Wastewater Reuse Business Planning To Support Effective Utility Development

Idaho Wastewater Reuse Conference

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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 peak and ADF water demands
- Recharge resources

Challenges of Implementation

- Public acceptability
- Customer considerations
- Existing utility coordination
- Costs
  - High initial capital cost of construction
  - Incremental operating costs
- Revenues
  - Uncertain and may reduce water rate revenues

Presentation Overview

- Discuss issues and lessons learned from 20 years of implementation in Florida.
- Discuss underlying business challenges in implementation.
- Identify business planning process and tools to support system management.

Wastewater Reuse Development

- Water withdrawals (use) are governed by Water Management Districts.
- Consumptive use permits have mandated consideration of reclaimed water for 20 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 (600 MGD).
- 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.

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

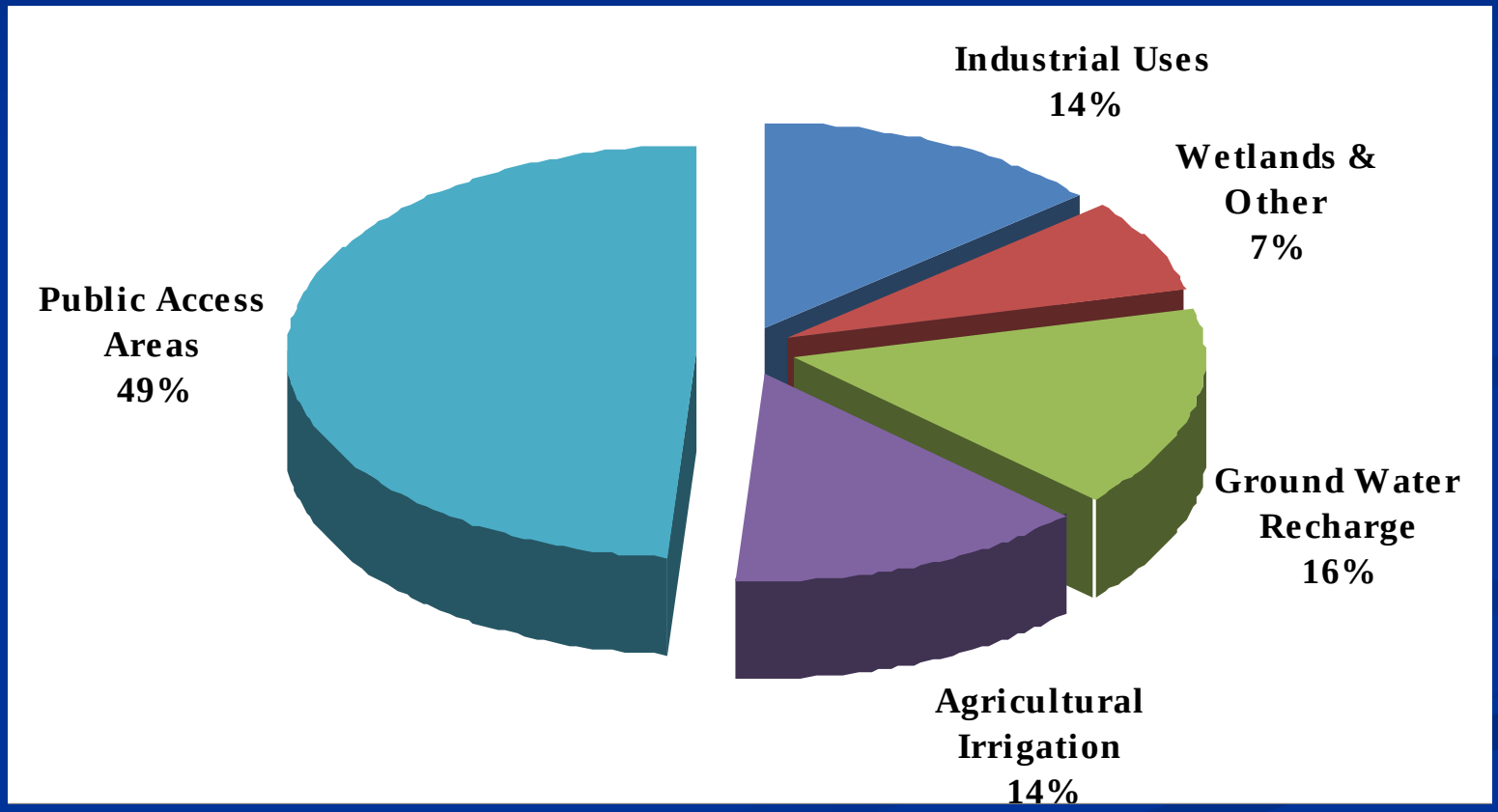
Reuse Type	Number of Systems	Reuse Capacity Total (MGD)	Reuse Capacity Average (MGD)	Reuse Flow Total (MGD)	Reuse Flow Average (MGD)	Flow to Capacity (%)	Area Total (Acres)	Area Average (Acres)	Capacity (gpd/acre)	Flow (gpd/acre)
Public Access Areas & Landscape Irrigation										
Golf Course Irrigation	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.)

