Innovation & Technology Working Group Recommendations

On-Site Waste Water Treatment

The workgroup recommends that the City develop a set of guidelines for on-site wastewater treatment and reuse (including proposals for sewer mining operations) which detail the issues and criteria (including the financial viability of a proposed project) that proposals must meet or address in order for the City to participate in or cooperate with such projects.

Further, the workgroup recommends that the City consider the value of both wastewater (when providing water for potential sewer mining operations) and reclaimed water (when projects provide water to City owned properties) and increased costs or avoided costs that the City would incur or realize, and how the proposed project could impact the City's plans for potable reuse when setting a charge for wastewater supply and/or purchase price of recycled product water provided by the project. Finally, the workgroup recommends that the City establish standby fees and reserved capacity charges for such projects, so that developers can take such fees into account in determining whether a proposed project makes economic sense.

Advanced Metering Infrastructure

The working group recommends that the City:

- Pursue grant funding to offset some of the costs for an entire system AMI retrofit; and
- Set as its goal to retrofit all of the remaining 265,000 water meters with AMI technology within 10 years; and
- Consider cost sharing with single family customers who would like to retrofit their water meters with AMI technology on a more expeditious basis.

Energy & Water Nexus

As part of the City's Energy Optimization Study, the City should consider evaluating the costs and benefits of dynamic optimization programs that provide water utilities an opportunity to use behind the meter dynamic real-time SMARTGrid technology to increase efficiency and flexibility to better manage their own energy use. Considering the complexity of the City's treatment and distribution system, at the minimum, the dynamic optimization programs evaluated should be able to handle several hundred pumps, control-valves, and demand zones and save energy costs, in at least five main ways, by:

1. Time-of-use load shifting where the pumping operations are moved from daytime (high energy tariff) to night-time (low energy tariff);
2. Peak charges avoidance where the software will naturally chose to avoid running pumps during high periods when peak charges occur;
3. Selecting lowest cost sources of water where the software queries the lowest cost of production of water and adjusts the water source based on the information;
4. Achievement of shortest path through the trunk distribution network by constantly reading and working to the lowest headloss; and
5. Pump efficiency improvement because the software holds the actual pump operating curve which is calibrated from flow and pressure measurements read from telemetry, and from the monthly energy bill. The software selects the combination of pump settings which delivers the overall lowest operating cost and highest possible efficiency.

San Diego Water Policy Implementation Task Force
Innovation and Technology Working Group
Recommendations
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On Site Wastewater Treatment and Reuse. On site wastewater treatment using Membrane Bioreactor (MBR) technology is used in various areas of the country including southern California (Anaheim CA.). In 2005 a study was completed for the San Diego County Water Authority which evaluated potential satellite MBR sites within the SDCWA service area, including three sites within the City of San Diego. There appears to be some renewed interest in the application of this technology and the working group heard a presentation regarding a proposal to construct and operate a combined sewer mining and on-site recycled water project near the Bahia Hotel. The project, according to the proponent, would treat wastewater produced by the hotel and from the City of San Diego collection system to irrigate the hotel property and an adjacent City park with the product water. The additional water from the City's wastewater system would be required at times to meet irrigation demands, and at other times (such as during rainy periods), it is likely that there would be little or no demand for the treated wastewater. In these cases the system may need to be shut down, or product water would need to be stored, or discharged elsewhere. The working group asked for and is receiving additional information from the project proponent regarding the specific role, obligations, and estimated cost impacts to the City, and further information regarding production, use, permitting and environmental impacts.

The working group also heard from City of San Diego representatives regarding their concerns and issues with this specific project. These include financial risk to rate payers, permitting, economic feasibility and technical challenges as detailed in a January 2012 letter to the project proponent. Additionally, City staff told the workgroup that it wishes to focus efforts on its indirect potable reuse program and projects as the means to increase the use of recycled water within the City.

While taking no position on the Bahia project or any other specific project, the workgroup feels that in certain cases on-site wastewater treatment using MBR technology may provide opportunities to increase the use of recycled water within the City without competing with IPR plans. These projects can be divided into two types of projects, or a combination of both:

1. On-site wastewater treatment including the collection, treatment and reuse of wastewater at the location in which the waste is generated. The supply for the wastewater treatment system could also include rainwater and storm water.

2. Sewer mining wastewater treatment, meaning the withdrawal of wastewater from City of San Diego's wastewater collection system for treatment and reuse at or near the location of the wastewater treatment system.

There are opportunities and constraints, benefits, challenges, and potential risks associated with both types of projects. Further coordination with regulatory and permitting agencies such as Department of

Public Health (DPH) and Regional Water Quality Control Board (RWQCB), along with other water utilities is needed. Primary issues and concerns of the City include:

1. City's liability – what responsibility will the City have if the treatment system fails to perform?
2. Public health and safety – who is responsible for monitoring and reporting?
3. System redundancy – how much redundancy should be required to minimize the risk of failure?
4. Responsibility for long-term operation and maintenance – how to ensure long term operation and maintenance by the property owner?
5. Compliance with existing and future regulations – who is responsible for monitoring and reporting to ensure compliance, and how to ensure adequate funding for improvements that may be required?
6. Impacts to future City infrastructure development – how does this impact the City's current and future ability and/or need to fund existing and future infrastructure?
7. Benefits versus costs to the City – do the benefits outweigh the potential risks and liabilities?

