Department of Water and Power



### the City of Los Angeles

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March 10, 2010

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The Honorable City Council c/o Office of the City Clerk Room 395, City Hall Mail Stop 160

Attention: Councilmember Jan Perry Chairperson, Energy and Environment Committee

Honorable Members:

Subject: Council File No. 09-1741 Utility Undergrounding Program Second Report

Enclosed is the second report of the Los Angeles Department of Water and Power's Utility Undergrounding Program. This report studies a new proposal for undergrounding 25 percent of all overhead utility lines within the City of Los Angeles by Fiscal Year 2030. This report was requested in a motion put forth by Councilmember Herb Wesson Jr., Tenth District, and referred to the Energy and Environment Committee.

If you have any questions or require additional information, please contact me at (213) 367-1338 or Ms. Winifred J. Yancy, Manager of Government and Neighborhood Relations, at (213) 367-0025.

Sincerely,

S. David Freeman Interim General Manager

RJM:sas Enclosure c/enc: Councilmember Tony Cardenas, Vice Chair Energy and Environment Committee Councilmember Paul Koretz, Member Councilmember Richard Alarcon Councilmember Herb J. Wesson, Jr. Mr. Gerry F. Miller, Chief Legislative Analyst Ms. Maria Espinoza, Legislative Assistant

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# City of Los Angeles Utility Undergrounding Program Second Report





Los Angeles Department of Water & Power March 5, 2010

## City of Los Angeles Utility Undergrounding Program

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### EXECUTIVE SUMMARY

#### BACKGROUND

The Los Angeles City Council (City Council) Motion No. 09-1741 (Motion) directed the Los Angeles Department of Water and Power (LADWP) to report on a new program to underground 25 percent of all utility lines in the City of Los Angeles (City) by Fiscal Year (FY) 2030. This Motion also directed LADWP to review other utility line undergrounding programs, including the City of San Diego.

#### FINDINGS

LADWP found that almost 27 percent of all power utility lines in the City are installed underground excluding service connections and secondary lines<sup>1</sup>. Therefore, the 25-percent target has already been met under LADWP's existing underground program. This report will summarize these efforts and recommend enhancements to the program for the City Council to consider.

Last year, LADWP installed roughly 220 circuit<sup>2</sup> miles of underground cable. Most of this work was for cable replacement or new service connections and resulted in a net increase of 20 circuit miles of new underground primary cable.

LADWP has recently accelerated conversion efforts through its Power Reliability Program (PRP), which will fund the conversion of 21 pole<sup>3</sup> miles of overhead lines to underground cable in the next five years. Thereafter, the plan is to ramp up to continue to convert eight pole miles annually (\$24Million/year) to enhance system reliability through the PRP. These goals do not include the average three pole miles per year of customer driven conversions, which are expected to increase in the short term due to transportation and urban revitalization projects along primary arterial streets.

LADWP will spend \$10 million or 0.3-percent of power revenue on conversion projects this year under the existing program. This program is expected to result in 35-percent of all utility lines installed underground by FY 2030.

#### WHAT OTHER CITIES AND UTILITIES SPEND ON CONVERSIONS

- San Diego Gas and Electric spends \$50 million or 4.5-percent per year by a power revenue surcharge in the City of San Diego.
- The City of Anaheim spends four percent of power revenue on 10 to12 miles per year by an undergrounding surcharge.
- Southern California Edison (Edison) spends \$45 million or 0.4-percent of power revenues among its 430 cities. The City of Pasadena spends two percent of electric revenues.
- The City of Burbank targets poles on major streets for conversions as its budget allows.

<sup>&</sup>lt;sup>1</sup> Low voltage underground cable or circuit conductors.

<sup>&</sup>lt;sup>2</sup> A circuit mile is the distance in miles of underground cable or circuit conductors.

<sup>&</sup>lt;sup>3</sup> A pole mile is the distance in miles between poles.

#### RECOMMENDATION

LADWP will continue system growth and accelerated conversion efforts, under the PRP, to add more than 600 miles of new underground cable resulting in the removal of 200 pole miles of existing overhead lines across the City by FY 2030. LADWP will also target aging poles along major arterial streets for conversion under this program.

Based on proposed LADWP projects, the City Council would declare Underground Utility Districts in target areas to require private property owners and other utilities to underground their overhead lines. The City Council would also direct Los Angeles Department of Public Works (Public Works) to establish a resident funded program where neighborhoods could request, by a simple vote, the conversion of overhead lines using bond money paid back by property tax assessments.

