



Testimony

Provided By

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Metropolitan Water District of Southern California

On

*Investment in Small Hydropower: Prospects of Expanding Low-Impact and Affordable Hydropower Generation in the West*

Before the

U.S. House of Representatives  
Committee on Natural Resources  
Water and Power Subcommittee

July 29, 2010

Madam Chair and Subcommittee Members:

### **Introduction**

Thank you for providing the Metropolitan Water District of Southern California (Metropolitan) the opportunity to testify regarding investment in small hydropower and the prospects of expanding low impact and affordable hydropower generation in the West . I am Jon Lambeck, Manager of Power Resources at the Metropolitan Water District of Southern California. My responsibilities include the management of the energy and environmental attributes produced from Metropolitan's 16 small conduit hydropower generators. In addition to this testimony, information developed earlier this month in response to an inquiry from the Subcommittee regarding Metropolitan's experience with the development of small hydropower generation has also been submitted for the record.

Metropolitan is the nation's largest provider of treated drinking water. Each day during a normal year, it moves on

average more than 1.6 billion gallons of water through its distribution system, delivering supplies to 26 member agencies. Those agencies, in turn, sell that water to more than 300 sub-agencies or directly to consumers. In all, 19 million Southern Californians rely on Metropolitan for some or all of the water they use in their homes and businesses.

Since Metropolitan's inception over 75 years ago, hydropower has played a key role in its success of providing water to the southern California coastal plain. As one of the largest contractors for power from the Hoover Dam, Metropolitan has used that energy from the start of its water operations in 1939 to supply over one-half of the power needed to move Metropolitan's allocation of Colorado River water to southern California. More recently, beginning in the late 1970's, Metropolitan has developed 16 small conduit hydropower generators throughout its water distribution system. These generators annually produce an average of 350,000 megawatt-

hours of energy.

### **Incentives**

Metropolitan developed these hydropower generators with its own funds with little or no incentives helping to offset the cost. The generators were placed at locations on the water distribution system where pressure control structures already existed. The installation of generators at these sites, typically where the water pipelines reach the bottom of a hill, allowed the necessary dissipation of energy to be accomplished with a turbine, rather than a large valve. Thus, the energy in the flowing water is used to produce environmentally benign electricity instead of simply being wasted in an energy dissipater. The economic justification of the development of these new generators was based on the sale of the energy to local utilities.

Due to the regional and national emphasis on the development of renewable, green energy and Metropolitan's own goal to develop cost-effective renewable energy while reducing its

carbon footprint, Metropolitan is re-evaluating its water distribution system for the potential of installing additional hydropower generators. The economics of these projects are once again being driven by the estimated revenue from the sale of the electricity to local utilities. However, given the possibility of green house gas regulations, Metropolitan is also looking at the potential to use the energy itself. The evaluations have identified three sites for detailed economic analysis and preliminary design.

To determine the economic feasibility of new generator installations, Metropolitan assumes the energy produced will carry a higher value since it will meet the criteria for renewable energy. However, even with the expected higher revenues from the sale of renewable energy, without incentives the breakeven point can occur too far into the future to make the project viable. In its analysis, Metropolitan assumes there will not be any incentives available to help defray the cost of the new facilities. Most renewable incentives have been developed to benefit for-profit

organizations by providing reductions in tax payments.

Metropolitan, like most water agencies, is a not-for-profit organization and does not benefit from incentives based on tax issues.

### **Barriers**

Over the past 30 years of Metropolitan's development of small hydropower generators, the regulatory environment for hydropower generators has changed to become more complex and burdensome. For example, all of Metropolitan's generators are classified as small conduit hydro. They were installed in existing water conduits or pipelines and simply redirect water to a power generating turbine instead of a pressure dissipating valve. However, even though the Federal Energy Regulatory Commission has always been expeditious in granting the small conduit exemptions from the full hydropower license requirements requested by Metropolitan, there are still inspections and reporting requirements that are burdensome and time consuming.

Metropolitan sees little value gained from these activities. Additionally, for small water agencies that have little or no experience with the power industry, such complexities could easily dissuade them from installing hydropower generators on their own conduits and pipelines, thus foregoing an opportunity to increase the production of renewable power that has no impact on the environment.

Another change has been the creation of Regional Transmission Organizations (RTO). RTOs have promulgated their own set of regulations and requirements for generators. Many times the regulations make no distinction for size and ability to impact the power system. For example, a water agency that wants to use a small, one megawatt hydropower generator to extract some of the energy from the water flowing through its pipelines may be required to report power schedules and projections as if it were a multi-hundred megawatt natural gas fired generator. These types of one-size-fits-all regulations may

simplify life for the RTO but they hinder and discourage small hydropower generator development that water agencies may be contemplating. Many water utilities have little experience in energy generation and may decide the regulatory burdens and risks are too great to proceed with the installation of a hydropower generator.

