

Wastewater Reuse Business Planning To Support Effective Utility Development

Idaho Wastewater Reuse Conference

May 13, 2009

**Robert Ori, CPA
Blair Troutman, PE**

General Definition

“Reclaimed water involves taking what was once considered a waste product, giving it a higher degree of treatment, and using the resulting water product for beneficial uses.”

General Objectives of Reclaimed Water

- Provide aligned method of effluent disposal
- Reduce nutrient loadings
- Reduce potable water use
 - Replace or supplement a source of utility water supply
 - Offset potable water use for activities that do not require potable water
 - Decrease PDF and ADF water demands
- Recharge resources

Presentation Overview

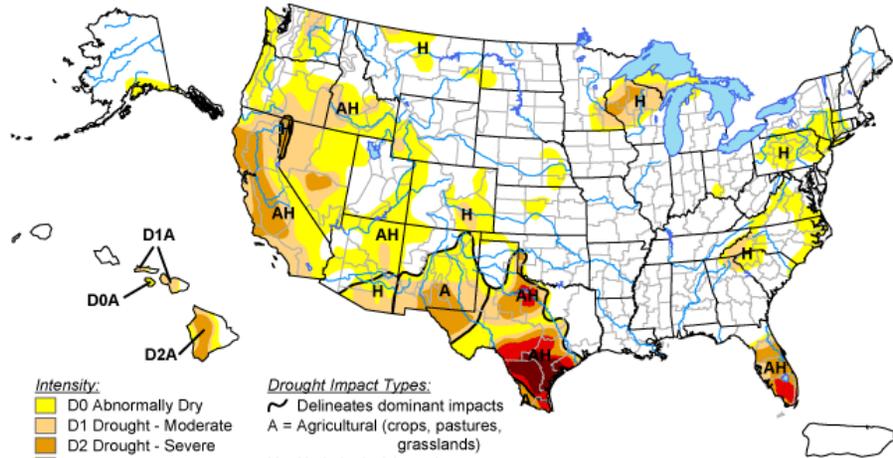
- Discuss issues and lessons learned from 25 years of implementation in Florida and California.
- Discuss underlying business challenges in implementation.
- Identify business planning process and tools to support system management.

The Need For Action

U.S. Drought Monitor

May 5, 2009

Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)



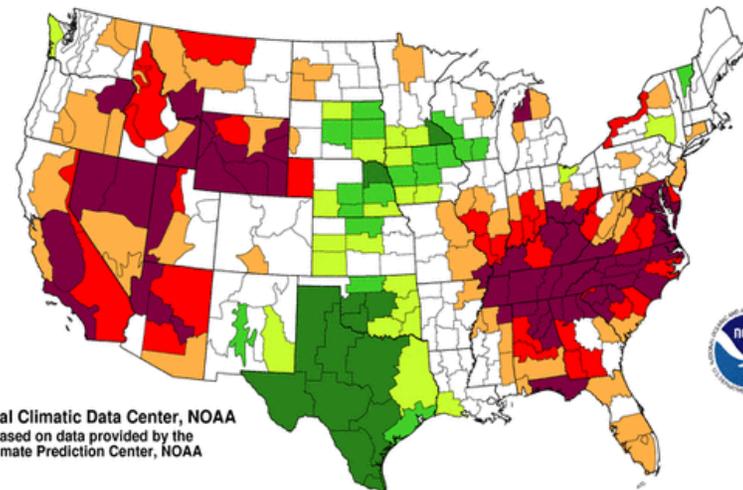
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Released Thursday, May 7, 2009

