Strategic SDWA Compliance Planning for Small Systems

Sponsored by:

U.S. Environmental Protection Agency
Office of Ground Water and Drinking Water
Drinking Water Protection Division
Drinking Water Utilities Team
Washington, DC

In cooperation with:

Association of State Drinking Water Administrators
American Consulting Engineers Council
American Water Works Association
National Association of Regulatory Utility Commissioners
U.S. Dept. of Agriculture - RUS
National Association of Water Companies
National Drinking Water Clearinghouse
National Rural Water Association
Rural Community Assistance Program

Strategic Planning in the 21st Century

Opening Remarks

Workshop Format

- Agenda
- Presentations
  - Internal assessment
  - External assessment
  - Identifying options & determining optimum solutions
- Facilitated Questions and Answers

Introductions

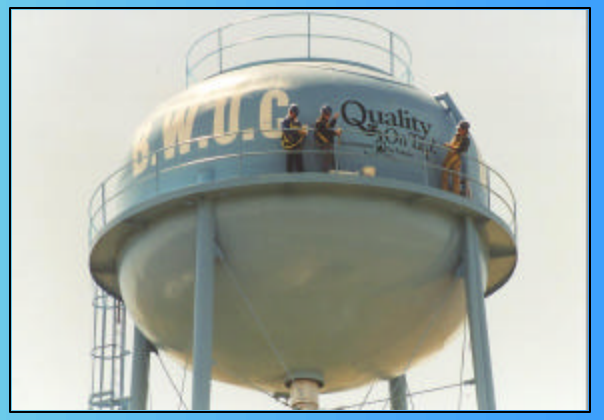
- Mr. Peter Shanaghan
- Dr. Ralph Jones
- Mr. Dan Fraser
- Mr. Fred Pontius
- Mr. Ian Kline

Information Resources

- SDWA Hotline
  - 1-800-426-4791
  - email: hotline-sdwa@epamail.epa.gov
- Web Page
  - http://www.epa.gov
  - http://www.epa.gov/safewater/
- Documents (e.g.)
  - Strategic SDWA Compliance Planning: A Comprehensive Handbook
  - Guidance and Information Documents

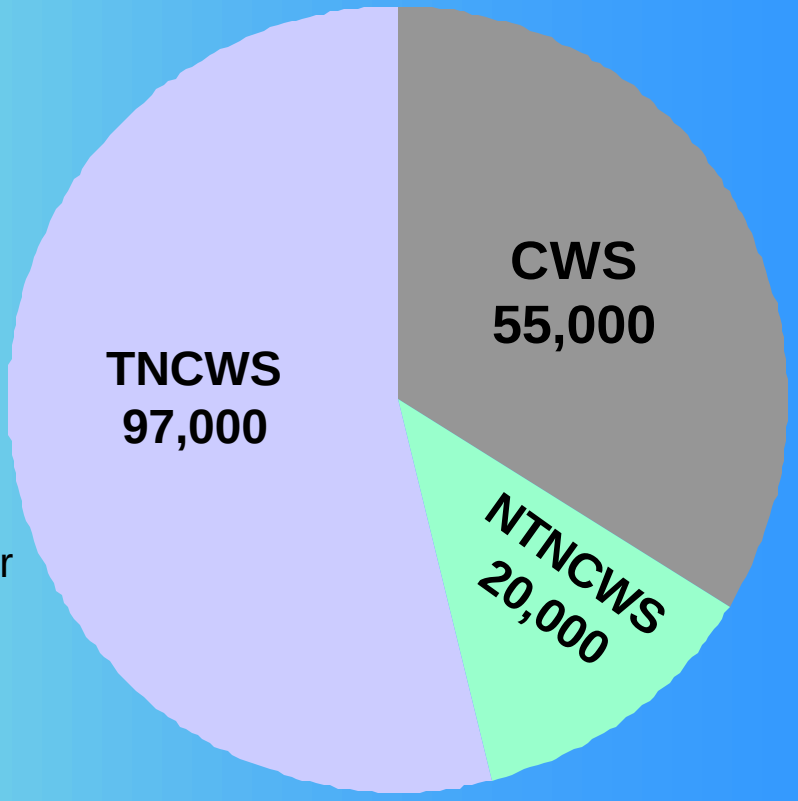
Water System Strategic Planning in the 21st Century

The Planning Imperative: Need to Rehabilitate or Replace Basic Infrastructure

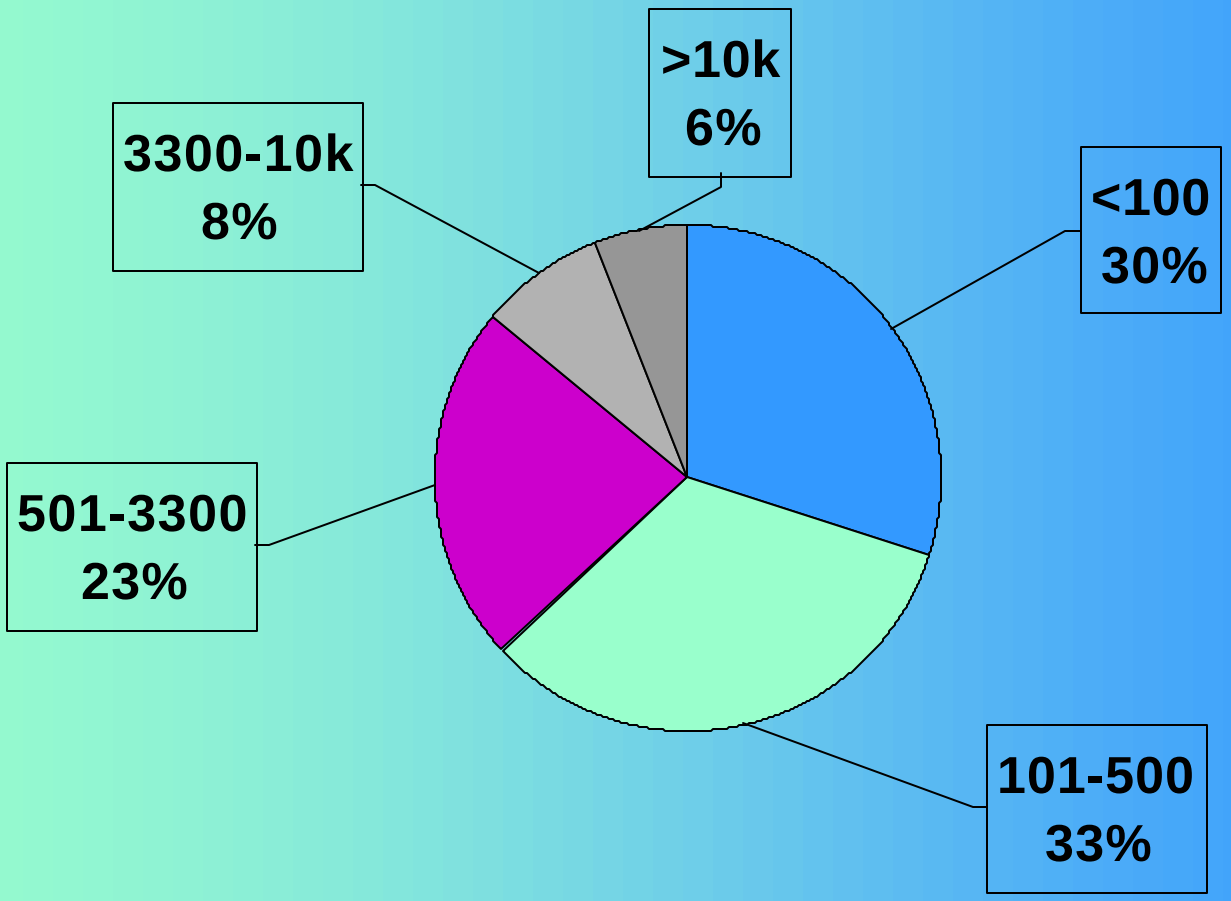


Public Water Systems

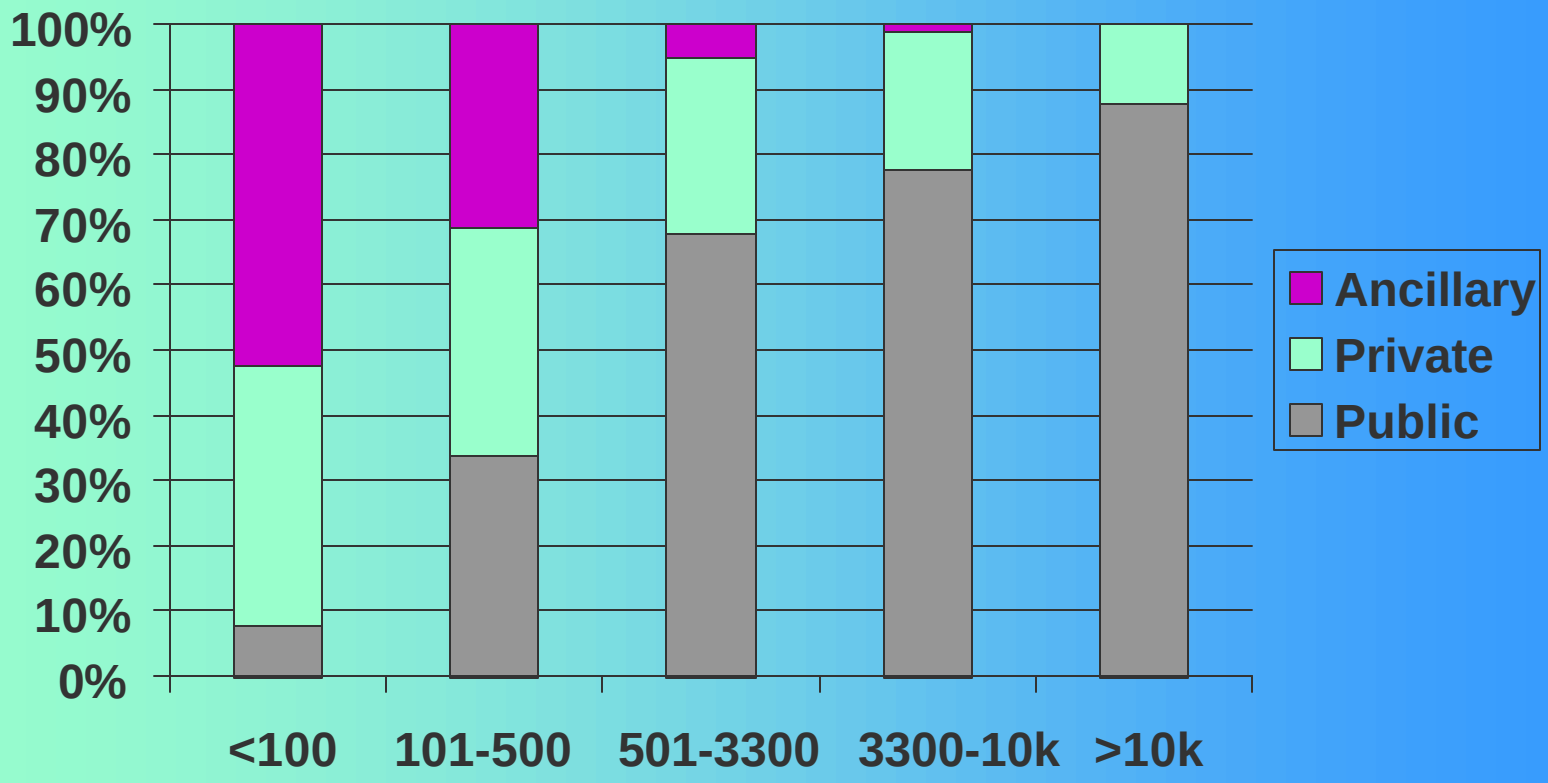
- Public Water Systems (PWSs)
  - Serve:
    - 15 connections or 25 people per day at least 60 days per year
  - There are currently 172,000 PWSs
    - Community Water Systems (CWSs)
    - Non-Community Water Systems
      - Non-Transient, Non-Community Water Systems (NTNCWSs)
      - Transient, Non-Community Water Systems (TNCWSs)
- 85% of US Households Are Served by PWSs



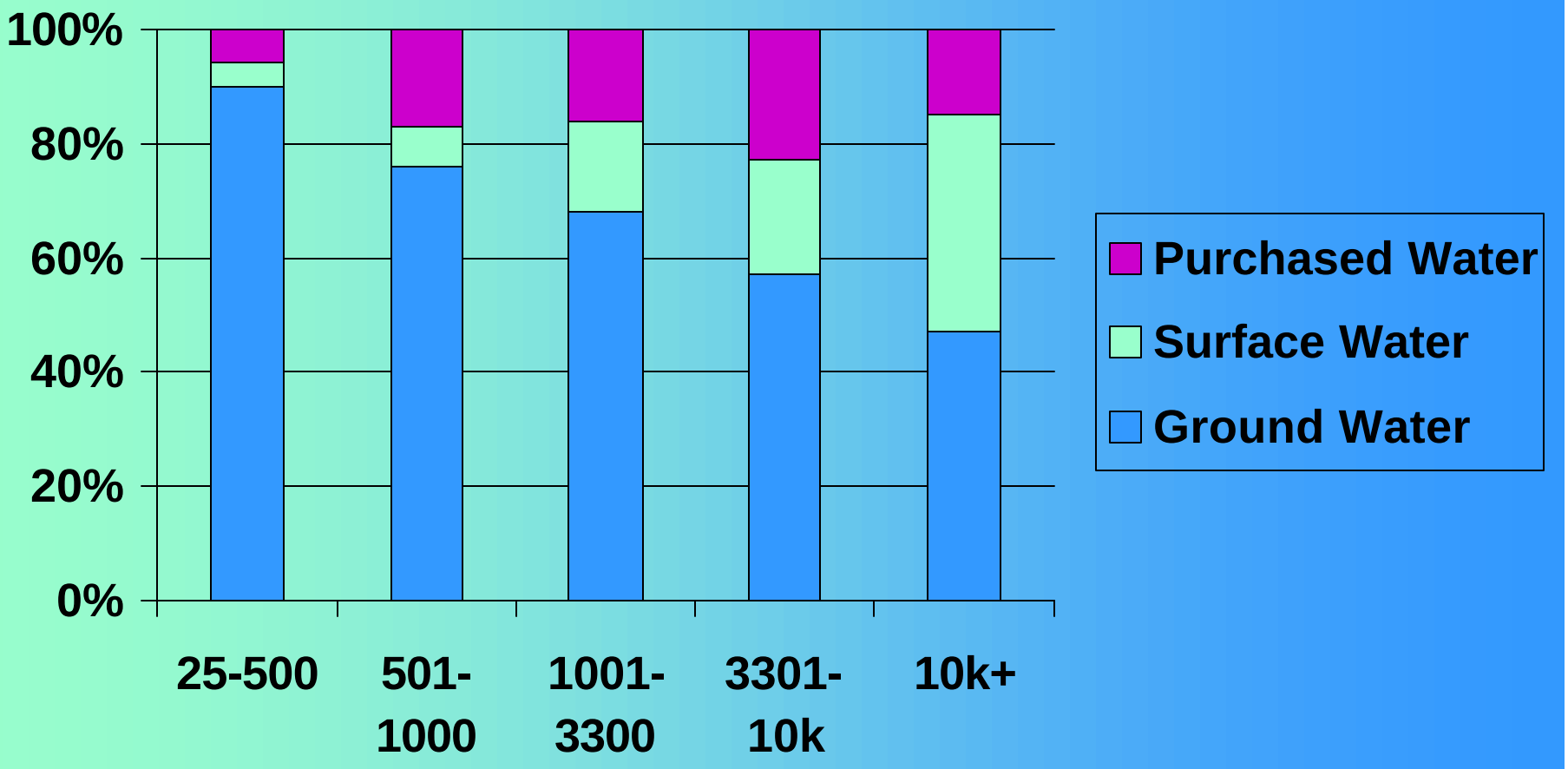
CWSs:
Size Distribution by Population Served



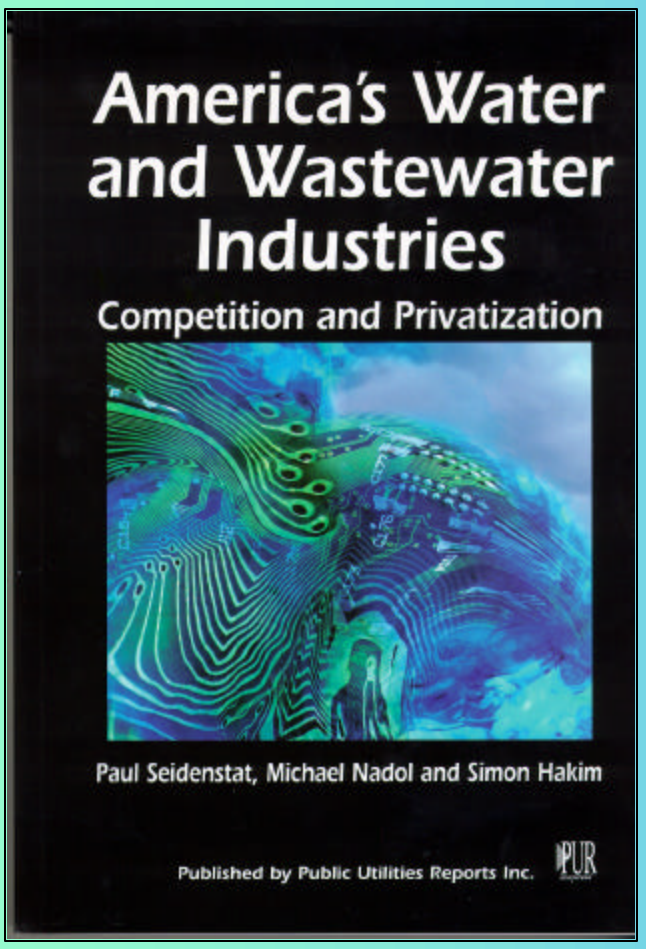
Ownership Profile of CWSs by Population Size Category Served

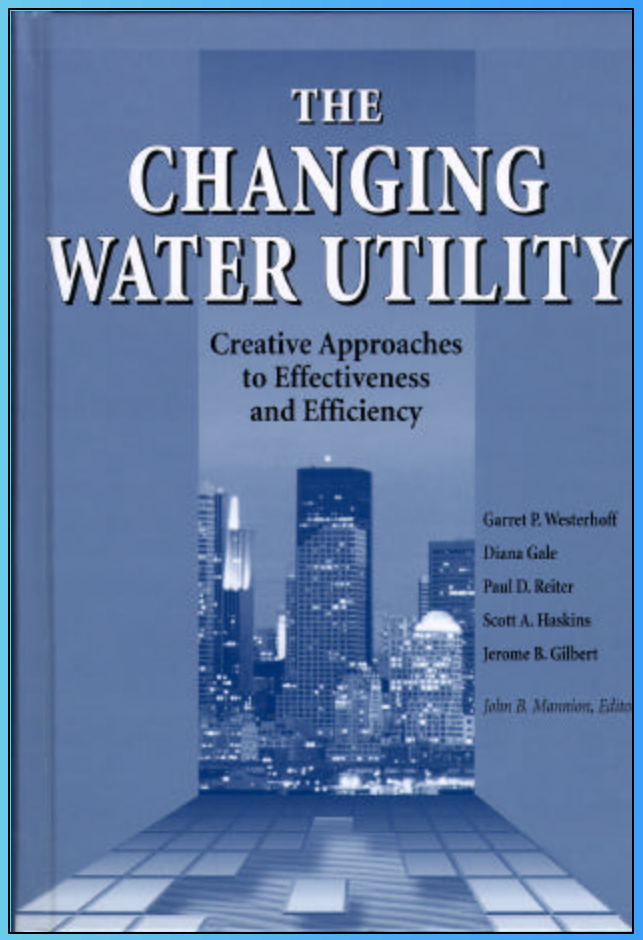


Percentage of Systems by Source and System Size

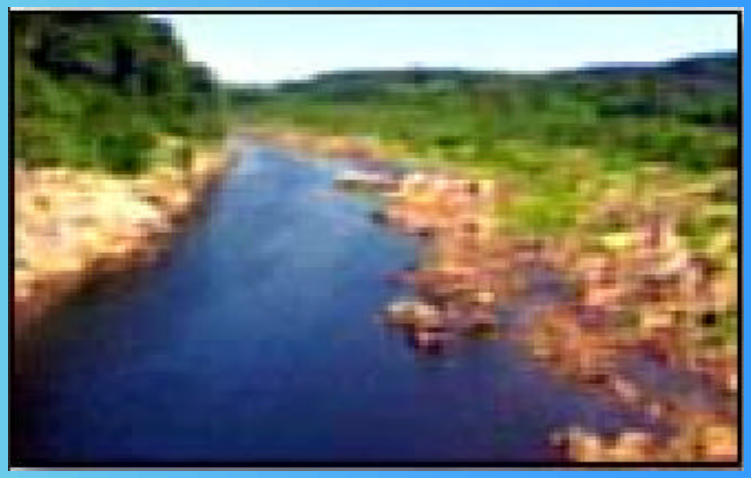


The Planning Imperative: Drinking Water Utilities Are Facing Unprecedented and Increasing Competitive Pressure

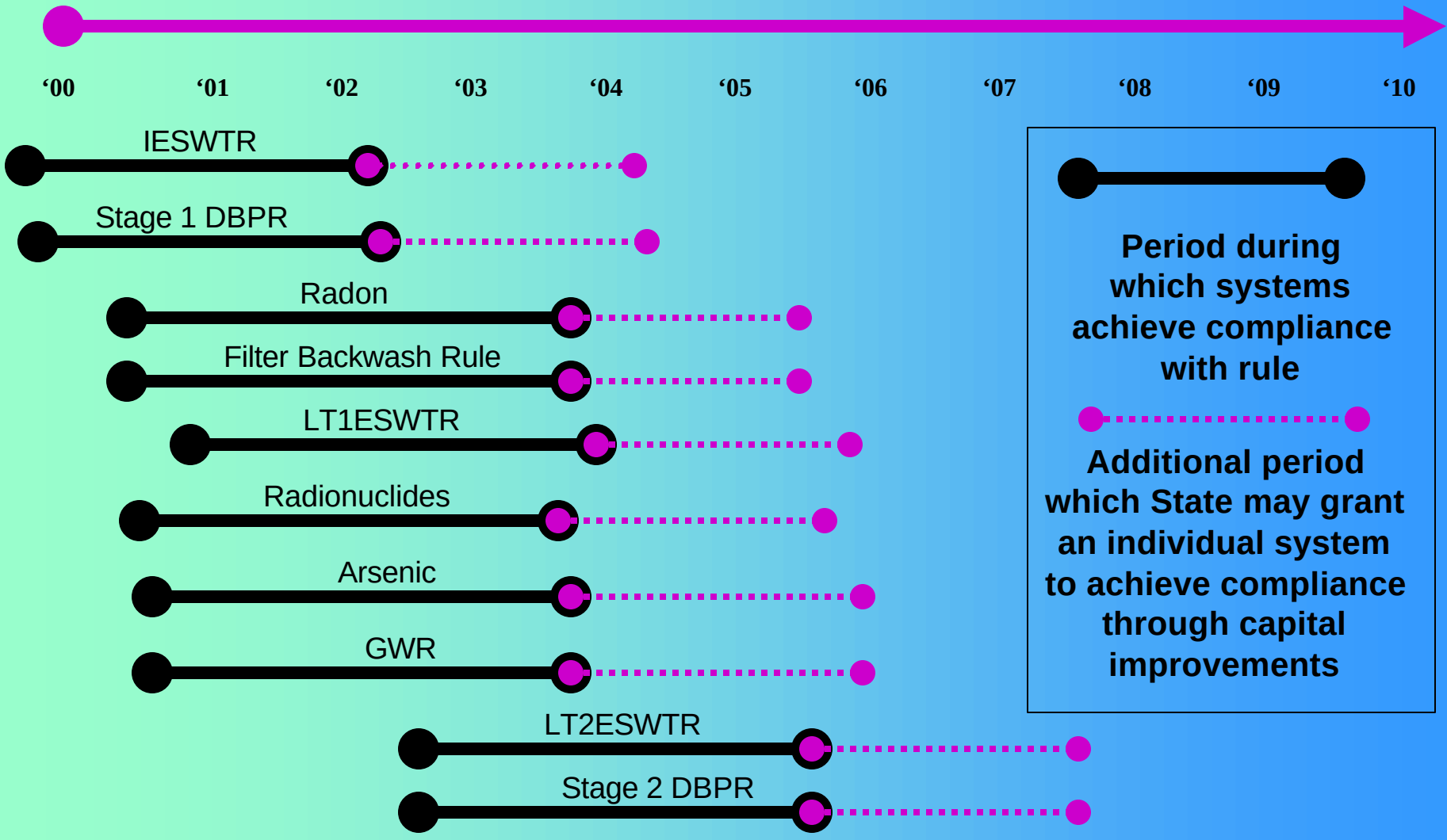




The Planning Imperative: Emphasis on Source Water Protection & Difficulty in Developing New Supplies



The Planning Imperative: SDWA Compliance



The Planning Imperative: Public Expectations Have Never Been Higher

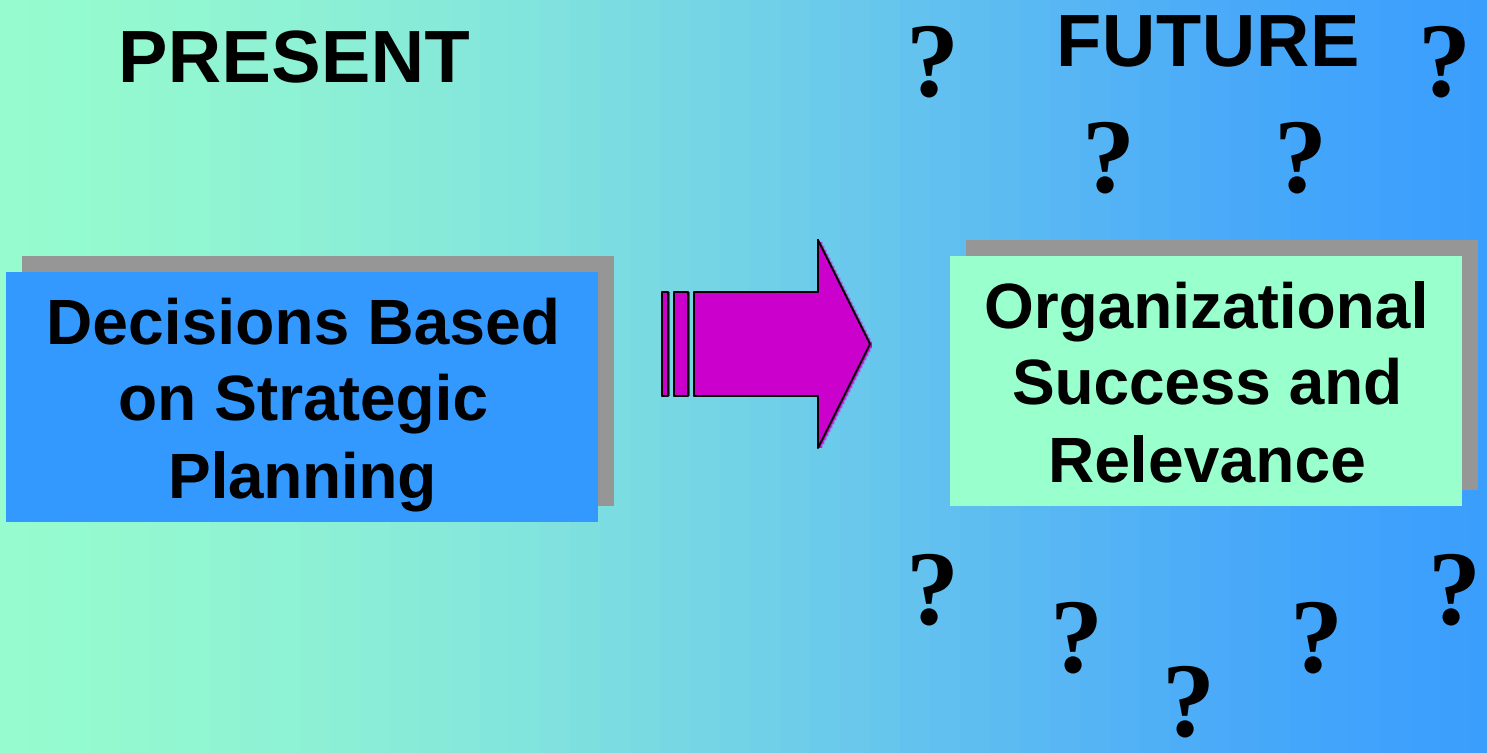
The Customer Expects

- Regulatory Compliance
- Service at Lowest Reasonable Cost
- Aesthetic Quality

Strategic Planning is...

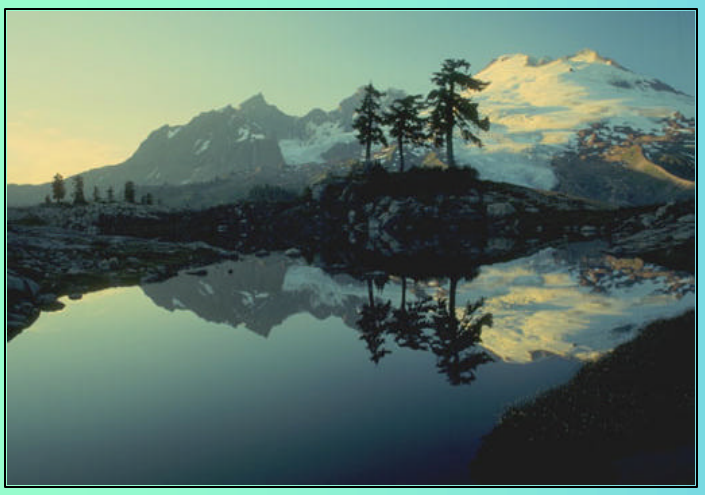
- A Disciplined Effort
- To Produce Fundamental Decisions and Actions
- That Shape and Guide
  - What an organization is
  - What it does
  - Why it does it
- With a Focus on the Future.