### **Federal Role**

Metropolitan believes the Federal government can play a very important role in assisting the development of small hydropower generators. This assistance could be provided as follows:

- Remove the size limitations for conduit hydropower licensing exemptions.
- Treat all hydropower generation as renewable.
- Eliminate regulations and reporting requirements that do not provide added value.



- Provide grants and other incentives for hydropower generator development that can be used by not-for-profit agencies that do not pay taxes.
- Work with state and regional entities to eliminate redundant or unnecessary regulations related to the development of new hydropower generators.
- Undertake or support studies to develop and improve the design and applicability of turbines for small hydropower generators.

## **Conclusion**

In conclusion, Metropolitan believes there are opportunities to expand the number of small hydropower generators, especially at existing water distribution facilities. Focused incentives and appropriate regulations will facilitate the identification of potential generator sites and result in the installation of new hydropower generators. The renewable energy produced through the more

expansive use of existing water distribution infrastructure and approved water diversions will replace energy from fossil fueled generators and assist in the reduction of green house gasses.



THE METROPOLITAN WATER DISTRICT  
OF SOUTHERN CALIFORNIA

**The Metropolitan Water District of Southern California (Metropolitan) Response to a  
Water and Power Subcommittee Inquiry Request  
Dated July 14, 2010**

**Purpose of Water and Power Subcommittee Inquiry:**

1. Reviewing the prospects of expanding small, low-impact, affordable hydropower.
2. Several factors have culminated in an increase in small hydro:
  - Potential federal renewable electricity standards;
  - Existing state renewable portfolio standards; and
  - Extension of tax incentives for renewable energy sources from ARRA and EPAct 2005.
3. Looking into these incentives as well as statutory and regulatory obstacles to expanding small hydro.

**Inquiry:**

- As it relates to the operations of Metropolitan, what has Metropolitan done, or is doing, to incorporate hydroelectric generators into its water delivery system?
- How much power is generated through these means?
- Has Metropolitan experienced any hurdles in installing these projects?
- Does Metropolitan have any recommendations to encourage these types of projects? (Not looking into the prospects of increasing hydropower through encouraging water impoundments or dams at this time).

**Metropolitan Response:**

**Description of Metropolitan and its Water Delivery System:**

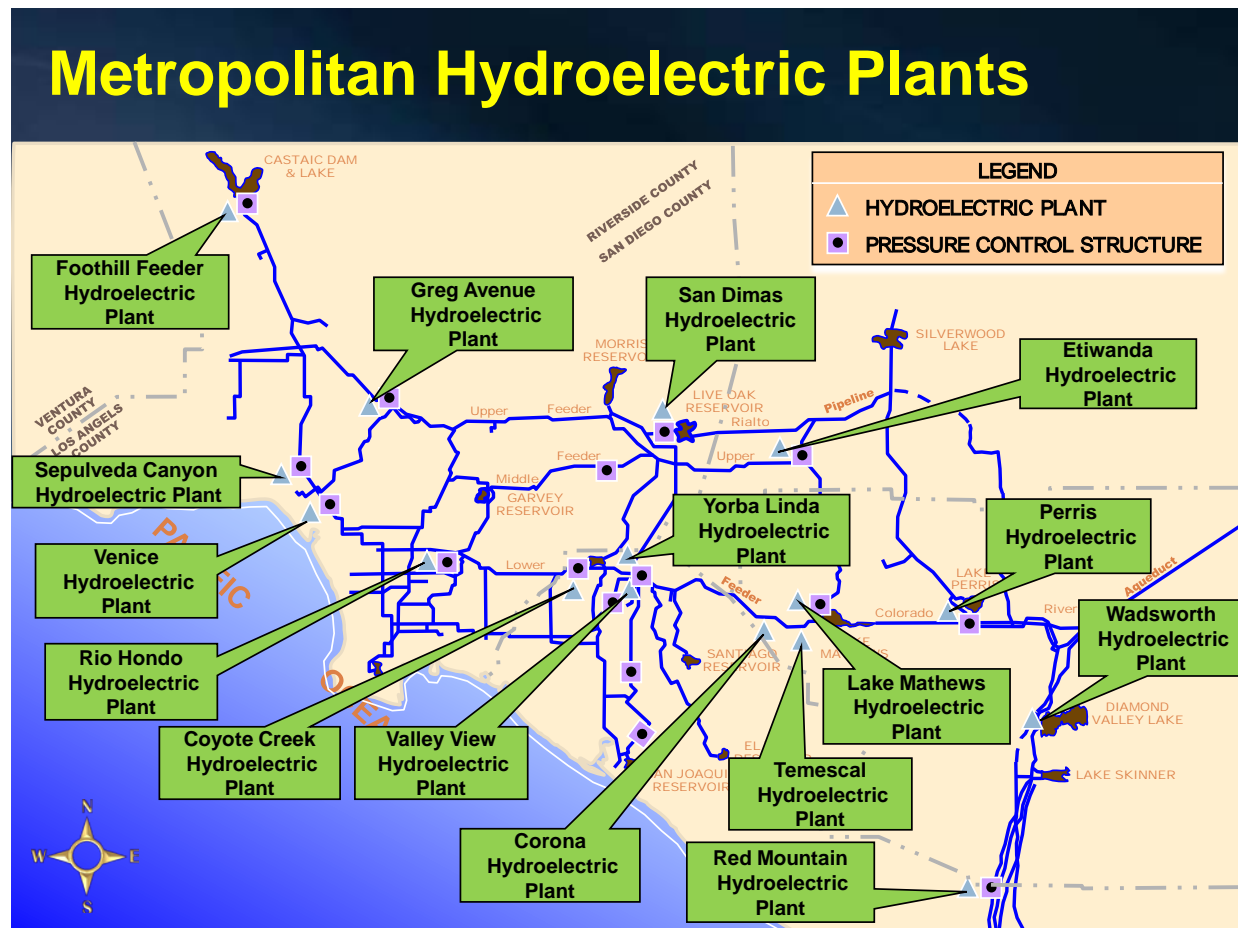
Metropolitan's primary purpose is to provide a supplemental supply of water for domestic and municipal uses at wholesale rates to its member public agencies. Metropolitan serves its member agencies as a water wholesaler and has no retail customers.