Author: Laura Edwards, Western Regional Climate Center

<http://drought.unl.edu/dm>

Palmer Drought Index Long-Term (Meteorological) Conditions



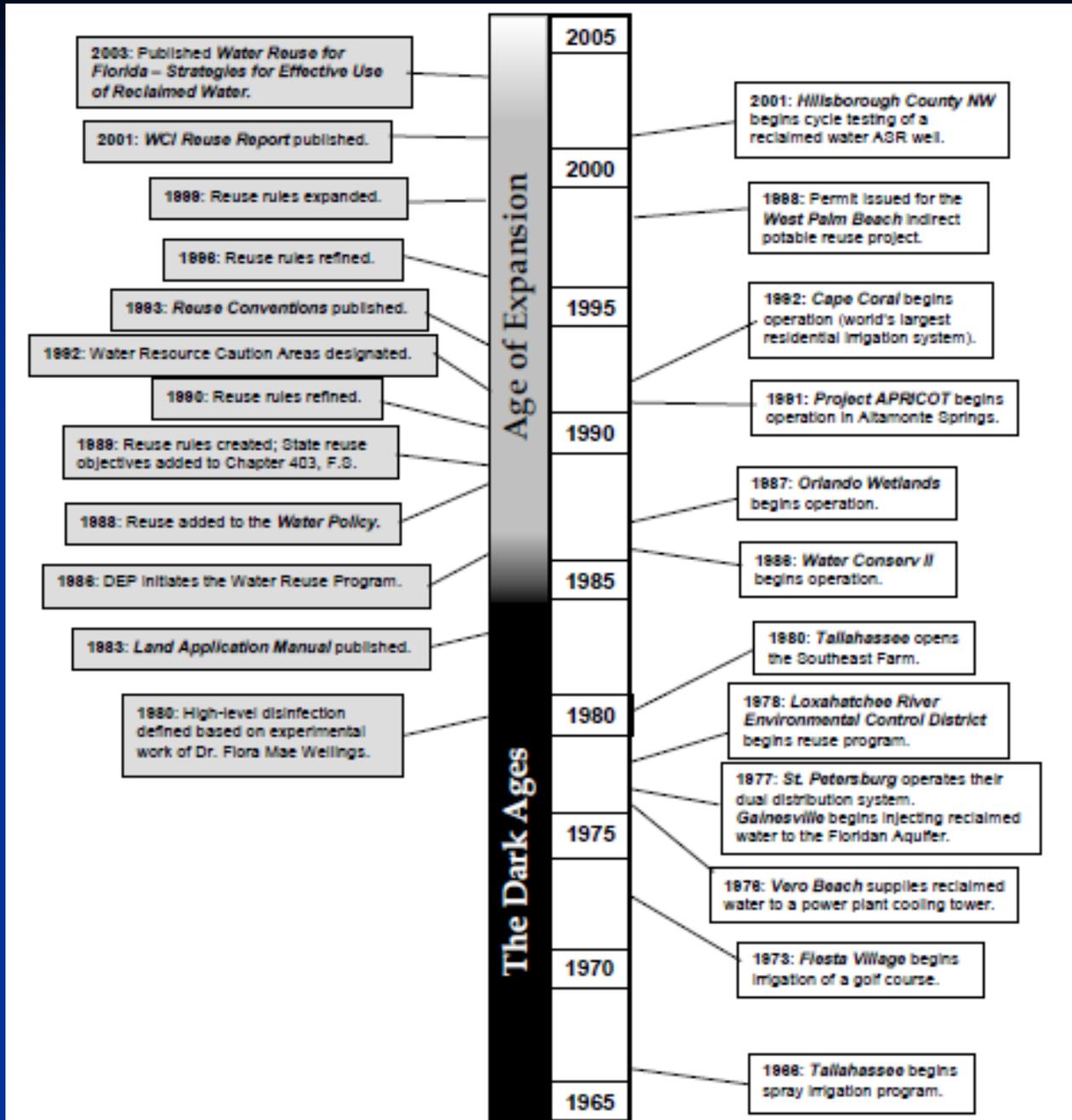
National Climatic Data Center, NOAA
based on data provided by the
Climate Prediction Center, NOAA

extreme drought	severe drought	moderate drought	mid-range	moderately moist	very moist	extremely moist
-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

Wastewater Reuse Development

- Water withdrawals (use) are governed by Water Management Districts.
- Consumptive use permits have mandated consideration of reclaimed water for 25 years.
- Huge variations in potable water demand and wastewater generation exist.
- Systems were installed at no capital or monthly cost to end user.





Wastewater Reuse Development in Florida -2001

- Reuse implementation generally effective.
- Not uniformly implemented.
 - 900 MGD effluent disposed using deep injection wells/ocean and surface outfalls.
 - 2 largest counties averaged 5% reuse.
- During droughts, utilities realized they had oversold capacity and that customer selection and service contracts created significant problems.

2003 Water Reuse for Florida- Strategies for Effective Use of Reclaimed Water

- “Potable Quality Water Offset”- amount of potable quality water saved through the use of reclaimed water as a % of the total reclaimed water used.
- “Recharge Fraction”- portion of reclaimed water used that recharges an underlying potable quality ground or surface water that is used as a source for potable water.
- Relative importance is dependent on local circumstances.
- Focused consideration on efficiency of achieving targeted reuse benefits.

Relative Desirability of Reuse Activities

Desirability	Reuse Activity	Offset	Recharge Fraction
High	Indirect potable reuse	—	100
	Ground water recharge- injection to potable ground water	—	100
	Industrial uses	100	—
	Toilet flushing	100	—
	Rapid Infiltration Basins (where ground water is used)	—	90
	Efficient agricultural irrigation where irrigation is needed	75	25
	Efficient landscape irrigation (golf courses, parks, etc.)	75	10
	Efficient residential irrigation	60	40
	Cooling Towers	100	—
	Vehicle washing	100	—
	Commercial laundries	100	—
	Cleaning of roads, sidewalks, & work areas	100	10
	Fire protection	100	10
	Construction dust control	100	—
	Mixing of pesticides	100	—
Moderate	Inefficient landscape irrigation (parks and other landscaped areas)	50	50
	Inefficient agricultural irrigation	50	50
	Surface water with direct connection to ground water (canals)	—	75
	Wetlands restoration (when additional water is needed)	75	10
	Inefficient residential irrigation	25	50
	Flushing & testing of sewers and reclaimed water lines	50	—
	RIBs where ground water is currently not used	—	25
Low	Aesthetic features (ponds, fountains, etc.)	75	10
	Spray fields (irrigation of grass or other cover crop when irrigation would not normally be practiced)	—	50
	Wetlands (when additional water is not needed)	—	10