Focus of Strategic Planning



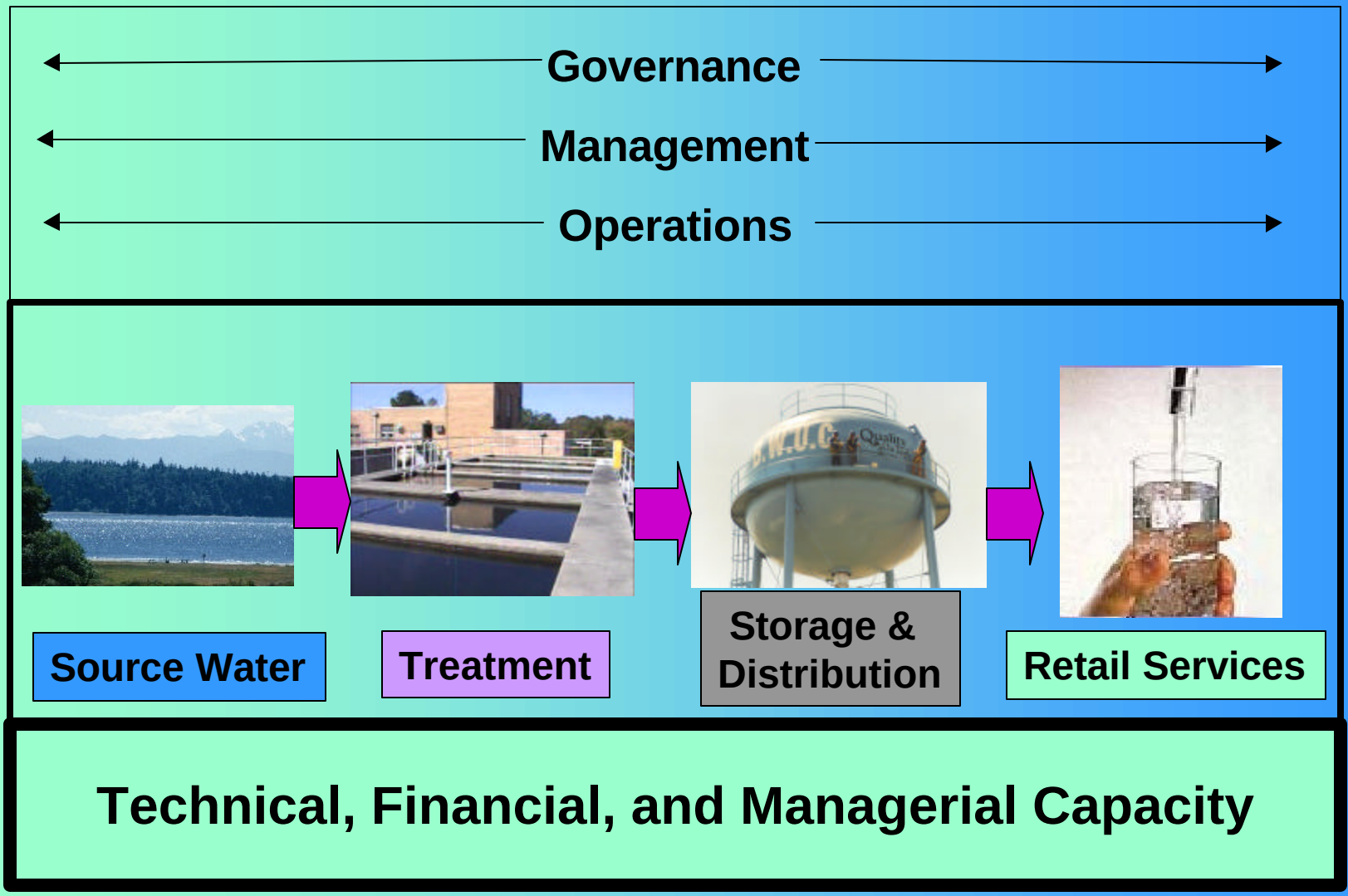
- Preparing today for an uncertain tomorrow
- Futurity of present decisions

Simplified 6-Step Framework

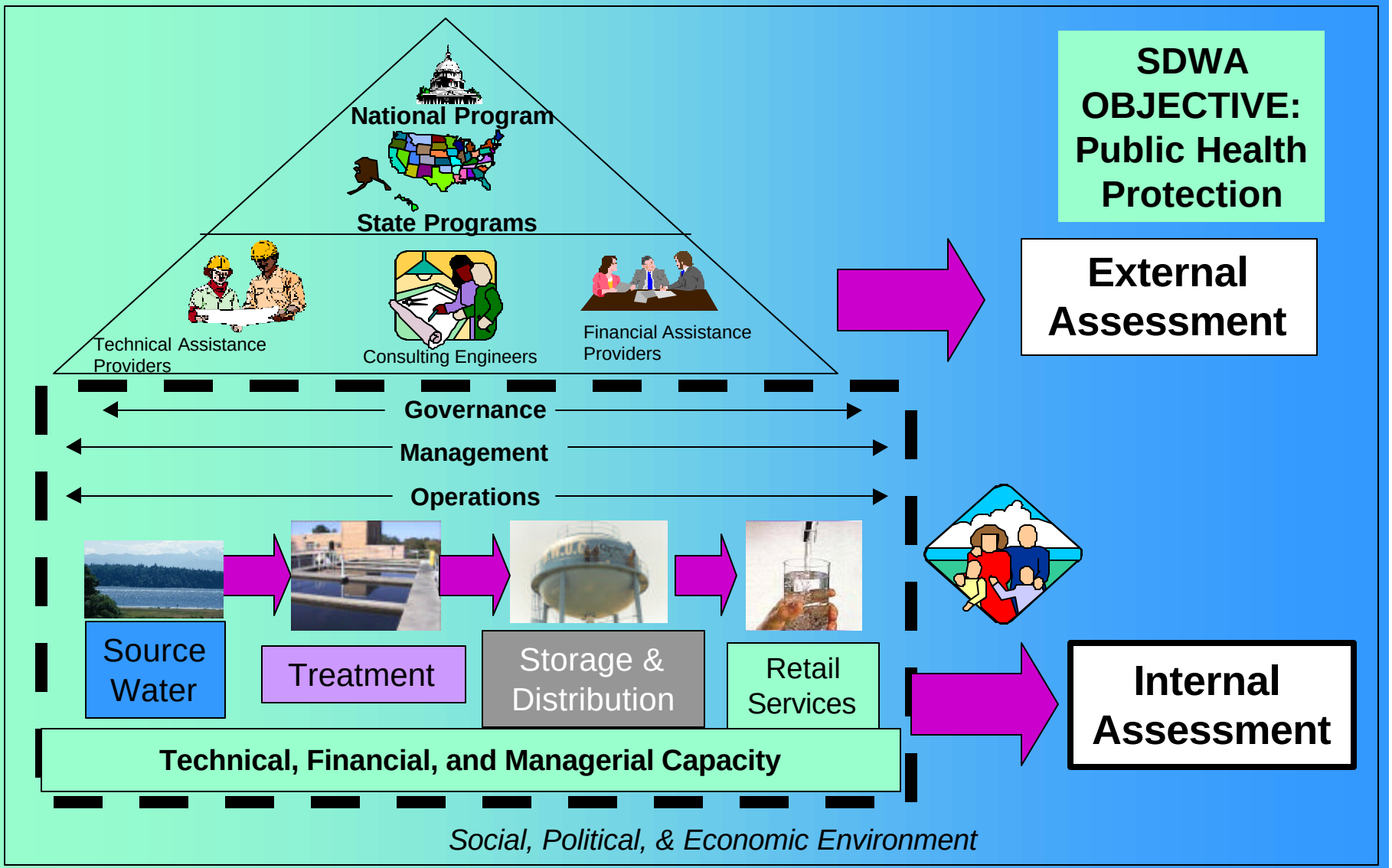


- **Assess** system needs, external pressures, and internal capacity
- **Define** the “Service Horizon”
- **Identify** strategic options
- **Analyze** options and select the optimum
- **Implement** strategic plan
- **Evaluate** and revise strategic plan

Strategic, Functional Water System Model



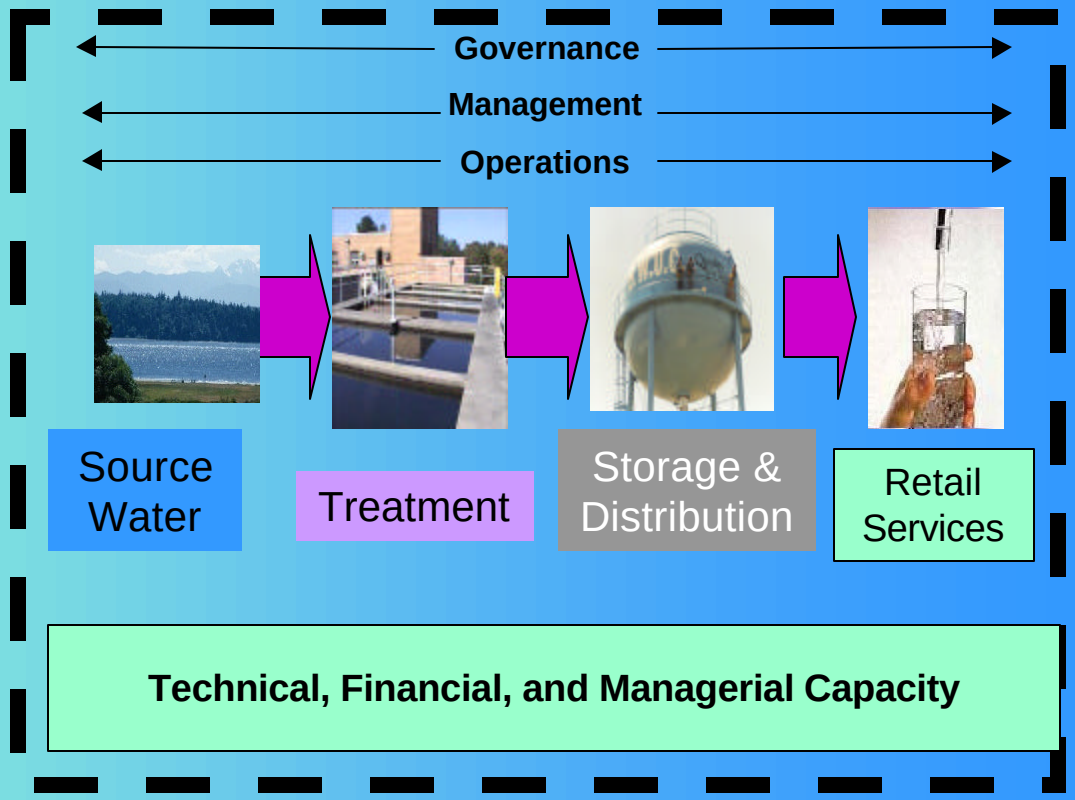
Generalized Water System Strategic Planning Context



Strategic Planning in the 21st Century

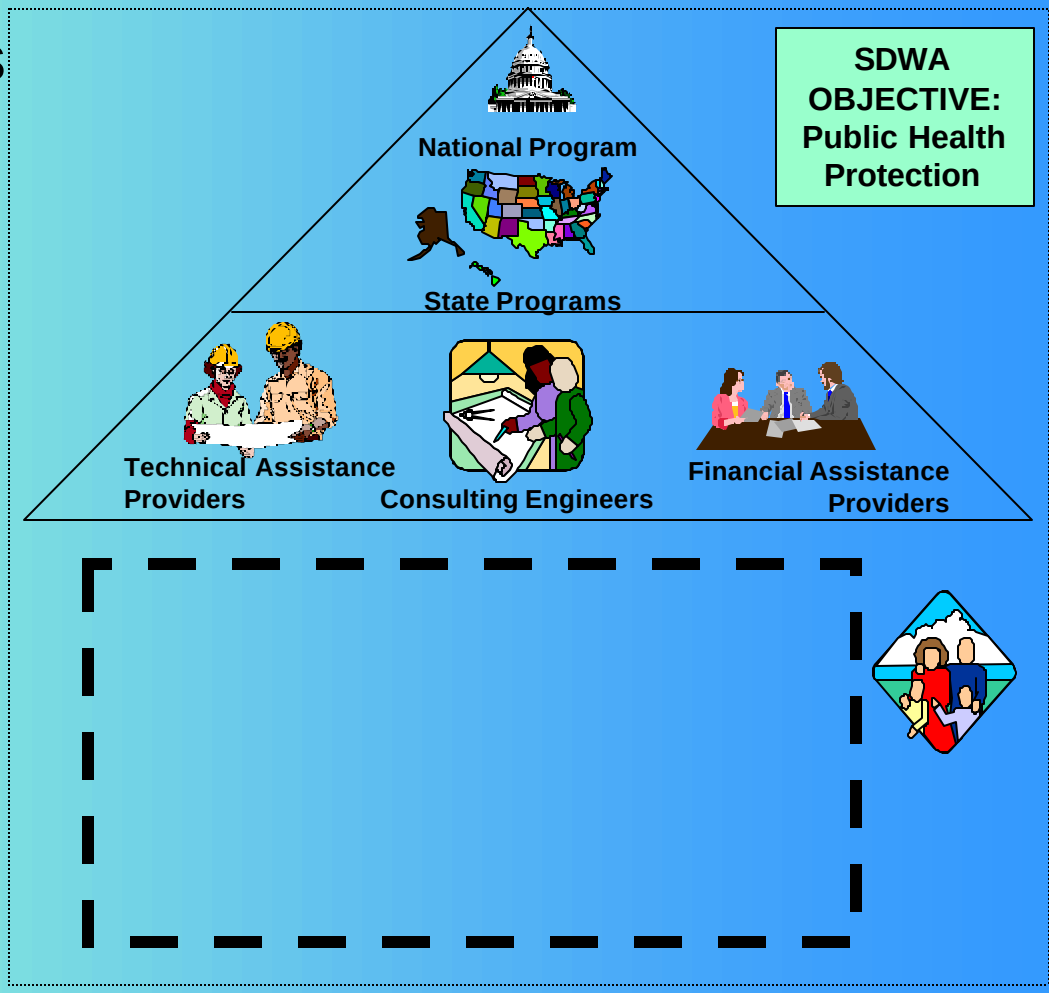
Internal Assessment

- Identify Strengths and Weaknesses
  - Functional Areas
    - Source Water
    - Treatment
    - Storage & Distribution
    - Retail Delivery
- System "Capacity"
  - Technical
  - Financial
  - Managerial



External Assessment

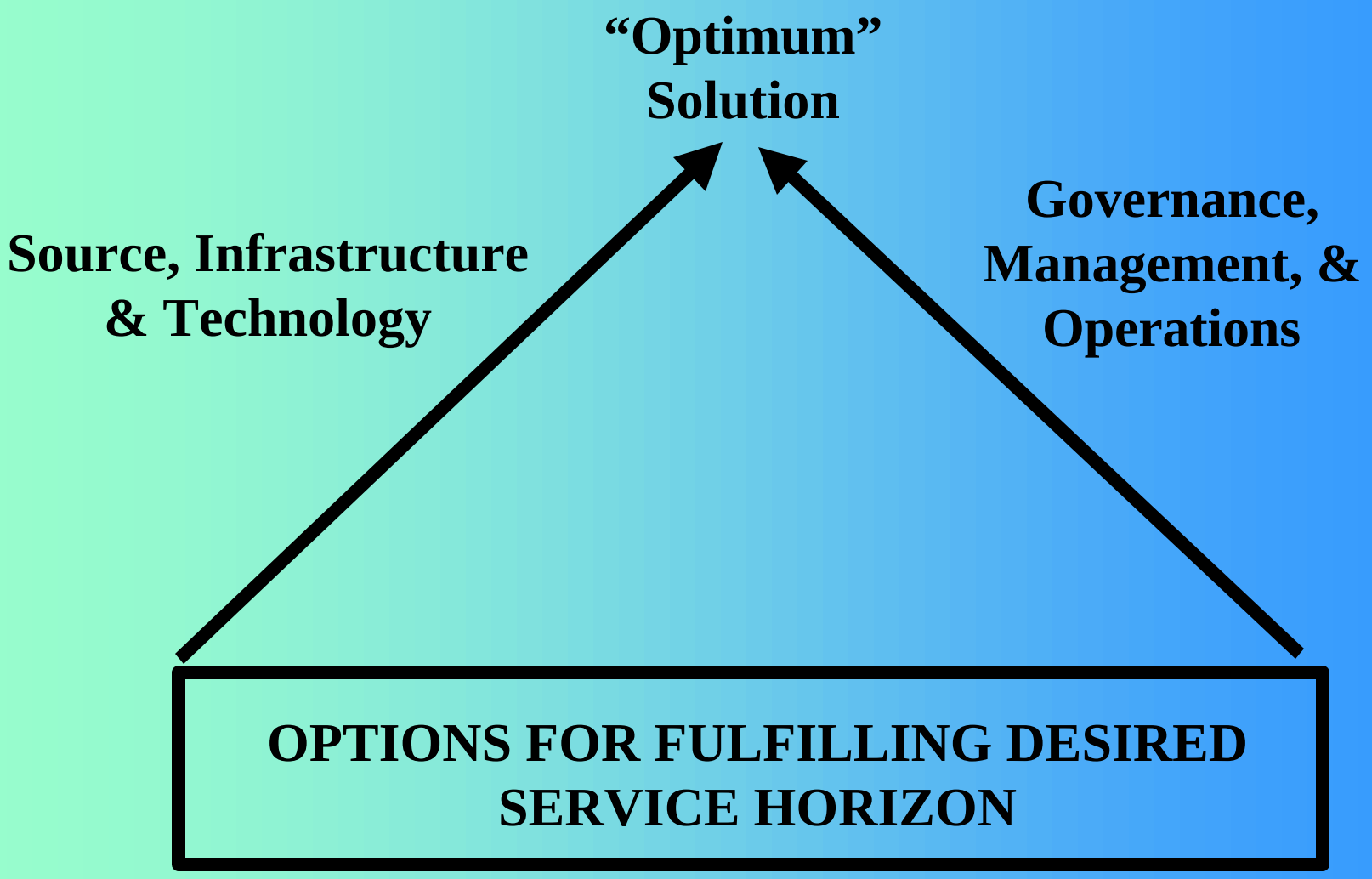
- Identify Challenges and Opportunities
  - Challenges
    - Regulations
    - Competition
    - Source quality & availability
  - Opportunities
    - Partnerships
    - Source protection
    - Resources
    - Public awareness



A Utility's Service Horizon

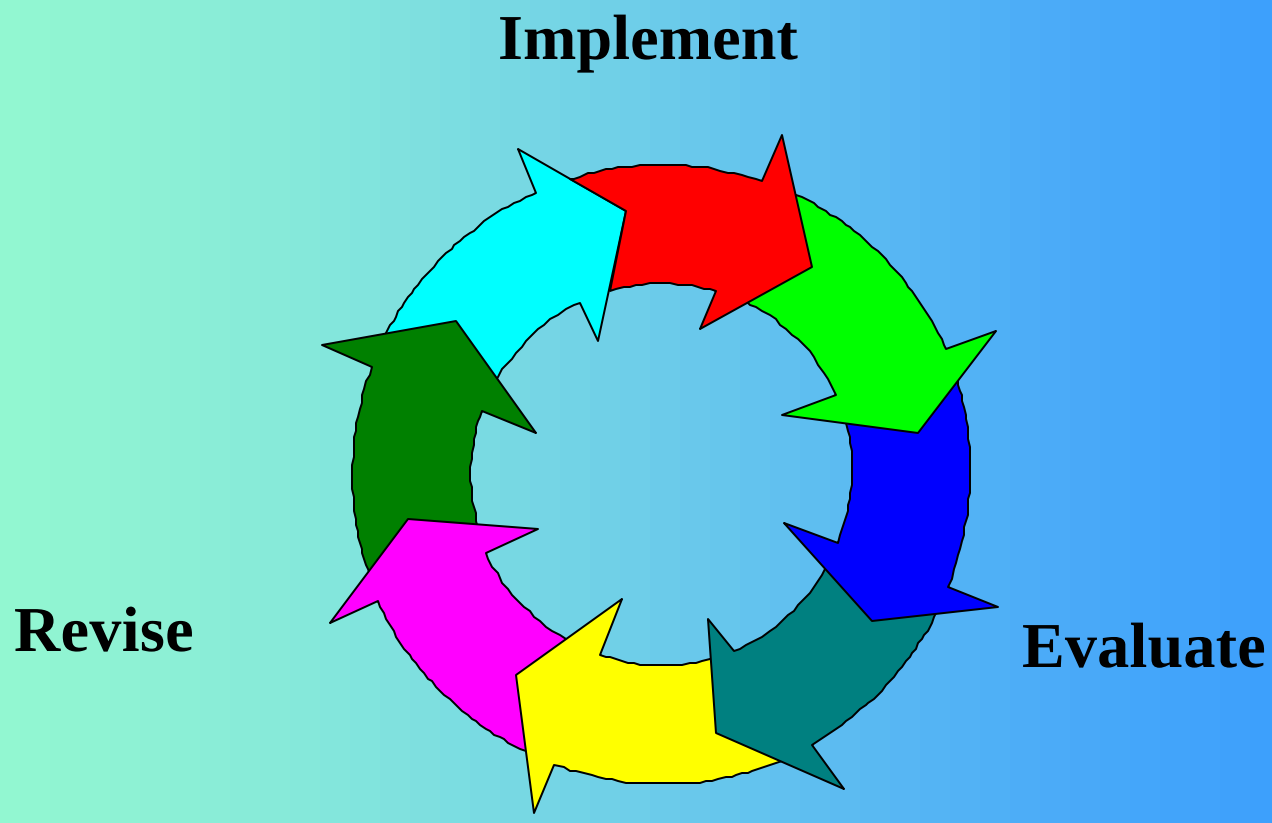
Role	Source Water	Treatment	Storage & Distribution	Retail Services
Governance				
Management				
Operations				

Identify & Analyze Options



Implement & Evaluate

Strategic Management



Summary

- Planning Imperatives
- Consumer Expectations
- What is the Focus of Strategic Planning?
- Strategic Planning Framework
  - Assess internal and external capacity
  - Define the “service horizon”
  - Implement the strategic plan

Assessing Existing Infrastructure

Internal System Assessment

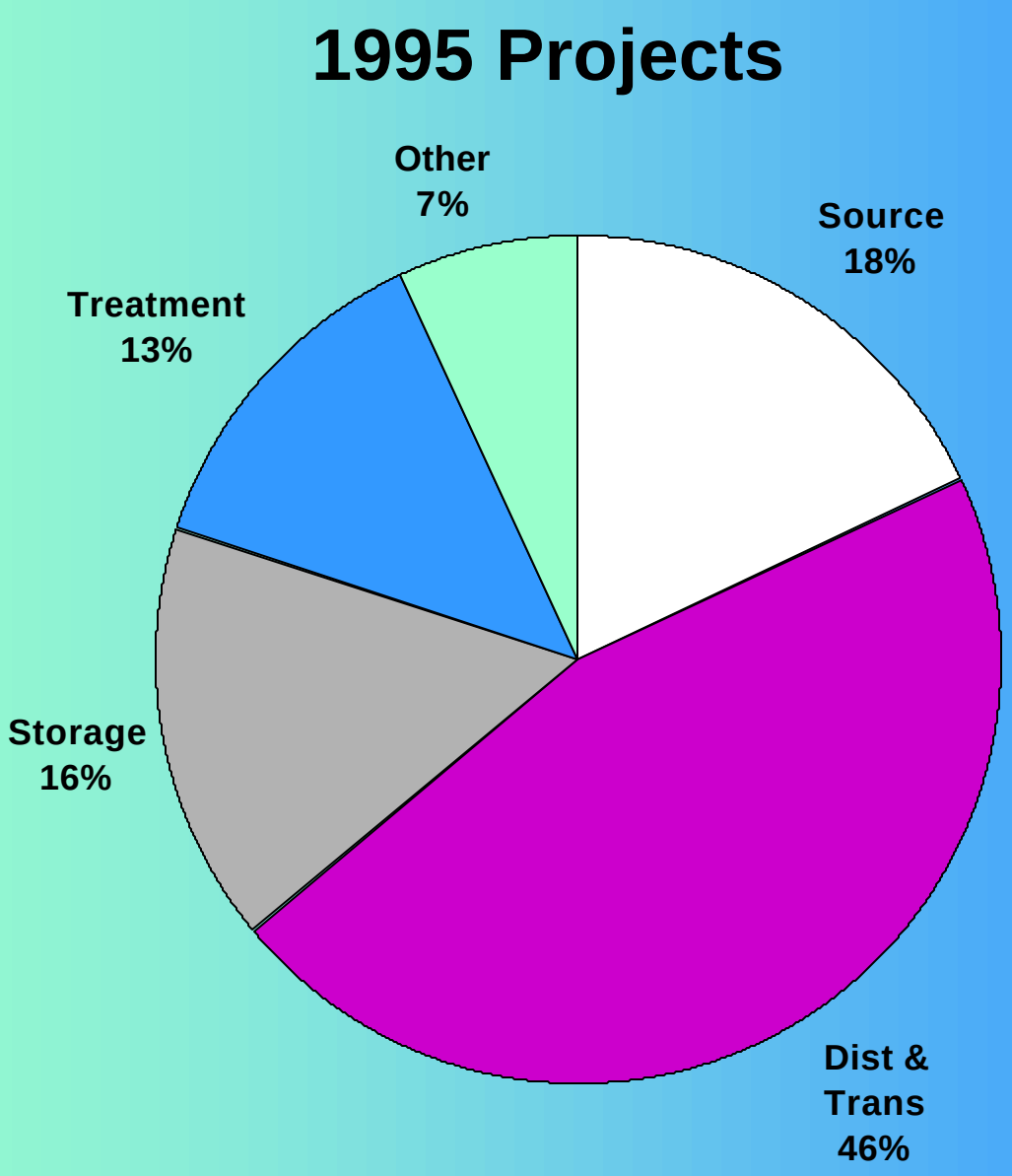
Assessment of Key Components

- Source
- Intake or Well
  - Raw water pumping
- Transmission
- Treatment
- Distribution
- Storage
- Pumping Facilities

Essential to Assess Total Needs

- Not All Needs Are Obvious
- An Assessment Must Be Made
  - Source
  - Transmission
  - Treatment
  - Distribution
  - Storage
  - Pumping

EPA's Drinking Water Needs Survey



Internal System Assessment

Assessing Source of Supply

- Quantity
  - Current and projected use
  - Source capacity
- Quality
  - Current quality
  - Trends
  - Source water protection

Ground Water Sources

- Well Construction
- Capacities
  - Wells
  - Pumps
- Sanitary Condition
  - Surface completion
  - Grouting
  - Sanitary seal
- Source Water Protection

Surface Water Sources

- Source Water Protection
- Intake
  - Condition
  - Problems
- Turbidity

Assessing Transmission

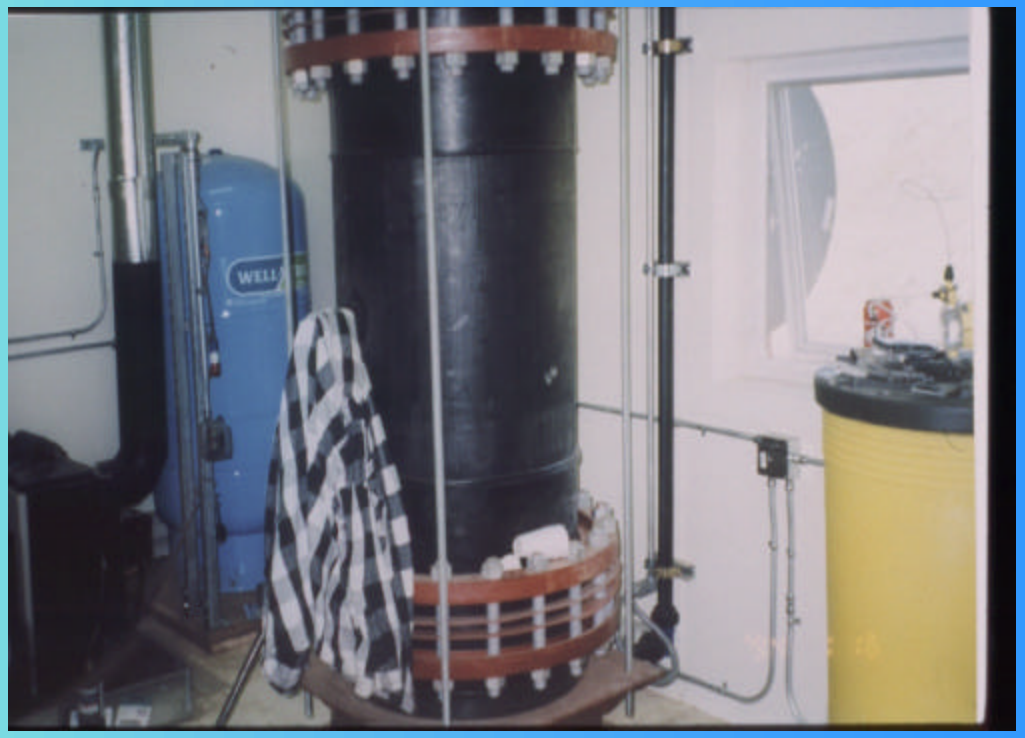
- Size
- Materials
- Capacity
- Condition
- Air/Vacuum Relief
- Peak Daily Flows
- Redundancy

Assessing Existing Treatment

- Objectives
- Design
- Performance
- Age and Condition
- Residuals

Existing Treatment Objectives

- Primary Standards
- Secondary Standards



Internal System Assessment

Existing Treatment Design

- Design Conditions
  - Hydraulic loading
  - Solids loading
  - Chemical feed
  - Peak daily flow
  - Residuals handling
- Future Demands on System

Existing Treatment Performance

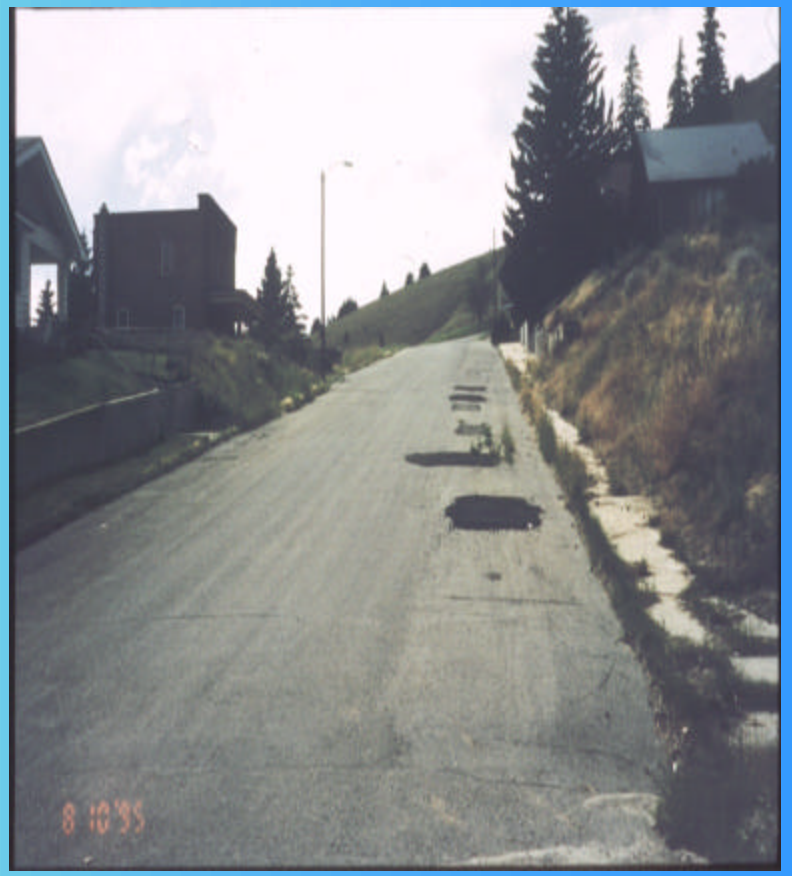
- Finished Water Quality
  - Average
  - Excursions
- Process Control
- Performance Limiting Factors
- Cost and Efficiency
- SCADA

Age and Condition of Treatment

- Structural Components
- Process Equipment
- Electrical Systems
- Control Systems
- Safety
- Redundancy

Assessing the Distribution System

- Age
- Materials
- Installation
- Repair History
- Water Use Records
- Valves
- Hydrants



Assessing the Distribution System (cont.)