Metropolitan is the nation's largest provider of treated drinking water. Each day during a normal year, the district moves more than 1.5 billion gallons of water through its distribution system, delivering supplies to 26 member agencies. Those agencies, in turn, sell that water to more than 300 sub-agencies or directly to consumers. In all, 19 million Southern Californians rely on Metropolitan for some or all of the water they use in their homes and businesses.

Metropolitan has a six-county service area, which encompasses 5,200 square miles in Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura counties. In geographic terms, that's nearly as large as the states of Connecticut and Rhode Island combined.

Metropolitan's internal water distribution system includes components that were built beginning in the 1930's through the present. Metropolitan owns all of these components, including 14 off-stream dams and reservoirs, five regional treatment plants, 45 pressure control structures, over 800 miles of pipelines and canals, and 16 hydroelectric plants with an aggregate nameplate capacity of 131 megawatts. All but 5 of the hydroelectric plants are certified as meeting California's Renewable Portfolio Standard (CARPS). The remaining 5 plants physically meet the CARPS, but certification has not been requested at this time.

All 16 hydroelectric plants are a conduit hydro design and are located to recover some of the hydraulic energy at pressure-reducing structures along Metropolitan's 819 miles of water distribution system pipelines as shown in the southern California area map below.



Existing Conduit Hydro Plants on Metropolitan's System:

The hydro plant capacities' range from 1 to 29.7 MW with a total installed capacity of approximately 131 MW. Most of the plants were installed in the late 1970's to mid 1980's. Table A lists the plants, their in-service dates and capacities.

