation was issued as a two-step Invitation for Bids (IFB) on June 01, 2010, requesting bids for the complete design, engineering, fabrication, installation, and monitoring of the WESS at the Metro Red Line Westlake/MacArthur Park Station. On August 5, 2010, two technical bids were received.

Each submittal was assessed in accordance with the IFB qualification criteria, resulting in one technically qualified bidder. The remaining bidder's cost proposal exceeded the authorized budget and therefore, the bid was rejected and the IFB canceled.
This new procurement has been performed in accordance with Los Angeles County Metropolitan Transportation Authority (Metro) Procurement Policies and Procedures, for the design, manufacture, and monitoring of an energy recycling system at the Metro Red Line Westlake/MacArthur Park Station and the contract type is a Firm Fixed Price.

RFP C0964R was issued on December 19, 2011. The solicitation was advertised in Mass Transit Magazine in November 2011, the LA Daily News on November 18, 2011, and the Greensheet on November 28, 2011. Additionally, the RFP was posted on the Metro website. Notice of availability postcards were emailed to 354 firms on December 19, 2011.

Four amendments were issued during the solicitation phase of this RFP;

- Amendment No. 1 issued on January 6, 2012, changed the Pre-Bid Conference date and time;
- Amendment No. 2 issued on January 19, 2012, distributed the Pre-Bid Conference attendees and extended the bid due date;
- Amendment No. 3 issued on January 24, 2012, clarified the WESS cooling requirements; and
- Amendment No. 4 issued on January 25, 2012, extended the bid due date to January 30, 2012.

Three proposals were received on January 30, 2012.

B. Evaluation of Proposals/Bids

An evaluation team consisting of staff from Systems Engineering, Rail MOW Engineering, and Wayside Systems was convened and conducted a comprehensive technical evaluation of the proposals received.

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

- Skill and Experience 15 percent
- Past Performance 10 percent
- Project Understanding and Appropriateness of the Proposed Equipment 60 percent
- Price 15 percent
Of the three proposals received, two were determined to be within the competitive range. The two firms within the competitive range are listed below in alphabetical order:

1. Kinetic Traction Systems, Inc.
2. Vycon, Inc.

<table>
<thead>
<tr>
<th></th>
<th>FIRM</th>
<th>Average Score</th>
<th>Factor Weight</th>
<th>Weighted Average Score</th>
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<tr>
<td>2</td>
<td>Kinetic Traction Systems, Inc.</td>
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<td>3</td>
<td>Proposer's Skill and Experience</td>
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<td>Past Performance of Proposer and Team</td>
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<td>6</td>
<td>Price</td>
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<td>7</td>
<td>Total</td>
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<td>100.00%</td>
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<td>8</td>
<td>Vycon, Inc.</td>
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<td>9</td>
<td>Proposer's Skill and Experience</td>
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<td>Understanding of the Work and Appropriateness of Proposed Equipment</td>
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<td>11</td>
<td>Past Performance of Proposer and Team</td>
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<td>12</td>
<td>Price</td>
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<td>13</td>
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Qualifications Summary of Firms Within the Competitive Range:

**Kinetic Traction Systems, Inc.**

Kinetic Traction Systems, Inc. (KTS) was formed by key executives from its predecessor company, Pentadyne Power Corporation. While recently sold to new investors in 2010, the primary emphasis of KTS remains in the rail energy storage application. KTS had recently completed a flywheel energy storage project for Bombardier on a test track application. Its high cycle flywheel and system design appear capable of collecting and storing the regenerative braking energy in Metro’s application. A recent contract award through the South Coast Air Quality Management District is slated for installation along the Metro Gold Line to improve voltage stabilization. Last year, KTS manufactured seven flywheel units with its existing production staff of two full time employees, and two part-time employees. This staffing level would require augmentation to support the WESS production of six flywheels for the 2MW system. The recent departure of an executive with a key role in this project also left a void that would need to be filled by KTS.

**Vycon, Inc.**

Vycon was established in 2003 and recently relocated from a 38,000 square foot facility in Yorba Linda, CA, to a 90,000 square foot facility in Cerritos, CA. Its existing staff of fifty full-time employees can sufficiently support the production of the flywheel units required for Metro’s 2MW system. Vycon’s high speed flywheel unit is a proven design on port crane applications, with six systems installed at the Port of Long Beach. To integrate this technology into the transit application, Vycon teamed with Turner Engineering Corporation, an experienced Los Angeles-based transportation engineering firm with expertise in rail applications, and familiarity with Metro’s traction power system.