- Main Break and Leak Patterns
- Corrosion History
- Environmental Stresses
- Peak Hourly Flow
- Looping

Maintenance Alternatives

- Main Break Repair or Replacement
- Cleaning and Lining
- Leak Detection and Repair

Assessing Storage

- Condition
- Storage Capacity
- CT Provided
- Sanitary Condition
  - Vents
  - Hatches
  - Level measuring devices
  - Overflows

Storage Capacity

- Operational Storage
  - Peak demands vs. supply capacity
- Fire Storage
  - ISO
  - Fire marshall
- Emergency Storage
  - Power outages
  - Natural disasters
  - Pump or supply failures

Storage Capacity (Hydropneumatic)

- Frequency of Pump Cycling
- Auxiliary Power
- Pumping Rate vs. Treatment Capacity

Storage Sanitary Condition

- Vents
- Hatches
- Level Measuring Devices
- Overflows
- Elevation (Pressure)

Pumping Stations

- Age
- Condition
- Design Standards
  - Redundancy
  - Auxiliary power
  - Pressure
  - Peak hourly flow
  - Confined spaces

Assessing Retail Services

- Meters
- Meter Reading Equipment
- Billing and Revenue Collection
- Hardware and Software

The Cost of Inadequate Planning

- Financial Hardship
- Poor or Variable Water Quality
- Regulatory Violations
- Periodic or Chronic Water Shortages
- Loss of Revenue Due to Inaccurate Meters or Leaks

Internal System Assessment

Technical, Managerial, and Financial Capacity

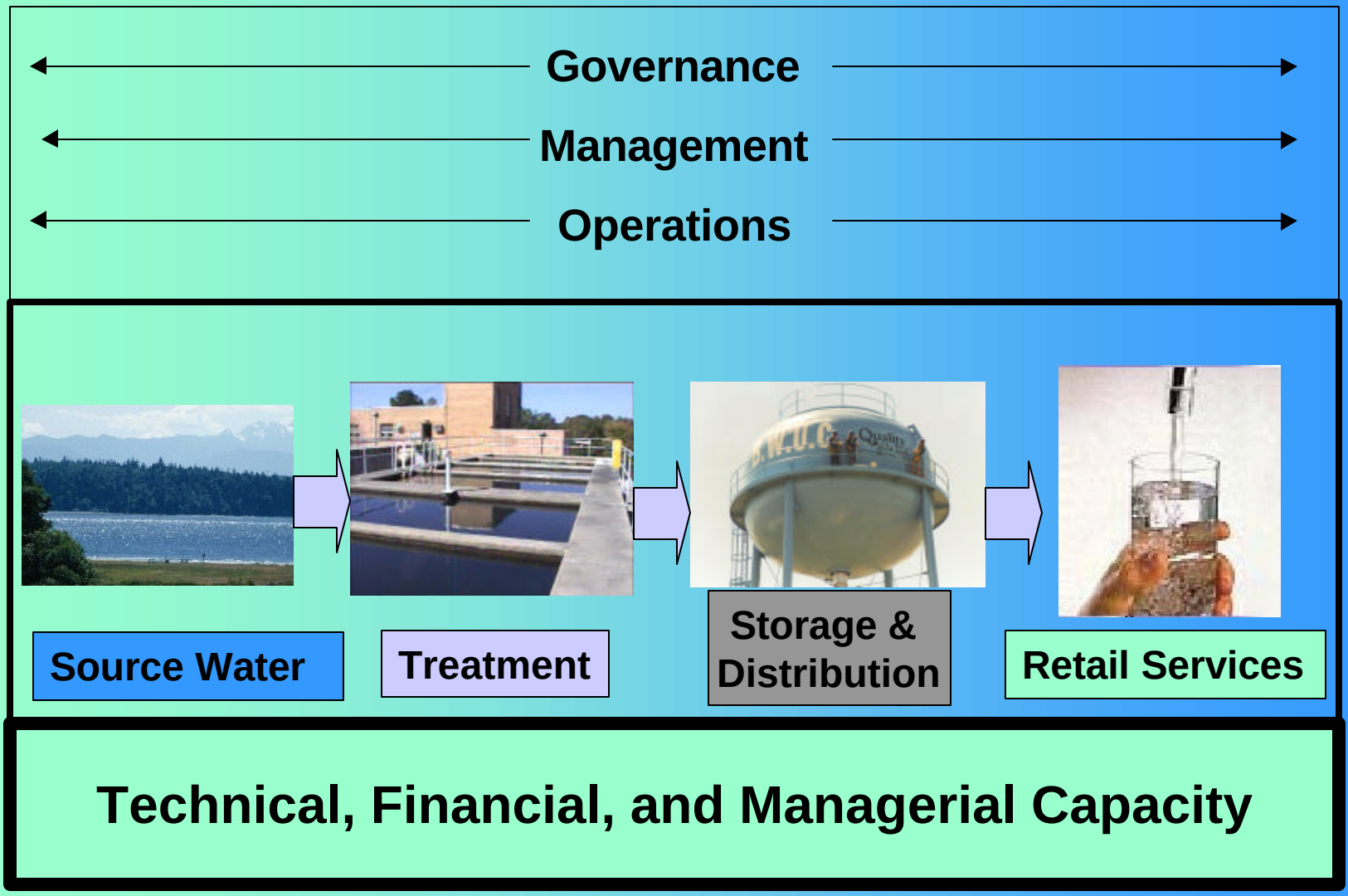
The Three Elements Of Capacity

Technical

Financial

Managerial

Strategic, Functional Water System Model



Internal System Assessment

Technical Capacity

- Source Water
- Infrastructure
- O&M

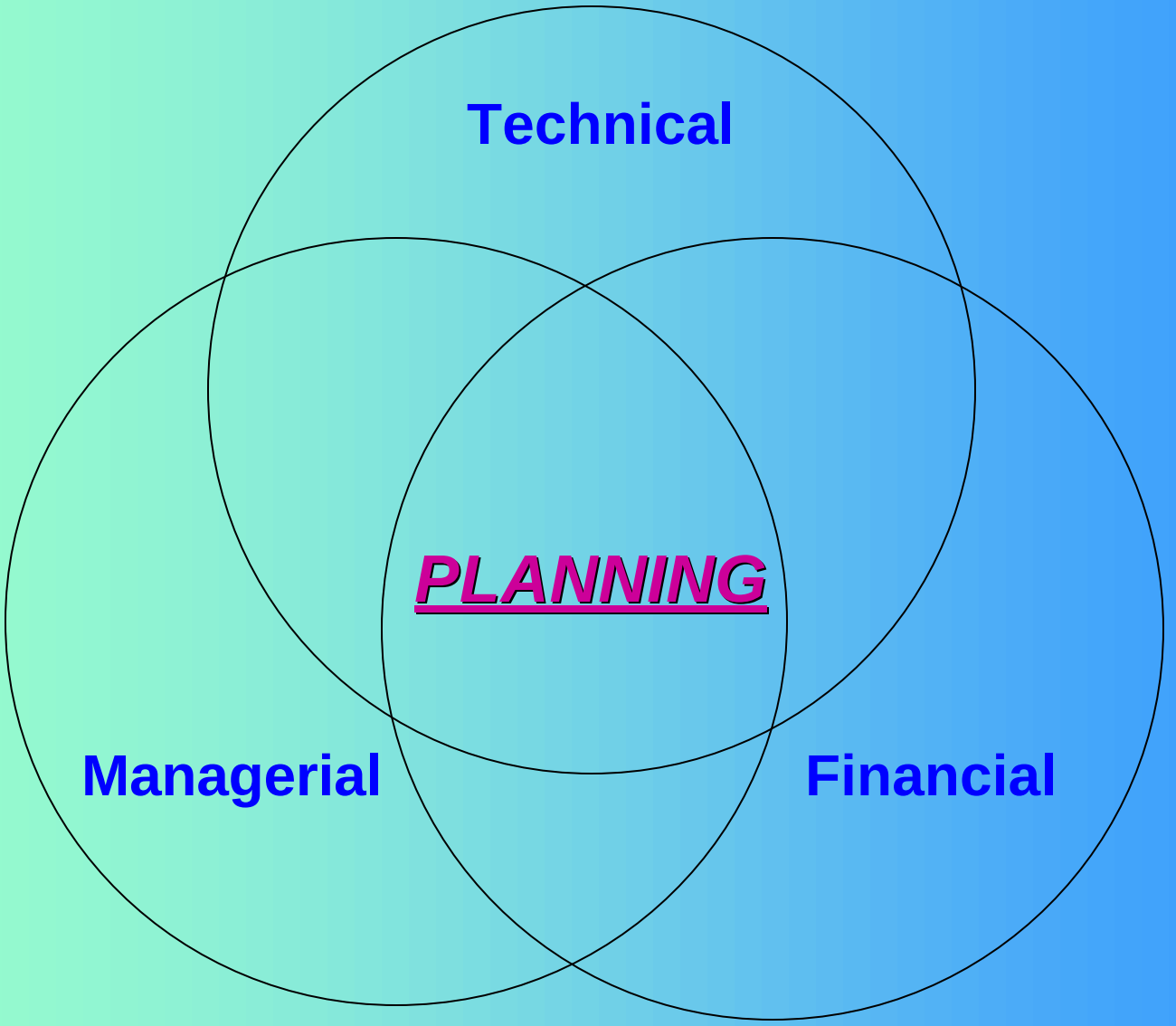
Financial Capacity

- Revenue Sufficiency
- Credit Worthiness
- Fiscal Management

Managerial Capacity

- Ownership
  Accountability
- Staffing & Organization
- Effective External
  Linkages

Dimensions Of Capacity Are Distinct But Interrelated



Assessment of Internal Capacity

Internal System Assessment

	Elements of Capacity	Strengths	Weaknesses
Technical	Source Water Adequacy		
	Infrastructure Adequacy		
	O & M		
Managerial	Ownership Structure & Accountability		
	Staffing and Organization		
	External Linkages		
Financial	Revenue Sufficiency		
	Credit Worthiness		
	Fiscal Management & Controls		

Examples Of Capacity Assessment Tools

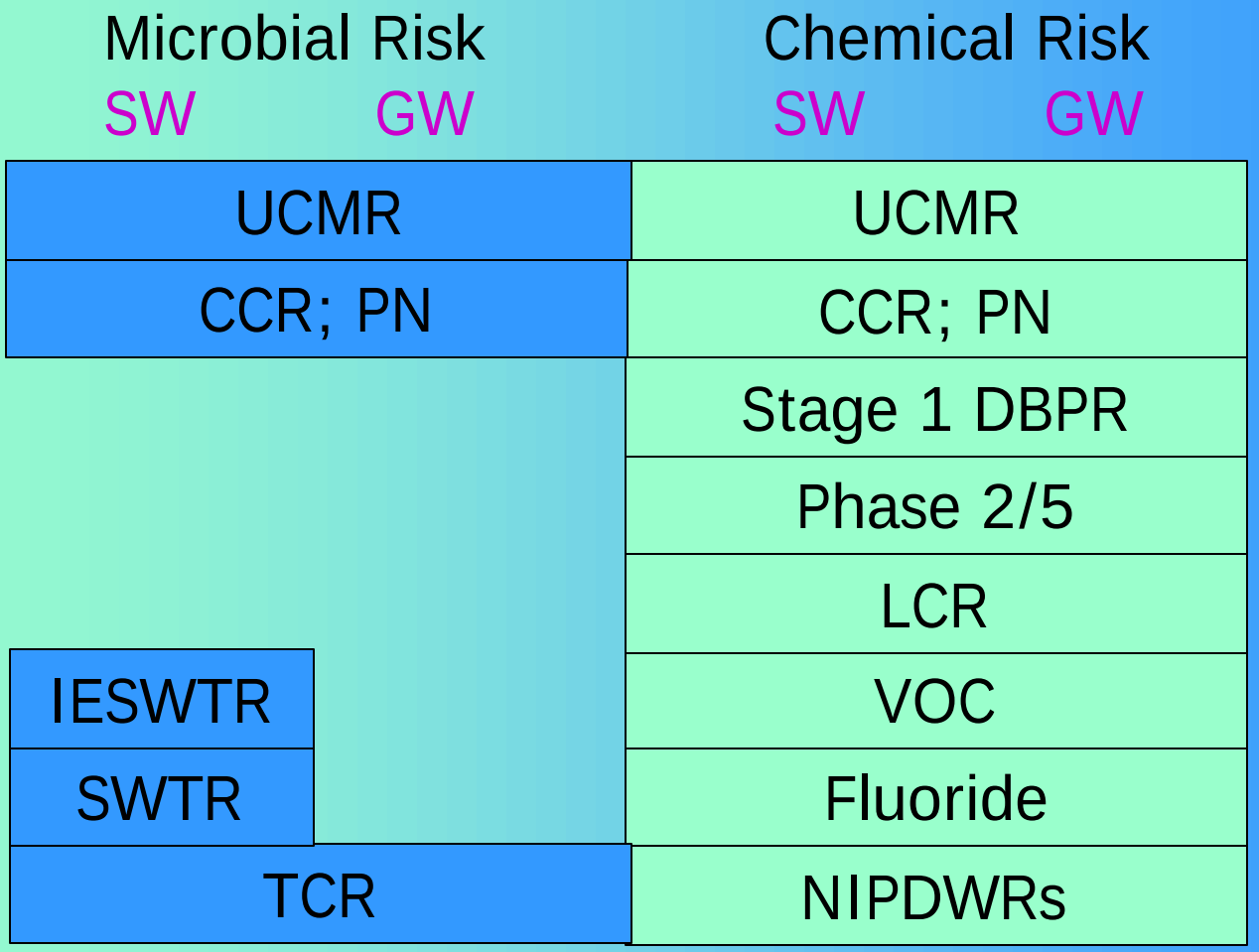
- NRWA Self-Assessments
- State Self-Assessments (e.g., CA, PA, IA)
- The “Dozen Questions” (AWWA)
- Financial Viability Assessments Developed by PUCs
- Sanitary Surveys
- Permit Application Data
- Criteria Used by Lenders

Assessing External Challenges

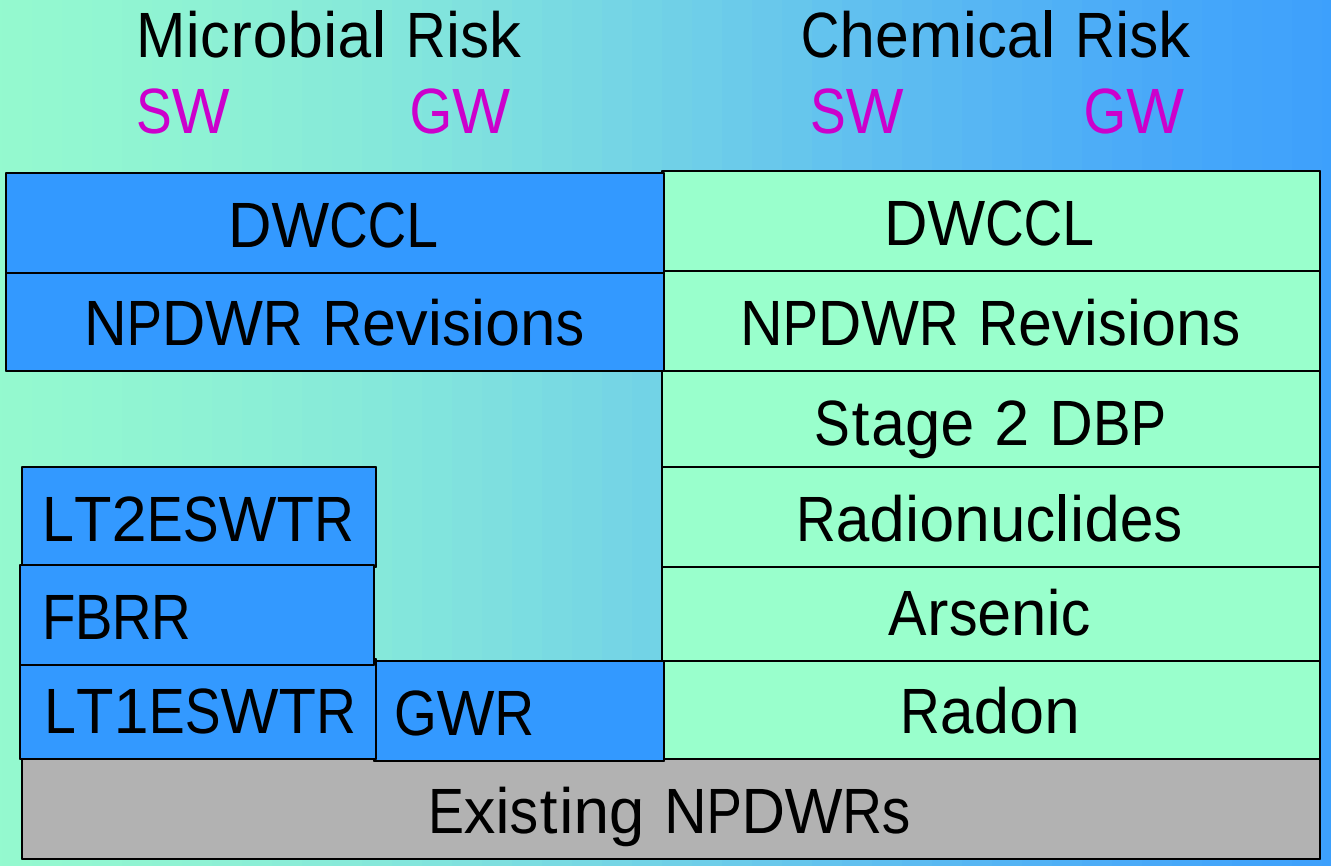
Regulation Overview for Small Systems

An Imposing Mountain

Existing Rules Reduce Risk



New Rules Address Newly Identified Risks



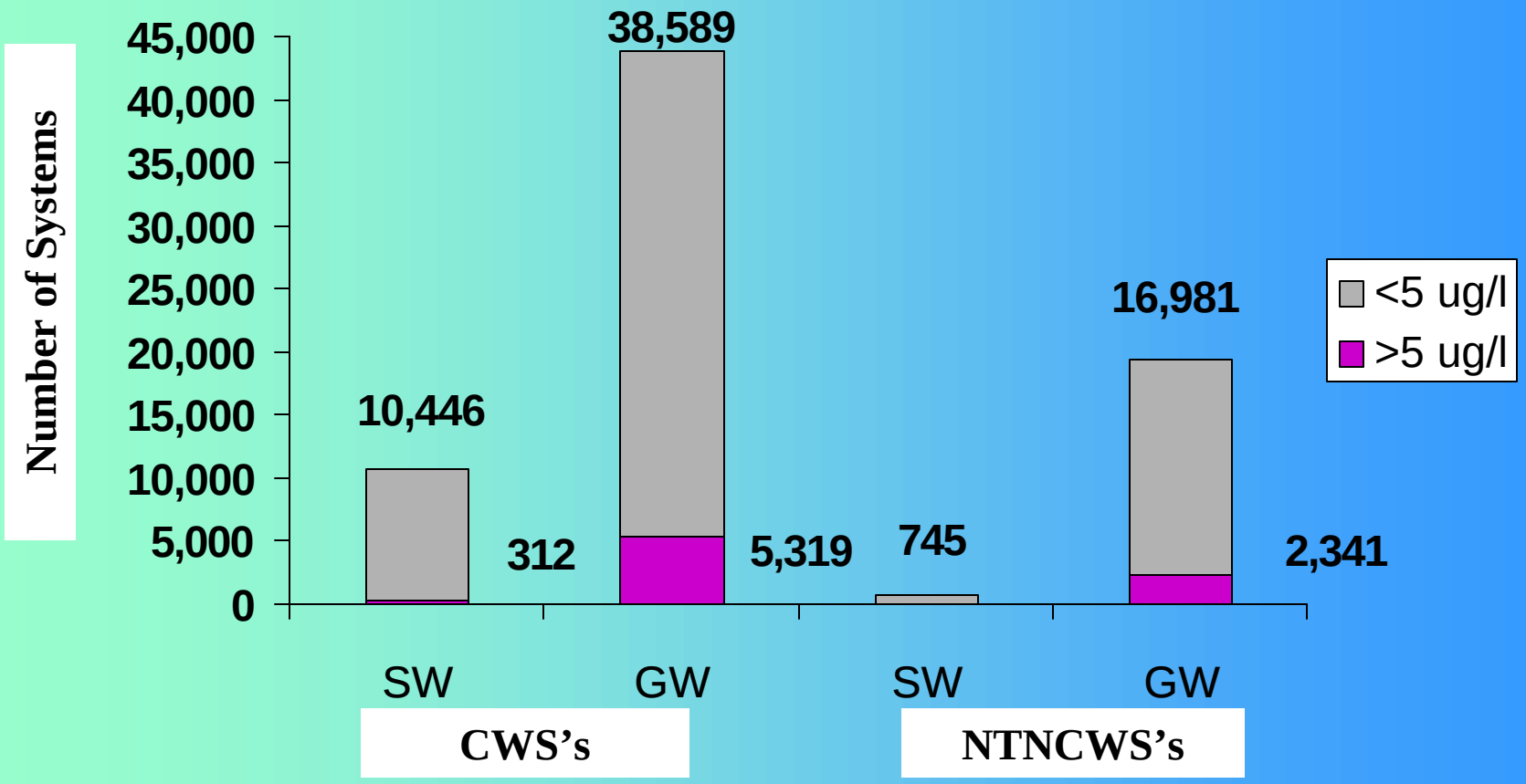
Arsenic

- Proposed June 22, 2000 (Sept. 20)
- Final Rule Due January 2001
- Goal
  - Establish an updated regulation to protect the public from health risks caused by arsenic in drinking water
- Applies to Community Water Systems
  - NTNCWSs to notify customers if MCL exceeded

Arsenic Proposed Requirements

- MCLG = zero
- Feasible Level = 3 ug/L
- Proposed MCL = 5 ug/L
  - Comments requested at 3, 10, and 20 ug/L
  - Proposed MCL was adjusted upward to where the cost is justified by the benefits
- Best Available Technology
- Compliance Monitoring and Reporting

Proposed Arsenic Rule - System Impacts



Radon

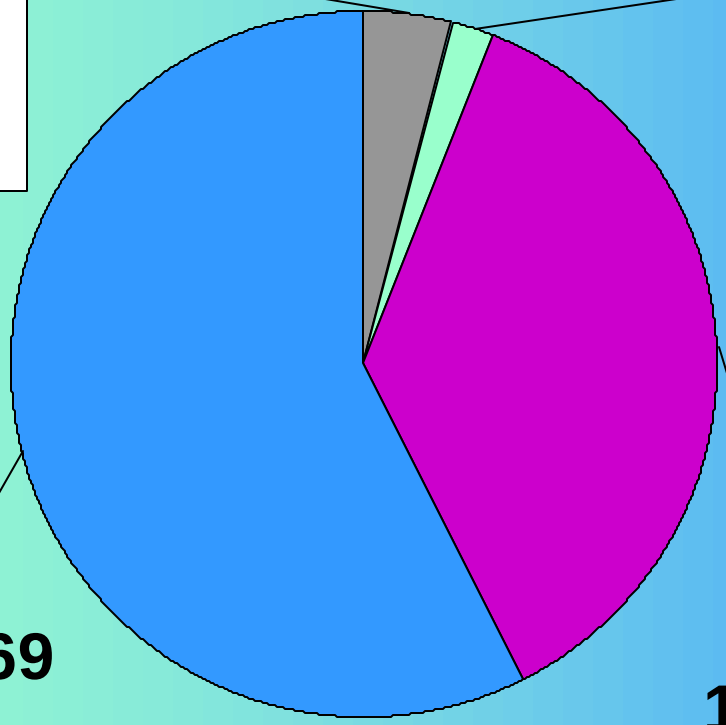
- Proposed November 2, 1999
- Final Rule Expected Fall 2000
- Goal
  - Reduce health risks to exposure to radon in drinking water
- Applies to All Community Water Systems Using Ground Water or Mixed Ground Water and Surface Water

Radon Proposed Requirements

- MCLG = Zero
- MCL = 300 pCi/l
  - Alternative MCL (AMCL) = 4,000 pCi/l
- MMM Program Assistance Document to Be Provided With Final Rule
- BAT, Compliance Monitoring, Reporting

- Option 1
  - State Develops Multimedia Mitigation (MMM) Program for Indoor Radon (to Achieve ❍ Risk Reduction)
- Option 2
  - No State MMM Program

Proposed Radon Rule - System Impacts



1,777

Systems with 1 or more sources >4000 pCi/L

932

Systems with one or more source >300 pCi/L that chose to mitigate

25,269

Systems with all sources <300 pCi/L

15,930

Systems with 1 or more sources >300 pCi/L that participate in a MMM program

Radionuclides

- Proposed Rule July 1991
- Notice of Data Availability (NODA) published April 21, 2000
- Goal
  - Protect the public against the harmful effects of radionuclides in drinking water
- Applies to Community Water Systems
  - Options presented for NTNCWSs

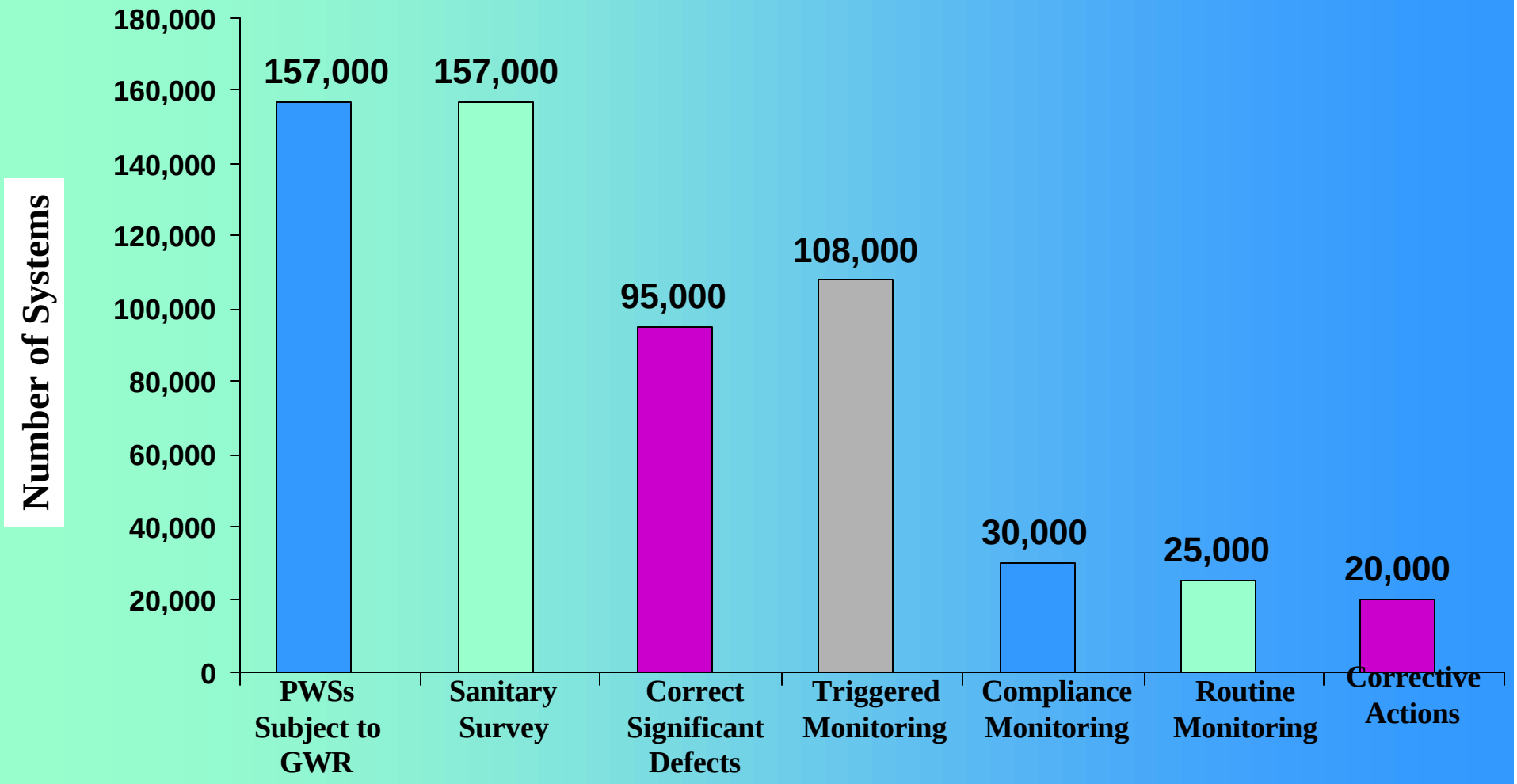
Ground Water Rule (GWR)

- Proposed Rule May 10, 2000 (Aug. 9)
- Final Rule Expected Fall 2000
- Goals
  - Establish a targeted strategy to identify ground water systems susceptible to microbial contamination
  - Establish a protective barrier to prevent microbial illness in ground water systems