As more policies are developed that link water supply to future land use and development, there may be an increased level of interest by local developers to include on-site or sewer mining wastewater projects as part of a new and/or expansion of existing development.

The concept of on-site recycling based on treatment of waste produced on-site and use of the recycled water on site only is the simplest scenario to manage potential impacts to the City but in some cases and in order to make on-site wastewater treatment and reuse more cost-effective, additional wastewater flows beyond what is expected to be produced by a project may be needed or there may be a need to find other customers for the recycled water produced. Still other projects may be able to provide irrigation water to public parks, open spaces, golf courses or other City-owned properties. This creates a scenario that combines on-site recycling with sewer mining and potential impacts become more complex.

Other issues will also need to be addressed. At times, if there is no on-site storage, discharge back into the City's wastewater system is likely when seasonal demand for recycled water is reduced. The concentrated waste stream (sludge) may also need to be discharged to the City's wastewater collection system with potential impacts to the collection system and downstream wastewater treatment plant.

Currently, developers of such projects do not have sufficient guidelines as to whether on-site wastewater treatment (and potential sewer mining operations) would be consistent with the City's operations or plans for increasing reclaimed water usage. Similarly, proposals to construct such facilities do not always contain sufficient details necessary for the City to evaluate projects on a case-by-case basis and within the context of the City's regional recycled water plans, wastewater operations, or irrigation needs.

The workgroup recommends that the City develop a set of guidelines for on-site wastewater treatment and reuse (including proposals for sewer mining operations) which detail the issues and criteria (including the financial viability of a proposed project) that proposals must meet or address in order for the City to participate in or cooperate with such projects.

Further, the workgroup recommends that the City consider the value of both wastewater (when providing water for potential sewer mining operations) and reclaimed water (when projects provide water to City owned properties) and increased costs or avoided costs that the City would

incur or realize, and how the proposed project could impact the City's plans for potable reuse when setting a charge for wastewater supply and/or purchase price of recycled product water provided by the project. Finally, the workgroup recommends that the City establish standby fees and reserved capacity charges for such projects, so that developers can take such fees into account in determining whether a proposed project makes economic sense.

Advanced Metering Infrastructure (AMI) Technology to read water meters . SDG&E has converted nearly every one of its electricity meters to smart meters that can be read remotely and in real time, and the technology exists to do the same with water meters. The City of San Diego has adopted, and is in the process of implementing, a program to replace or convert 10,000 to 11,000 water meters City-wide with AMI technology. These water meters are larger meters that are currently read monthly, and such conversion or replacement would be accomplished by the end of the year. This effort would also put in place much of the infrastructure necessary to expand the program to all water meters.

AMI technology has the potential to save the City costs for meter reading and provide both the City and customers opportunities to know real-time water use. For the City's current program, it is estimated that the pay-back period is only 5 years to recover the cost of the program. This favorable payback period applies to the large meter program; it is anticipated that a longer period may be required for a more expanded smaller meter program. According to City staff, the cost to retrofit all City meters to AMI technology is $84 million, or about $300 per meter for the remaining 265,000 water meters. The sub-committee was pleased that the City is beginning to utilize AMI technology, but felt that there was an opportunity to expand and accelerate the program to further promote water conservation among water users and labor and other cost savings for the City. Further, over time older meters tend to register a lower amount of water than actually flows through the meter. This loss, which can be up to 8 percent per meter results in lost revenue to the City that if recovered could offset in part the additional investment which would be required. **The working group recommends that the City:**

- **Pursue grant funding to offset some of the costs for an entire system AMI retrofit; and**
- **Set as its goal to retrofit all of the remaining 265,000 water meters with AMI technology within 10 years; and**
- **Consider cost sharing with single family customers who would like to retrofit their water meters with AMI technology on a more expeditious basis.**

Energy and water. The working group previously provided a recommendation regarding the use of pumped storage, in-line hydroelectric (microturbines), and solar energy at City owned sites to reduce the use of imported energy consumption by the City.

Following is an additional recommendation that is related to the information Soma Bhadra presented at our last Task Force meeting. The ultimate goal would be to integrate dynamic hydraulic optimization with the City's existing hydraulic models to be able to receive and react to dynamic energy pricing, maximize the City's participation in multi-level demand response programs and to potentially create a new, continuous revenue stream by entering the energy market:

As part of the City's Energy Optimization Study, the City should consider evaluating the costs and benefits of dynamic optimization programs that provide water utilities an opportunity to use behind the meter dynamic real-time SMARTGrid technology to increase efficiency and flexibility to better manage their own energy use. Considering the complexity of the City's treatment and distribution system, at the minimum, the dynamic optimization programs evaluated should be able

to handle several hundred pumps, control-valves, and demand zones and save energy costs, in at least five main ways, by:

6. **Time-of-use load shifting where the pumping operations are moved from daytime (high energy tariff) to night-time (low energy tariff);**
7. **Peak charges avoidance where the software will naturally chose to avoid running pumps during high periods when peak charges occur;**
8. **Selecting lowest cost sources of water where the software queries the lowest cost of production of water and adjusts the water source based on the information;**
9. **Achievement of shortest path through the trunk distribution network by constantly reading and working to the lowest headloss; and**
10. **Pump efficiency improvement because the software holds the actual pump operating curve which is calibrated from flow and pressure measurements read from telemetry, and from the monthly energy bill. The software selects the combination of pump settings which delivers the overall lowest operating cost and highest possible efficiency.**