2005 Wastewater Reuse Results

- Total Reuse Flow- 660 MGD
- Wetland Discharge- 49 MGD
- Potable Quality Water Offset- 331 MGD
- Recharge Fraction- 220 MGD

Florida In A Nutshell

Reuse Type	Reuse Capacity			Reuse Flow		Flow to Capacity (%)	Area			
	Number of Systems	Total (MGD)	Average (MGD)	Total (MGD)	Average (MGD)		Total (Acres)	Average (Acres)	Capacity (gpd/acre)	Flow (gpd/acre)
Public Access Areas & Landscape Irrigation										
Golf Course Irrigation	186	262	1.41	110	0.59	42%	56,027	301	4,700	2,000
Residential Irrigation	102	266	2.61	144	1.41	54%	95,941	941	2,800	1,500
Other Public Asses Areas	102	141	1.38	67	0.66	48%	29,495	289	4,800	2,300
Subtotal	390	669	1.72	321	0.82	48%	181,463	465	3,700	1,800
Agricultural Irrigation										
Edible Crops	19	57	3.00	16	0.84	28%	13,914	732	4,100	1,100
Other Crops	111	141	1.27	76	0.68	54%	24,126	217	5,800	3,200
Subtotal	130	198	1.52	92	0.71	46%	38,040	293	5,200	2,400
Ground Water Recharge & Indirect Potable Reuse										
Rapid Infiltration Basins	164	159	0.97	91	0.55	57%	5,778	35	27,500	15,700
Absorption Fields	15	8	0.53	3	0.20	38%	355	24	22,500	8,500
Surface Water Augmentation	0	0	NA	0	NA	NA	NA	NA	NA	NA
Injection	1	10	10.00	9	9.00	90%	NA	NA	NA	NA
Subtotal	180	177	0.98	103	0.57	58%	6,133	34	28,900	16,800
Industrial										
At Treatment Plant	96	103	1.07	57	0.59	55%	35	0.36	2,942,900	1,628,600
At Other Facilities	27	69	2.56	39	1.44	57%	1,449	54	47,600	26,900
Subtotal	123	172	1.40	96	0.78	56%	1,484	12	115,900	64,700
Wetlands	19	95	5.00	45	2.37	47%	4,514	238	21,000	10,000
Other Uses	16	12	0.75	3	0.19	25%	707	44	17,000	4,200
Total	438	1,323	3.02	660	1.51	50%	232,341	530	5,700	2,800
% Change Since 2004	0%	4%		5%		1%	2%			

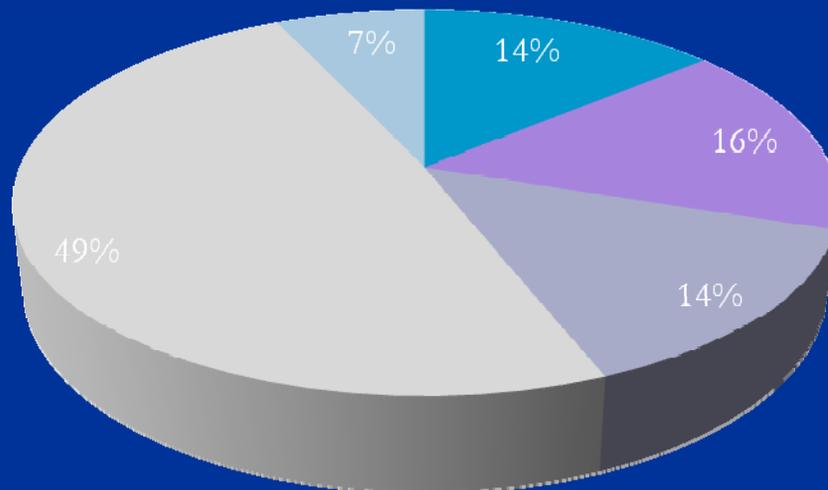
Florida In A Nutshell (cont.)

Summary of Treatment/Reuse Facilities in Florida In 2005

DEP District	No. of Treatment Facilities	No. of Reuse Systems	No. of Residences Irrigated	No. of Golf Courses Irrigated	No. of Parks Irrigated	No. of Schools Irrigated
Central (Orlando)	122	115	58,450	113	173	85
Northeast (Jacksonville)	63	62	7,296	33	8	3
Northwest (Pensacola)	52	52	923	19	5	1
Sotheast (West Palm)	49	49	15,062	58	25	9
South (Ft. Myers)	55	53	45,128	89	33	16
Southwest (Tampa)	124	107	74606	150	328	137
Total	465	438	201,465	462	572	251
% Change Since 2004	0%	0%	15%	4%	13%	12%