GWR Proposed Requirements

- Sanitary Surveys by State to Identify Significant Deficiencies
- Corrective Actions
- Compliance Monitoring for Systems That Disinfect
- For Systems That Do Not Disinfect
  - Hydrogeologic sensitivity assessments
  - Source water monitoring from sensitive aquifers or by systems that have detected fecal indicators in the distribution system

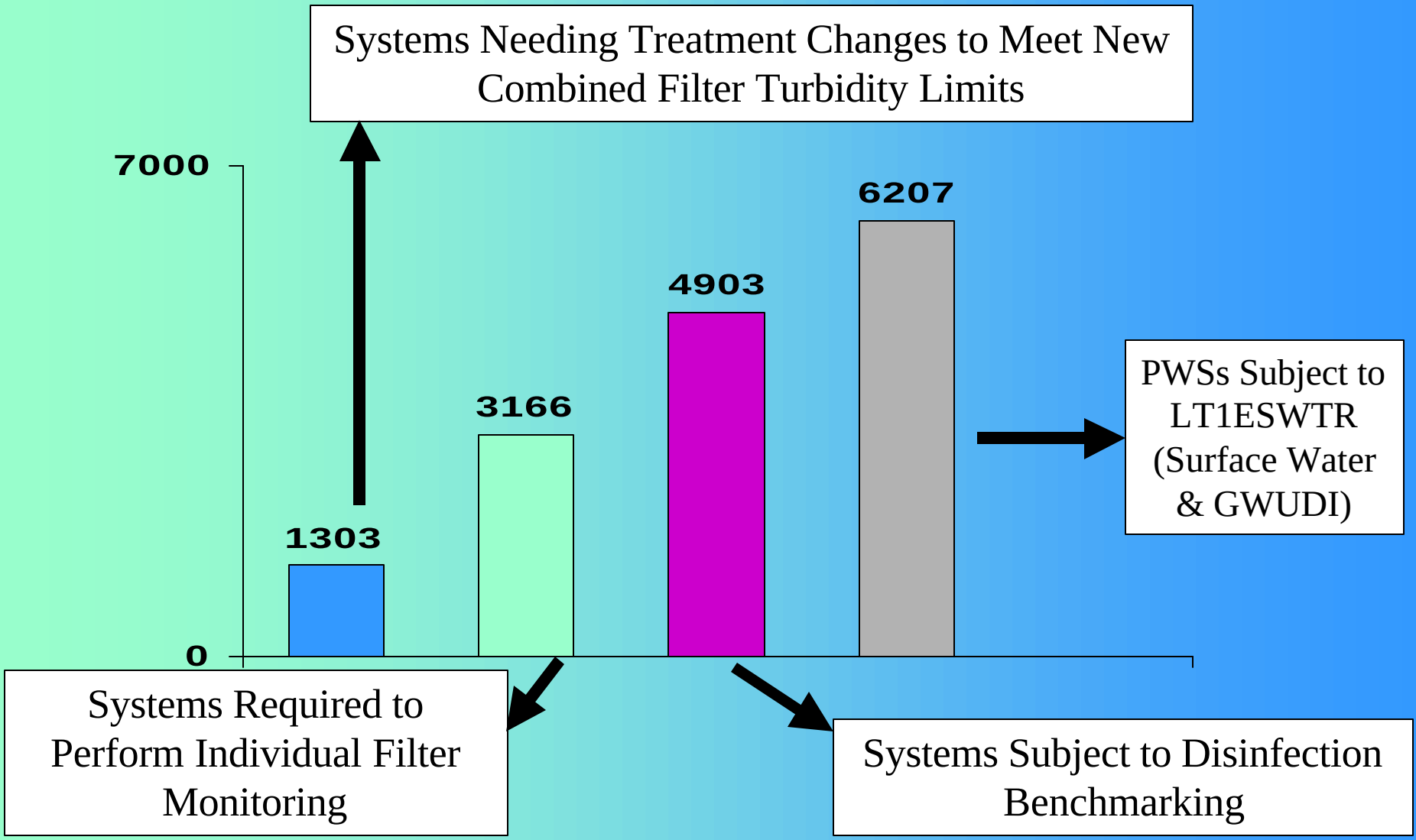
GWR Anticipated Impacts



LT1ESWTR Proposed Requirements

- Applies to Systems < 10,000 Using Surface Water or Ground Water Under Direct Influence (GWUDI)
- Cryptosporidium Removal (99%; 2-log)
- Filter Performance Criteria
- Disinfection Benchmarking
- Source Water Protection to Address Cryptosporidium for Unfiltered Systems
- New Uncovered Reservoirs Prohibited

LT1ESWTR Anticipated Impacts



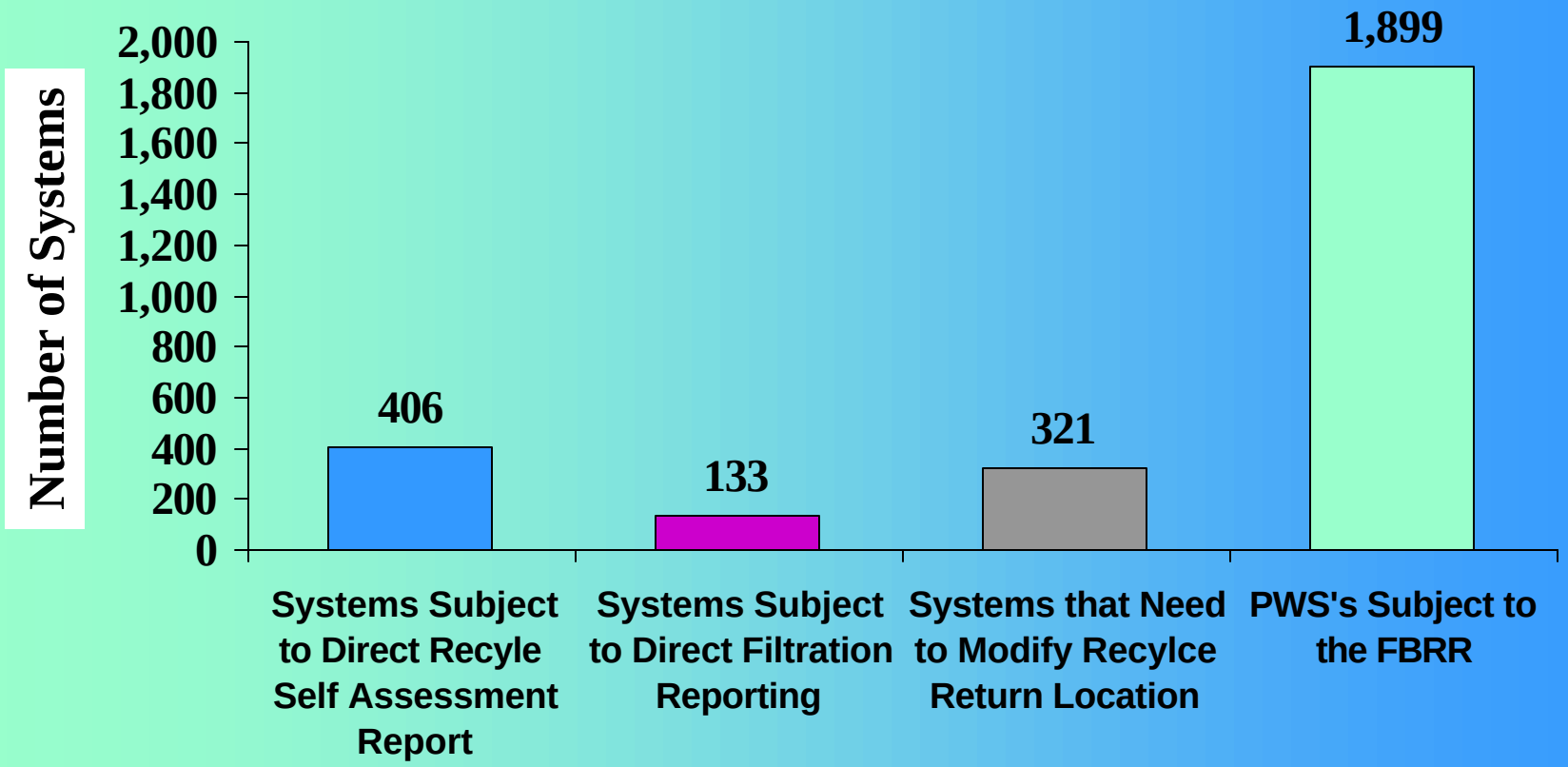
Filter Backwash Recycling Rule (FBRR)

- Incorporated in Proposed LT1ESWTR/FBRR
- Goal
  - Assess and eliminate adverse effects of direct recycling on surface water plants
- Applies to all Surface Water and GWUDI Systems

FBRR Proposed Requirements

- Recycle Prior to the Point of Primary Coagulant Addition (State May Modify)
- Direct Filtration Systems Provide Information to State
- One-month, One-time Recycle Self Assessment for Certain Systems

FBRR Anticipated Requirements



Identify Potential Compliance Actions

RULE	MONITORING	EXISTING TREATMENT PROCESS OPTIMIZATION OR ENHANCEMENT	NEW TREATMENT PROCESS INSTALLATION	MANAGEMENT PRACTICES OPTIMIZATION OR ENHANCEMENT
TCR	X			
SWTR			X	
Phase 1/2/5	X			
Lead & Copper	X		X	
IESWTR	X	X		
LTIESWTR	X	X		
FBRR		X		
LT2ESWTR	X	X	?	
GWR	X			X
Stage 1 DBPR	X	X		
Stage 2 DBPR	X	X	?	
Radon	X			X
Radionuclides	X		?	
Arsenic	X	X	X	
CCR				X
PN				X

Plan Strategically

- Take the Initiative
- Time Is Adequate If You Plan Intelligently
- No Time to Delay Long-term Planning
- It's Only a 'Train Wreck' If You Let It Become One
- It Can Be Done!

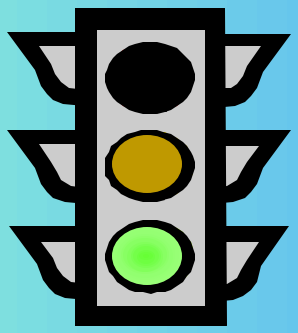
Assessing External Challenges

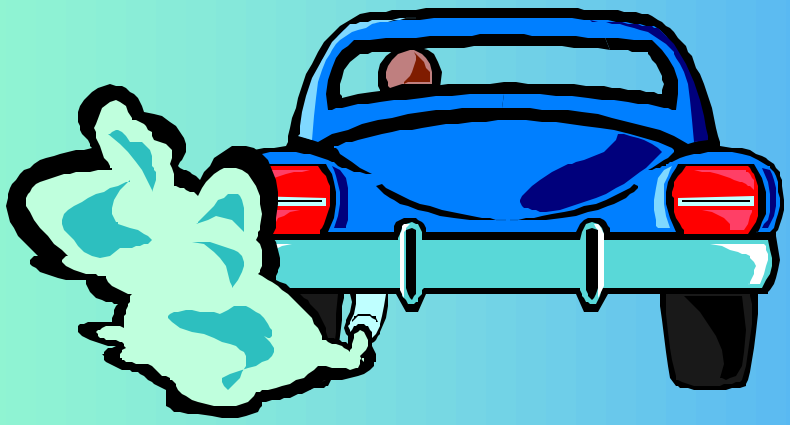
Small System Treatment Technology Selection

Does the System Really Want to Be in the Water Treatment Business?

Alternatives to Treatment

- Improve Source Water Protection
- Improve System Operation and Maintenance (O & M)
- Switch to Higher Quality Source
- Purchase Water
- Consolidate



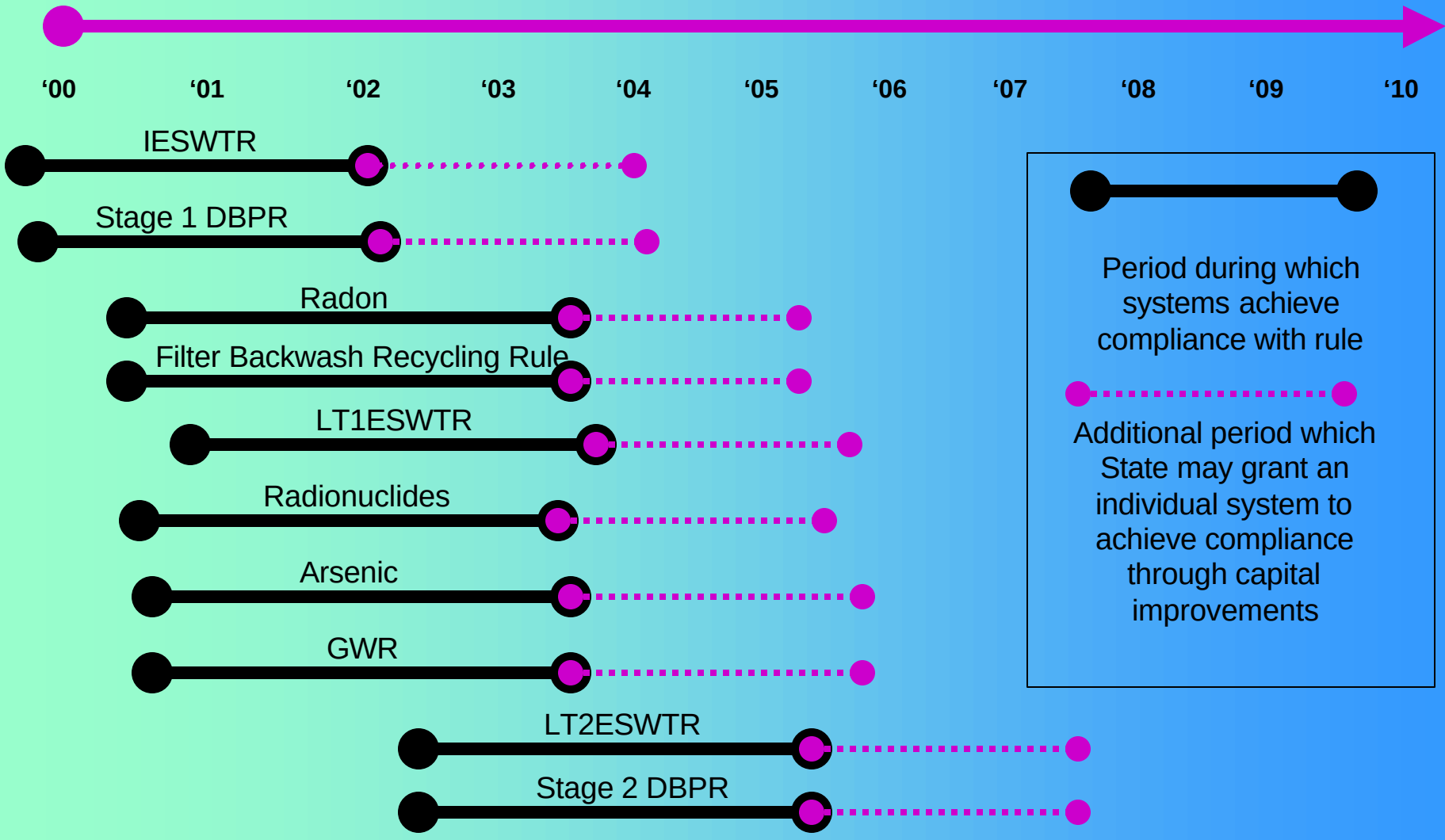


Go Forward with Treatment Selection if No Practical and Economically Attractive Alternatives to Treatment of a Current or New Water Source Exist

Factors Influencing Treatment Selection

- System Characteristics
- Impact of Upcoming Rules
- Characteristics of Proposed Treatment(s)

Compliance Timeline



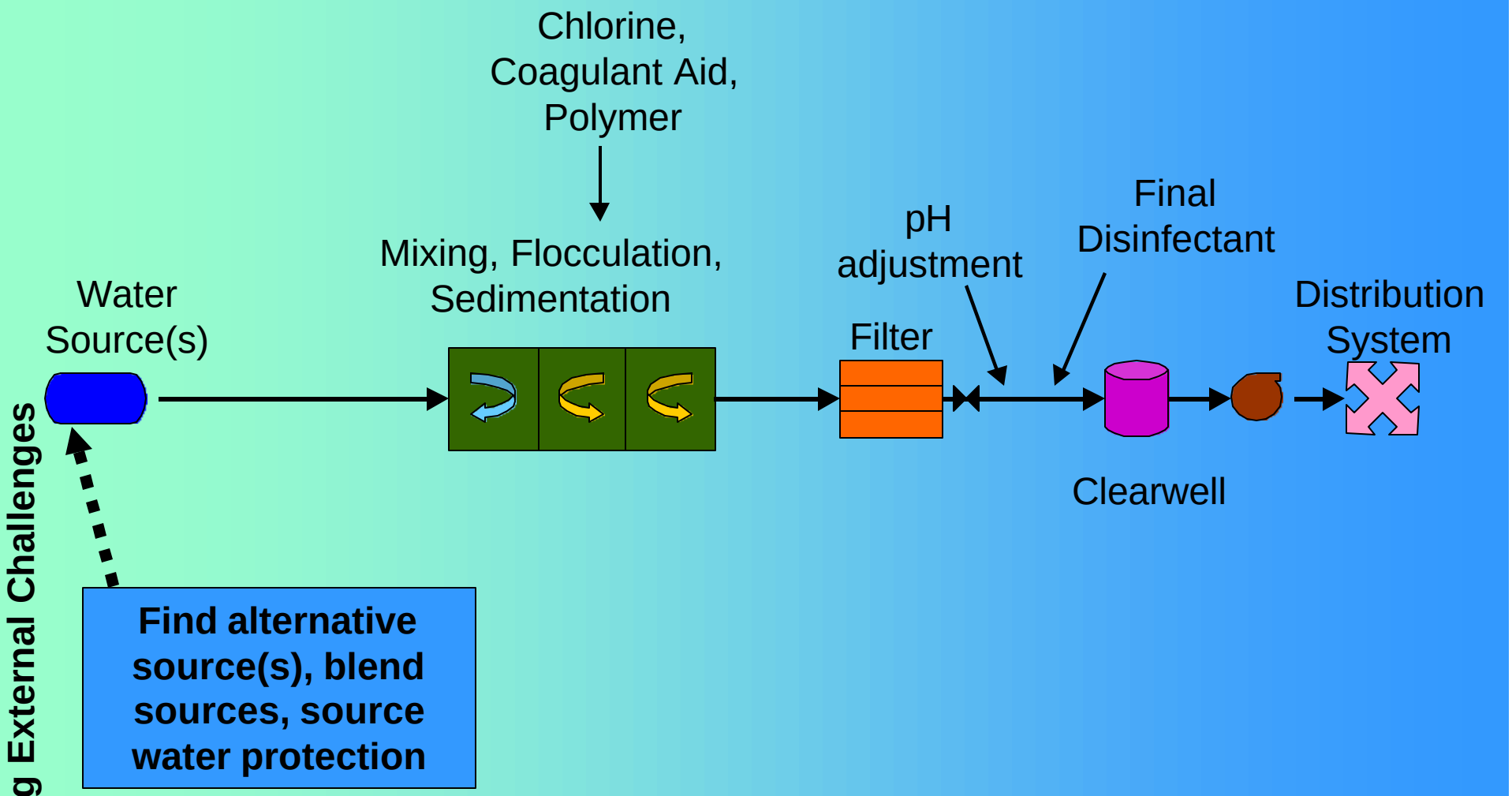
Characteristics of Proposed Treatment(s)

- Ability to Reliably Achieve Compliance
- Costs (Capital, O&M, Waste Disposal)
- Complexity and Flexibility
- Environmental Compatibility

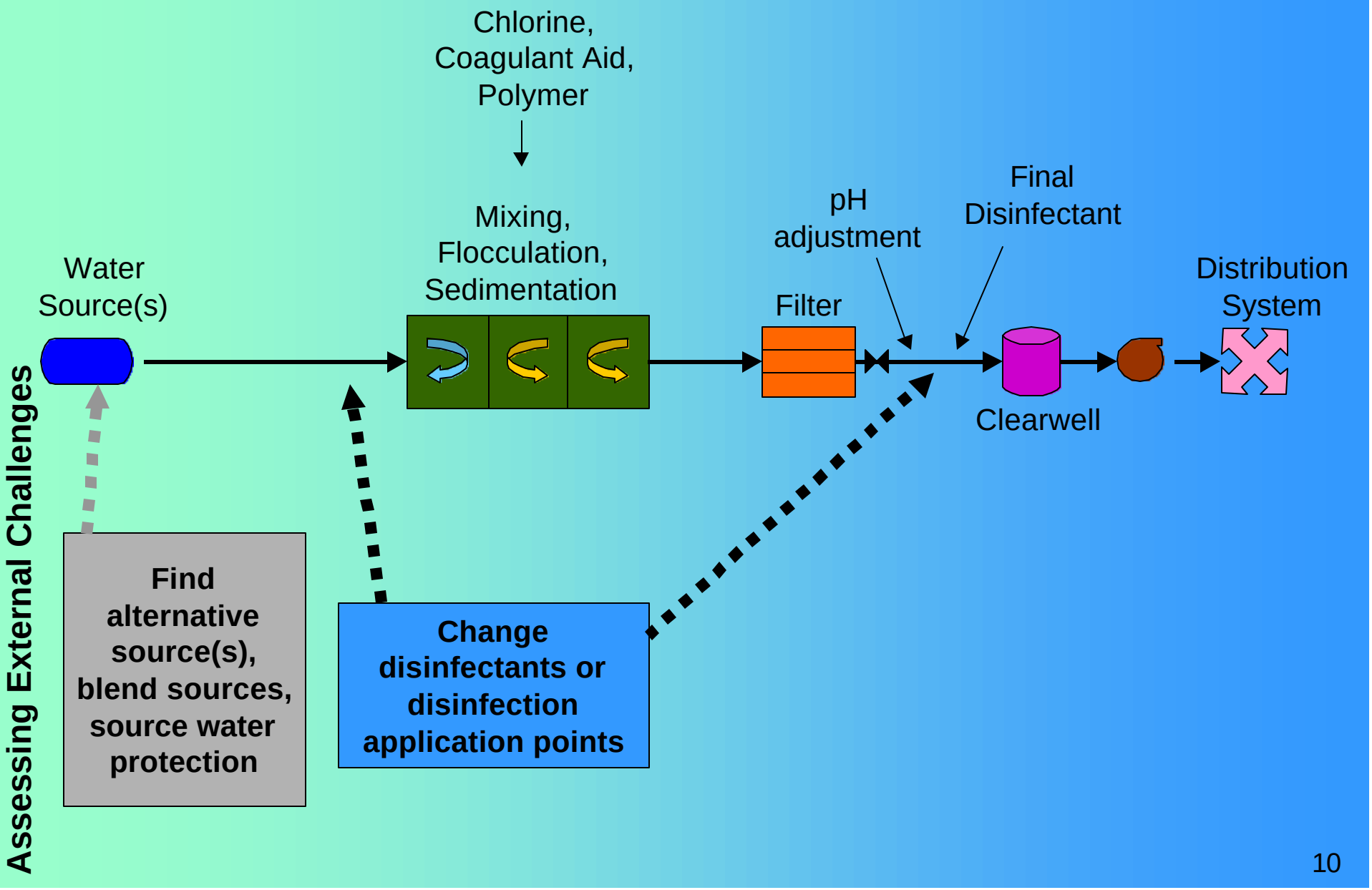
Treatment Options Analysis-Case Study

- System Characteristics
  - CWS, surface water, serves 2,500
  - Conventional filtration with chlorine disinfection
  - Raw TOC averages 3.2 mg/l
  - Alkalinity averages 95 mg/l
- Compliance Concerns
  - TTHMS average 0.085 mg/l
  - Treated TOC averages 2.3 mg/l
  - Turbidity is not less than 0.3 NTU 95% of the time
  - Turbidity excursions on individual filters
- Observations
  - Must reduce finished water TOC
  - Address turbidity