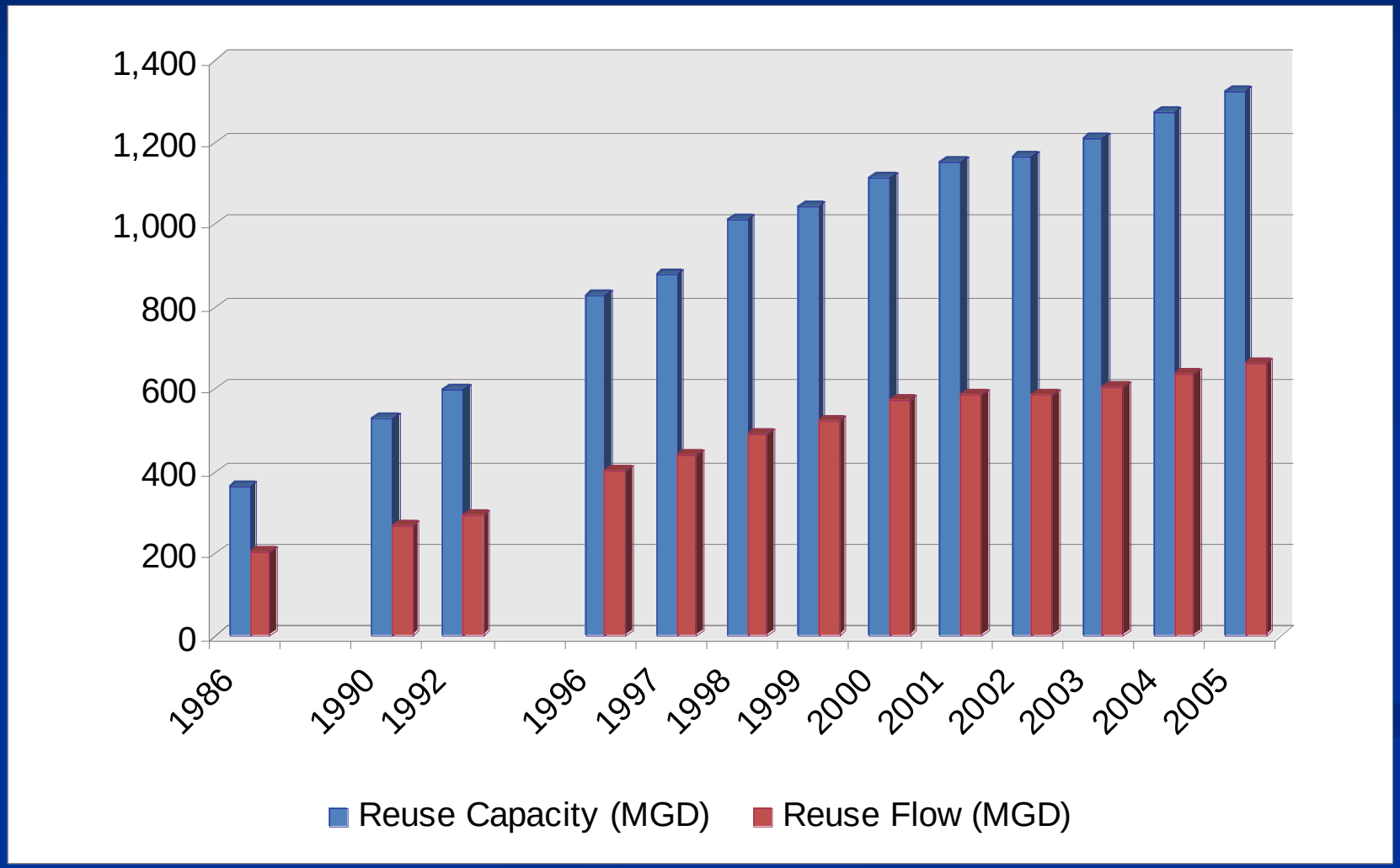
Summary of Treatment/Reuse Facilities in Florida In 2005

DEP District	No. of Treatment Facilities	No. of Reuse Systems	No. of Residences Irrigated	No. of Gulf 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%

Utilization of Reclaimed Water



Usage Trends In Florida



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, are only now starting to define water reclamation policies and master plan.

