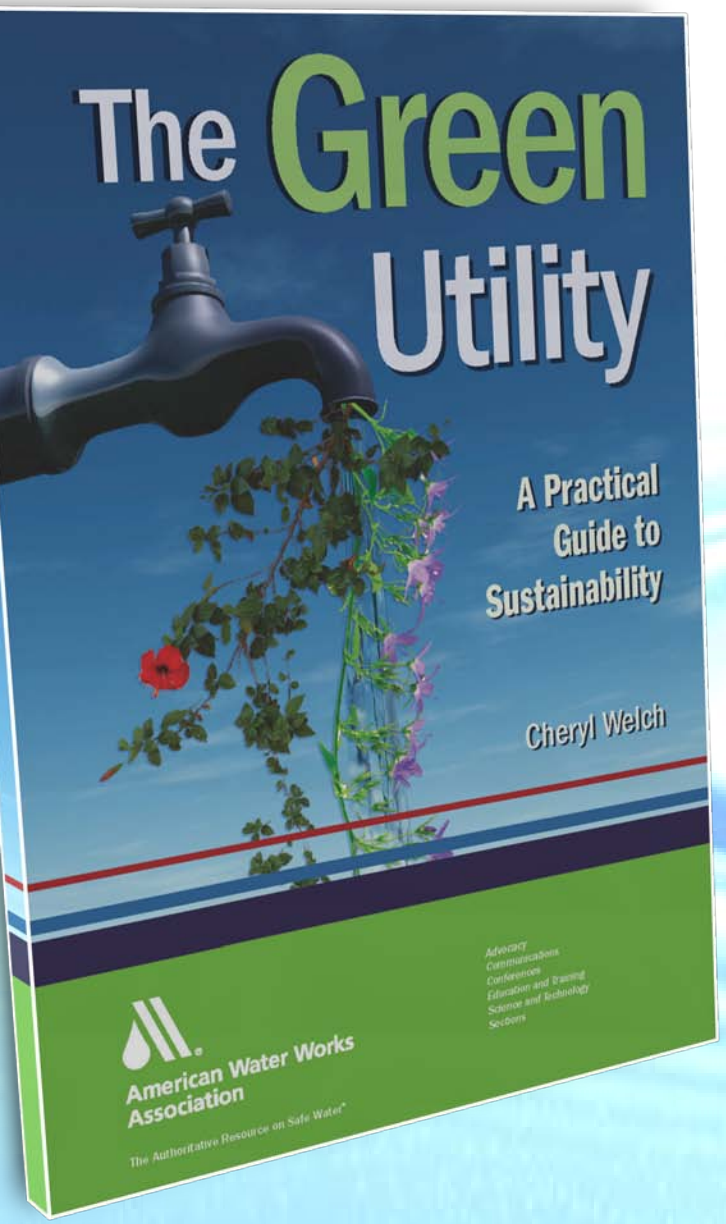


The Green Utility: A Practical Guide to Sustainability

Cheryl Welch, Strategic Planner
Tualatin Valley Water District
Beaverton, Oregon

Questions

What does sustainability mean to a water utility?

Why would a water utility want to be more sustainable?

Where do we start?

What sustainability opportunities exist at a water utility?

How do we talk about sustainability?

Where do we go from here?

Looking at how we do what we already do

Providing water and sewerage services within the carrying capacity of nature

(Yarra Valley Water – Australia)

Providing an adequate and reliable water supply of desired quality – now and for future generations – in a manner that integrates economic growth, environmental protection and social development

(AWWA Ad Hoc Sustainability Committee)

Our Mission

To provide our community quality water and customer service.

Our Sustainability Mission

To provide our community quality water and customer service…

in a manner that protects the earth's environment, supports a strong economy and promotes a robust community.

Why should we care?

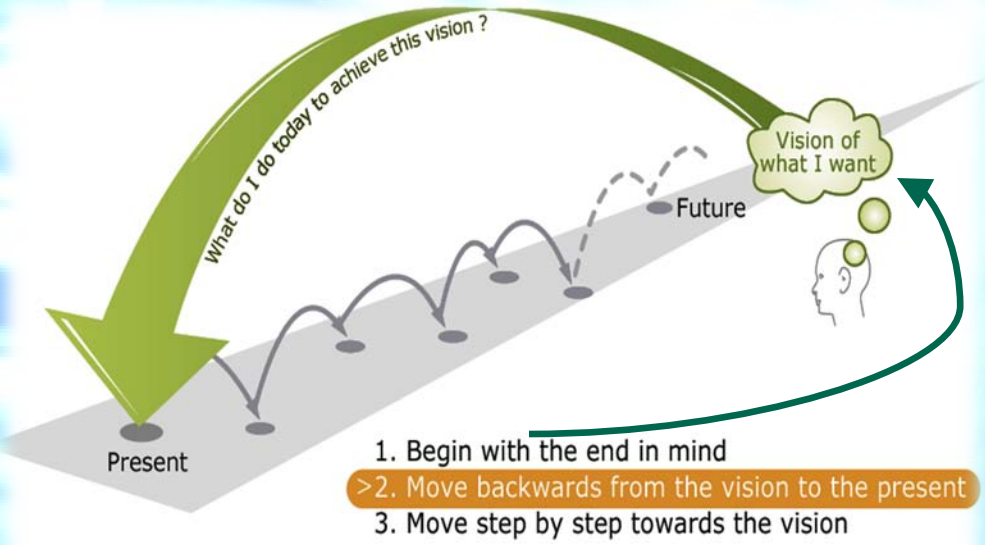
Sustainability benefits…

- Your utility
- The environment
- Your community & society

Where do we start?