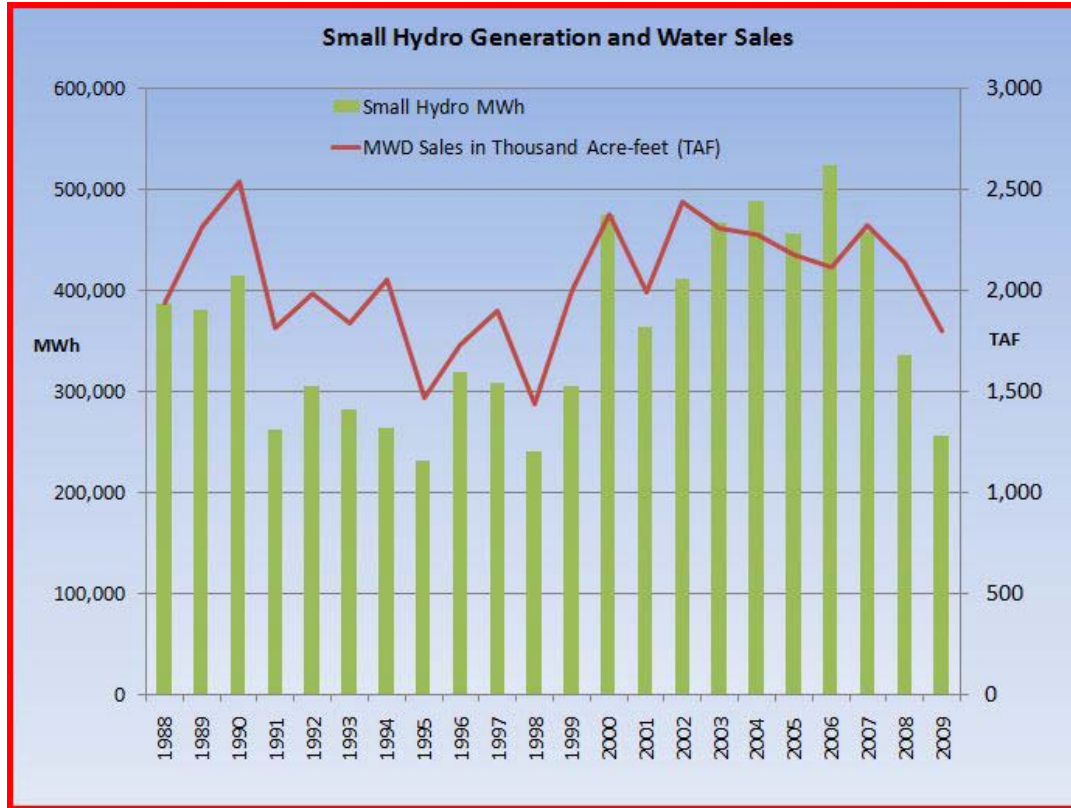
**TABLE A**

Hydro Plant	In Service Date	Nameplate Capacity MW
1 Greg Ave.	Dec-79	1
2 Lake Mathews	Aug-80	4.9
3 Foothill Feeder	Apr-81	9
4 San Dimas	Jun-81	9.9
5 Yorba Linda	Nov-81	5.09
6 Sepulveda Canyon	Jun-82	8.54
7 Venice	Aug-82	10.1
8 Temescal	Jul-83	2.85
9 Corona	Aug-83	2.85
10 Perris	May-83	7.9
11 Rio Hondo	Mar-84	1.9
12 Coyote Creek	Apr-84	3.1
13 Red Mountain	Mar-86	5.9
14 Valley View	Jul-86	4.1
15 Etiwanda	Jun-94	23.9
16 Diamond Valley Lake (at Wadsworth)	May-01	29.7
<b>Grand Total</b>		<b>131</b>

During the California energy crisis in 2000/2001 the California Energy Commission (CEC) offered a new renewable resources account program. This program included incentive payments if renewable projects were on line and generating by summer 2001. Metropolitan accelerated plans to convert four pumps at the Wadsworth pump plant facility to allow reverse turbine/power generation by May 2001. By the end of 2001, the remaining eight pumps at the Wadsworth facility were converted to permit generation. The plant is also known as the Diamond Valley Lake Small Conduit hydroelectric plant (DVL).

Generation at all Metropolitan's hydro plants is dependent upon water deliveries through the water distribution system. Depending on supplies and water quality, the generation can be forecasted over a week in advance. This differs from most run-of-river hydro plants which are typically not as predictable and are dependent on hydrologies or run-off. The total generation from Metropolitan's plants in calendar years 2006-2009 is shown in Table B. A chart of the generation as compared to Metropolitan's water sales is shown below for years 1988 - 2009. The decreasing generation values show the impacts of California's drought and reduced water deliveries.

<b>TABLE B</b>	Total Generation MWh
Year	
2006	524,681
2007	457,305
2008	334,972
2009	256,113



Assessment of Existing and New Hydro Plants on Metropolitan’s Water Distribution System:

Metropolitan has a continuing interest in expanding existing or developing new hydro facilities on its water distribution system. Metropolitan is in the process of the planning and design work to replace a turbine at the Yorba Linda hydro plant due to changes to the onsite water treatment facility. Once the turbine is replaced and the necessary electrical connections are reconfigured, Metropolitan will be able to serve some or all of the onsite power needs and sell any excess energy. This will result in a reduction in Metropolitan’s carbon footprint. Metropolitan is also considering the potential of adding one or two additional hydro units at the Foothill Feeder facility.

In February 2010, a feasibility study was completed on ten potential hydroelectric power sites that were previously identified in a 2008 assessment study. The results of the feasibility study indicate three of the ten sites have favorable economics for development with estimated payback periods ranging from 9 to 13 years. The three plants have capacities ranging from 1.4- 2.5 MW and Metropolitan plans to begin preliminary design work for two of the sites in fiscal year 2011/2012.