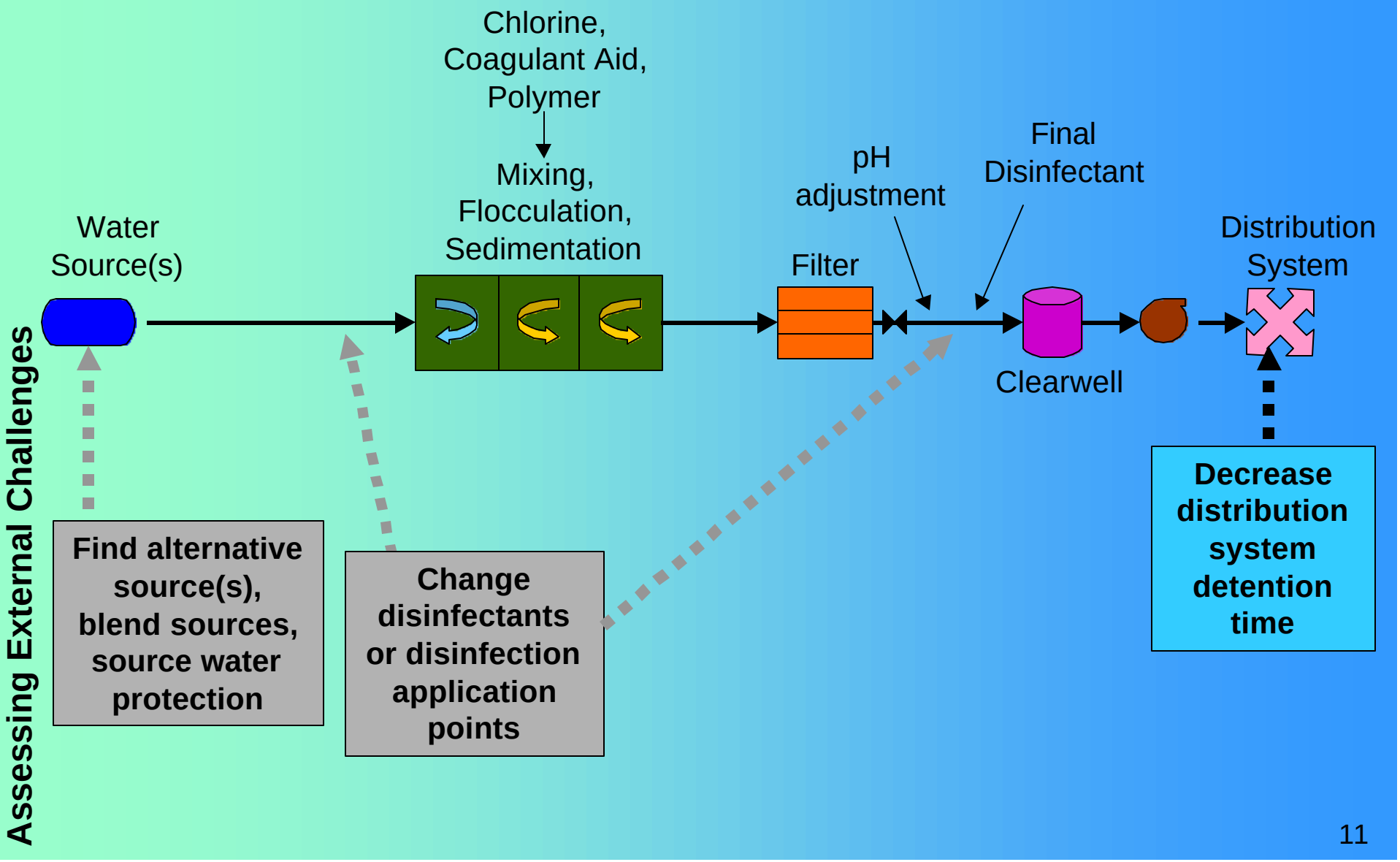
Treatment Options Analysis - Case Study



Treatment Options Analysis - Case Study



Treatment Options Analysis - Case Study



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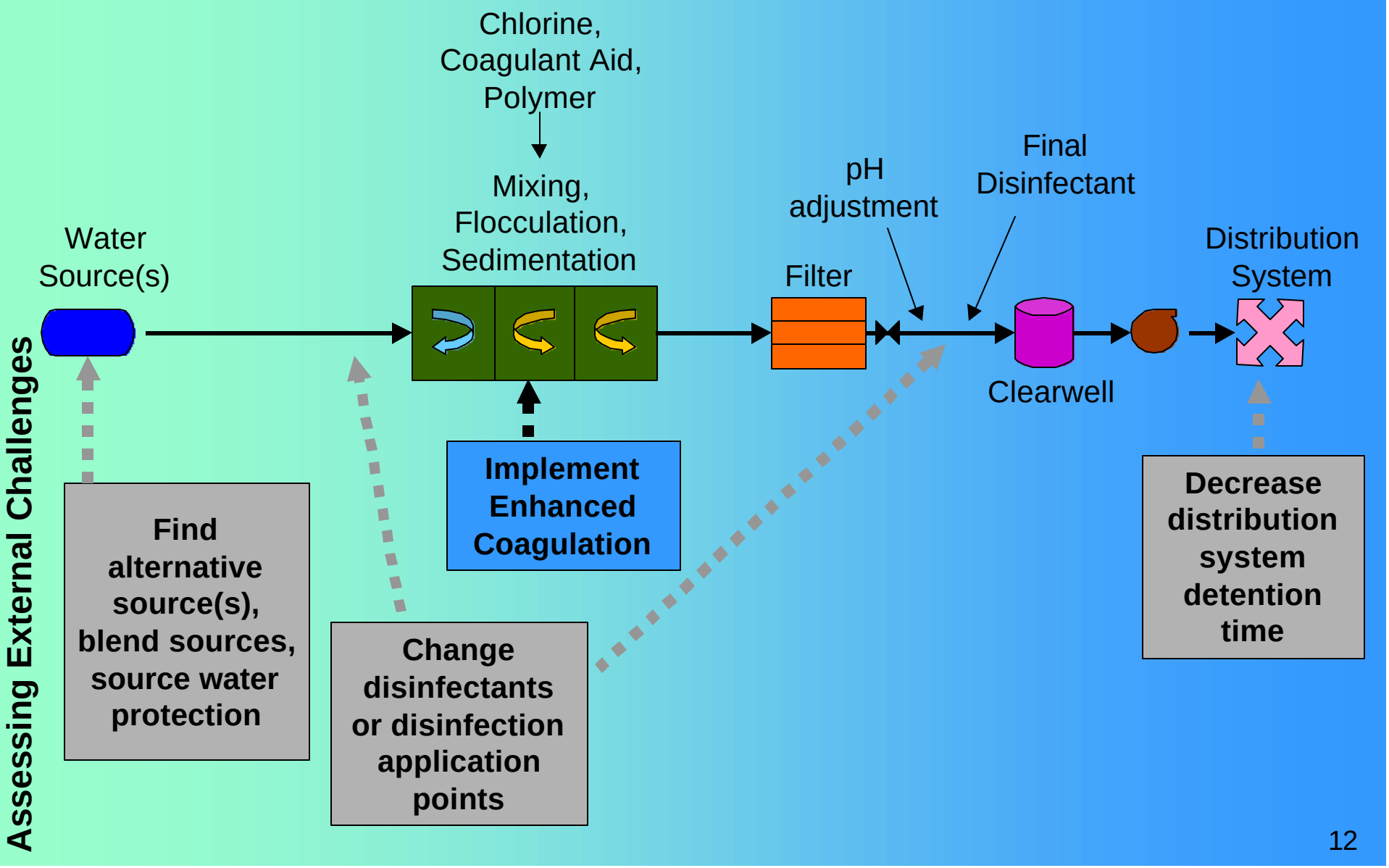
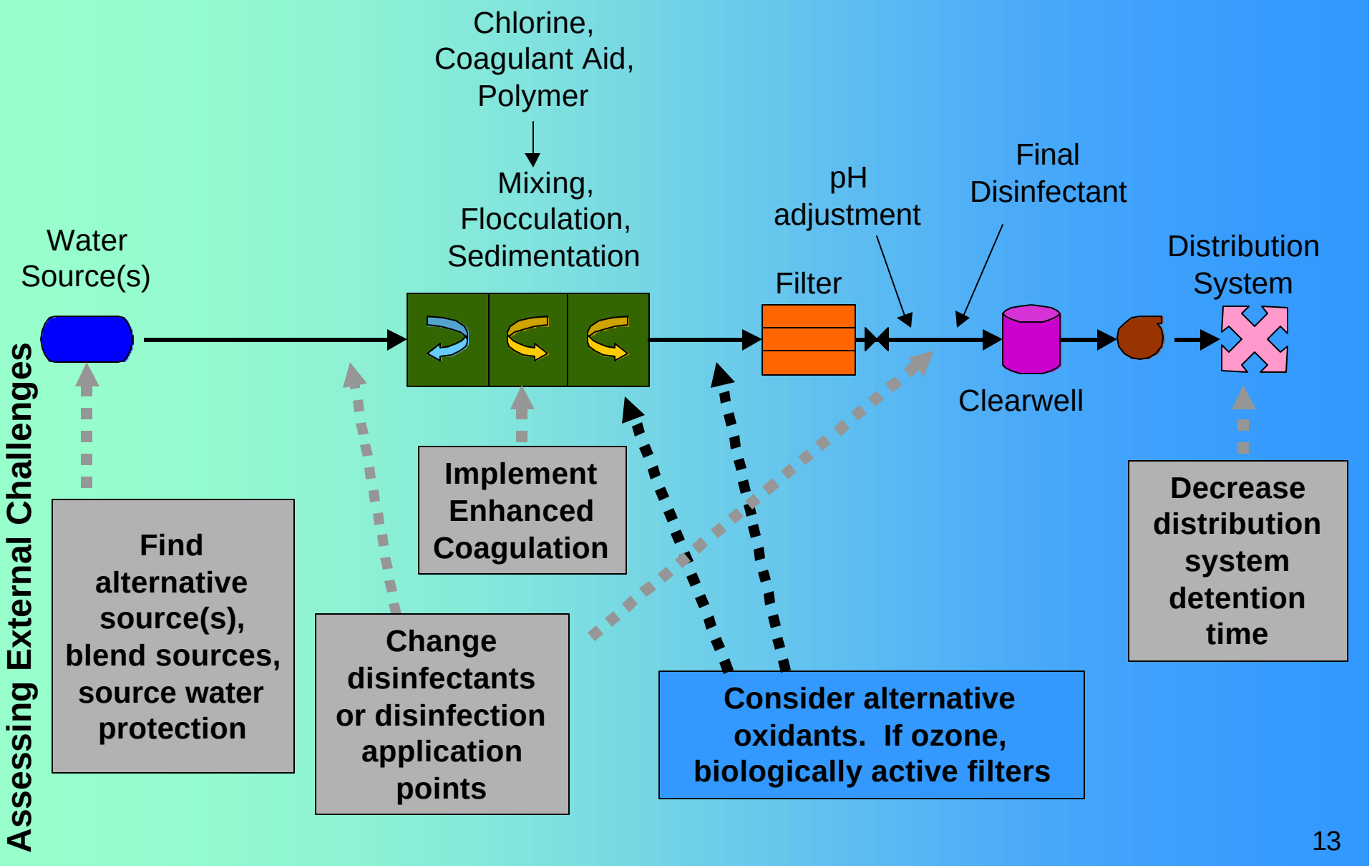
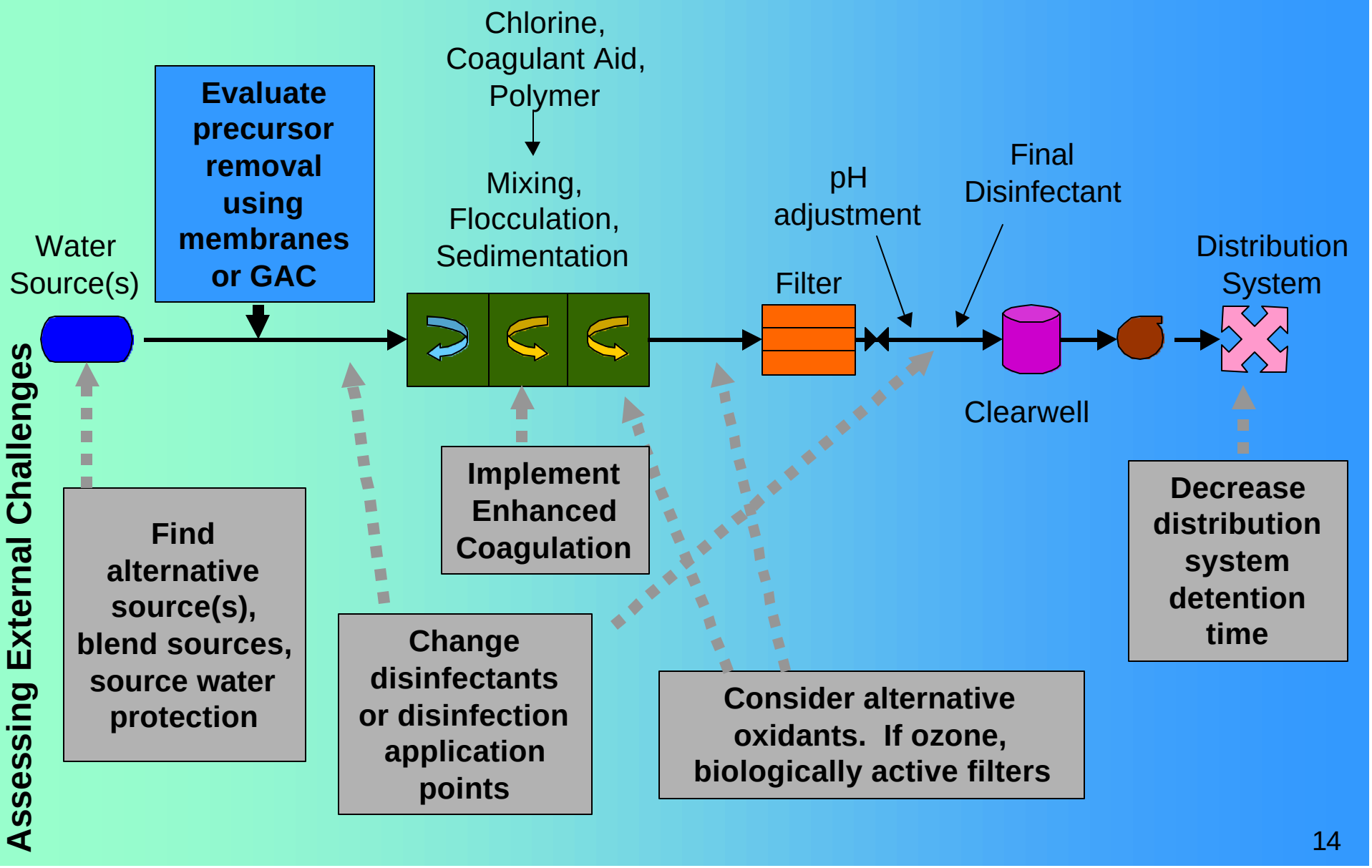


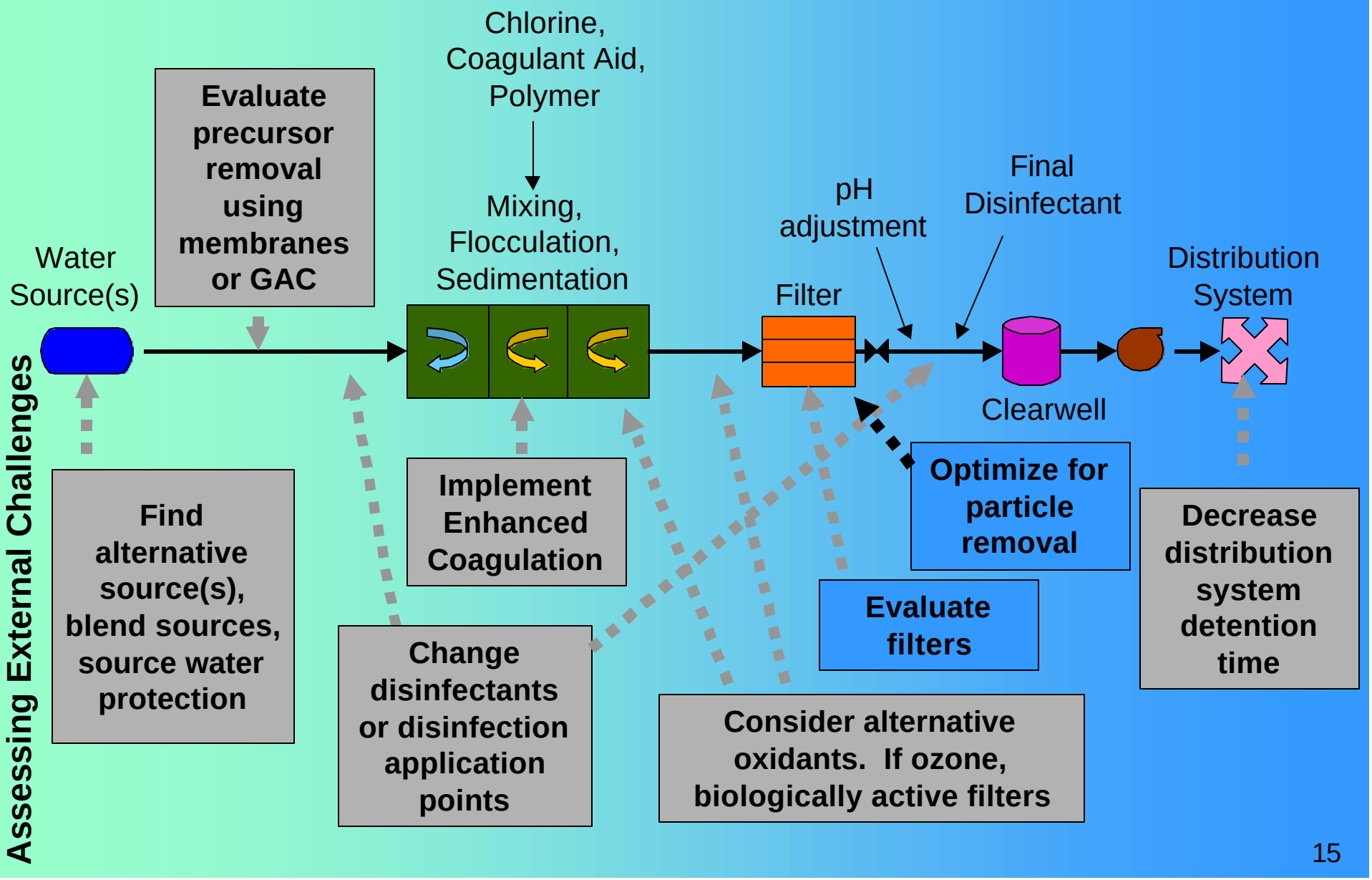
Treatment Options Analysis - Case Study



Treatment Options Analysis - Case Study



Treatment Options Analysis - Case Study



Conventional Treatment

- Pros:
  - Removal capabilities
  - Ability to treat source waters of low or inconsistent quality
- Cons:
  - Advanced operator
  - Adequate land
  - High costs
  - Sludge disposal

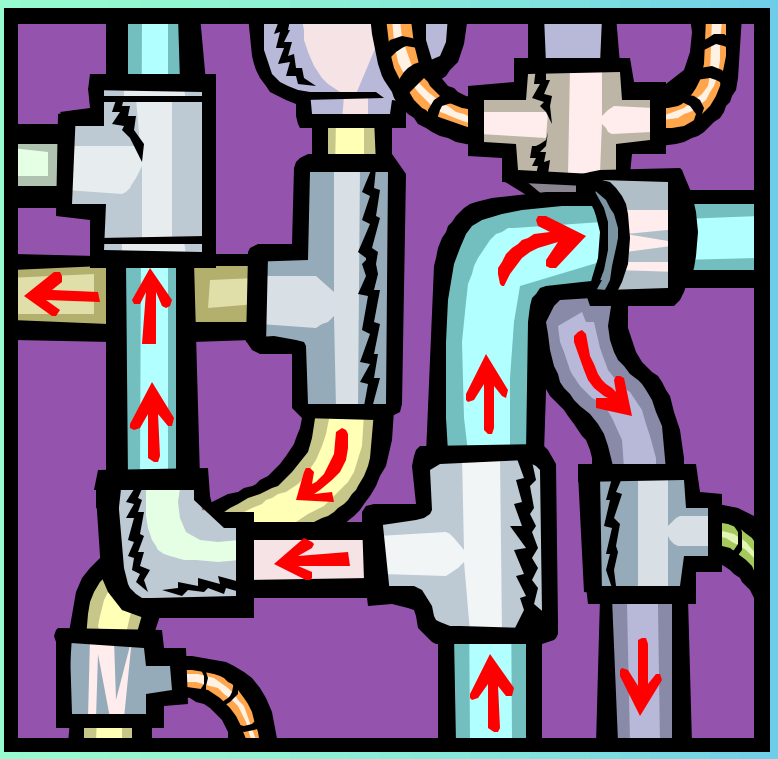
Membrane Filtration

- RO, NF, UF, MF
- Pros:
  - Removal capabilities
  - Size and flexibility
  - Intermediate operator
- Cons:
  - Water rejection (RO & NF)
  - Pre-treatments
  - Waste disposal (RO & NF)
  - High costs

Ion Exchange

- Pros:
  - High removal rates
  - Low cost
  - Intermediate operator
- Cons:
  - Co-contaminants
  - Brine disposal

Disinfection



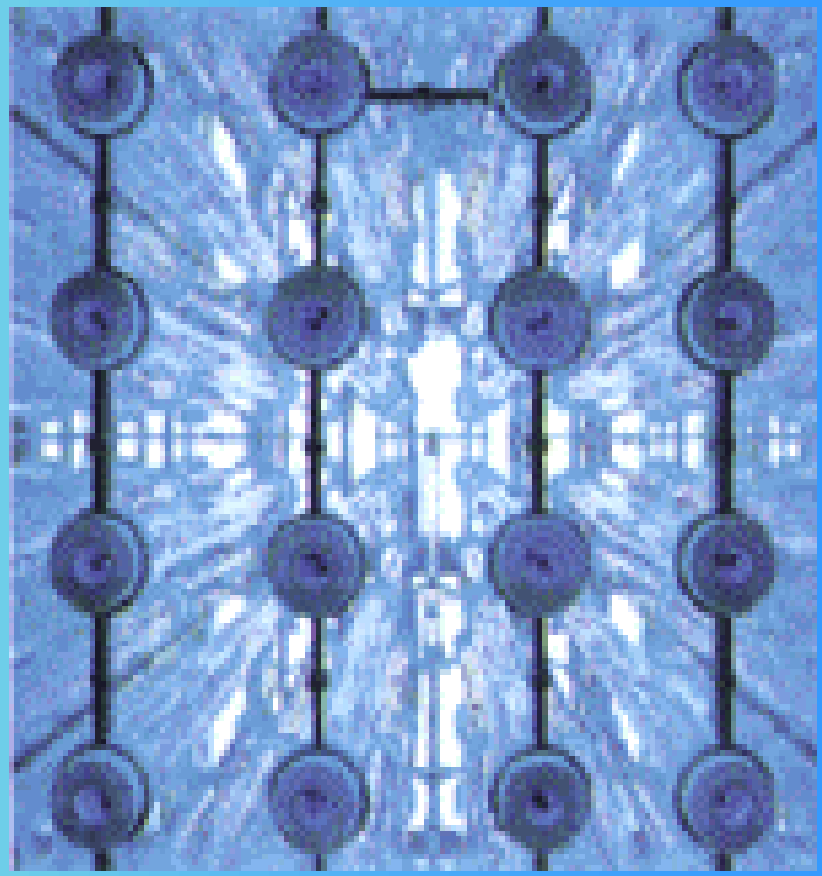
- I. Type
  - Chemical
    - Chlorine
      - Chloramines
    - Chlorine Dioxide
    - Ozone
  - Non-chemical
    - UV
    - Membranes
- II. Purpose
  - Primary
  - Secondary

Chemical Disinfection

- Pros:
  - Compliance with GW and TC rules
  - Low cost (chlorine, chloramines)
  - Oxidation
- Cons:
  - DBP formation (especially chlorine, chlorine dioxide)
  - Additional disinfectant (ozone, chloramines)
  - Handling dangerous chemicals

Ultraviolet Light Disinfection

- Pros:
  - No THM precursors
  - Easy & safe operation
  - Generally low cost
- Cons:
  - No residual disinfectant
  - Not appropriate for waters high in TSS or turbidity
  - High doses required for cyst inactivation will increase costs



Granular Activated Carbon

- Pros:
  - Effective removal of SOCs, VOCs, Radon
  - Improved aesthetic quality
  - Relatively low cost
- Cons:
  - Co-contaminants may interfere with adsorption of selected contaminants
  - GAC must be replaced periodically

Centrally Managed POU

- Pros:
  - Generally more cost effective for very small systems
- Cons:
  - Significant maintenance, oversight, and customer education required
  - Not approved for microbial removal

Centrally Managed POE

- Pros:
  - Generally more cost effective for very small systems
- Cons:
  - Significant maintenance, oversight, and customer education required
  - Some states may restrict disposal options for certain devices

External Challenges: Other Issues

Source Water Supply

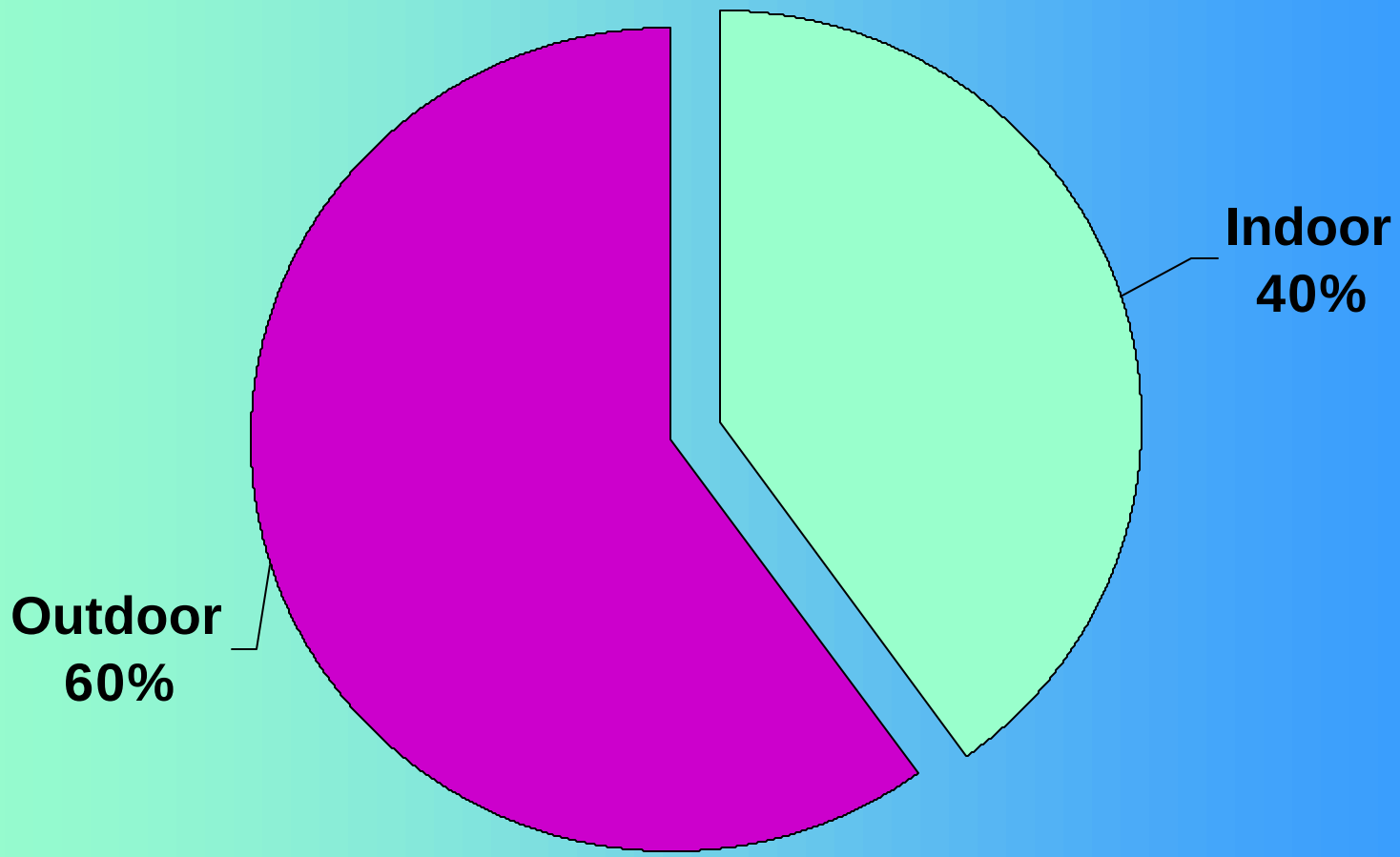
Achieving Competitive Efficiency

New Source Development

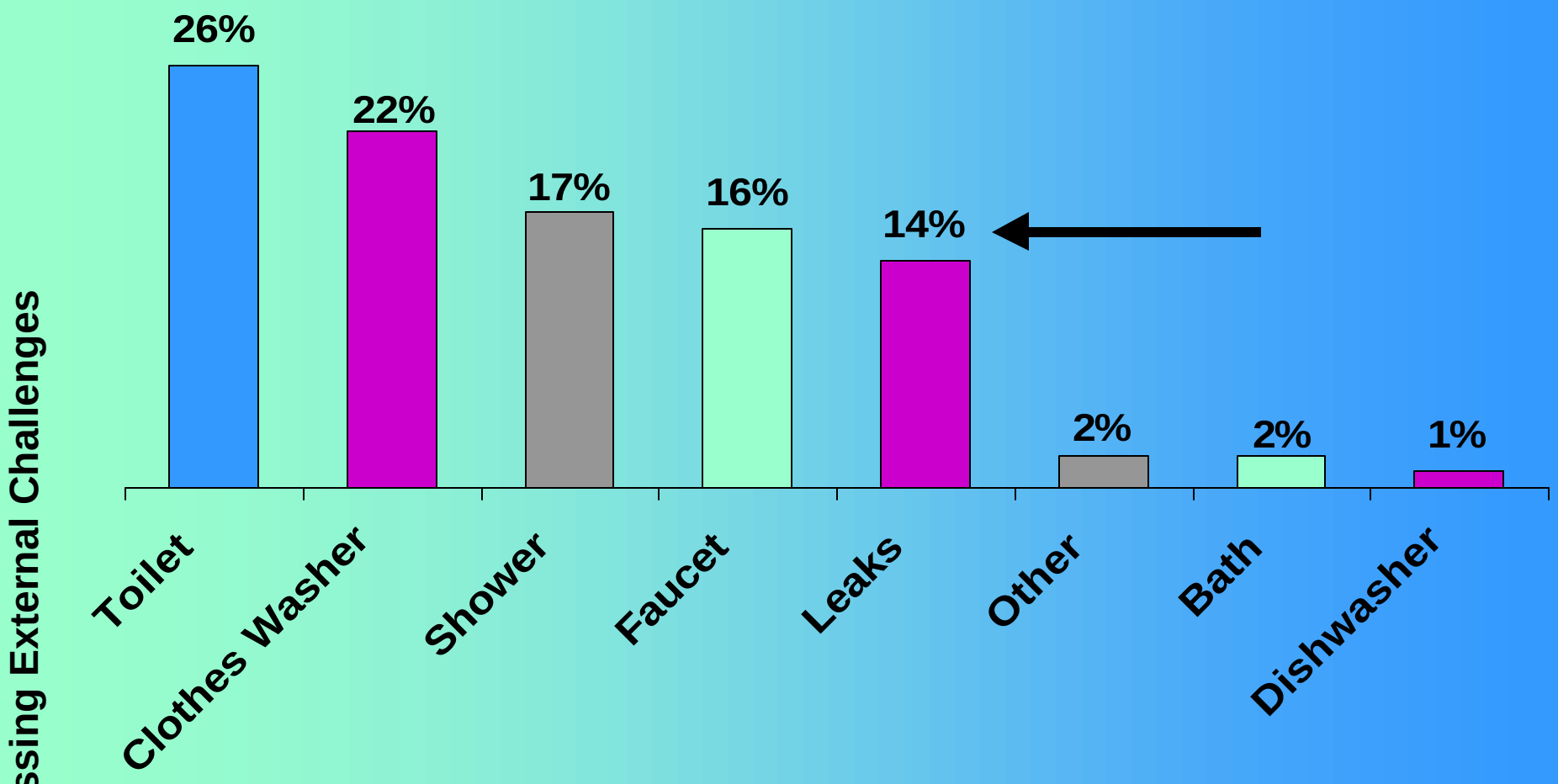
- Surface Sources
  - Many environmental, regulatory, and social barriers
- Groundwater Sources
  - Aquifers are limited and may be overdrawn

Source Conservation Is a Better Option!

Where Do Residential Customers Use Water?



Where Do Residential Customers Use Water Indoors?



Assessing External Challenges

Source: Residential End Uses of Water, AWWARF (1999)

Indoor Leaks

- Conservation Potential
  - 10% of homes responsible for 58% of leaks
  - AWWA estimates households can reduce daily per capita water use by about 30% by installing more efficient water fixtures and regularly checking for leaks.