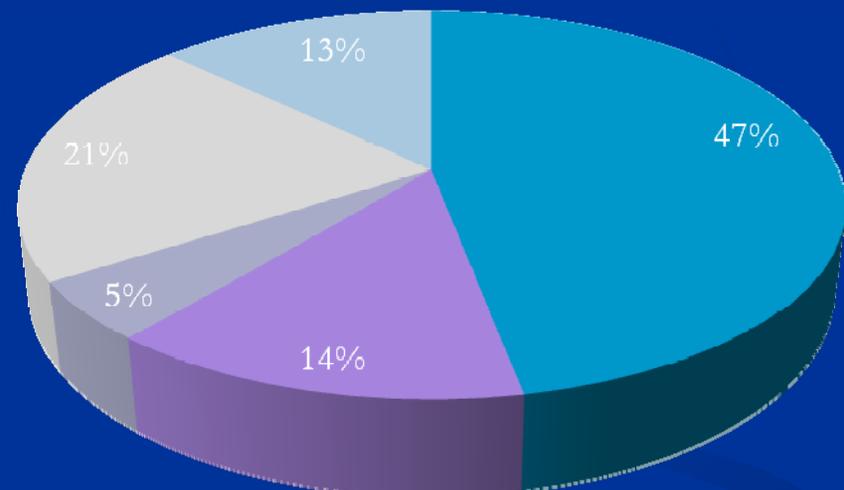
Getting There- A Tale of 2 States

Florida



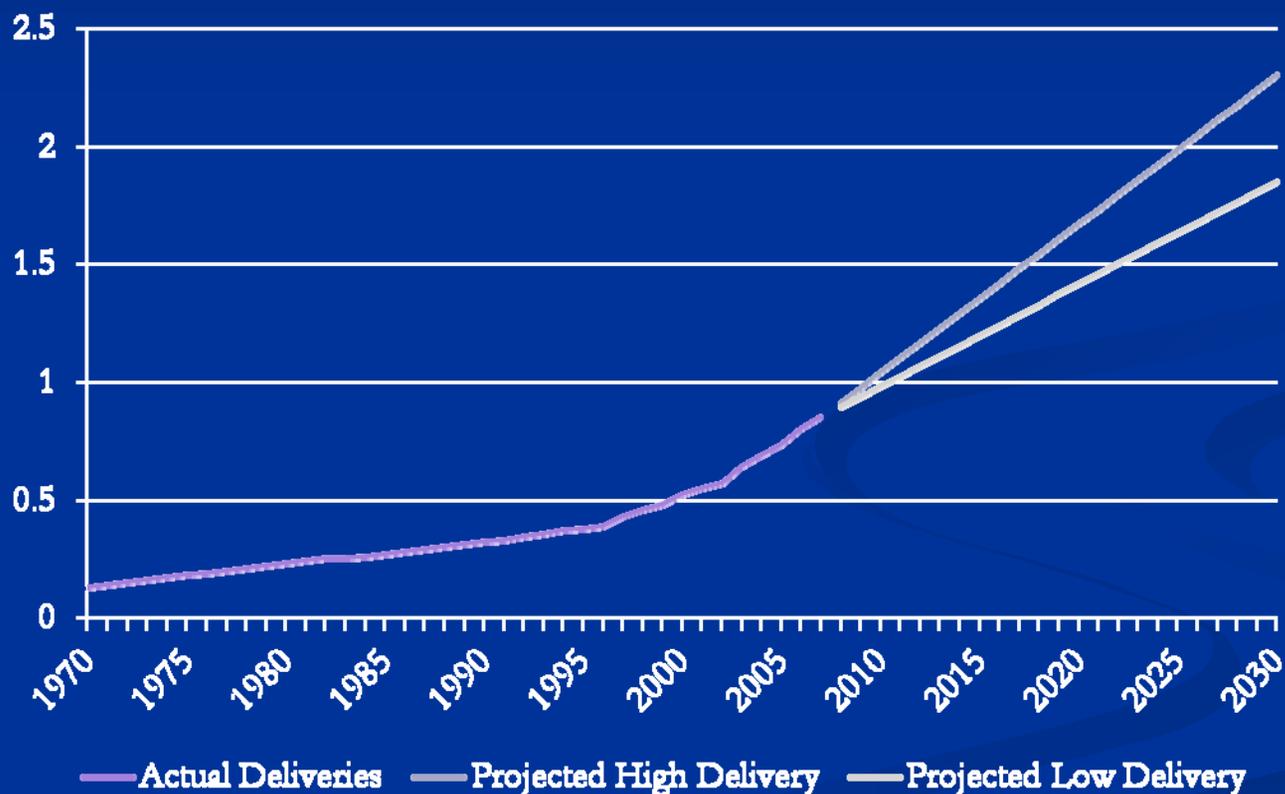
- Agricultural Irrigation
- Groundwater Recharge
- Industrial Usage
- Public Access Areas
- Wetlands and Other

California



- Agricultural Irrigation
- Groundwater Recharge
- Industrial Usage
- Public Access Areas
- Wetlands and Other

Historic and Projected California Recycled Water Deliveries in M AF/year



Collier County

- Implemented 20 years ago.
- 51 MGD treatment capacity/34 MGD of reuse capacity.
- 30 different agreements.
- Provides service to all customer classes.
- 121 customers on waiting list.
- But, only recently started to define water reclamation policies and master plan.