Strategic Sustainability Planning

- ✓ Strategic Sustainability Plan
- ✓ Backcasting
- ✓ Process Mapping
- ✓ Management Systems



TVWD's Path

Actions to inform and engage employees

Sustainability plans to set targets & plan strategy

A balance of practices, processes and policy

Training for all staff

Board Resolution to make public statement

Key to Success

Integrating sustainability into what already existed

- Organizational goals
- Performance measures
- CIP planning process
- Budget
- Comprehensive Annual Financial Report (CAFR)
- Annual Report
- Purchasing policy
- Hiring notices
- Performance reviews

Opportunities to be more sustainable

195 actions listed and described

From basics…

- ✓Establish a Sustainability Team
- ✓Use doubled-sided copying
- ✓Cover construction areas with straw or other material to prevent erosion
- ✓Encourage employee recycling
- ✓Turn off equipment and lights when not in use
- ✓Make proper vehicle maintenance a priority

Opportunities to be more sustainable

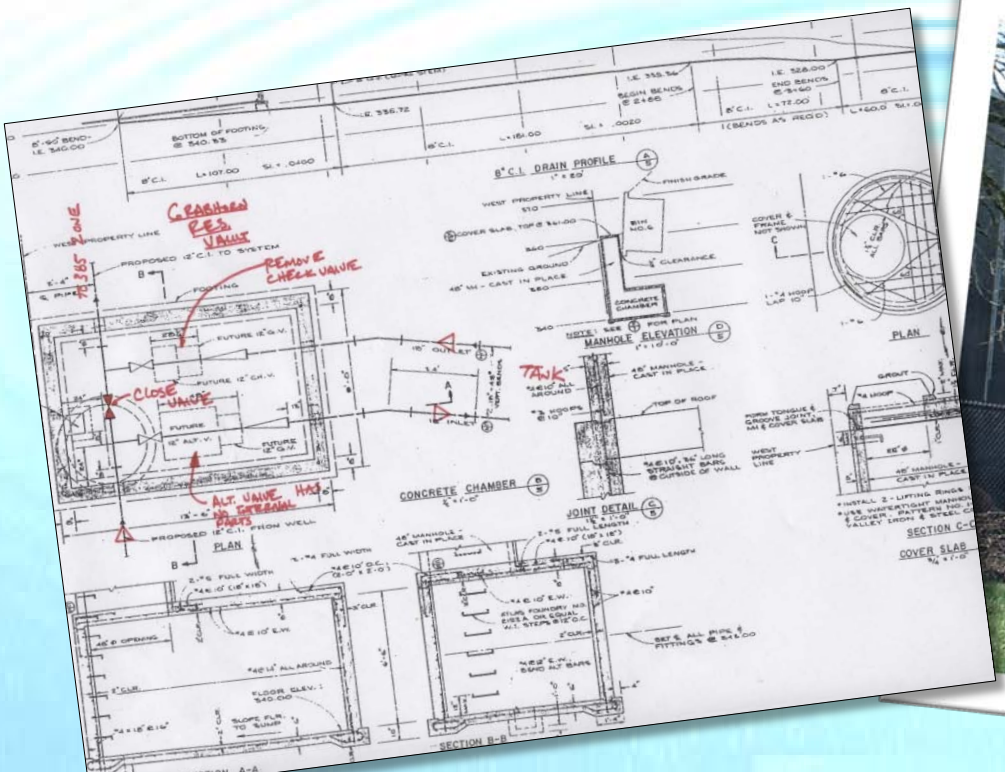
to more complicated or costly…

- ✓Construct LEED certified buildings
- ✓Conduct waste audits
- ✓Allow telecommuting or flexible hours
- ✓Install renewable energy generation on site
- ✓Install variable frequency drives where appropriate
- ✓Conduct a utility-wide carbon emissions inventory

CIP Process Integration

After purchased water, physical assets are our next biggest 'spend'

CIP sustainability rankings help us think through how to construct projects



CIP Criteria

Category	Criteria	Weight	Scoring Guidelines	
			Score	Characteristic
Economy	Supports economic growth and development	4	5 3 1	Project will directly allow increased development. Project will only serve existing development. Project incidental to existing and/or new development.
	Utilization of local employment and manufacturing	2	5 3 1	Oregon employment and manufacturing. US employment and manufacturing. Outside US employment and manufacturing.
	Improves efficiency (1) Improves effectiveness (1) Improves reliability (1) Reduces long-term costs (1) Other economic benefit (1)	4	5 3 1	Five criteria addressed Three criteria addressed One criterion addressed
	Total Category Weight	10		
Society	Meets regulatory or contractual requirement or recognized standards of practice	4	5 3	Corrects current violation of regulation , contract, or standards of practice. Prevents future violation of regulation ,

Tualatin Valley Water District
Washington County, Oregon

CIP Criteria

Category	Criteria	Weight	Scoring Guidelines	
			Score	Characteristic
Economy	Supports economic growth and development	4	5	Project will directly allow increased development.
			3	Project will only serve existing development.

PROJECT TITLE	PROJ NUM	Supports economic growth and development	Utilization of local employment/ manufacturing	Improves efficiency, effectiveness, reliability, reduces long-term costs	Meets regulatory or contractual requirement	Supportive of community esthetics and livability
		4	2	4	4	2
SOURCE - TVWD						
Aquifer Storage & Recovery	*16*	5	5	5	3	3
STORAGE - TVWD						
Cornell Tank Replacement	*17*	5	5	5	3	3
Garden Home Tank Upgrade	*18*	3	5	3	3	3
Teufel Reservoir Tank Replacement	*19*	5	5	5	3	3
Somerset Reservoir #2	*20*	5	4	4	3	3

Tualatin Valley Water District
Washington County, Oregon

CIP Criteria

Category	Criteria	Weight	Scoring Guidelines	
			Score	Characteristic
Economy	Supports economic growth and development	4	5	Project will directly allow increased development.
			3	Project will only serve existing development.

			pports economic wth and velopment	ization of local ployment/ nufacturing	proves efficiency, ectiveness, ability, reduces g-term costs	ets regulatory or ntractual uirement	pportive of mmunity esthetics d livability	Improves efficiency, effectiveness, reliability, reduces long-term costs	Meets regulatory or contractual requirement	Supportive of community esthetics and livability	Improves public/employee safety; improves drinking water quality	Construction impact on natural environment	Project Sustainability	Supports conserva-tion or demand management goals		Rank
								4	4	2	4	2	4	4	Weights / Totals	
	SOURCE -															
	Aquifer S							5	3	3	3	1	3	1	94	6
Soc	**STORAGE**							5	3	3	3	1	3	1	86	22
	Cornell T							5	3	3	3	1	3	1	90	10
	Garden H							5	3	3	3	1	3	1	97	3
	Teufel Re															
	Somerse															