#### **OVERVIEW**

#### Purpose

In response to a Los Angeles City Council (City Council) Motion No. 09-1741 (Motion), referred to the Energy and Environment Committee, the Los Angeles Department of Water and Power (LADWP) examines and reports on the parameters of a new program to underground 25 percent of overhead lines throughout the City of Los Angeles (City).

#### Background

This is the second of two reports requested by the Motion. The first report outlined the status of LADWP's underground power line program which includes two components. The first component consists of underground cable installed for the purpose of distribution system maintenance and growth. The second component relates to replacing poles and overhead lines with new underground cable in accordance to LADWP Rule No. 20 in a process know as *conversion*.

Rule No. 20 outlines the conditions and funding arrangements by which applicants may request that this work be done. By and large, the bulk of conversion activity is needed to clear construction for public and private development projects. Although overhead lines have performed an exemplary service by bringing low-cost, reliable electric power to each property within the City, conversions can improve reliability, relieve overhead circuit congestion, and can be used to achieve beautification or scenic improvement along heavily used thoroughfares.

Today, underground distribution is an economical method of service in new residential subdivisions, high-density urban areas, and larger commercial developments. Underground cable inventory continues to grow annually while overhead pole miles have remained essentially static for the past 20 years. Therefore, the percentage of underground cable compared to overhead lines has been growing, albeit slowly, since policies were established limiting overhead construction in the 1960s.

#### Installation and Reliability of Overhead Facilities

A 2006 LADWP study determined that underground service is generally more reliable than overhead, but also three times more expensive to install. Underground facilities have fewer power outages, but when they occur, they typically last longer. The study examined advantages of an all underground distribution system and outlined key differences in overhead versus underground systems:

- Installation Overhead electric facilities are less expensive averaging about 30 percent the cost of an equivalent underground system. This cost advantage increases when undergrounding takes you into well-established streets containing other underground structures or when new circuit conductors can simply be added to existing poles.
- Cost to Maintain Overhead versus Underground 2006 data indicate that overhead and underground distribution typically costs \$5,858/mile/year and \$5,137/mile/year to maintain, respectively. It could be concluded that every mile of underground distribution installed saves LADWP approximately \$721/year or 12 percent.

 Outages - Overhead areas have more frequent electric outages than underground because overhead lines are exposed to the gamut of above-ground hazards including bad weather, wandering balloons, and errant drivers. Overhead outages will be shorter because repairing or replacing overhead lines takes less time than repairing or replacing underground lines.

Reliability is measured by two primary indices: SAIFI and SAIDI. SAIFI is the average frequency of outages a customer would see annually. SAIDI is the average duration of all outages a customer would experience annually. A reliability review done in 2006 for the City over the previous five years found, that if LADWP were to have a 100-percent underground system, we could expect reliability to improve as follows:

	Present	Totally UG	Change (%)
SAIFI (Frequency)	0.73 times/yr.	0.39 times/yr.	-47%
SAIDI (Duration)	81.2 min./yr.	86.3 min./yr.	+5.9%

Based on the contribution of overhead to the reliability indices, having a completely underground system would benefit the SAIFI by 47 percent because overhead fails 1.9 times more often than underground. SAIDI does not improve because it takes longer to repair underground than overhead.

Because the indices above reflect existing LADWP distribution systems, it is expected reliability would be measurably better when new underground replaces aging overhead facilities which are subject to failure from fatigued lines and components. It is one goal of LADWP's Power Reliability Program (PRP) to leverage this advantage through its Rule No. 20 program by accelerating conversion of overhead lines approaching the end of their replacement cycle.

#### DISCUSSION

LADWP currently has 29 percent of its 4800-V primary circuits and 25 percent of its 34.5-kV sub-transmission circuits underground. Within the City, 284,000 power poles support about 5,500 circuit<sup>4</sup> miles of overhead primary and 1,500 circuit miles of overhead 34.5-kV sub-transmission lines, excluding service connections and secondary lines<sup>5</sup>.

Because more than one circuit can attach to a pole, a distinction is drawn between circuit miles and pole<sup>6</sup> miles.Of the 5,500 miles of overhead primary, only 770 circuit miles are on Primary Arterial Streets. The balance is spread among Secondary Arterial Streets, Residential Streets, Alleys and property lines at the rear.