Lessons Learned

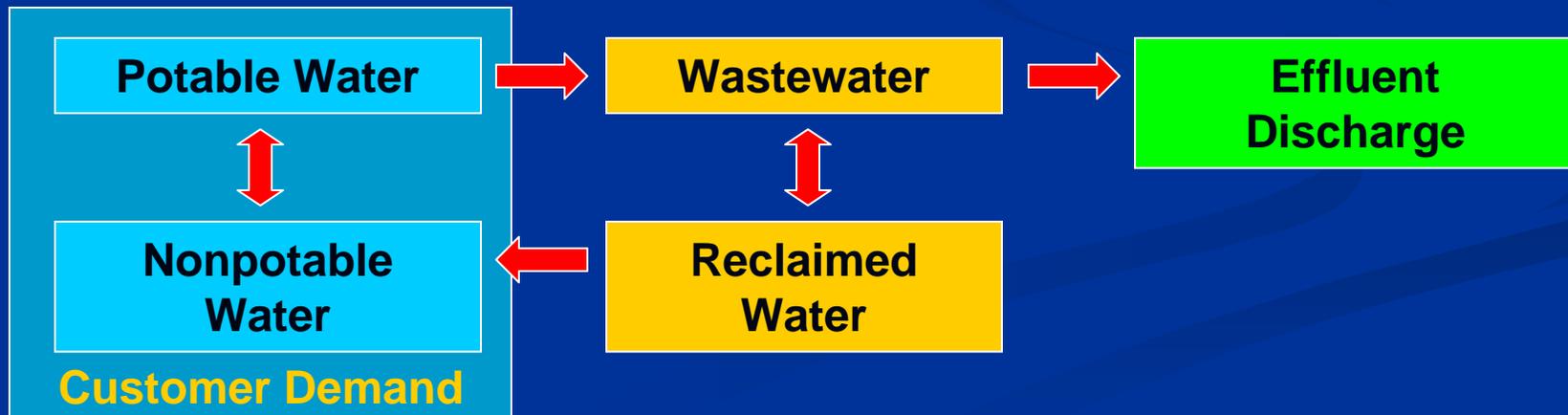
- Must establish business objectives up-front.
- Must identify utility area for service.
- Must identify level of service (availability, delivery, interrupt ability, etc).
- Must identify where the “reuse system starts”.
- Should have a service area agreement (standard) for large users.
- Standard extension policies same as potable water.