Aquifer Storage & Recovery (ASR)

Reduces peak season reliance on surface water

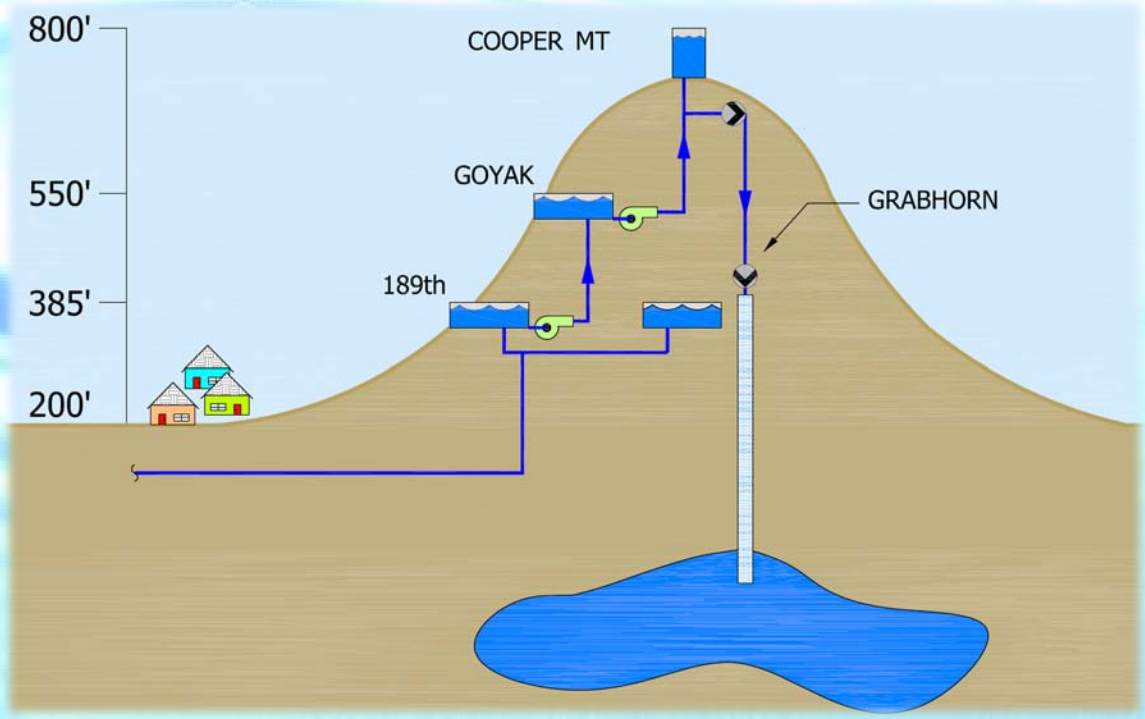
Takes water at time of plenty

Needs energy to pump down and back up

Pumped multiple times

Capacity issues

Wasted energy

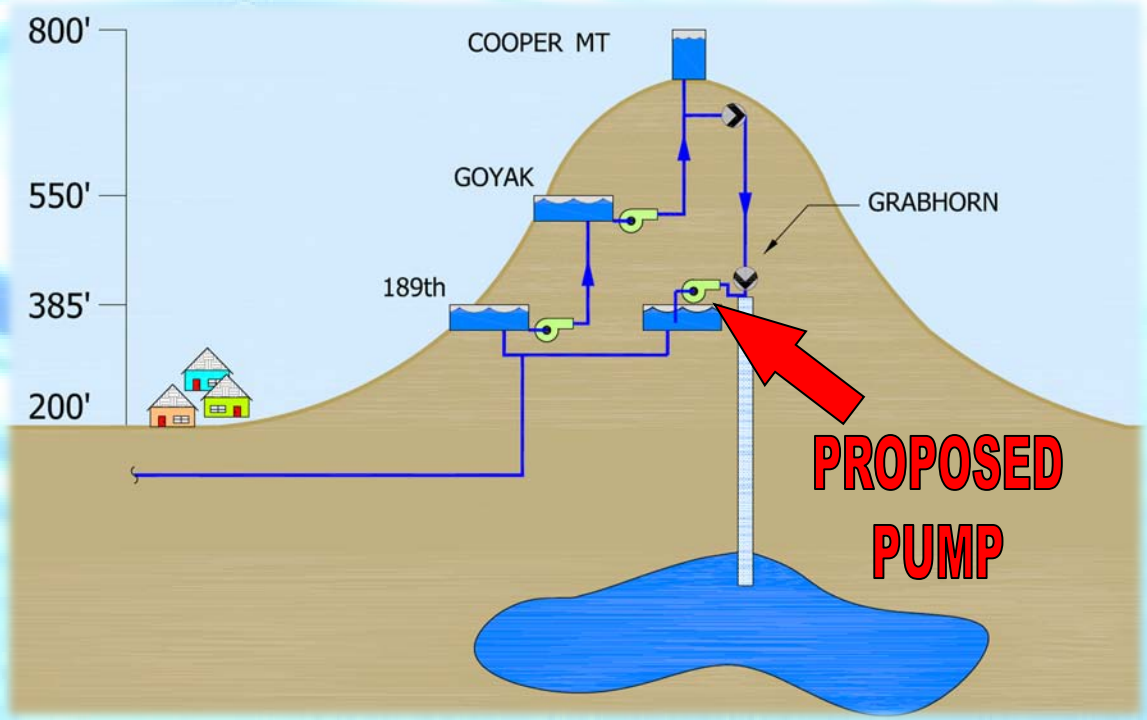


Grabhorn Reservoir – Option 1