The breakdowns for pole lines are as follows:

Mile	s of Street	Poles on Street	Rear PL Poles
Primary Arterial Streets	900	30,771 or 786 miles	7,996 or 204 miles
Other Streets	5600	149,450 or 3800 miles	38,835 or 992 miles
Alleys	800	30,767 or 786 miles	

<sup>&</sup>lt;sup>4</sup> A circuit mile is the distance in miles of underground cable or circuit conductors.

<sup>&</sup>lt;sup>5</sup> Low voltage underground cable or circuit conductors.

<sup>&</sup>lt;sup>6</sup> A pole mile is the distance in miles between poles.

LADWP has roughly 4,600 pole miles along City streets. Converting 1,400 pole miles or 25 percent of all overhead lines in the City could eliminate up to 33 percent of the street poles in the City by FY 2030. Eliminating pole lines along property rears or alleys would be excluded because these don't target the visual blight noted in Motion No. 09-1741.

#### Allocations of Overhead and Underground Lines :

This map shows the division of overhead and underground circuits by Council District:

## Primary System Circuit Miles by Council District



It is instructive to note that some Council Districts, such as West Metro and West Valley areas, contain larger percentages of existing underground primary. This is due to concentrations of electrical load and the need to serve these loads in a manner that is economical and practical.

In heavily loaded areas, existing pole lines are often fully occupied and lack space for additional circuit conductors. Adding more poles on streets already burdened with overhead lines is often not feasible due to congestion, applicable City policies that limit pole line construction. or to address constituent or ratepayer complaints. In many circumstances, underground cables are simply installed into existing infrastructure built for development projects constructed years earlier. So it is that the underground system grows organically by about 20 circuit miles per year through Power System capital work as local area electrical demand increases and resources are dispatched economically to meet that need.

The use of existing infrastructure is a key element in the selection of PRP conversion areas in LADWP's capital program described in this report. This program will also outline a proposal for undergrounding poles along Primary Arterial Streets, as well as a Public Works Bond Program for funding residential neighborhood conversions through a simple majority vote.

#### Which Lines to Underground:

Underground conversions can be done for a number of reasons, including beautification and congestion relief, synergy with concurrent City projects, reliability, infrastructure improvements, security benefits, cost-effectiveness, and reducing future maintenance. Undergrounding on major streets gives the greatest benefit to the most customers by enhancing scenic views along heavy traffic corridors while conforming to the California Public Utility Commission (CPUC) regulations for approved Rule No. 20 expenditures.

Reducing visual blight is the primary reason this Motion cites for proposing a new conversion program. It is more important to properly identify conversion parameters because the CPUC regulations require that ratepayer money benefit the public good so as not to "gift" conversion work to a small pool of beneficiaries. The following five parameters are recommended for selecting underground conversions areas:

- Target Primary Arterial Streets for the highest number of constituents that would benefit.
- Identify the oldest pole lines or the Worst Performing Overhead Circuits (WPOC) along these roadways to prioritize the schedule of work.
- Identify areas that have existing infrastructure in the street. Conversions along these routes can cost half what a typical Rule No. 20 job costs.
- Study all large pole line relocation requests to determine if the above parameters apply and add funds as needed to achieve reliability improvements through conversions.
- Study economic revitalization, street restoration overlays and business improvement projects for opportunities to achieve reliability and aesthetic goals.
- Select projects among the 15 Council Districts to benefit constituents and ratepayers across the City in an equitable manner.

#### Conversions along Major Street Projects:

For the most part, major water, sewer or storm drain projects, provide little incentive or reasons to underground overhead lines. The most cost-effective method to underground pole lines occur in general funding street-widening projects where aged pole lines, in excess of 500 feet, must be relocated along Primary Streets.

Other work, such as water system, sanitation, or storm drain projects seldom conform to criteria that justify overhead conversions. Water trunk line work especially is simply too wide to accommodate concurrent underground system construction, eliminating economies of scale and time. The Power System Engineering Division maintains a team of utility coordinators that work with internal and external customers seeking facility relocations, thereby monitoring opportunities to convert facilities as needed.

#### Why Converting 25 Percent of Existing Overhead by FY 2030 is Not Feasible:

An additional funding source to achieve the 25-percent goal of total system underground would be needed because the cost to underground 1,400 pole miles would approach the \$4.2 billion mark amortized over 20 years. This equates to \$210 million every year or seven percent of power revenues over the same period.

This approach would be unlike any comparable program for its scale and schedule by a utility regulated in the CPUC. Compared to the City of San Diego, this program would, on an annual basis, be five times larger, six times more costly, and achieve similar goals in less than half the time. The seven percent in revenue needed would also be at least twice the burden assumed by any ratepayers in the State of California.