Reclaimed water planning is dynamic and complex

Conventional



Reclaimed

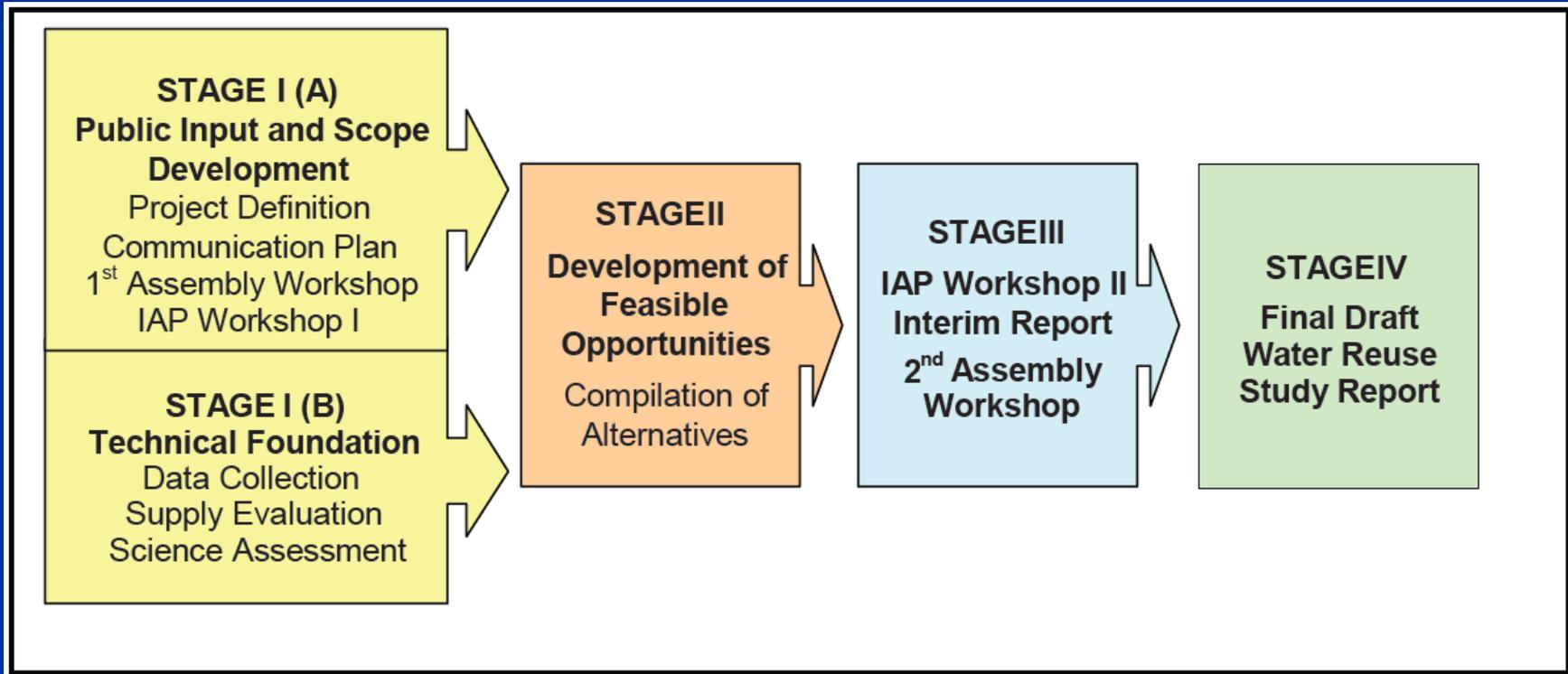


Effective Implementation Process

1. Develop business objectives and supporting policies at inception of the reuse program.
2. Develop an aligned Master Plan.
3. Develop supporting Financial Plan.
4. Develop Rate Plan.
5. Implement customer/elected official communication and outreach program.



City of San Diego's Development Process



City of San Diego- Water Reuse Study Contents

- 1.0 Introduction
 - 1.1 Study Background
 - 1.2 Purpose of the Water Reuse Study
 - 1.3 Study Approach
 - 1.4 Methodology
- 2.0 Public Outreach and Education
 - 2.1 City of San Diego Assembly on Water Reuse
 - 2.2 Public Outreach Activities
 - 2.3 Regulatory and Interagency Meetings
 - 2.4 Council Aide/PUAC Briefings
- 3.0 Development and Supply Availability of Recycled Water
 - 3.1 History of Water Reuse in San Diego
 - 3.2 North City Water Reclamation Plant Recycled Water Use and Availability
 - 3.3 South Bay Water Reclamation Plant Recycled Water Use and Availability
 - 3.4 New Recycled Water Supply Sources
 - 3.5 Seasonal Storage
- 4.0 Overview of Water Reuse Opportunities and Public Health Protection
 - 4.1 Stakeholder Input on Reuse Opportunities
 - 4.2 Non-potable Reuse Description and Project Types
 - 4.3 Indirect Potable Reuse Description and Project Types.
 - 4.4 Recycled Water and Protection of Public Health
 - 4.5 Water Treatment Technology
 - 4.6 Regulations and Public Health Issues Associated with Non-potable Reuse
 - 4.7 Regulations and Public Health Issues Associated with Indirect Potable Reuse
- 5.0 Non-Potable Reuse Opportunities
 - 5.1 Northern Service Area Recycled Water Opportunities
 - 5.2 Southern Service Area Recycled Water Opportunities
 - 5.3 Regional Opportunities
 - 5.4 Graywater Opportunities
 - 5.5 Summary of Non-potable Opportunities that are Brought Forward for Evaluation
- 6.0 Indirect Potable Reuse Opportunities.
 - 6.1 Reservoir Augmentation Opportunities
 - 6.2 Groundwater Recharge Opportunities
 - 6.3 Summary of Indirect Potable Reuse Opportunities that are Brought Forward for Evaluation
- 7.0 Assessment of Reuse Opportunities
 - 7.1 Recognizing the Value of Recycled Water
 - 7.2 Overview of Alternative Implementation Strategies
 - 7.3 North City/South Bay Strategies
 - 7.4 Cost Evaluations
 - 7.5 Evaluation Summary
 - 7.6 Next Steps
- 8.0 Glossary of Terminology and Abbreviations
- 9.0 References
- Appendices**
 - A. City Council Resolution No 298781
 - B. American Assembly Statement I (City of San Diego Assembly Process Workshop I)
 - C. American Assembly Statement II
 - D. Public Utilities Advisory Commission Resolution
 - E. Findings of the Independent Advisory Panel

Business Objectives and Supporting Policies

1. Identify Vision/Mission Statement.
2. Develop Business Objectives and Principals.
3. Policies include:
 - Priority of use (purpose of Program).
 - Level of Service (availability, delivery, interrupt ability, etc).
 - Cost recovery strategies.
 - Service extension and timing.

Mission Statement

The Collier County Water-Sewer District is committed to meeting the irrigation needs of its customers in an economically feasible and environmentally acceptable manner. It will meet this commitment by promoting the use of reclaimed water and other alternative water resources to conserve its potable water supplies.

The Collier County Water-Sewer District (District) has developed the following guiding principles and corresponding policies to accomplish the above-stated mission. The definitions of several key words have been included at the end of this policy document.