Lastly, Metropolitan is investigating new technologies and designs that may allow small scale hydro generators to be placed within pipelines and open canals, and provide renewable energy without impacting water operations and maintenance activities.

Metropolitan will continue to reevaluate the payback periods for these and other hydro plants as water supplies, water deliveries and the value of renewable power change in the future.

#### Hurdles or Impediments Related to Hydro Plants:

For several years Metropolitan attempted to receive CARPS certification for the DVL plant which originally had a nameplate capacity of 39.6 MW. It was just below the Federal Energy Regulatory Commission's (FERC's) 40 MW conduit exemption limit, but it was greater than the CARPS 30 MW eligibility limit. This posed a problem, as Metropolitan could not enter into a renewable power purchase and sales agreement with most utilities in California for this plant until it submitted an application to FERC on October 8, 2009 to amend the conduit exemption at DVL by retiring three units and derating the plant to 29.7 MW. FERC responded in only 8 days by issuing a FERC order granting the amendment of exemption for DVL on October 16, 2009. Metropolitan was impressed and grateful for FERC's quick approval time. Metropolitan completed the necessary changes to the plant to retire the three units, and then submitted a certification application to the CEC for CARPS for DVL on October 21, 2009. By December 24, 2009, Metropolitan received notice of DVL's CARPS eligibility. There are additional hydro certification hurdles Metropolitan is pursuing with the state before the output from DVL can be sold under a renewable contract with an investor owned utility in California. It is unfortunate that Metropolitan had to spend several years trying to meet the CARPS requirements, and in doing so, has reduced the reliability of the DVL plant by retiring three units. Therefore, Metropolitan questions whether some of these impediments could be eliminated, such as the 40 MW FERC exemption limit, the 30 MW CARPS hydro limit, and other water quality and water right permitting requirements for existing conduit facilities.

Some state regulations are more restrictive than federal regulations. Some regulations appear to be written as though all hydropower is large and developed in conjunction with streams, water impoundments, or dams. For water districts that have conduits, pipelines, and canals and have the potential to simply add hydroelectric plants to existing facilities, with little to no impact to the environment or stream flows; progress can be hindered with regulations that add unnecessary complexity in contracts, administration, operations as well as in acquiring permits and certifications. Additionally, Metropolitan questions whether certain FERC annual inspections and reporting requirements for exempt conduit plants provide value and if they could be minimized or eliminated, especially since there are no dam or dam safety issues.

There are also many new burdens that did not exist prior to the existence of Regional Transmission Organizations (RTOs). Prior to 1998, the scheduling, transmission and accounting of the small hydro facilities could be managed by a small number of people. Now, however the efforts to maintain or add renewable hydro plants have to be weighed with the cost of additional labor and potential penalties due to statutory and regulatory changes. There are laws and tariffs that require specific scheduling coordinators, interconnection requirements, wholesale distribution tariffs, participating generator agreements, metering, forecasting of intermittent resources, outage reporting, renewable tracking and accounting, settlements, etc. This adds a whole new dimension to the mission of a small water district who may be looking at

installing a 2 or 3 MW conduit hydro plant, but will be burdened with operating and reporting requirements as if they were running a multi-hundred MW thermal generator.

### Incentives

Incentive payments from the federal government or as offered through the state can provide the economic boost needed to justify a project. As most water agencies are municipal or public agencies, any incentives should be structured to provide benefits that are not tied to tax reductions, as the agencies do not pay taxes.

### Metropolitan Recommendations:

Metropolitan would certainly encourage the development of hydro facilities, especially conduit hydroelectric. The benefits of a renewable conduit hydro resource include: lack of fuel volatility, lack of emissions, and a more predictable output than other renewable resources such as wind and solar power. Metropolitan has the following recommendations:

- Continue the FERC hydro licensing conduit exemption, but remove the 40MW limit.
- Eliminate renewable limits for hydroelectric power. Limitations are restrictive and arbitrary. Therefore, it is recommended there should be no federal or state restrictions on hydropower. All hydroelectric power, regardless of size, should qualify as renewable.
- Suggest offering grants as well as tax incentives so public agencies can benefit.
- There should be an effort to coordinate both federal and state regulations to be as streamlined and non-burdensome as possible for conduit hydro projects, since they do not pose a burden on the public, streams or the environment.
- Since pipelines can be located miles away from a water agency's electrical load, regulations should allow water agencies to utilize hydro-generation from their water distribution systems to serve their offsite retail electric loads.