Low HP submersible pump

Difficult to build

Maintenance & security issues



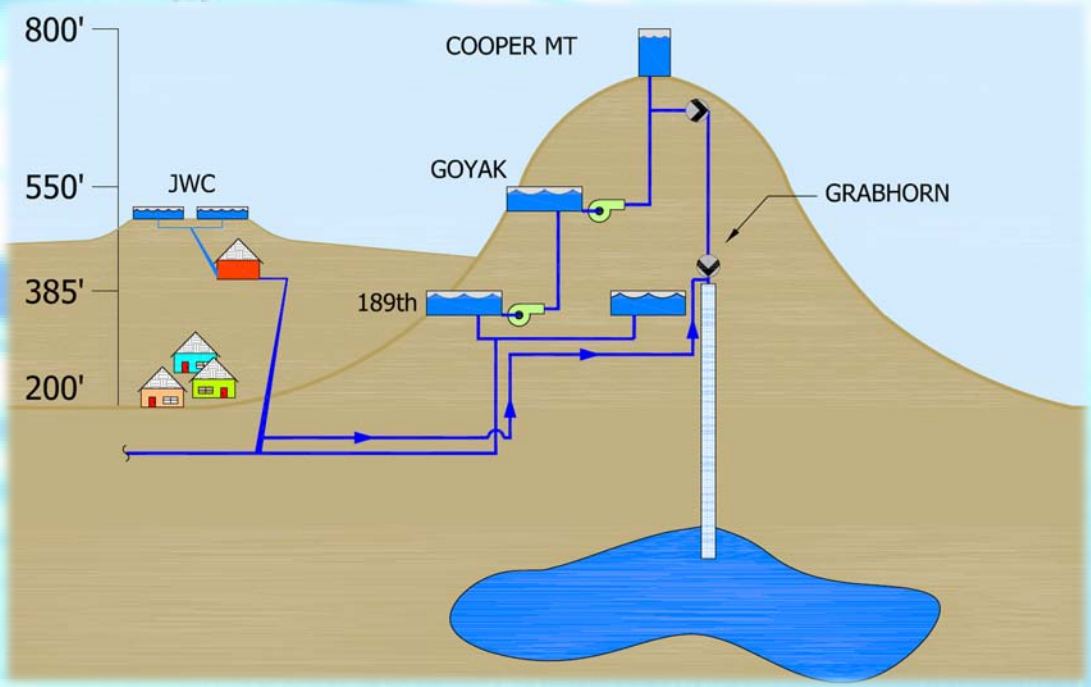
Grabhorn Reservoir – Option 2

Most of the pipe was already in place

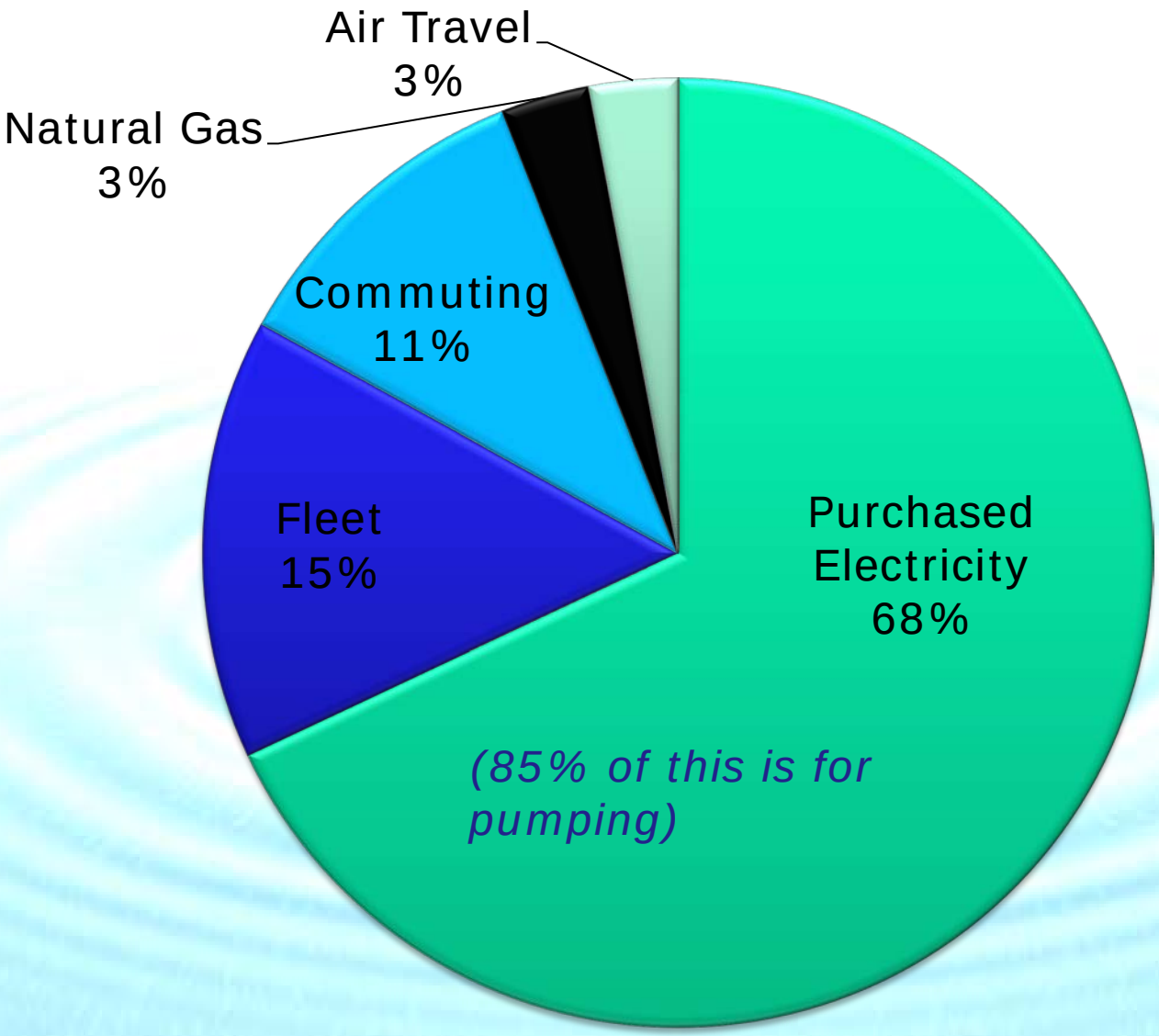
No energy use, estimated savings of more than 630,000 kWh ($45,000) per year