Setting magnitude of costs and ratepayer inequities aside, a program modeled after the Motion's request for proposal, would divert LADWP's construction resources to meet program goals at a pace too fast to be practical. Construction resources currently maintain critical utility functions and are in the midst of major infrastructure improvements that will improve LADWP reliability performance and augment ratepayer return.

#### LADWP CAPITAL PROGRAMS - UNDERGROUNDING

In the last fiscal year, LADWP installed roughly 220 circuit miles of underground cable for new business, system expansion and maintenance, and customer driven conversions. Because most of this work was for upgrading or replacing existing cable or installing new service connections, it resulted in a net increase of just 20 circuit miles of new underground primary.

In the current fiscal year, capital programs related to underground system growth are as follows:

- Install 4 circuit miles of underground cable through its Rule No. 20 program. This work is on shared-cost or applicant-paid basis and will remove approximately three miles of overhead utility lines across the City.
- The PRP began a new project to underground 21 miles of existing overhead lines over the next five years. Most of this work will utilize vacant underground ducts which are augmented or modified to allow rerouting of overhead lines to underground at a roughly 50-percent lower cost compared to Rule No. 20 work. Plans are to continue at a pace of eight pole miles annually after the five-year implementation period. This work is expected to convert 25 percent of pole lines along Primary Arterial Streets by FY 2030.
- The Power System is on pace to install 60 circuit miles of new underground cable for distribution maintenance adding a net 12 circuit miles to system growth.

• New business is expected to install about 145 circuit miles of new underground cable for service connections, but will add a modest net eight circuit miles to system growth

In this fiscal year, LADWP began conversions to install two circuit miles of new underground cable and remove 1.8 pole miles. This program will ramp up to and remove seven miles of poles in its fifth year. The five-year total will be 21 miles and much of that mileage has been identified to occupy existing infrastructure requiring some modifications to complete the work. As this work will replace aging overhead facilities, reliability will improve along a number of Primary Arterial Streets. These jobs will also improve scenic views as an ancillary benefit.

The PRP will also leverage new transportation and urban renewal projects requiring pole relocations to achieve conversion reliability goals using funds provided by proponents of these projects and the PRP.

At the rate of converting 11 miles per year through a fully implemented PRP and 20 miles of additional system growth, it is projected new underground cables will increase by more than 600 miles by FY 2030. Projecting a decrease of 200 pole miles due to the PRP and Rule No. 20 conversions, underground distribution circuit miles will reach 35-percent by FY 2030.

#### ENHANCED UNDERGROUNDING PROCESS

The following process is in place to achieve conversion goals along Primary Arterial Streets:

**Public Hearings:** Before design work can begin, the City Council will create an Underground Utility District (District), in accordance with the Los Angeles Municipal Code and hold related publics hearings.

**Design:** Once the City Council has created a District, the design process begins. This typically takes 12 to18 months to complete.

**Notifications:** All property owners will receive notices prior to the start of construction. Property owners will receive an additional notice prior to any work occurring on private property.

*Construction:* Construction of underground utility systems and the subsequent removal of overhead utility systems typically take between 18 and 24 months for most large projects.

**Phase 1 - Trenching:** In this phase, crews create a trench and install plastic conduit below the surface of the roadway. The crews will also trench up to each of the homes and businesses at this time. This is the most community-impacted phase of construction and typically can be expected to last 9 to12 months.

**Phase II - Cabling:** In this phase, technicians place new utility lines within the new conduits. The new lines are then energized and brought into service.

**Phase III - Cut Over:** Once a new underground system is in place and energized, and all properties have been prepared to receive underground service, all properties are switched over from the overhead lines to the new underground systems. This phase will typically take one to two months.

**Phase IV - Pole Removal:** When 100 percent of the properties have been switched over to the new underground system, the overhead systems are deenergized and removed. This phase can last two to three months.

**Post Construction:** Once the overhead utility lines are removed, some work will still be required to finish the projects. The streetlights that were once attached to the wooden poles must be replaced, the roadway must be resurfaced, and if applicable, street trees will be installed where necessary.

*Streetlight:* New streetlight poles are installed in accordance with the City's current streetlight standards as needed.

*Trees:* All reasonable steps are taken to protect trees while work is in progress. Where safety is a concern, a tree may need to be removed. All tree removals are performed in accordance with the City's policies and permitting process. The City will provide and plant a new tree for any property owner who is willing to water and care for the tree until it has been established.