FLORIDA'S VISION OF WATER REUSE IN 2020

- 1. Water reuse will be employed by all domestic wastewater treatment facilities having capacities of 0.1 million gallons per day (MGD) and larger. Statewide, on the order of 65 percent of all domestic wastewater will be reclaimed and reused for beneficial purposes.**
- 2. Effluent disposal using ocean outfalls, other surface discharges, and deep injection wells will be largely limited to facilities that serve as backups to water reuse facilities.**
- 3. Regulatory agencies, health agencies, utilities, and the public will embrace a “water is water” philosophy and will fully and readily accept the full range of water reuse options and the full range of alternative water supplies.**
- 4. Reclaimed water will be used in an efficient and effective manner, as a means to conserve and recharge potable quality water resources. Newer reuse systems will have potable quality water offsets and/or recharge fractions of 75 percent or larger.**
- 5. Ground water recharge and indirect potable reuse projects will become common practice.**
- 6. Membrane treatment technologies will be widely used for the production of high-quality reclaimed water, particularly for the control of pathogens and organic compounds.**
- 7. Ultraviolet (UV) disinfection will be the norm for water reuse and domestic wastewater facilities.**
- 8. “Sewer mining” will be common practice, particularly in the larger urban areas, as a means for enabling effective use of reclaimed water.**
- 9. Reclaimed water will be widely used to flush toilets in commercial facilities, industrial facilities, hotels and motels, and multiple-family residential units in Florida.**

Guiding Principles

1. The District will establish a defined Irrigation Quality (IQ) Water System service area in order to effectively plan for the capital and operating needs in providing service and identifying the customers to be served.
2. The IQ Water System will benefit the entire Collier County Water-Sewer District (the “District”) to the extent that i) on behalf of all water customers, it may replace the need for additional potential potable water supply sources; and ii) on behalf of all wastewater customers, to the extent that it will provide for the effective disposal of wastewater effluent.
3. The District will financially account for the IQ Water System by tracking operating and capital revenues and expenditures of the IQ Water separately from those for potable water and wastewater systems.
4. The District will prioritize the availability and sale of IQ Water to its customers, while recognizing its existing contractual commitments, to provide for the maximum conservation of potable water resources on a cost effective basis.

Guiding Principles (cont.)

5. All future IQ Water System customers will be responsible for the cost of extending and connecting to the District's IQ Water System.
6. All existing IQ Water System customers will be responsible for the cost of operating, maintaining, and replacing of the District's existing IQ Water System.
7. The District will establish rates, fees and charges that are reasonable, fair and adequate to eventually recover the full costs of the IQ Water System and to promote conservation of IQ Water.
8. The IQ Water will be used to maximize the elimination of potable water for irrigation purposes.
9. The District will establish criteria for the reservation of IQ Water Capacity. Presently, the criterion is to furnish IQ Water equivalent to 1-inch per week of irrigable area on an annualized basis.

Business and Management Objectives

1. Encourage metering and volume-based rate structures.
2. Implement viable funding programs.
3. Facilitate seasonal reclaimed water storage (including ASR).
4. Encourage use of reclaimed water in the agricultural irrigation, landscape irrigation, industrial/commercial/institutional, and indoor water use sectors.
5. Link reuse to regional water supply planning (integrated water resource planning).
6. Develop integrated water education programs.
7. Encourage ground water recharge and indirect potable reuse.
8. Discourage effluent disposal.
9. Provide water use permitting incentives for utilities implementing reuse programs.
10. Encourage use of supplemental water supplies.
11. Encourage efficient irrigation practices.
12. Encourage reuse system interconnects.
13. Enable redirecting of existing reuse systems to more desirable reuse options.
14. Use reclaimed water at government facilities.
15. Ensure continued safety of water reuse.

Policies to Support Principles

B-1 Established IQ Water Service Area

1. The IQ Water Service Area will be contained within the Collier County Water-Sewer District Boundaries, and within unincorporated Collier County at all times unless mandated otherwise by the Board of County Commissioners (BCC).
2. The District will perform an Irrigation Water Master Plan, which will identify the proposed IQ Water Service Area and update such a plan periodically to ensure that the service area and the availability of IQ Water are consistent.
3. The District will evaluate and rank the alternative water resources available for the IQ Water System and will structure the service delivery requirements to its customers based on such resources.
4. The IQ Water Service Area will promote the efficient and cost effective delivery of IQ Water to its customers.
5. The District will adopt a policy regarding the prioritization of customers based on service area needs and the cost effectiveness of providing service.

Policies to Support Principles

B-4 Prioritize Customers and Service Requirements

1. The District shall prioritize its customers based on . . .
2. The customers for service will be segregated into the following classifications (please refer to Definitions section for each of the customer classes listed below):
 - Bulk Service Customers
 - Pressurized Service Customers
 - Pressurized and Distributed Service Customers
3. All IQ Water delivered to a customer, regardless of class, shall be metered.
4. Service availability (connected to the System) does not guarantee service delivery and the District has the right to restrict or reduce service when necessary in order to meet District needs.
5. Reduction in service across different classes of customers may not be uniform.

Definitions

IQ Water Application Rate

IQ Water Application Rate is a measure of the IQ Water demand to achieve healthy growth of the irrigated plants, grasses, and other vegetation. It is generally measured in terms of volume of IQ Water required per week on the irrigable acreage. While IQ Water demand is seasonal, low during wet season and high during dry season, presently in Collier County, as a yearly average, the IQ Water for most irrigable acreage is around 1-inch per week. The District will, therefore, use 1-inch per week on irrigable acreage to compute average annual daily volumes of IQ Water for capacity reservation. As an example, a 100 acre irrigable parcel of land, at the rate of 1-inch per week, will require 387,900 gallons per day of IQ Water on an average annual basis ($100 \times 43,560 \times (1/12) \times 7.48 / 7 = 387,900$).