Received $45,000 in Energy Trust of Oregon incentives

Simple to operate



Carbon Footprint



Variable Frequency Drives (VFDs)

Installing one VFD moved one of our biggest pump stations from pumping 1650 gal/kWh to 2550 gal/kWh

- Averages 17,700 fewer kWh/mo @ ~ $0.08/kWh
- About $1400/mo savings for the last nine years

Power Generation

Center Street Generating Station

- Energy Trust of Oregon helped fund study to see if opportunity was there
- $20,000+ from PGE revenue in 3 years

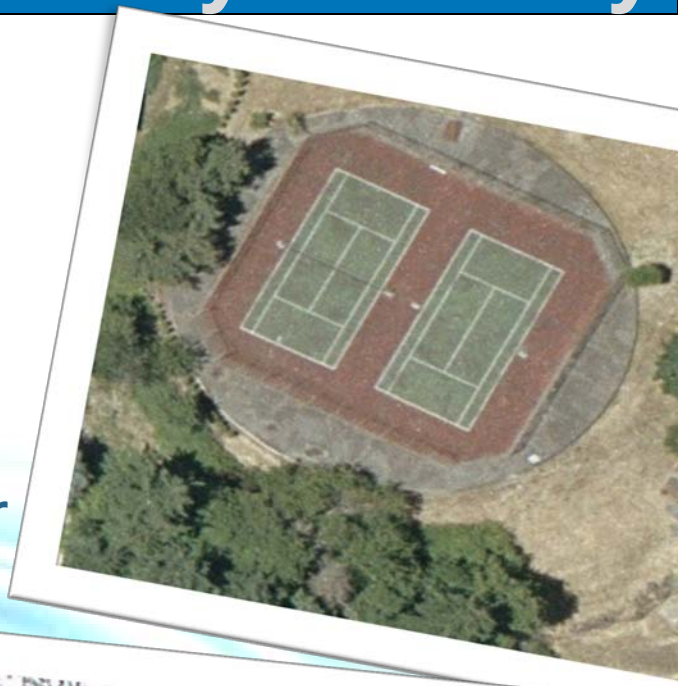
Site on west side of District is also under consideration

District Water Usage

Water efficient Demonstration Garden

- Xeriscape landscaping
- Zones show water needed for different plants
- Drip irrigation
- Weather-based irrigation
- Signage for public, information kiosk
- Tours and events

Community / Society



Local Community

- Care to Share
- Park Dept. partnership
- Sustainability & Wellness Fair

Employees

- Hire and train well
- Innovative benefits
- Sustainability mindset

Employee Recycling Benefit

- Employees may bring anything they can't recycle at home that TVWD does recycle
- Employee benefit so not obligated to offer to public
- We are already going to the facility to take TVWD materials, so very little extra cost

Uniforms
CDs/DVDs
Cell phones
Electronics
Styrofoam
Packing peanuts
Pallets
Light bulbs
Shoes
Batteries
Lawnmowers

The Green Utility

To maximize the usefulness of this book, look for the following aids:

TIPS: Tips are just things to think about. These will describe the benefits and challenges of a particular process, piece of equipment, or behavioral change. They may help you make the business case for selecting a more sustainable option. Or they might just be obstacles or hints others have discovered.

You will also find described some of the challenges you may face in implementing a process or changing equipment. These incorporate the experience of many water utility employees and may save you from going down a path not right for you.

Case Studies

People from all over the world have discovered or invented solutions for their own unique problems. They have found ways to be more efficient or use a safer product or process. They have found uses for what was once waste or collaborated in ways previously unheard of. The stories of many clever and resourceful people are included to instruct and inspire you. Maybe you can use their solutions as is. Or maybe their answers will spark a similar idea from someone in your organization that will be the perfect resolution to your specific needs.

Resources

This book is intentionally compact so you don't have to wade through more information than you require. But there are many wonderful books, articles, and tools available from AWWA, the Water Research Foundation, US Environmental Protection Agency, and others that may be important to your journey toward sustainability. Some of these are listed throughout the book to assist you in delving deeper into areas as needed.

Book includes:

- ✓Tips
- ✓Case Studies
- ✓Resources
- ✓Policies
- ✓Practices
- ✓CIP Projects
- ✓Sample Documents

Examples

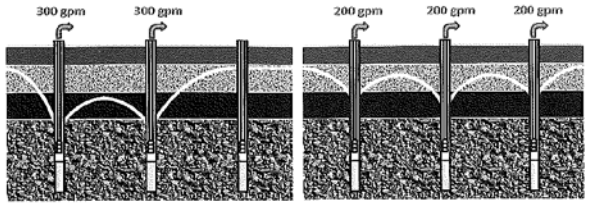


Figure 4.1. Groundwater optimization results in less drawdown, less energy

32. Implement a "No Mow" Program at Appropriate Sites

You may have a long list of remote or not-so-remote sites that w turf long ago and have been kept mowed and groomed ever since. sites to see if there are portions that could be planted with nati brought to a condition that is aesthetically pleasing but does not ing. This will reduce staff time, vehicles on the road transportin equipment emissions. It may also alleviate some safety concerns terrain is somewhat steep.

If the area is large or requires labor to replant, enlist the he community members to develop the site and provide labor. This w the area becomes something nearby residents want and cuts deve Add signage to let the public know what is happening and how community.

33. Use Goats or Other Animals to Keep Remote Sites Tr

Yes, seriously. Partner with a local 4-H group, lease the animal outright if you have enough property. Property must be well encl but this can reduce risk of staff injury on steep terrain and reduc sions and maintenance time associated with trimmers and mowe

Be sure to consider the health of the animals, too. Perhaps ner with local farmers to "rotate" animals to different sites to k overgrazing.

Water Efficiency Within Utility Facilities

34. Install Half-flush or Dual-flush Toilets, Waterless Uri

Plumbing codes in some areas do not allow these fixtures, but change, investigate the possibility of installing them in new bui

Appendix E

Greenhouse Gas Inventory Process

Contributed by
Douglas Huxley and Priya Sathyanarayan
(authors of WRF Project 4156, Greenhouse Gas Emission Inventory and Management Strategy Guidelines for Water Utilities.)