Issues With Typical Implementation Process

- "Build it and they may not come."
- Match of service area needs to availability.
- Limited resource and priority of use (service).
- Extension of service- who pays.
- Storage and encouraging "off peak" use.
- Pricing of service and potential "lost" income.
- Accounting for operations (enterprise vs. cost center).
- Flexibility in service requirements (changing terms, rates).

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.

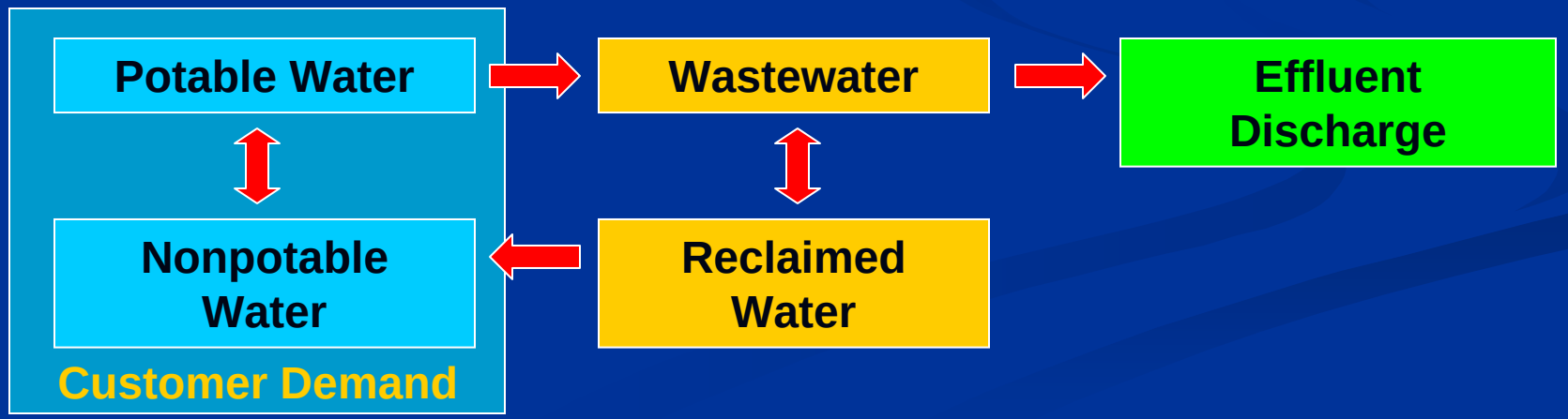
Must Price the Service in Accordance with Business Provided

- 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.