Distribution System Leak Detection

- Leak Detection and Repair Saves Water and Expenditures Over the Long Run
- Water Accounting Is the First Step
- If >10% Unaccounted-for Water, Leak Detection Is Recommended
- Investment Pays off Over Time to Repair Leaks

Achieving Competitive Efficiency

New Players

- Foreign Companies
  - British (Thames)
  - French (Vivendi)
- Energy Companies (subsidiaries)
- Converged Utilities
- Non-utilities -- Vendors

The Public Sector Responds

- Re-engineering
- Improved Efficiency
- “Publicization”

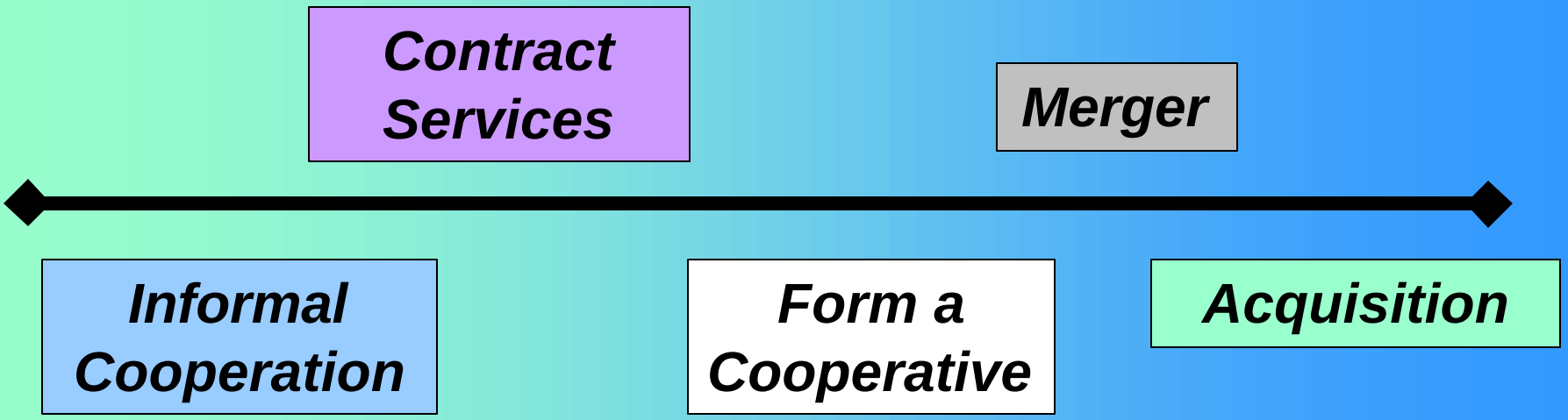
Implications for Small Systems

- Performance Expectations for Industry as a Whole Will Rise
- Shift in Focus to Water Supply as a Business (Especially Efficiency)
- More Opportunities for Partnerships

Assessing External Opportunities

Partnerships & Water System Organizational Structures

System Partnership Spectrum



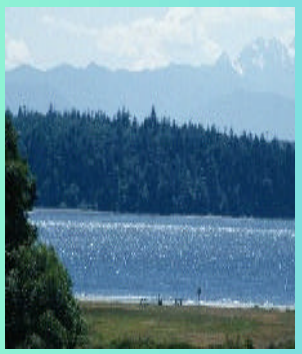
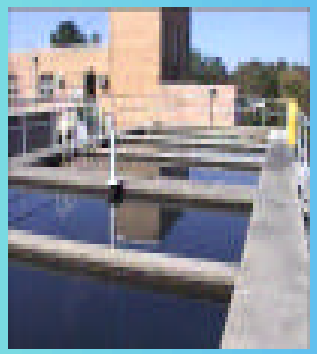
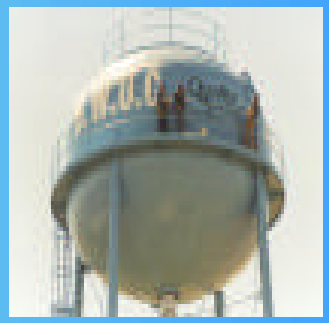
Assessing System Partnership Potential

Governance

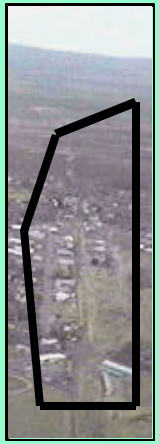
Management

Operations

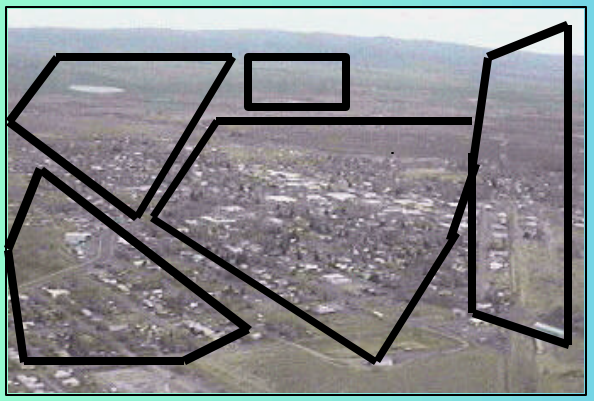
Assessing External Opportunities

	Source Water	Treatment	Storage & Distribution	Retail Services
				
Offer				
Acquire				

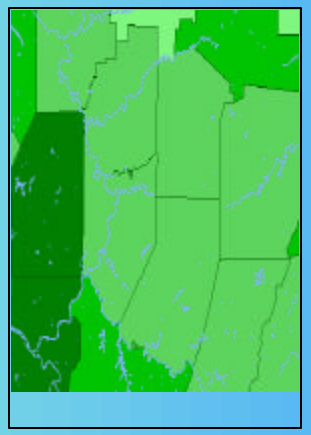
Alternative Spatial Boundaries



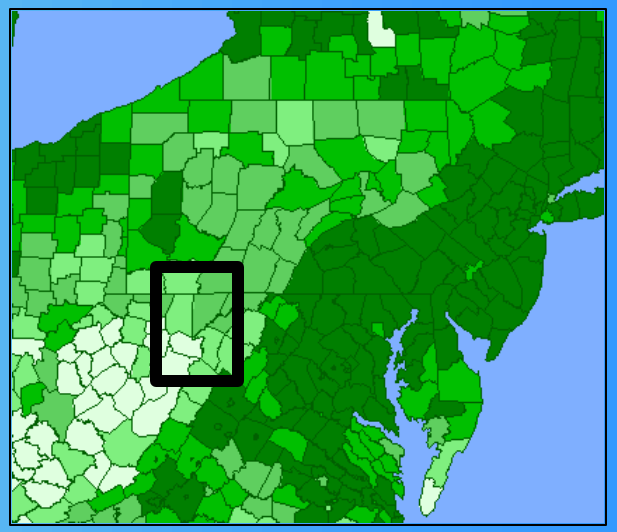
Single System



Multiple Systems



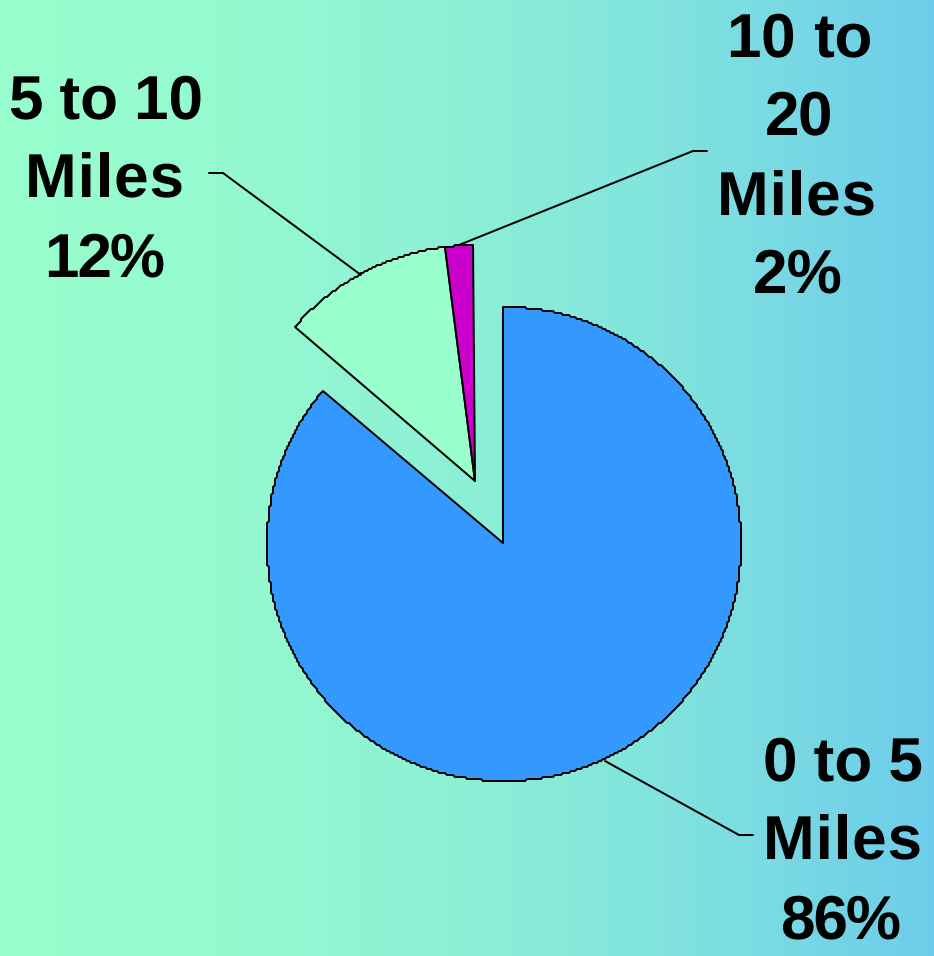
County / Multi-county



State Wide

Assessing External Opportunities

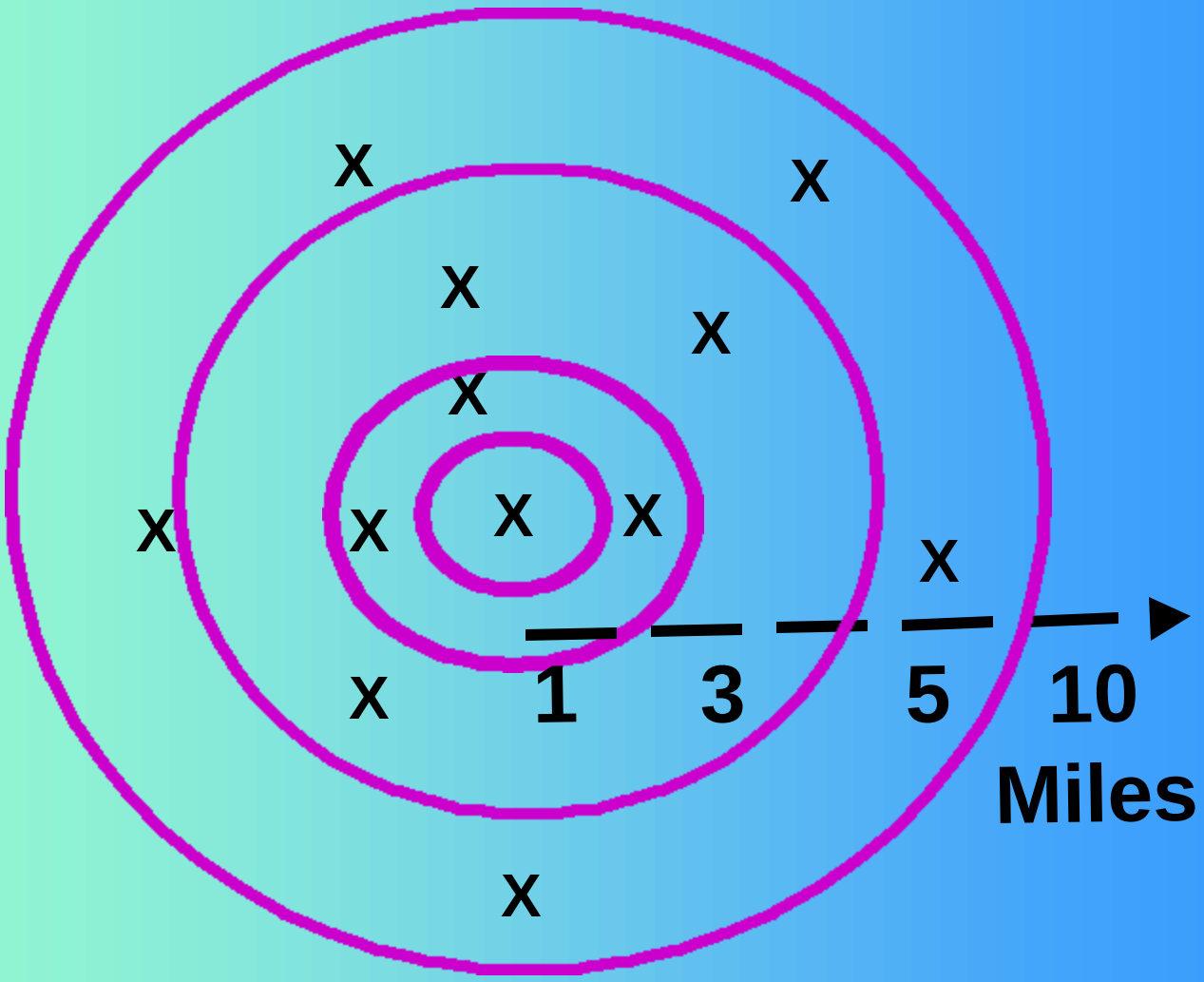
Distance to the Next Closest CWS



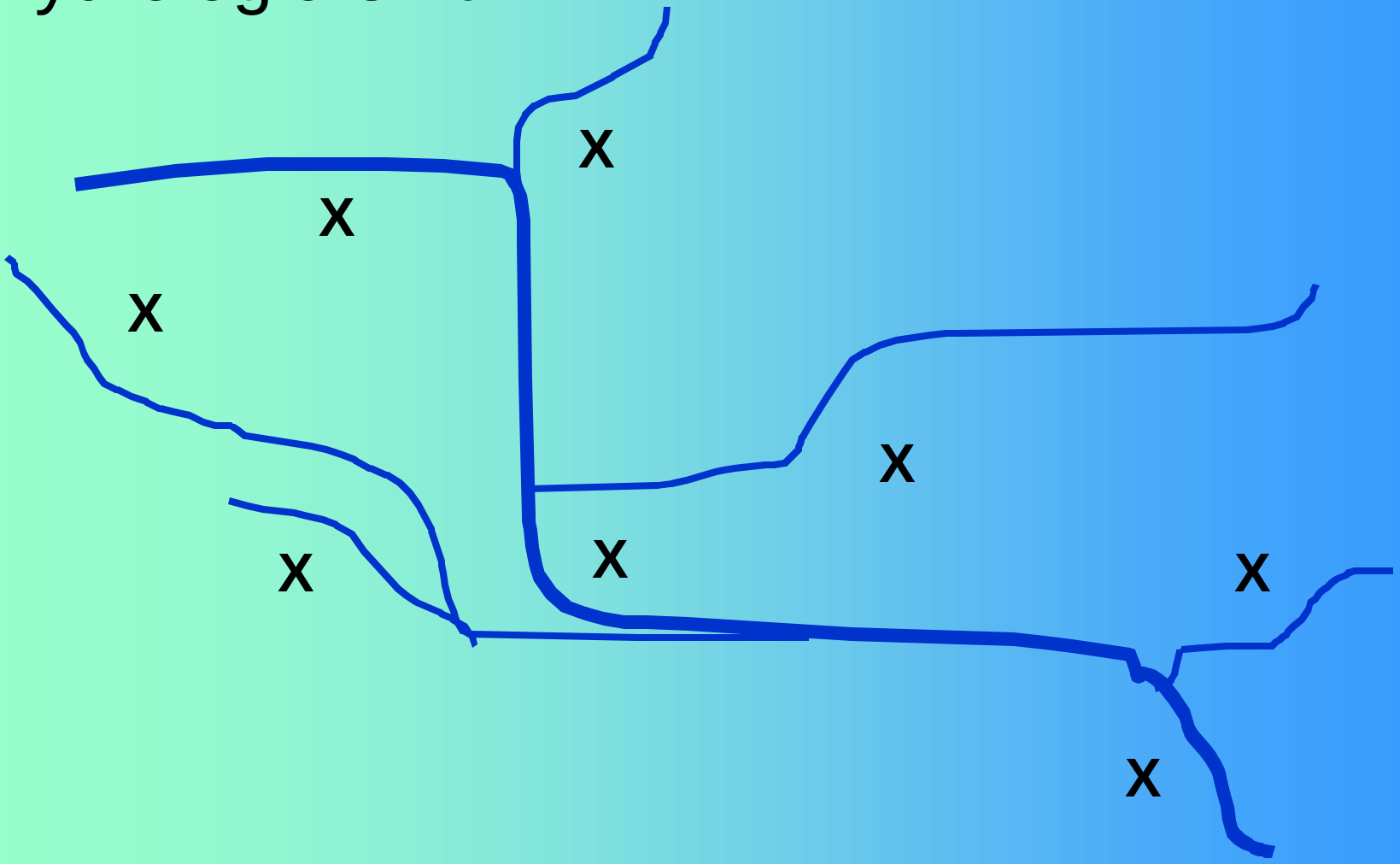
- 86% of Small Systems Are within 5 Miles of Another System
- Nearly 100% of Small Systems Are within 20 Miles of Another System

Weighted Average of 17 States

Potential Partnerships Based on Distance



Potential Partnerships Based on Hydrologic Unit



System Organizational Structures

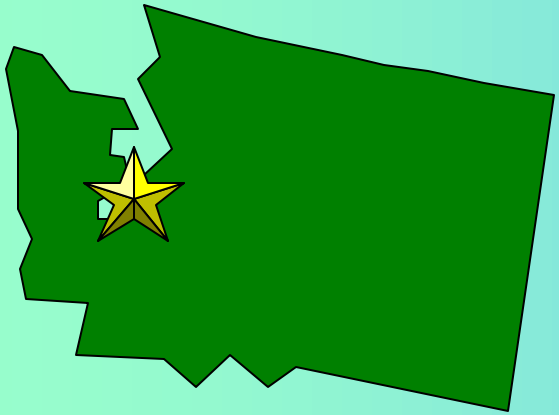
- Public - Local Government
- Public - Special Purpose District
- Private - For Profit
- Private - Not-for-Profit

Assessing Organizational Structures

	Current Organizational Structure	Strengths	Weaknesses	Interest in Partnering
System 1				
System 2				
System n. . .				

Assessing External Opportunities

CASE STUDY
Kitsap Public Utility District, WA



- **KPUD is a municipal corporation**
  - Elected board
  - Incorporated boundaries = county
  - Formed in 1940's
    - Assumed operation of several systems in 1970's
- **Serves:**
  - 55 systems (1/2 are Group B)
  - 30,000 people
  - 8,000 service connections

Kitsap Public Utility District, WA
Services Offered

- UTILITY OPERATIONS
  - Satellite management

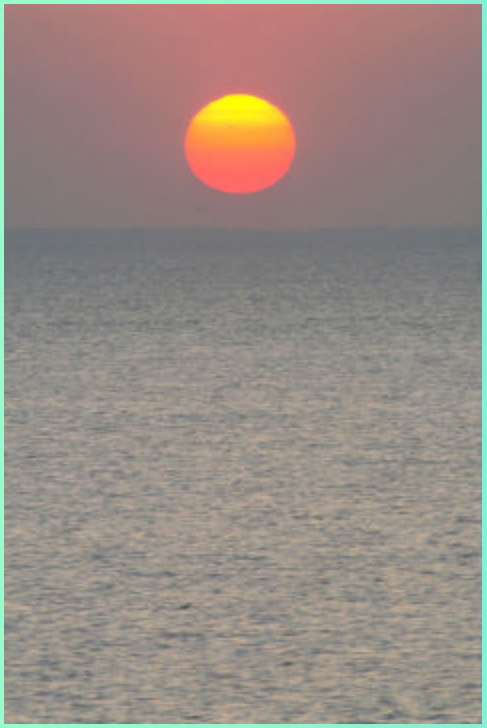
KPUD	System Owner
Operations	Financing
Preventive Maintenance	Rate Setting
Water Quality Monitoring	Legal Liability
Emergency Response	
Record keeping	

  - Direct ownership
    - Physical interconnection
    - Satellite operation

- CONTRACT & DATA SERVICES
  - Wholesale supply
  - Planning
  - Management & monitoring
  - Information services & TA

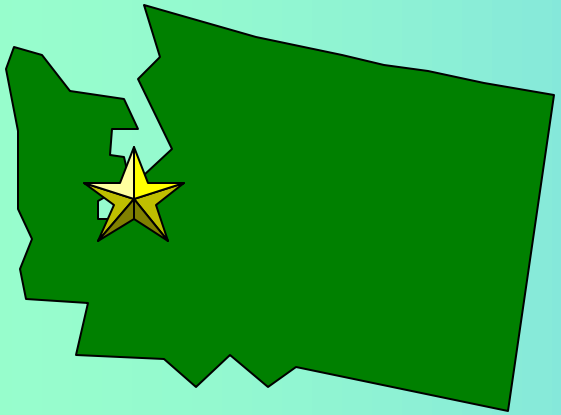
- SUPPORT ASSISTANCE
  - Bulk purchase
  - Training
  - Source protection & resource studies
  - Public education

Kitsap Public Utility District, WA
RATES



- **Consolidated (Postage Stamp) rates**
  - All systems owned by KPUD pay the same rate
- **Customer charges**
  - $14/month Basic Service Charge (Fixed Costs)
  - Increasing block rate (Commodity Charges cover Marginal Costs)
    - $0.75-$1.05/100 ft^3
  - Assessment for newly acquired systems
    - If needed
    - $2,000-$5,000 / connection
    - Payable over 20 years

CASE STUDY
Hansville Water District, WA



- 1,184 connections
- SW & GW
- Issues
  - Quantity
  - SWTR compliance
- Solution
  - Requested consolidation with KPUD

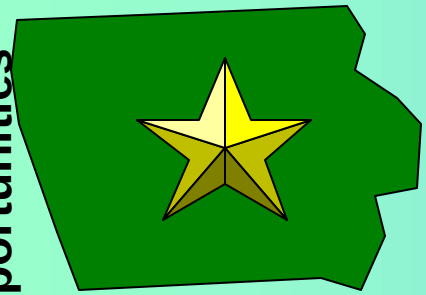
Hansville Water District, WA

- **KPUD tied Hansville into Kingston Water System**
  - 41,000 ft of 10” transmission main
  - Fire hydrants
  - Booster station
  - Steel storage tank
- **Rates for Hansville customers**

NO SPECIAL ASSESSMENT

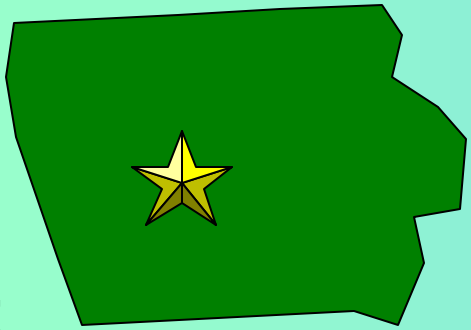
Assessing External Opportunities

CASE STUDY
Central Iowa Water Association



- Serves 8,400 customers; 2.4 MGD
- Water purchased from Newton, Marshalltown, and Pella Water Works
- Provides service to 12 counties
  - Plans to expand to serve 6 more
- Provides direct retail service in 5 incorporated towns & 11 unincorporated communities
- 18 towns purchase bulk water
- 7 towns have emergency connections
- CIWA provides contract operation for 1 town's water and wastewater system

CASE STUDY
Sully, IA



City of Sully

- Provides water to 841 people
- Concerns about condition and adequacy of:
  - Treatment
  - Storage
  - Distribution
- In 1997 city commissioned consulting engineer to prepare study of water system facilities

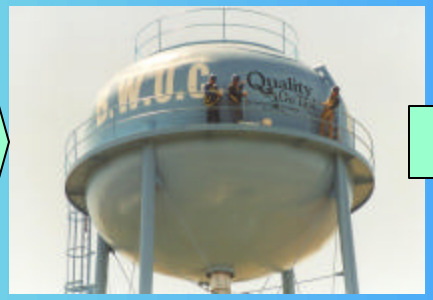
City of Sully, IA -- Facilities Condition

Source Water

- 1 well
- 2,300 ft deep
- 110 gpm
- Average demand 58 gpm
- Semi-annual inspection and preventive maintenance program
- No backup well
- Emergency connection with CIWA

Treatment

- Iron & Manganese removal
  - Iron filters
  - Capacity 120 gpm
- RO Membrane Filtration for radium removal & softening
  - Capacity 110 gpm
  - Actual yield 80 gpm
  - Operating 20-22 hours/day
- Chlorination



Storage & Distribution

- Elevated tower
- 30,000 gal
- IDNR recommends 75,000 gal for 1,000 people
  - Emergency connection with CIWA
- Water loss 26%
- Low fire flows - mains need looping

Retail Services

- 840 people in 1996
- Expected to increase to 1,000 people within a few years

Assessing External Opportunities

Major Issues and Options for City of Sully, IA

Adequate Water Supply and Storage Capacity

- Need backup supply and additional storage
  - Options:
    - Renew emergency contract with CIWA (CIWA serving other permanent demands)
    - Upgrade supply and storage
      - New well
      - New elevated tank
    - Full-Service connection with CIWA

Upgrading Water Treatment System

- Replace and upgrade iron filters, and
- Provide higher capacity radium removal
  - Add additional RO unit, or
  - Install lime softening, or
  - Install ion exchange
- OR, Full-service connection with CIWA

Distribution System Improvement

- Connect dead-end mains to improve water quality
- Loop mains to improve fire flow.

Sully, IA - Scenarios Evaluated

EMERGENCY CONNECTION			X	X	
UPGRADE SUPPLY	**X**	**X**			
REPLACE IRON FILTERS	**X**	**X**	**X**	**X**	
RO • Replace • Upgrade	 **X** **X**		 **X** **X**		
UPGRADE STORAGE	**X**	**X**			
FULL-SERVICE BULK CONNECTION WITH CIWA					**X**

$166,846

$151,859

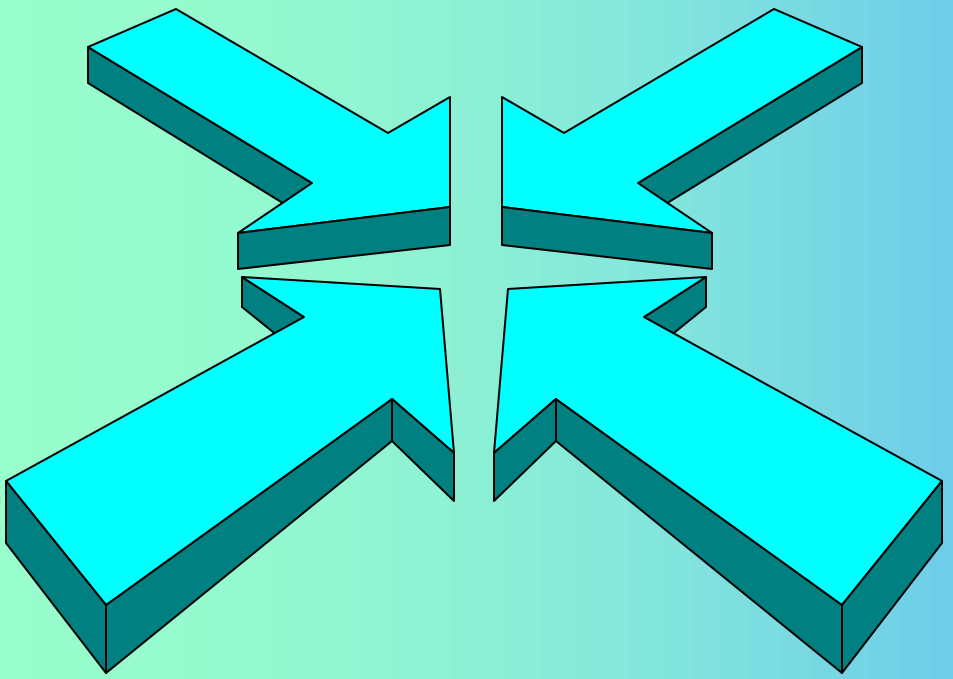
$112,700

$94,715

$119,230

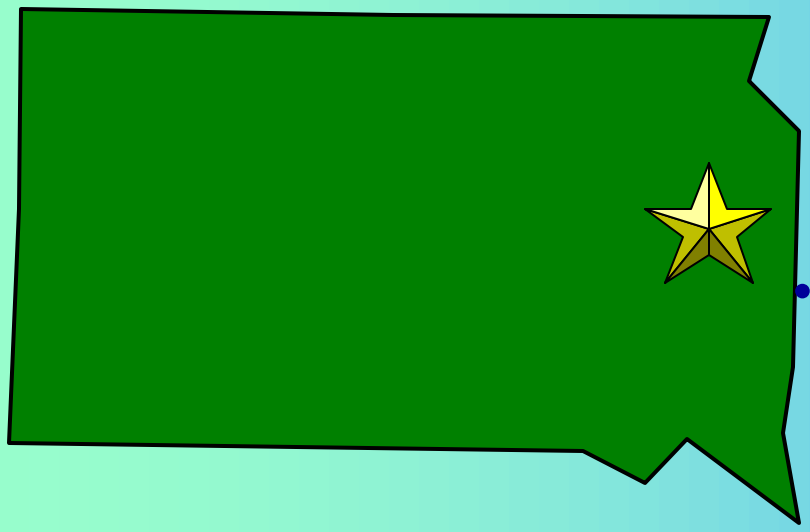
Assessing External Opportunities

Sully, IA -- Option Selected



- **<u>Full-service bulk connection partnership with CIWA</u>**
  - Sully focuses on distribution and retail services
  - CIWA offers economies of scale
  - Sully gets out of treatment business - avoids future costs
  - Sully avoids costs associated with further developing its own water supply

CASE STUDY
Aurora, SD



- Population 600
- System
  - Installed 1972
  - One 150 gpm Well
  - Disinfection & Fluoridation
  - One 50,000 gal elevated tower
  - Flow: Average 100 gpcd; Max 150 gpcd
- Issues
  - Nitrate contamination
  - Hiring Certified Operator
  - 20%-30% Unaccounted for water

Aurora, SD - Alternatives Considered

New Well Field & Treatment Owned by City

New Well Field & Treatment Jointly Owned by City and Big Sioux Rural Water System

Interconnect With & Purchase Water Wholesale From City of Brookings

Interconnect With & Purchase Water Wholesale From the Brookings-Deuel Rural Water System

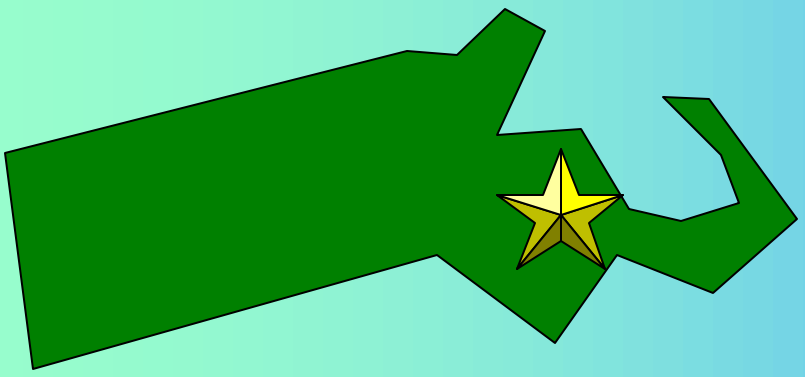
Aurora, SD
Capacity Perspective on Alternatives

Assessing External Opportunities

	New Well & Treatment – City Owned	New Well & Treatment – Jointly Owned	Interconnect & Wholesale Purchase – Brookings	Interconnect & Wholesale Purchase – Brookings-Deuel
Nitrate Compliance	+	+	+	+
Control of Rates	+	+	-	-
Liability for Future Treatment	-	-	+	+
Certified Operator	-	-	+	+
Access to Technical & Managerial Assistance	-	+	+	+
$/1000 gal	4.67	3.75	3.21	3.30

+ = Advantage - = Disadvantage

CASE STUDY
Cohasset, MA



- System serves 7,000 people.
- 3 MGD SW Treatment Plant.
- Board of Water Commissioners
  - Part-time, volunteers
  - Were focused on managing day-to-day system operations
  - Could not find replacement for water system superintendent
  - Wanted to focus energy on planning; not on daily oversight

Cohasset, MA

- Board decided to contract out system operation.
- First 3-Year contract to a joint venture.
- Second 3-Year contract with American Water Services, Inc.
  - Full-Service management, operation, & maintenance contract.

AWS Responsibilities

Treatment Facilities
Distribution Facilities
Cross Connection Program
Meter Reading
Meter Repair & Replacement
Customer Services
Accounting & Reporting
Personnel Administration

Town Responsibilities

Capital Improvement Decisions

Funding

Construction Contracting

Benefits of Privatization - Cohasset, MA

- Board Now Focuses On Long-Range Planning.
- Board Developed Comprehensive Capital Improvement Plan.
  - Water Main Improvements
  - Treatment System Upgrades
  - SCADA System Installed
  - New Storage Tank Constructed
- Rates Have Not Increased.