Understanding the GHGs of Interest

Based on precedent from the Kyoto Protocol, developed by the United Natio Framework Convention on Climate Change (UNFCCC), and brought in force in February 2005, six greenhouse gases (GHGs) or types of GHGs a typically included in an emissions inventory:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)

Each GHG has a global warming potential (GWP). GWP represents the most accepted measure of the heat-trapping ability of each GHG relative to CO_2. For example, on a unit mass basis, CH_4 has approximately 25 times more ability to trap heat in the atmosphere than CO_2. Hence, the GWP of CH_4, according to the Fourth Assessment Report (AR4) noted below, is 25. Halogenated compounds such as the HFCs and PFCs are much more potent GHGs, primarily due to their long atmospheric lifetime, and thus have very high GWP.

The Intergovermental Panel on Climate Change (IPCC) has published a series of "assessment reports," which include, among other topics, consensus

United Utilities Planned Approach to Carbon Reduction Through 2050

Our ambition is to halve our greenhouse gas emissions by 2035, based on a 200 baseline, and to reduce them by 60%, in line with government targets, by 205 based on 1990 levels and as shown in Figure 3.11. While we have set ambitious ta gets, we have yet to identify how we will fully meet them. Figure 3.11 sets our carbo reduction plan broken down into four distinct phases, A–D. We will engage with o customers in each of these phases to ensure that they continue to support our carbo management approach.

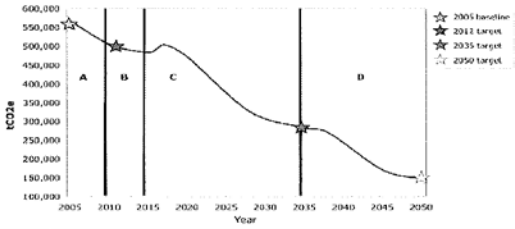


Figure 3.11. United Utilities long-term goals for carbon reduction

Phase A: Setting the agenda 2005–2010

A short-term program of measures has been implemented in AMP4 making redu tions to the baseline carbon footprint and that will contribute toward our 2012 targ of a gross 8% reduction. (We have purchased REGO certified green energy that worth a further 18% reduction.) This program consists of projects that apply know technology, including combined heat and power (CHP), pump efficiency, and our fir sustainable catchment management program (SCaMP). Collectively these projects w deliver a reduction of 39,000 tCO_2e (based on an electricity conversion factor of 0.4 by 2012.

Phase B: Consolidation and preparation 2010–2015

This second phase of our program will be based on continued implementation existing technology as well as through introduction of new projects and technologie such as composting grit and screenings. The program will further harness renewab

Sample Documents

Weight and Scoring Guide—Sustainability-oriented Evaluation Criteria

Project evaluation for: _____

Economy			
Category	**Criteria**	**Score**	**Scoring Guidelines—one point if "yes"**
Local Economic Development	**E1** Supports locally owned businesses		Project provides a direct benefit to locally owned businesses, e.g., better access to customers, better provision of Agency services to business, direct purchase by Agency.
	E2 Supports local employment		Project will increase opportunities for local employment, e.g., better access to employment centers, increased opportunities for home businesses, direct local employment if job to be done by local contractors.
	E3 Uses materials that are produced within 250 miles of work site		Project's primary material(s) are produced locally and could be sourced locally (recognizing that they may not practices). In produced loc mostly recycl
	E4 Uses materials that are produced in US		Project's primar and could be ing that proc whether they in cement ar unless it is m
Economic Efficiency	**E5** Increases efficiency in an essential system		Project allows a resources su produce resu
	E6 Increases connectivity in an essential system		Project complet water distrib essential net
	E7 Improves reliability of an essential system/structure		Project makes a more reliabl that serves t plant, distrib
	E8 Will not increase long-term maintenance/operating costs		Project results i nance obligat
	E9 Reduces long-term maintenance/operating costs		Project reduces long term.
	E10 Creates a resource that can be shared between City and another entity		Project increase that can be s other regiona or grant-fund
	E11 Proprietary/single technology MINUS ONE		Project may pre efficient/cho as they emer single techno
			TOTAL ECONOM (10 POSSIBLE)

EBMUD

Policy 7.05

EFFECTIVE 10 SEP 08

SUPERSEDES 22 SEP 98

SUSTAINABILITY

THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

de reliable, high-quality drinking water and wastewater service through sustainable ational, maintenance and construction activities that avoid, minimize or mitigate adverse s to the environment and the public.

ctive

The District will strive to balance environmental, social, and economic objectives into its decision-making, policies, programs, and work practices. In doing so, the District will:

- promote an environmental stewardship ethic in its staff and among other drinking water and wastewater treatment agencies;
- assure that the District adheres to the principles of sustainability and environmental justice;
- comply with environmental laws and regulations;
- look for opportunities for continuous improvement of environmental performance and prevention of pollution to reduce impacts to the environment;
- promote the purchase and use of recycled and recyclable products;
- move towards zero waste and seek ways to recycle materials the District cannot use in its operations;
- establish a framework for setting and reviewing environmental objectives; and
- foster communication with employees and the public about the environmental significance of the District's current and future operations.

onsibilities

To promote environmental stewardship and facilitate compliance with laws and regulations, the District will conduct compliance audits, administer staff training, and assist in the development and implementation of management and operational practices that support environmental, social, and economic considerations and ensure compliance. The District will maintain strong working relationships with local regulatory agencies, exchanging information on District plans and procedures that support the development of sustainable environmental guidelines for the water and wastewater industry at large.

To advance environmental leadership and awareness, the District will participate in drinking water and wastewater organizations and associations, and work cooperatively with and solicit input from the environmental community and public on District activities.