Vycon’s negotiated price was seventeen percent higher than KTS’, however, its proposal’s technical superiority significantly outweighed the price differential. Given the fact that this is a first in the nation pioneering project applying state of the art technology for rail applications, technical qualifications are more important than price. Vycon has assembled a strong technical team with applicable skill and experience in traction power applications. In addition to a more diversified range of applications, Vycon’s team exhibits a good understanding of the concept, plans, and challenges of this project. Vycon has a proven record in manufacturing flywheels with a steady production rate and backlog. An important project requirement is the ability for future expandability within Metro’s existing substations. Vycon’s equipment meets Metro’s dimensional, weight, and heat requirements, and offers a clear approach to future expandability up to 6MW’s.
C. **Cost/Price Analysis**

The recommended price has been determined to be fair and reasonable based upon adequate competition, an independent cost estimate, and negotiations resulting in Best and Final Offers submitted by both firms in the competitive range.

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<thead>
<tr>
<th>Bidder/Proposer Name</th>
<th>Proposal Amount</th>
<th>Negotiated Amount</th>
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<tbody>
<tr>
<td>1. Kinetic Traction Systems, Inc.</td>
<td>$3,830,140</td>
<td>$3,050,340</td>
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<tr>
<td>2. Vycon, Inc.</td>
<td>$4,918,951</td>
<td>$3,593,330</td>
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D. **Background on Recommended Contractor**

The recommended firm, Vycon, Incorporated, located in Cerritos, California has been in business for nine years, and is a leader in the design and development of high-speed flywheel systems. Vycon's line of energy storage flywheels are used for different applications including energy savings, voltage support, critical power, and power quality. Customer uses for this technology include the transportation, data center, medical, university, and industrial sectors.

E. **Small Business Participation**

The Diversity and Economic Opportunity Department (DEOD) established a 13% Disadvantaged Business Enterprise (DBE) Anticipated Level of Participation (DALP) for this procurement. Vycon, Inc. did not list any DBE subcontractors nor commit to any DBE participation. Vycon indicated that the bulk of the effort being done is in the fabrication of energy storage flywheel assemblies that they perform in-house leaving limited opportunity for DBE participation. However, Vycon listed an SBE certified subcontractor to work on the project. Achieving the DALP percentage is neither a condition of award nor an issue of responsiveness.

F. **All Subcontractors Included with Recommended Contractor’s Proposal**

<table>
<thead>
<tr>
<th>Subcontractor</th>
<th>Services Provided</th>
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<tbody>
<tr>
<td>1. Steiny and Company</td>
<td>Construction</td>
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<tr>
<td>2. Altran Solutions</td>
<td>Engineering</td>
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<tr>
<td>3. Turner Engineering</td>
<td>Design and Engineering</td>
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# FUNDING/EXPENDITURE PLAN

METRO REDLINE WAYSIDE ENERGY STORAGE SUBSTATION PROJECT

<table>
<thead>
<tr>
<th>Uses of Funds</th>
<th>Incurred to Date</th>
<th>FY13</th>
<th>FY14</th>
<th>FY15</th>
<th>Total</th>
<th>% of Total</th>
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<tbody>
<tr>
<td>Project Administration</td>
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<td>$10,000</td>
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<td>Design/Production of WESS</td>
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<tr>
<td>Installation &amp; Commissioning</td>
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<td>$450,000</td>
<td></td>
<td></td>
<td>$600,000</td>
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<td>Vycon Testing, Monitoring &amp; Software Changes</td>
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<td>$450,000</td>
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<td><strong>Total Project Cost</strong></td>
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<td><strong>$2,725,000</strong></td>
<td><strong>$1,898,000</strong></td>
<td><strong>$305,000</strong></td>
<td><strong>$5,166,000</strong></td>
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## Sources of Funds

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<tr>
<th>Sources of Funds</th>
<th>FY13</th>
<th>FY14</th>
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<td><strong>Total Project Funding</strong></td>
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<td><strong>$2,725,000</strong></td>
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<td><strong>$305,000</strong></td>
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