#### HOW THE CITY COUNCIL CAN HELP

#### Bond Program for Neighborhood Conversions:

Concurrent with existing undergrounding activity on primary streets, a separate program is recommended to seamlessly permit residential customers to convert their neighborhoods using Public Works' bonds repaid through neighborhood assessments. This program exists now, but the terms and procedures are not favorable to the applicant. An ideal program would have the following characteristics:

- Simple approval and funding process for participants. (Vote of residents).
- Funding to be paid over 20 years (currently 10 years).
- Turnkey design and installation of all utilities.

A list of proposed projects for the Bond Program would be updated and reported annually to include neighborhoods participating in the program. Selection could be based on established evaluation criteria developed among different City departments and participating utilities.

#### **Declare Underground Utility (Districts):**

Ordinance No. 145,148 (October 5, 1973) allows the City Council to declare a District if public necessity, health, safety, and welfare require conversions within a designated area. This ordinance gives the City Council the power to request schedule and cost reports, notify affected parties, call public hearings, and declare a District, thereby ordering such work to be done.

#### Getting Other Utilities to Underground Their Lines:

A telecommunication company (telephone, cable TV providers) is not obligated to underground unless a District is declared by City Council. Most telecommunication companies will convert at their expense if a provision is made in their franchise agreement.

Please note, the City of Anaheim (Anaheim) lost a bid requiring a telephone company to go underground and pay for it. The case stated that telecommunications companies are under the jurisdiction of the CPUC and only they can determine the requirement to underground the lines. This may require special consideration in the current LADWP conversion program. Private electric utilities, such as Edison are also not automatically obligated to underground its lines when a municipal utility undergrounds their lines. Without a District and the City's willingness to pay most of the costs, the power lines will remain above ground even if LADWP has removed all of their lines. Edison has a number of overhead 66-kV lines in the City. Please note that Edison's 66-kV lines are exempt from the City's undergrounding ordinance that could be amended to correct this loop hole.

Historically, telecommunications and cable TV companies have been cooperative as occasional requests related to pole removals require few resources. A magnitude increase of work related to the expanding conversions program will meet resistance as the company's expenses begin to rise. This is why City Council action to declare underground utility districts is important to the viability of this program.

#### **UNDERGROUNDING COST AND SPENDING COMPARISON:**

Power system undergrounding costs \$3 million per pole mile on average and these expenses are typically borne in a cost- sharing or applicant-paid basis under Rule No. 20. The current FY budget for Rule 20 and PRP undergrounding is almost \$10 million or 0.3-percent power revenues. This will convert two pole miles for PRP and up to three pole miles in customer projects.

By comparison, Anaheim's cost is about \$4 million per street mile; for the City of Pasadena (Pasadena), the cost is about \$3.2 million per street mile; and the City of Burbank estimates \$3.5 million per pole mile. Urban utility expenses trend higher because some include private property work for customer service connections and work in congested streets.

Undergrounding expenditures for neighboring utilities in Southern California are Anaheim (\$9.7 million) and Pasadena (\$3.8 million) spend the most as a percentage of their revenue. The Cities of Burbank, Riverside, and Azusa are in the next tier of \$350,000 to \$1 million, while the Cities of Banning, Colton, and Glendale are less than \$10,000. Of the Investor Owned-Utilities, Edison spends approximately \$45 million or 0.4-percent among the 430 cities it serves.

San Diego Gas and Electric averages \$50 million annually in the City of San Diego, but due to its residential program, per mile costs are \$2.3 million including customer service connections.

#### RECOMMENDATIONS

LADWP will continue system growth and accelerated conversion efforts, under the PRP, to add more than 600 miles of new underground cable resulting in the removal of 200 pole miles of existing overhead lines across the City by FY 2030. LADWP will also target aging poles along major arterial streets for conversion under the PRP.

Based on proposed LADWP projects, the City Council would declare Underground Utility Districts in target areas to require private property owners and other utilities to underground their overhead lines. The City Council would also request that Public Works and LADWP i investigate the feasibility of establishing a resident-funded undergrounding program. Through this program, neighborhoods could request, by a simple vote, the conversion of overhead lines using bondy money paid back by property tax assessments.

#### CONCLUSION

The existing Utility Undergrounding Program will improve reliability and aesthetics across all Council Districts in the City by FY 2030. Job selection criteria have been and will continue to be based on equitability across Council Districts, cost, and the needs of constituents and ratepayers. The Utility Undergrounding Program along with system work will install 600 miles of new underground cable and achieve a 35-percent share of power lines in the City by FY 2030.