Appendix C

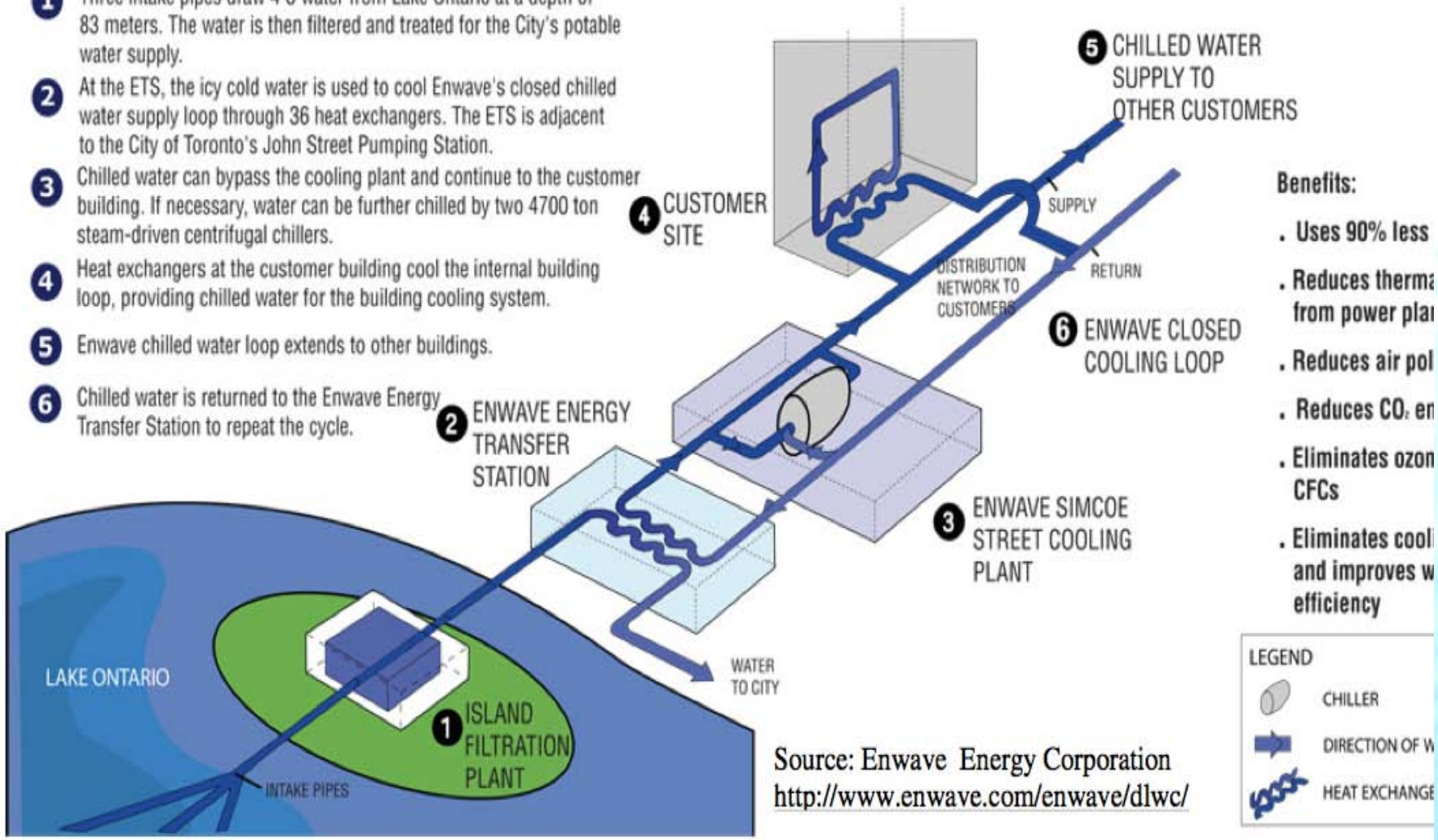
SCORE Assessment—Water Sector

WATER UTILITIES			
Practice	**1 point Incubator**	**3 points Initiative**	**9 points Integrated**
Management and Policy			
Water Conservation: Stabilize absolute water usage at a sustainable level.	Provide water conservation program that educates customers about important water conservation issues and incentivizes them, through rebates and other means, to reduce consumption.	Manage by reducing demand and making current practices more efficient. Develop integrated watershed management plan with other entities in your watershed. Document a reduction in absolute peak demand.	Operate with best practice use of "fit for purpose" water from a sustainable supply that protects natural systems within the watersheds supplying the system. Set absolute system water usage limit and establish a plan that meets that supply level sustainably (i.e., without lowering groundwater level). Review supply limit and monitor environmental impact at least biennially.
Watershed Protection: Preserve watershed health.	Actively participate in local groups looking at water issues from a watershed perspective.	Promote public policy and practices that preserve the water quality and health of your watershed.	Ensure that policies and practices in your watershed(s) protect the availability and quality of water for humans and the ecosystem in perpetuity (e.g., water rights, land use/development, forest/agricultural practices, pollution prevention, etc.).
Sustainability Planning and Thinking: Increase sustainable planning mind-set.	Provide education and communication materials on sustainable thinking to every department.	Manage planning process by requiring specific performance criteria in all planning documents. Develop a "mind-set shifting campaign" to transition planners from traditional thinking to sustainable thinking.	Enable an organization that embeds sustainable thinking in every facet of training, operations, performance, and accountability.

Innovative Water Use

Deep Lake Water Cooling System

1. Three intake pipes draw 4°C water from Lake Ontario at a depth of 83 meters. The water is then filtered and treated for the City's potable water supply.
2. At the ETS, the icy cold water is used to cool Enwave's closed chilled water supply loop through 36 heat exchangers. The ETS is adjacent to the City of Toronto's John Street Pumping Station.
3. Chilled water can bypass the cooling plant and continue to the customer building. If necessary, water can be further chilled by two 4700 ton steam-driven centrifugal chillers.
4. Heat exchangers at the customer building cool the internal building loop, providing chilled water for the building cooling system.
5. Enwave chilled water loop extends to other buildings.
6. Chilled water is returned to the Enwave Energy Transfer Station to repeat the cycle.