Definitions (cont.)

Bulk Service Customers

Bulk Service Customers are individually metered customers who:

- Provide on their site, customer-owned and maintained lined storage facilities isolated from the stormwater management and large enough to meet their IQ Water demand (expressed on an average daily flow basis of the capacity reserved by such customer) for a minimum of one day.
- Accept service that is interruptible in the ability to provide daily service.
- Accept service that is generally provided with no guaranteed minimum pressure.
- Accept service on an annualized daily basis throughout the year.
- Accept service with conservation rates when the customer's demand exceeds the reserved capacity by 20% during a billing cycle.
- Be responsible for the ultimate delivery to the customer's storage facility.
- Commit to IQ Water capacity reservation in excess of 100,000 gallons per day (gpd) on an annual average daily basis.

Customer Prioritization

Decision Matrix Criteria	Weight	Raw Score				
		0	1	2	3	4
Customer Classification	30%	OCO	ODI	P&Distr	Pressure	Bulk
Geographic Proximity (lf)	25%	>25,000	25,000	20,000	15,000	10,000
Direct Potable Water Substitution (No. of house on dual lines)	20%	<1	1	125	250	375
IQ Water Demand (MGD)	15%	<0.01	0.01	0.25	0.5	0.75
Alternative Water Availability*	10%	Available	None	Low	Medium	High
Total	100%					

ODI- Outside the district
 OCO- Outside County
 *- Measured by salt water intrusion potential

Develop Aligned Master Plan

Plan findings and priorities must consider, be supportive of, and consistent with:

- Water Master Plan
- Wastewater Master Plan
- Reclaimed Water System Business and Service Objectives
- Long-Term regulatory requirements



Develop Supporting Financial Plan

Development of Capital Funding Plan

- Identify contributed capital/utility capital relationships.
- Long-term financing (match to customer type).
- Secondary pledge of utility revenues.
- Functionalize assets.

Development of Operating Plan

- Identify direct costs and allocated costs.
- Establish ownership (e.g., don't want to own sprinklers, no access to private property, etc).
- Disclose existing customer impacts.

Develop Supporting Rate Plan

- Critical to Meeting Program Needs
- Must Support Business Objectives
- Issues Affecting Rate Setting Process
 - Cost vs. “What the Market Can Bear”
 - Costs incurred to provide service
- Develop pricing linked to level of service and resource management.



Must Price the Service in Accordance with Business Provided

- Large Users – Interruptible, on-site storage, lower cost.
- High Pressure Users – Similar to potable water with excess usage pricing.
- Full cost vs. subsidy (known).
- Different levels of service for similar class (those “with” and “without”).
- Meter ALL flows regardless of service class.
- Capital cost recovery.

“All prudent costs of a reuse project shall be recovered in rates. The Legislature finds that water reuse benefits the water, wastewater and reclaimed water customers. The Commission shall allow a utility to recover the costs of a reuse project from the utility’s water, wastewater or reuse customer or any combination thereof as deemed appropriate by the Commission.”

- This legislation dictates that all prudent costs of a reuse project will be considered **100 percent used and useful**, with **no deferral of costs to future customers**. It also provides flexibility in determining the method of recovery of reuse costs.
- Reclaimed water should be priced as a commodity in order **to recognize the costs and benefits of reuse**, while not discouraging its reasonable use, or negatively impacting the utilities’ ability to dispose of its effluent.
- Rates for reclaimed water can range from zero to the actual full cost of service. The **level of reuse rates usually is not based on recovery of the full cost from the reclaimed water customers**, and judgment must be exercised in determining the rate in each case.
- The approved rates are site-specific, based upon consideration of various customer and utility specific factors, leads to **different rates for different reuse customers of the same utility**.

Rate Setting Considerations

- Benefits to the reclaimed water customer versus the benefits to the utility's water and wastewater customers.
- Alternative sources of water available to the potential reclaimed water customer.
- Alternative methods of effluent disposal for the utility.
- Cost of the alternatives.
- Impact of rates on current and potential customers.
- Reuse agreements.
- Reclaimed water rates in the area.

Capital Cost Recovery in Idaho

Idaho Code Title 67-8201:8216

Development Impact Fee Must :

- **Not exceed a proportionate share of the cost of system improvements**
- **Be based on established levels of service.**
- **Be proportionate to the benefit/impact of the development.**
- **Be based on costs established in an adopted capital improvement or comprehensive plan.**
- **Provide credits for developer contributions, user fees, debt service payments . . .**
- **Manage funds in separate accounts.**

Conclusions

- Establish the Reclaimed Water Program as a long-term emerging utility.
- Develop a 20-year vision and systematically plan backwards.
- Carefully identify and define service levels for various customer classes.
- Develop pricing linked to level of service and resource management.
- What is Effluent Disposal today will be a Water Resource allocation tomorrow.

Questions and Discussion

btroutman@bluewaterinc.us