External Opportunities: Other Issues

Protecting Source Water
Financial Resources
Public Awareness

Source Water Protection

- Prevent Future Contamination
- Reduce Current Contamination

Elements of a Local Source Water Protection Program

1) Assess Source
2) Assemble Project Team
3) Choose Management Tools

1) Assess Source Water

- System/Third-party Activities Can Build on the State Source Water Assessment
  - SWAP will delineate source water protection areas, identify sources of contamination, and analyze susceptibility
  - Gather additional information where necessary
  - Create map for use in management decisions (GIS)
  - Prioritize contamination threats
  - Update assessment (if not updated by state)

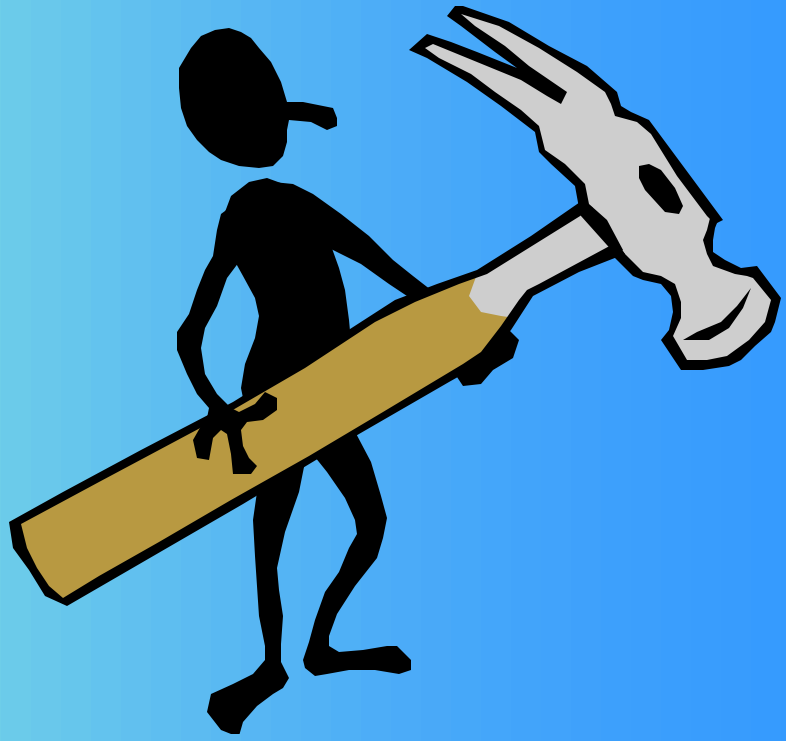
2) Assemble Local Project Team

- Assemble Committed Team to Guide Process
- Bring Together Appropriate Stakeholders
- Recruit Volunteers

- Establish Partnerships
  - Local authorities
  - Citizen groups
  - Neighboring communities
  - State regulators
  - Federal land management agencies
  - Businesses

3) Regulatory Management Tools

- Zoning Ordinances (Prohibition of Various Uses, or Permit Conditions)
- Performance Standards
- Health Regulations (Septic Systems, Floor Drains)



3) Non-Regulatory Management Tools

- Public Education
- Citizen Involvement
- Best Management Practices (BMPs)
- Land Acquisition and Protection
- Water Conservation

Assessing External Opportunities

Financial Resources

Assessment of Financial Options -- Implications

Option	Cost	Financing Source	Rates
1			
2			
N			

Water Rates

- Rates=f(cost,cost allocation, rate design…)
- Cost=f(system organization, roles, technology…)
- Choosing Economically Efficient Solutions Will Lead to Lower Rates

Water System Cost Allocation and Rate Design

- Fixed Charge -Capital
- Variable Charge - O&M

Sustainable Pricing

Sustainable Water Rate ($/unit)

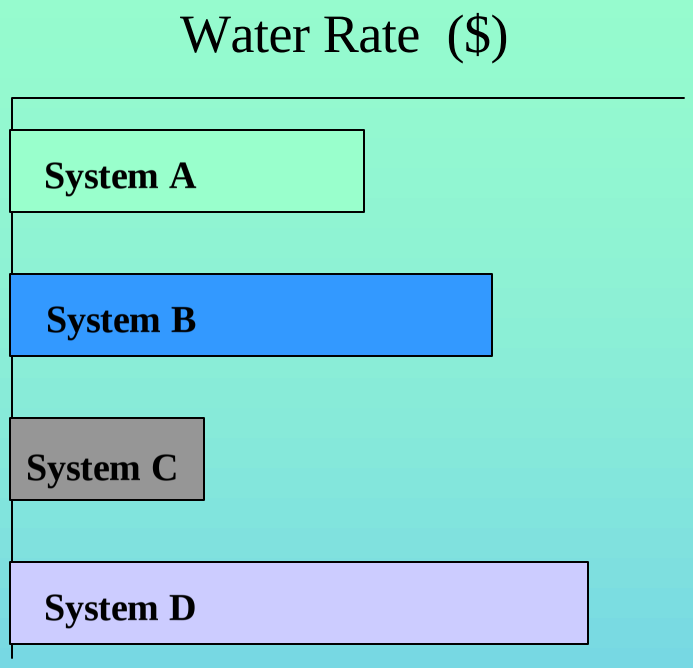
Low enough to be affordable for customers so that the system can be supported over time

High enough to cover the cost of service and send efficient price signals to guide consumption and product decisions

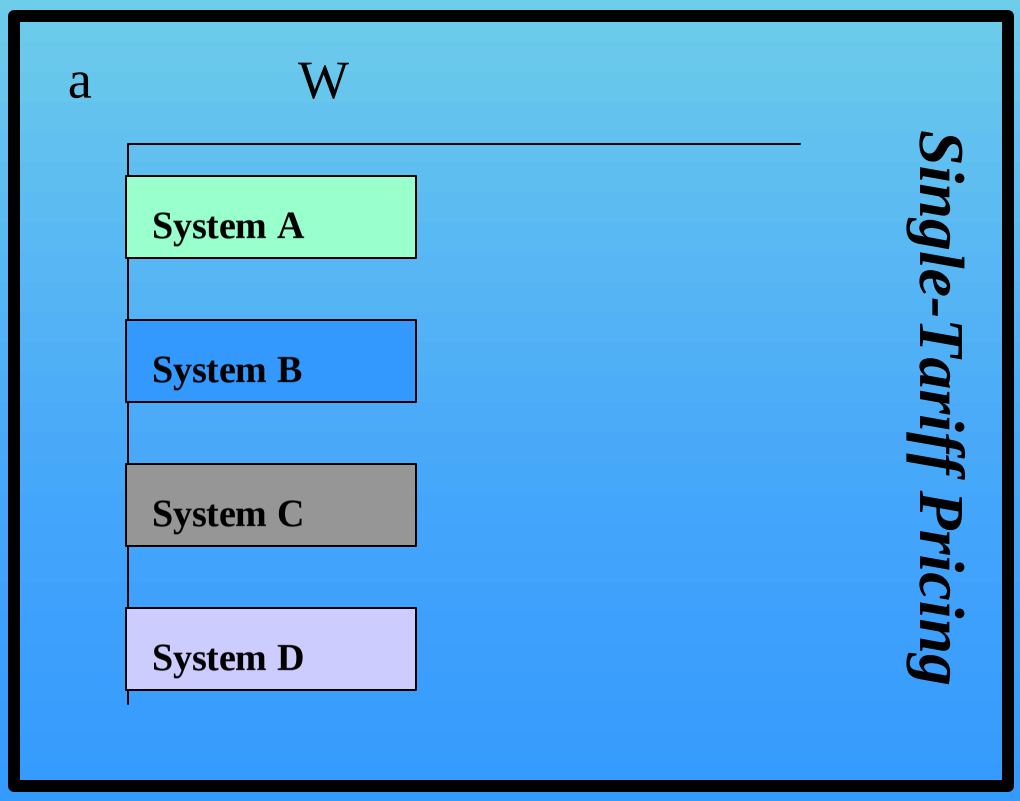
** Adapted from EPA, Sustainable Pricing: A Long Term Capacity Development Strategy*

Assessing External Opportunities

Single-Tariff Pricing



Stand Alone Pricing

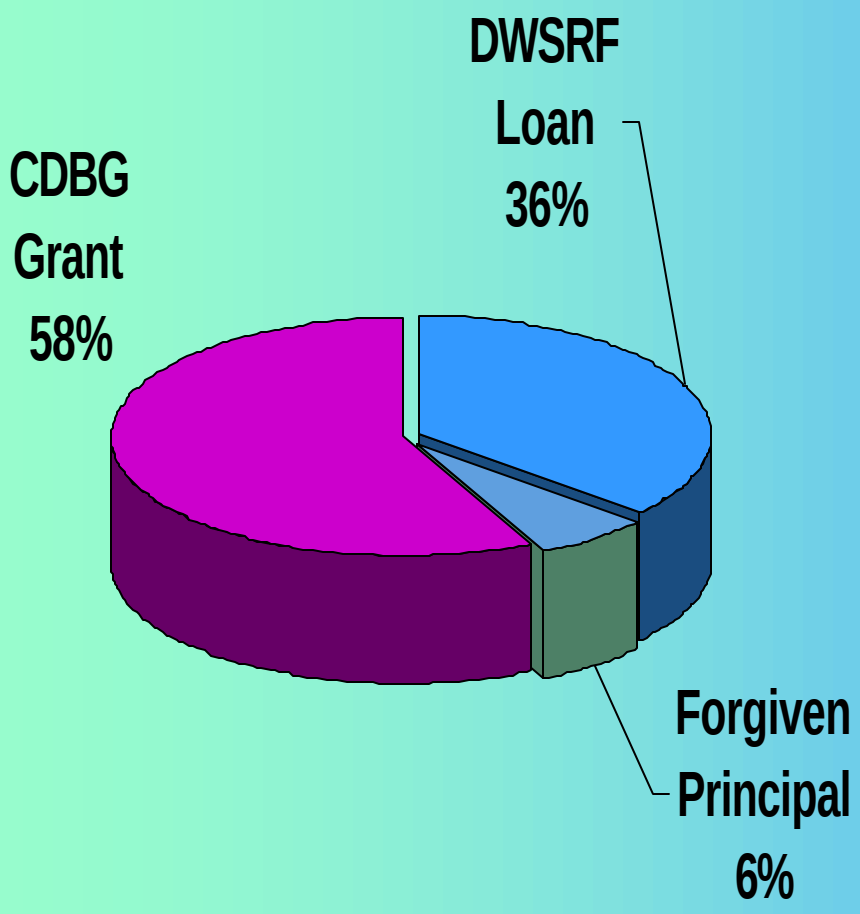


Single-Tariff Pricing

Major Funding Sources for Small Systems

- Grants
  - EPA Drinking Water State Revolving Fund (DWSRF) principal forgiveness
  - HUD Community Development Block Grant (CDBG) Program
  - USDA Rural Utilities Service (RUS) Water and Waste Disposal Program
- Loans
  - DWSRF
  - CoBank Rural Utility Banking Group
  - State Programs
  - Private Capital Markets
  - USDA Rural Utilities Service (RUS) Water and Waste Disposal Program

New Hampshire Case Study



- Town of Bristol
- 2,860 Served
- Disadvantaged
- Project to Install New Secondary Well
- Estimated Cost: $358,000
- Total Funding: $358,000

Public Awareness

Your Customers… Friends or Foes?

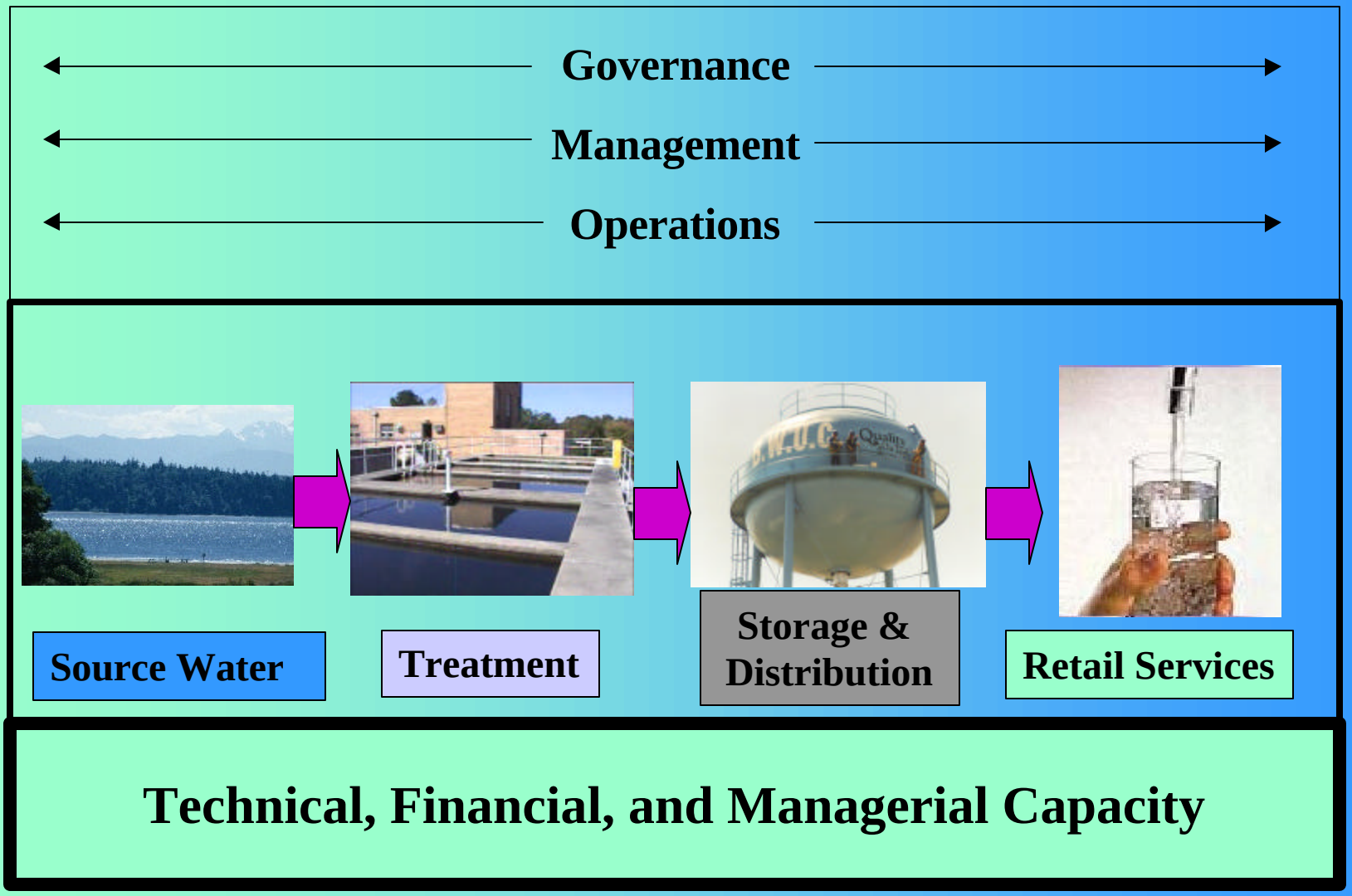
Interactions with the Public

- Public Relations
- Public Education
- Public Involvement

As Part of Your Strategic Plan...

- What Specific Actions Will You Take to Maintain Public Support?

Strategic, Functional Water System Model

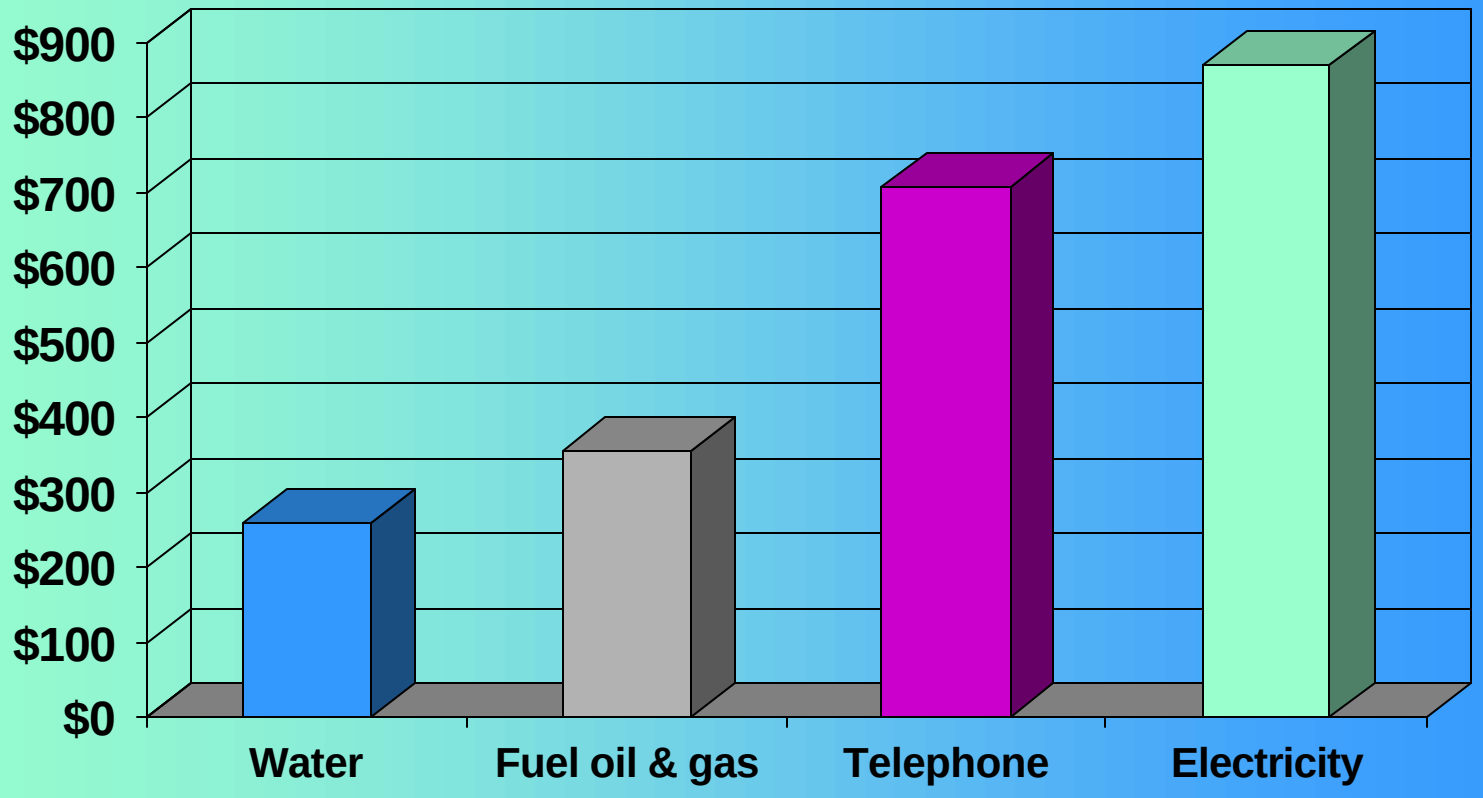


Assessing External Opportunities

Assessing Interactions with the Public

Utility Function	Steps to Build and Maintain Public Support
Source	
Treatment	
Storage & Distribution	
Retail Services	

Annual Household Expenditures for Utilities



Source: U.S. Bureau of Labor Statistics, Consumer Expenditures in 1995

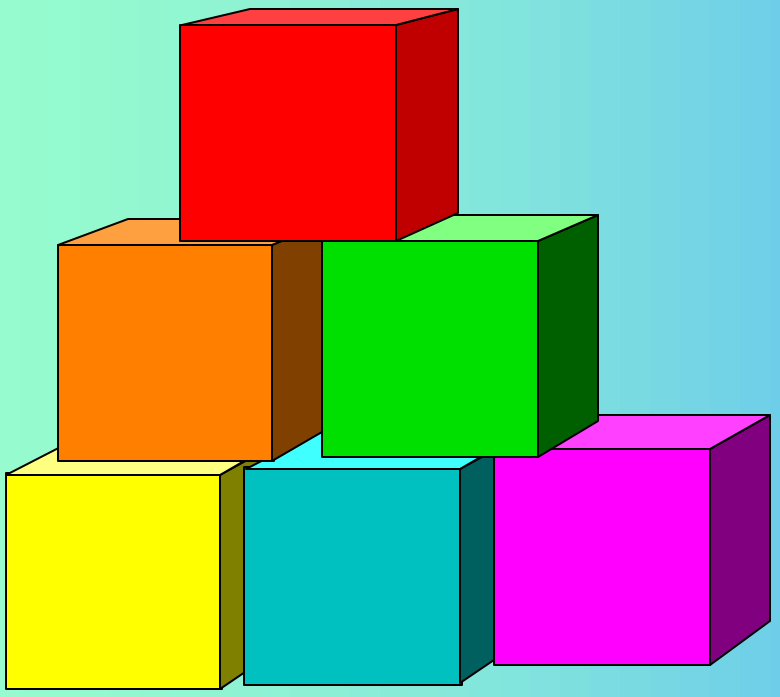
Summary

- Getting the Public Involved can:
  - Increase public understanding of true cost and value of water
  - Increase customer willingness to pay and to act
  - Increase public support for changes in infrastructure and administration
  - Enhance water service through public involvement in decision-making, source water protection

Identifying Options & Determining Optimum Solutions

Options and Solutions

Simplified 6-Step Framework

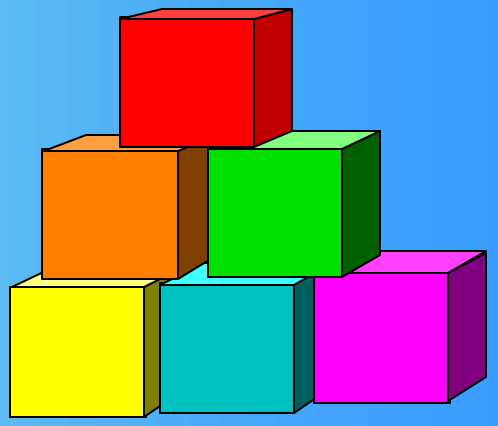


- Assess
- Define
- Identify
- Analyze
- Implement
- Evaluate

Options and Solutions

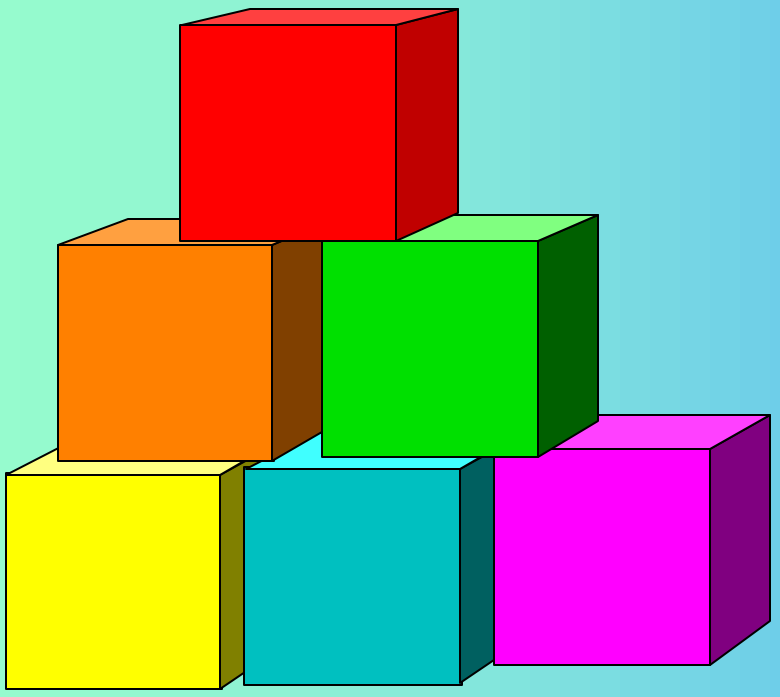
Simplified 6-Step Framework

- **Assess**
  - Internal -- strengths & weaknesses
    - Existing infrastructure
    - Technical, financial, & managerial capacity
  - External challenges
    - New regulations
    - Treatment for compliance
    - Source water supply
    - Competition
  - External opportunities
    - Partnerships
    - Source water protection
    - Financial resources
    - Public awareness
- Define
- Identify
- Analyze
- Implement
- Evaluate



Options and Solutions

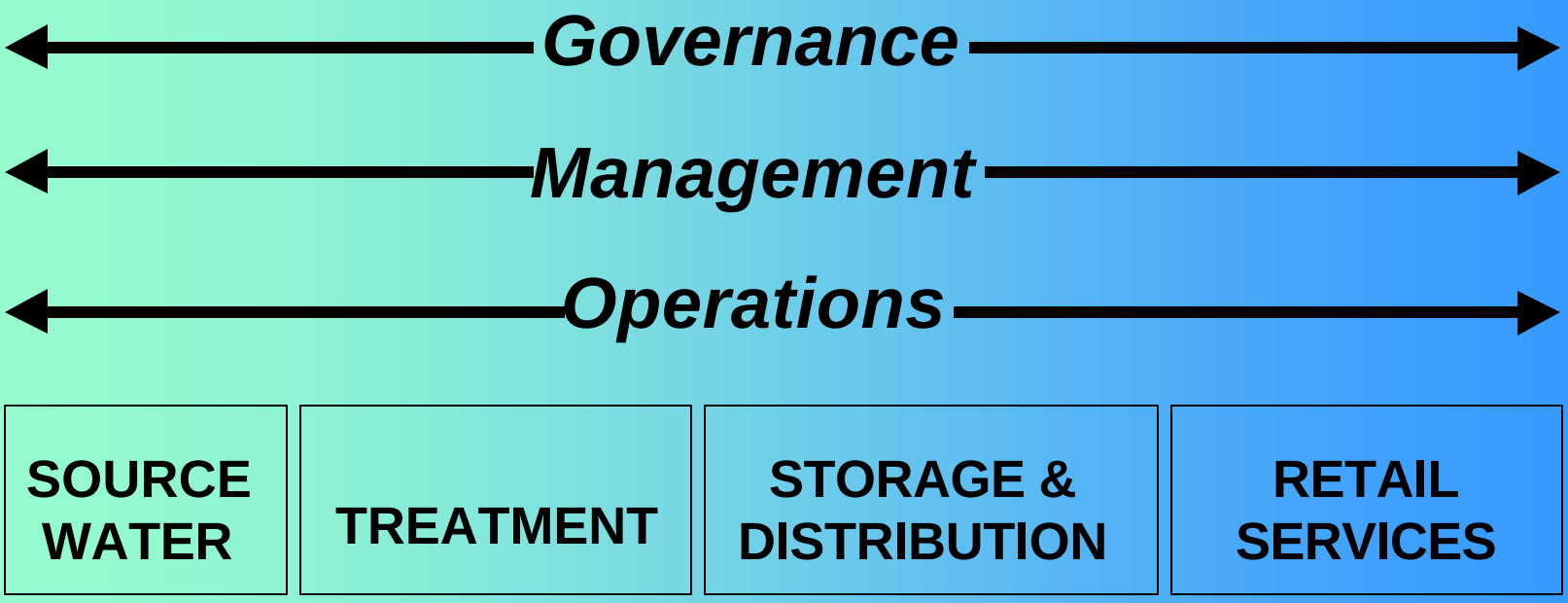
Simplified 6-Step Framework



- Assess
- **Define**
  - **Service Horizon**
- Identify
- Analyze
- Implement
- Evaluate

Options and Solutions

Define the Service Horizon



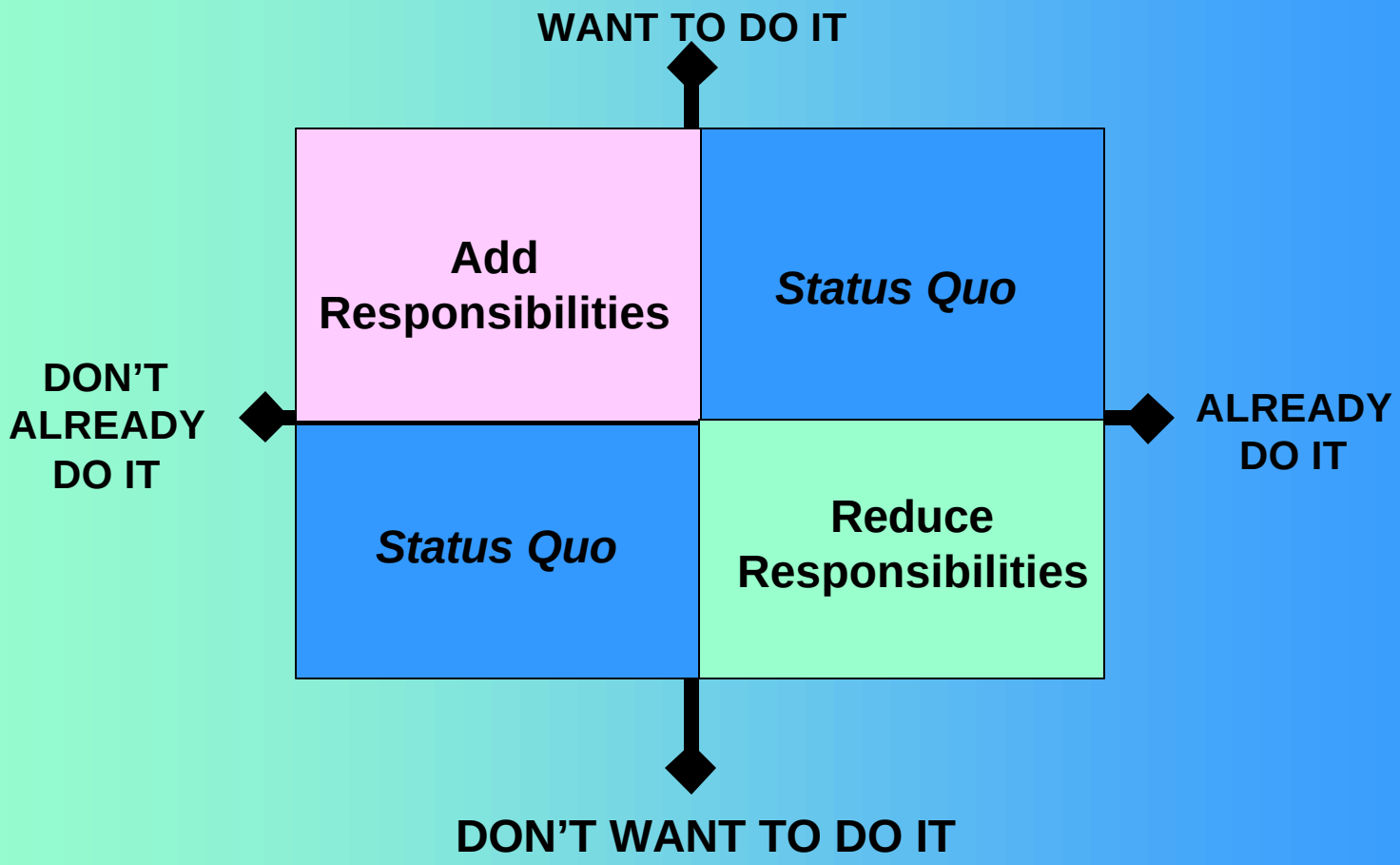
Service Horizon Matrix

	GOVERNANCE	MANAGEMENT	OPERATIONS
SOURCE			
TREATMENT			
STORAGE & DISTRIBUTION			
RETAIL SERVICES			

Options and Solutions

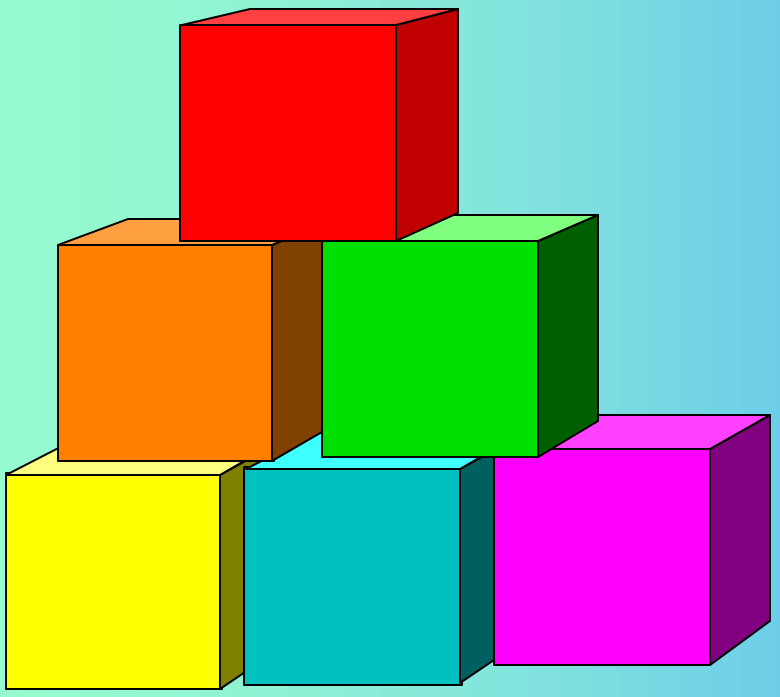
Defining the Service Horizon

Framework for Filling in the Cells of the Service Horizon Matrix



Options and Solutions

Simplified 6-Step Framework



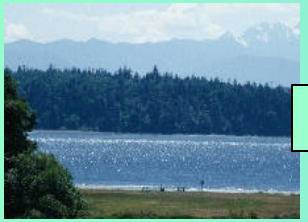
- Assess
- Define
- **Identify**
  - **Options for Fulfilling Desired Service Horizon**
- Analyze
- Implement
- Evaluate

What Will It Take To Fulfill The Desired Service Horizon?