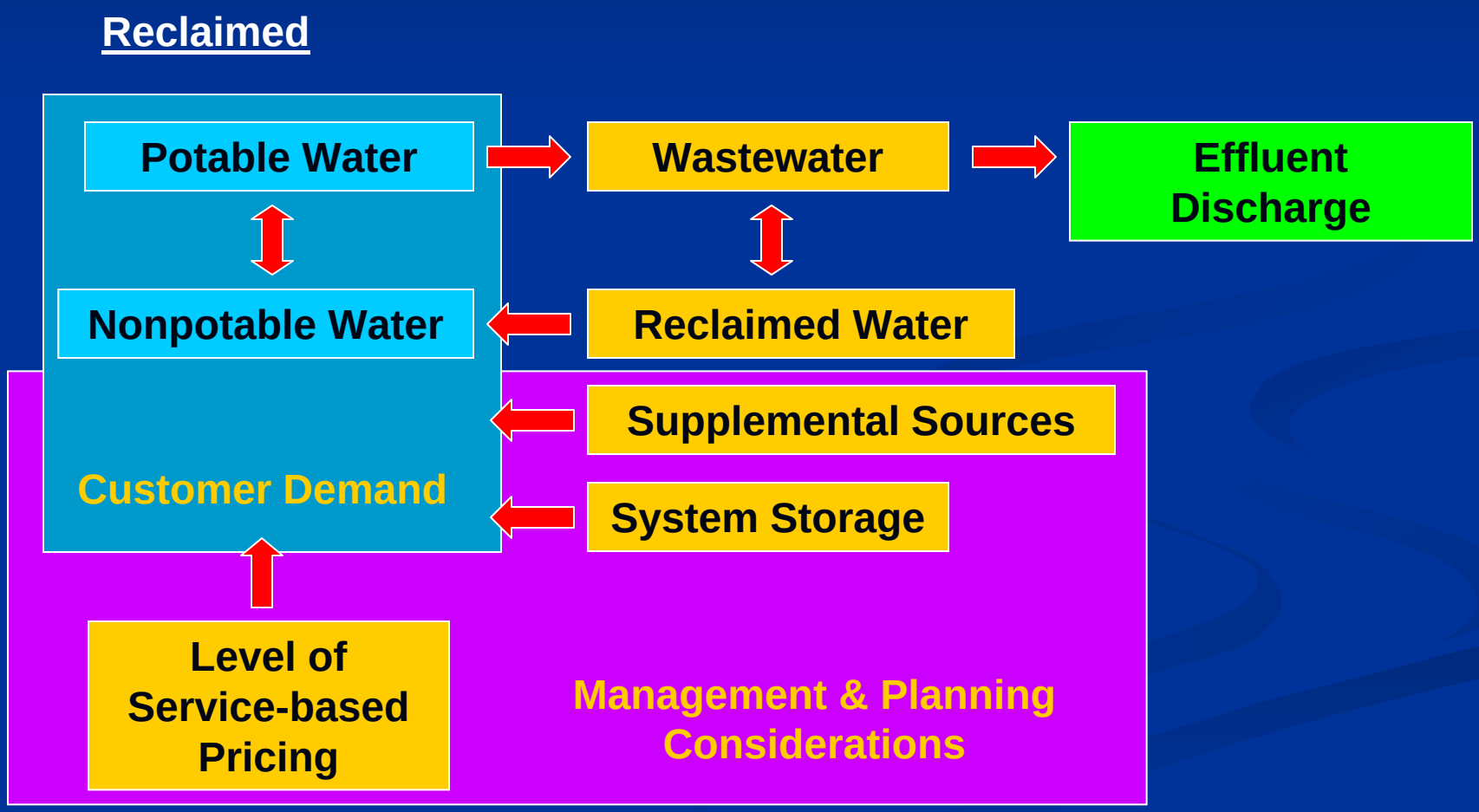
Reclaimed water planning is dynamic and complex

Conventional

Reclaimed



Management and Planning Help Address Complexity



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.

Business Objectives and Supporting Policies

1. Identify Vision/Mission Statement.
2. Develop Business 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.

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.

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 x 43,560 x (1/12) x 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

		Raw Score				
Decision Matrix Criteria	**Weight**	**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.

Common Utility Rate-Setting Objectives

- Equity among & within customers classes.
- Administrative efficiency.
- Comparability with neighboring utilities.
- Full cost recovery.

Conclusions

- Establish the Reclaimed Water Program as a long-term emerging utility.
- Develop a 20-year vision and 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 tomorrow.

Questions and Discussion

Influences on Comparability

- ***Lack of Comparable Systems***
  - Industry is still in its infancy
  - Most systems do not offer the service
- ***Wide Range of Rates & Structures***
  - Varying factors influencing pricing
  - No consistent structural trend

Pricing Influences on Full Cost Recovery

- ***Utility Management Perception*** 
  - Valuable commodity
  - Required effluent disposal

- ***Customer Perception***
  - Viewed as lower quality than potable water
  - Customer providing utility benefit (avoidance cost)
  - Should be less expensive than potable water

Pricing Influences on Full Cost Recovery

- ***Actual Costs***
  - Significant upfront capital costs
  - Increased O&M costs

- ***Cost of Other Disposal Alternatives***
  - Offset Against Inherent Capital Costs
  - Offset Against Inherent O&M Costs

Pricing Influences on Full Cost Recovery

Price of Other Water Supply Alternatives

- Availability of other alternatives
  - Wells, surface water, etc.
  - Other service providers
- Cost of other alternatives
- Incentive pricing to promote use

Pricing Influences on Full Cost Recovery

- ***Cost of Expanding Water Capacity***
  - "Free Up" treatment and transmission capacity
  - Postpone expansion costs
- ***Impact on Revenues***
  - Lower potable water usage and revenues
  - Lower wastewater revenues
  - Possible negative impact on total revenues

Reclaimed Water Standard Implementation Process

1. Identify large user of reclaimed water.
2. Enter into reclaimed water agreement.
   - Terms and condition of delivery (ADF)
   - Construction of conveyance and storage
   - Rates for service
   - Term of service
   - Other conditions (no delivery on wet days)
3. Provide service at customer's demand only.