Benefits:

- Uses 90% less
- Reduces therma from power pla
- Reduces air pol
- Reduces CO_2 en
- Eliminates ozon CFCs
- Eliminates cool and improves w efficiency

Source: Enwave Energy Corporation
http://www.enwave.com/enwave/dlwc/

Social Issues

Sydney Water Initiatives – Sydney, Australia

- ✓ No-interest loans for water-efficient washers
- ✓ Working to help targeted customer groups
  - ➢ Geographical isolation from services
  - ➢ Large household size
  - ➢ Socio-economic need
- ✓ Free interpreter for non-English speaking callers
- ✓ Giving Through Safety Program donates money to employee-chosen charities when specific safety goals are met

WTP Residuals

Medford, Oregon Water Treatment Plant (WTP) Residual Processing

- ✓ Engineered concrete backwash-water lagoons produce cake-like dried solids
- ✓Gravity thickening and solar drying

WTP Residuals

Medford, Oregon WTP Residual Processing

- ✓ Process takes advantage of regional climate, high evaporative potential
  - ➢ Lagoon design
  - ➢ Managed sludge loading cycles
- ✓ Final dried solids used as daily cover at local landfill

How do we talk about it?

Employees

In person

- Senior management
- All employee meetings
- Small group/crew meetings
- Brown bag/discussion groups
- Vendor/Organizational fairs

Written

- Newsletters
- Signage
- Posters
- Electronic newsletters, emails

Recognition

- Pats on the Back
- Employee Awards
- Notice by management

How do we talk about it?

Elected Officials

Formal meetings

- Concise presentations
- Gear toward answering questions from their constituents

Work Sessions

- More informal
- Explain details of issues

Written

- Periodic newsletters and updates

How do we talk about it?

Public

Press Releases

- Include sustainability as one aspect of other communications
- New initiatives, buildings, installations

Workshops/ Open Houses

- Water Conservation
- Xeriscaping
- Promotion/explanation of rebates

How do we talk about it?

- Annual Reports
- Organizational Goals
- Performance Measures
- CIP Planning
- Requests for Proposals
- Employee Newsletters
- Hiring Notices
- Job Descriptions
- Performance Reviews

Where do we go from here?

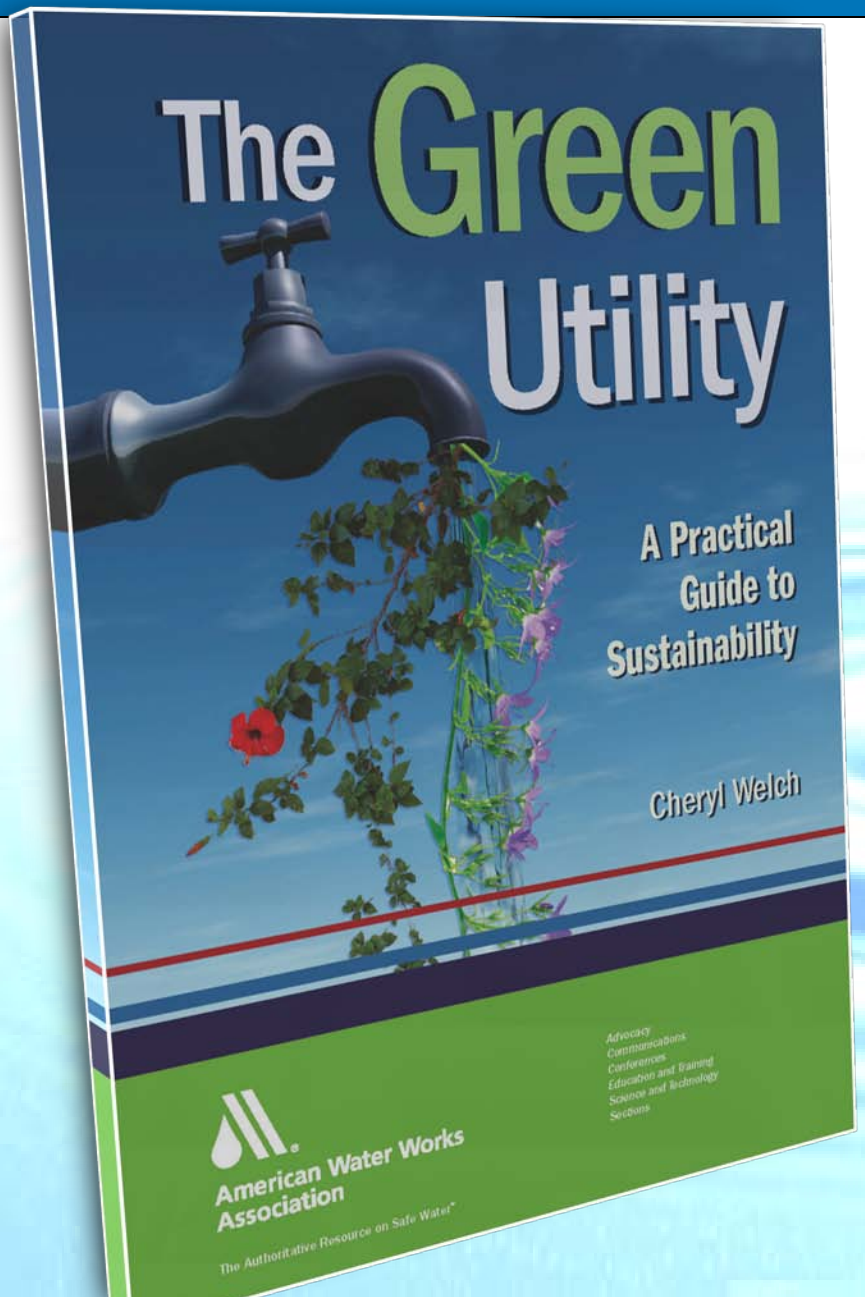
Efficiency is about doing things a better way

Conservation [Sustainability] is about doing different things

From "Thinking Beyond Pipes and Pumps: Top 10 Ways Communities Can Save Water and Money"
(Canada's POLIS Project on Ecological Governance)

Sustainability is not a destination, but a journey – there is always a next step

Available from AWWA



Includes:

- Business case for sustainability
- Examples and quotes from many different water utilities
- 195 actions to take
- Ways to communicate sustainability
- Sample documents and reports

Thank you!

Cheryl Welch

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