Governance

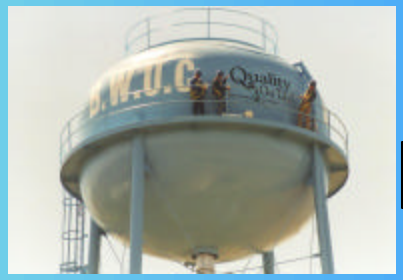
Management

Operations



Source Water

Treatment



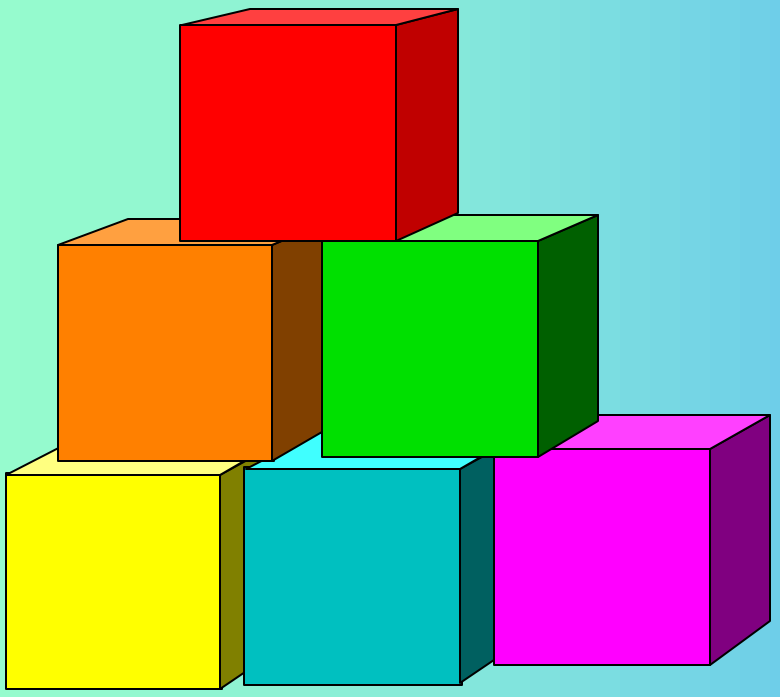
Storage & Distribution

Retail Services

Technical, Financial, and Managerial Capacity

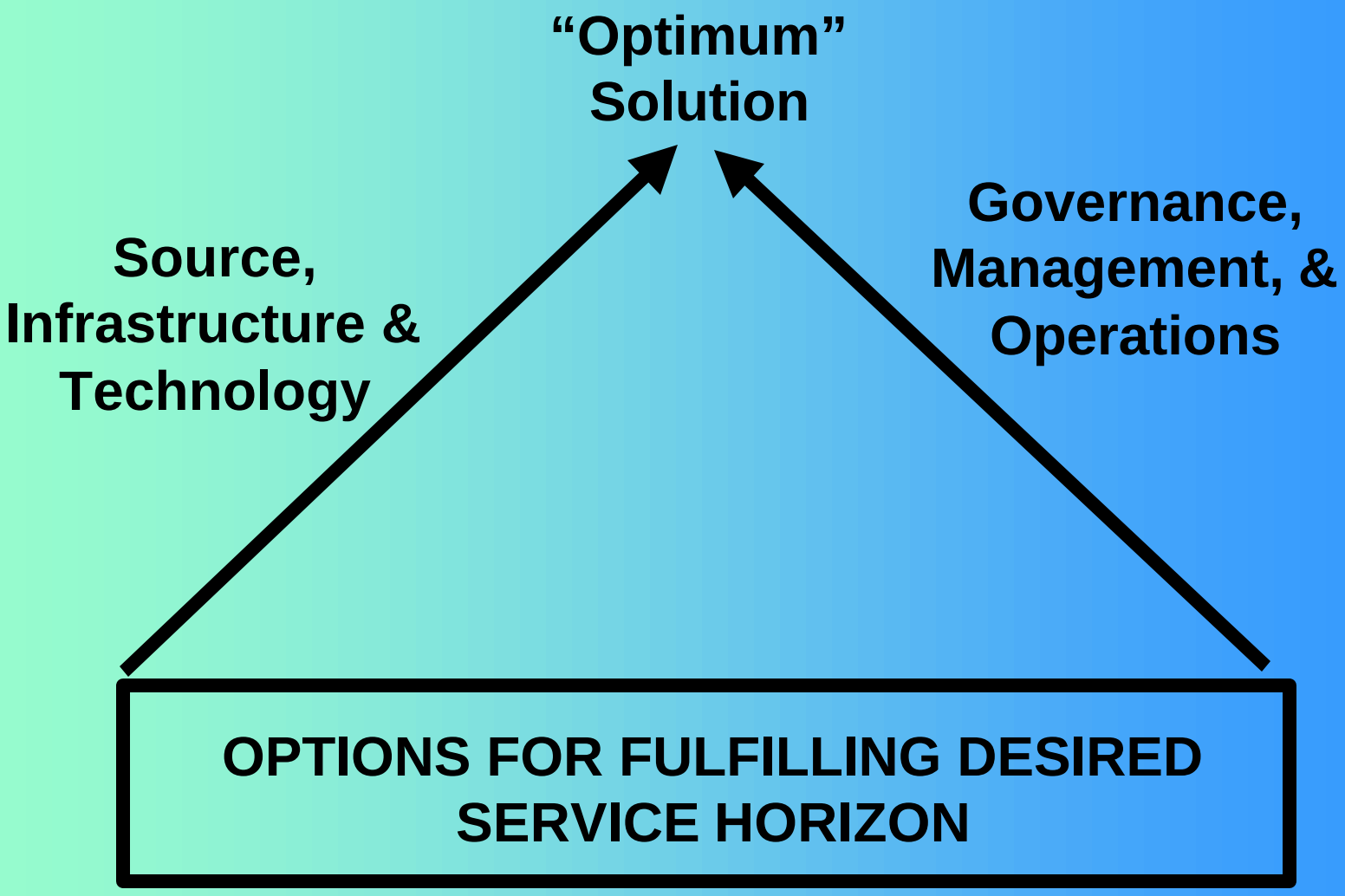
Options and Solutions

Simplified 6-Step Framework



- Assess
- Define
- Identify
- **Analyze**
  - **Identify "Optimum" Solution**
- Implement
- Evaluate

Identify & Analyze Options



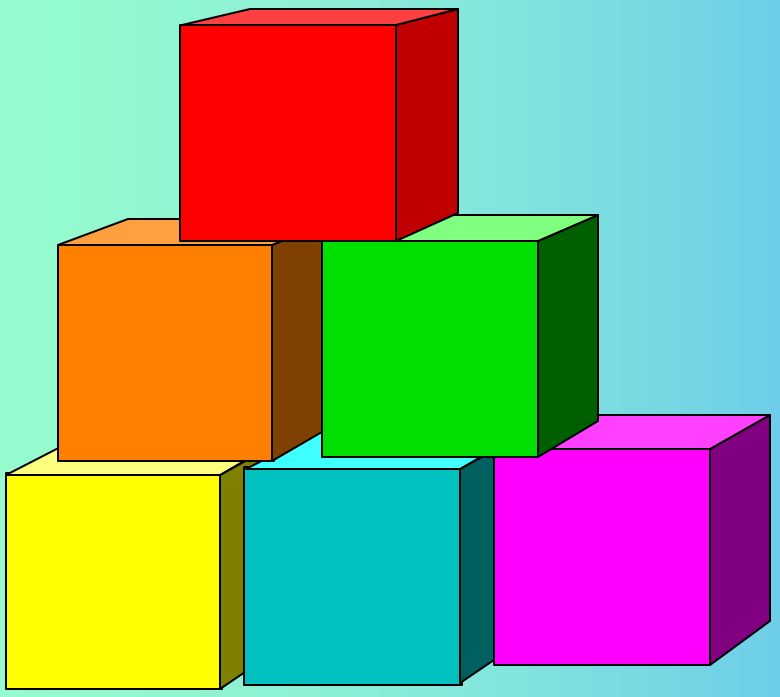
Options and Solutions

Optimum Relative To What?

- Least Cost
- Political Acceptability
- Best Service
- Water Quality
- Economic Growth

Each System Is Unique -- One Criterion Does Not Fit All -- Key Is To Ensure A Full Understanding Of Tradeoffs & An Informed Decision

Simplified 6-Step Framework



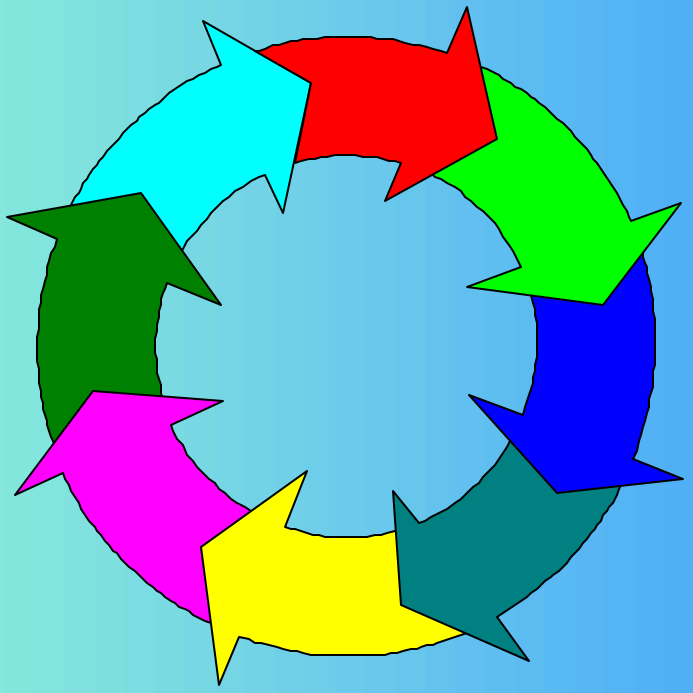
- Assess
- Define
- Identify
- Analyze
- **Implement**
- **Evaluate**

Options and Solutions

Implement & Evaluate

Strategic Management

Implement



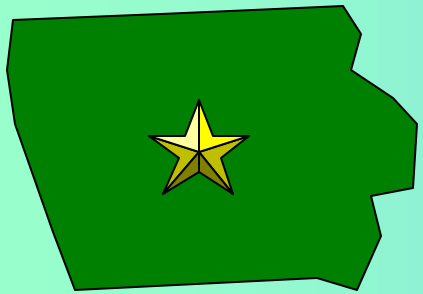
Evaluate

Revise

Options and Solutions

CASE STUDY: Des Moines Water Works (DMWW)

- **Municipal Utility**
- **Serves 350,000 people**
- **Provides "contract" services to 20 communities**
  - **Iowa Code § 28E**
  - **4 Basic levels of service offered**
    - **<u>Level 1</u> - Special Projects**
    - **<u>Level 2</u> - Wholesale Water**
    - **<u>Level 3</u> - Wholesale Water + Billing & Customer Service**
    - **<u>Level 4</u> - Total Service Contract**



Town of Panora, IA & DMWW (Level 1)

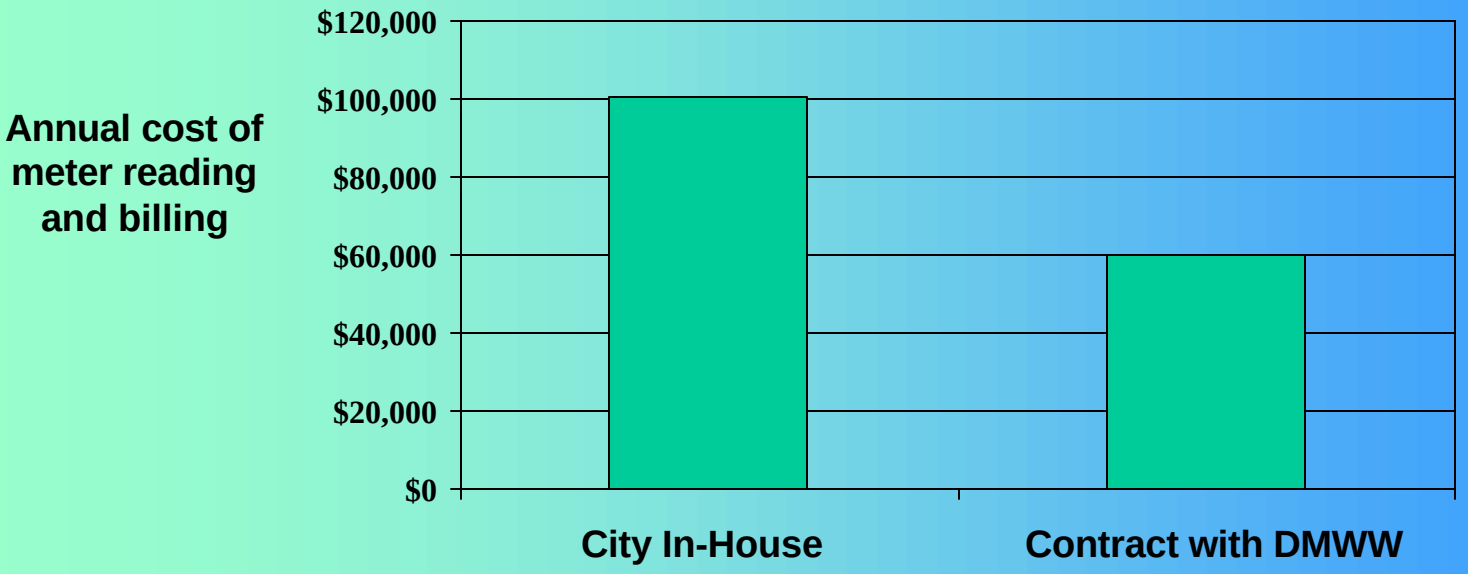
- **Panora, IA**
  - **Serves 1,100 people**
  - **Surface Water**
  - **Exceeds Nitrate MCL**
- **Panora contracts with DMWW for:**
  - **Nitrate Study**
  - **Employee Classification System**
  - **Rate Study**
- **DMWW charges fee based on time and materials**

Xenia, IA Rural Water District & DMWW (Level 2)

- **Xenia Rural Water District**
  - **Completed in 1983 - served 700**
  - **Today serves 5,000**
  - **Treatment plant at capacity**
  - **Purchasing water is least-cost solution to demand growth**
- **DMWW**
  - **One of 5 wholesale suppliers to Xenia**
  - **Agreement includes:**
    - **Initial connection fee based on anticipated demand**
    - **Metered wholesale supply**

City of Waukee, IA & DMWW (Level 3)

- **City of Waukee provides water to 3,400 people**
- **City obtains wholesale treated water from DMWW**
- **City analyzed its in-house meter reading and billing operation**
- **City determined that they could contract this function to DMWW and save 40%**



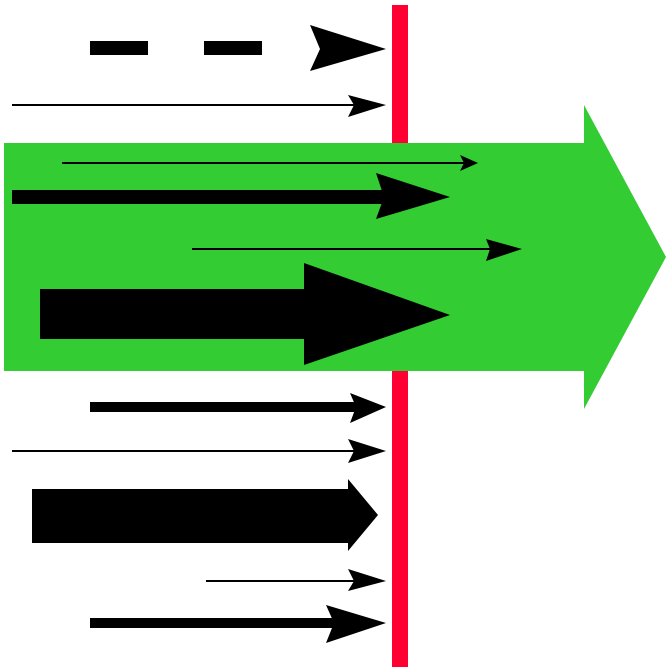
Options and Solutions

City of Windsor Heights, IA & DMWW (Level 4)

- City of Windsor Heights provides water to 5,000 people
- Since 1963 city has purchased entire supply wholesale from DMWW
- In 1989, to streamline its operations, the city contracted with DMWW for “total service”:
  - Water supply
  - Meter reading and billing
  - Inspections, preventive maintenance, & repair
  - Annual engineering analysis
  - Automated mapping/facility management data
- City receives significantly better service for the same cost

Summary

- **Assess** system needs, external pressures, and internal capacity
- **Define** the “Service Horizon”
- **Identify** strategic options
- **Analyze** options and select the optimum
- **Implement** strategic plan
- **Evaluate** and revise strategic plan



STRATEGIC SDWA COMPLIANCE PLANNING FOR SMALL SYSTEMS

Case Study Worksheets

System Identification

System Name: _____

Number of Persons Served: _____

Number of Connections: _____

Percent of Connections Residential: _____ **%**

Percent of Connections Commercial/Industrial: _____ **%**

Water Demand and Source:

AVERAGE DAY DEMAND _____ **gal/day**

PEAK DAY DEMAND _____ **gal/day**

GROUND WATER SOURCE

Well	Average Day Flow (gal/day)	Peak Day Flow (gal/day)	Safe Yield (gal/day)

SURFACE WATER SOURCE

Intake	Average Day Flow (gal/day)	Peak Day Flow (gal/day)	Safe Yield (gal/day)

PURCHASED WATER SOURCE

Purchased From:	Average Day Flow (gal/day)	Peak Day Flow (gal/day)	Maximum Available Flow (gal/day)

Back-up Source

Back-up Source Description	Maximum Available Supply (gal/day)

Treatment

Existing Treatment Processes	Existing Objective

Is existing treatment adequate to meet current finished water quality objectives?

YES NO NOT SURE

Storage

Storage Tank	Capacity (gal)

Retail Services

Metering

Connection Type	Percent Metered
Residential	**%**
Commercial/Industrial	**%**

Billing: Monthly Quarterly Semi-Annually Annually Other

Unaccounted –For-Water: _____ %

Internal Assessment

Functional Area Strengths & Weaknesses

Functional Area	Strengths	Weaknesses
SOURCE		
TREATMENT		
STORAGE & DISTRIBUTION		
RETAIL SERVICES		

Internal Assessment

Technical, Managerial, & Financial Capacity Strengths and Weaknesses

Element of Capacity		Strengths	Weaknesses
TECHNICAL	**Source Water Adequacy**		
	Infrastructure Adequacy		
	O&M		
MANAGERIAL	**Ownership Structure & Accountability**		
	Staffing & Organization		
	External Linkages		
FINANCIAL	**Revenue Sufficiency**		
	Credit Worthiness		
	Fiscal Management & Controls		

External Factors Assessment

Challenges

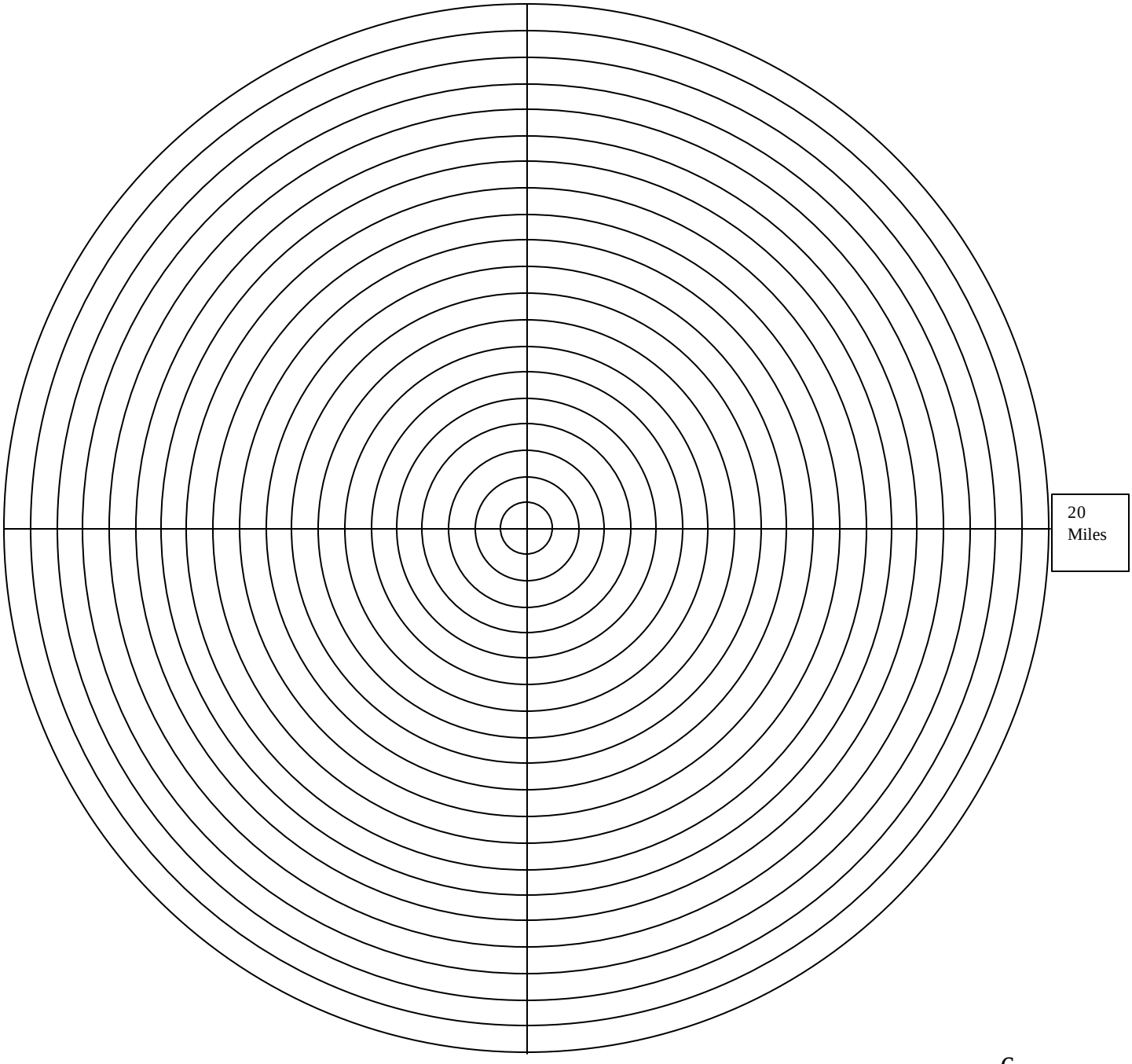
ISSUE	SPECIFIC CHALLENGES FACED BY CASE STUDY SYSTEM
Regulations	
Treatment	
Source Water Supply	
Competitive Efficiency	

External Opportunities

Worksheet For Identifying Potential Partnerships Based On Distance (Up To 20 Miles)

Distance Between Circles = 1 Mile

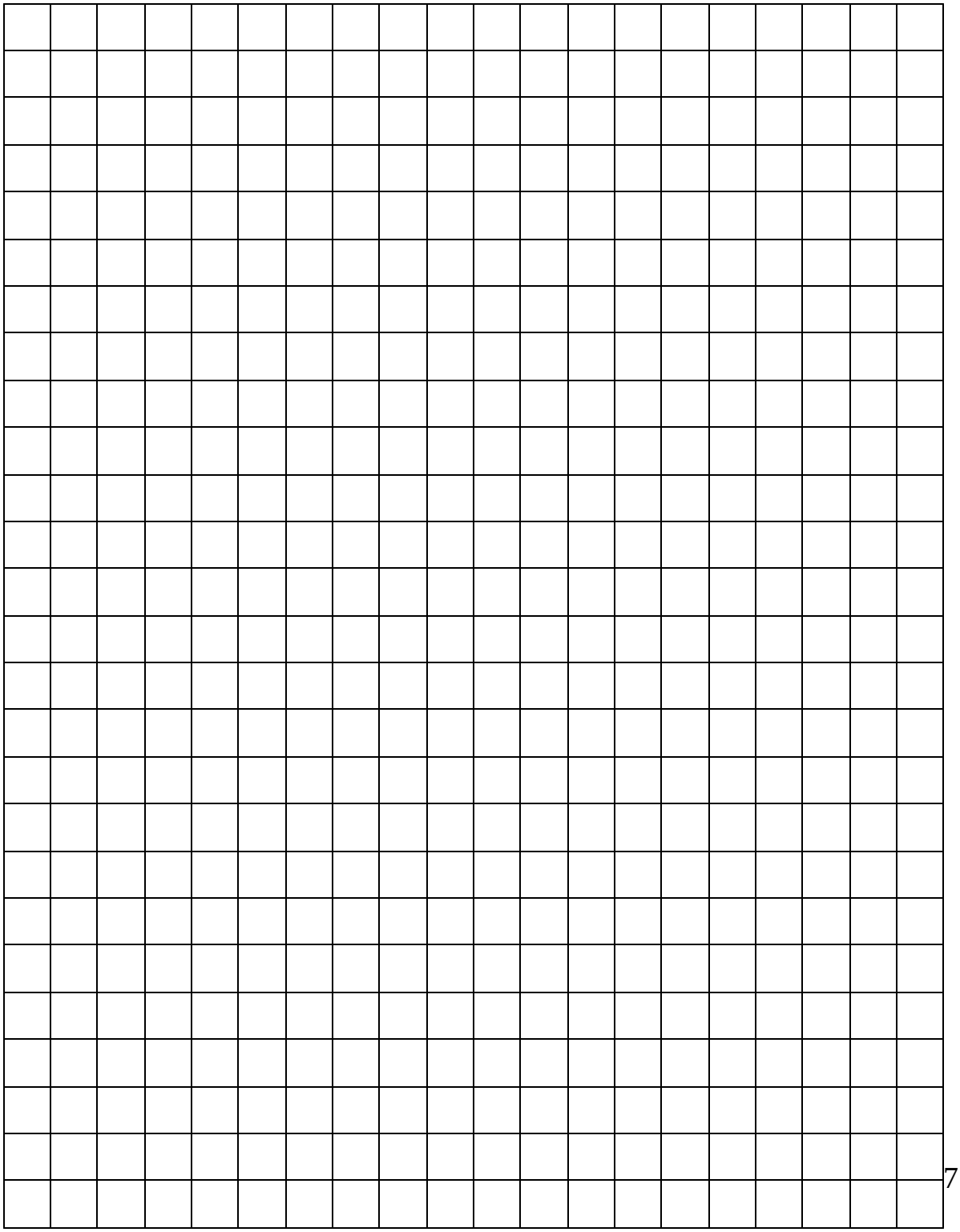
Indicate Approximate Location Of Other Public Water Systems



External Opportunities

Worksheet For Identifying Potential Partnerships Based On Hydrologic Unit

Sketch Major Features Of Aquifer Or Watershed; Indicate Subject System And Other Public Water Systems



Summary Of Potential Partner Systems

System	Organizational Structure	Strengths	Weaknesses	Interest In Partnership

External Opportunities

Source Water Protection

Contaminant	Role of Source Water Protection	Specific Regulatory or Non-Regulatory Actions To Protect Source Water

External Opportunities

RESOURCES

Resource Implications	**Option 1**	**Option 2**	**Option 3**
Cost			
Can cost be reduced?			
Cost which can be recovered by increasing rates as currently designed			
Cost which can be recovered by changing cost allocation and rate design			
Possible new sources of income			
Possible grants			
Possible loans			

External Opportunities

PUBLIC AWARENESS

Utility Function	Steps To Build Or Maintain Public Support
Source	
Treatment	
Storage & Distribution	
Retail Services	

DEFINING THE SERVICE HORIZON

	Governance	Management	Operations
Source			
Treatment			
Storage & Distribution			
Retail Services			

Identifying Options

Utility Function	Technological Options	Organizational Options	Implementation Issues
Source			
Treatment			
Storage & Distribution			
Retail Services			