Appendix B

Water Agency Profile: Inland Empire Utilities Agency

Recycled Water Summary

		2005	2010	2015	2020	2025	Source
1	Total Water Demand	244,189	284,600	302,000	321,900	341,400	2005 UWMP, Table 2-7
2	Targeted Conservation	8,600	26,260	28,700	31,490	33,400	2005 UWMP, Table 2-8
3	Net Water Demand	235,589	258,340	273,300	290,410	308,000	Line 1 – Line 2
4	Treatment Plant Capacity	86,600	94,500	115,740	133,640	-	2005 UWMP Table 5-2
5	Tertiary Flows	68,080	83,900	104,600	107,400	-	
6	Connected R.W. Demand	7,530	50,000	49,000	58,000	69,000	2005 UWMP Table 3-13
7	Direct Uses of Recycled Water	7,400	33,800	44,000	53,300	60,500	
8	GWater Replenishment from Recycled Water	1,000	17,500	25,000	28,000	35,000	
9	Santa Ana Environmental Water	16,875	16,875	16,875	16,875	16,875	1969 Court Judgment
10	Excess R.W. Discharged	43,705	15,725	18,725	9,225	-	Line 5 less sum of Lines 7-9

Note: All above numbers are in acre-feet per year, unless otherwise noted. IEUA's 2005 Urban Water Management Plan (UWMP) projected that the amount of recycled water available in 2015 would be about 49,000 acre-feet per year. In 2007, IEUA released a plan for accelerating its investments in recycled water infrastructure that moved the 2015 target up by 5 years, to 2010. The values shown for 2020 and 2025 are the projections from IEUA's 2005 UWMP and do not yet reflect any adjustments for the accelerated plan. Given that IEUA now plans to achieve its 2015 goal by 2010, and since available tertiary flows are expected to far exceed the amount of connected demand, it seems likely that IEUA will increase the amount of projected recycled water demand in its next UWMP.

The Inland Empire Utility Agency (IEUA), located in the Southwestern corner of San Bernardino County, serves one of the most rapidly urbanizing regions in Southern California. As a result, water demand in the region has increased substantially in recent years and is projected to continue growing at a continued high rate over the next 20 years.

The IEUA provides both water and wastewater services to eight cities and water districts. Its water supplies include potable water delivered by the State Water Project (SWP) and the Metropolitan Water District of Southern California (MWD); potable water treated by the Chino Desalter Authority; and tertiary-treated recycled wastewater. In addition to these supplies, local cities or agencies within IEUA's service territory rely on groundwater from the Chino Basin, or surface water.

The energy intensity of IEUA's supplies varies widely. Water conveyed by the SWP and treated to potable standards requires approximately 3,224 kWh per acre-foot. In comparison, wastewater that is treated to tertiary standards and used as recycled water uses 501 kWh per acre-foot. Currently, IEUA is required to treat all wastewater to tertiary standards before discharging it in the Santa Ana River. Therefore, to provide this recycled water to end users,

IEUA's only true additional energy requirement to use treated wastewater is for distribution. Increased use of recycled water offsets current and future demand of energy-intensive imported water from the SWP. IEUA's ability to productively apply all of its available recycled water is constrained by the capacity of existing infrastructure (recycled water distribution pipelines, storage facilities, and service laterals).

In response to the federal order reducing deliveries from Bay Delta, IEUA recently released a business plan that accelerates implementation of this needed infrastructure, with the intent to fully apply all of its available recycled water by 2010. To meet this goal, the IEUA will incur capital expenditures totaling approximately $123 million. This amount includes the cost of lateral service connections, but excludes costs associated with dual-plumbing customers' sites to enable use of the recycled water.

General Description and Service Area

The IEUA is a California municipal water and wastewater utility. With a service area covering 242 square miles, the IEUA provides wholesale water and wastewater treatment for nine member agencies.

Over the past several decades, IEUA's service area has undergone substantial changes in demographics and land use. Most notably, land use has changed from predominantly agriculture and open space to urban uses. The remaining rural land is continuing to be converted to urban use. In addition, population in the area grew from approximately 708,000 in 2000 to 814,000 in 2005[1] and is projected to increase an additional 29% to 1,050,000 in 2025.[2] The land conversions and population growth have important implications for both supply of and demand for recycled water.

Water Supply

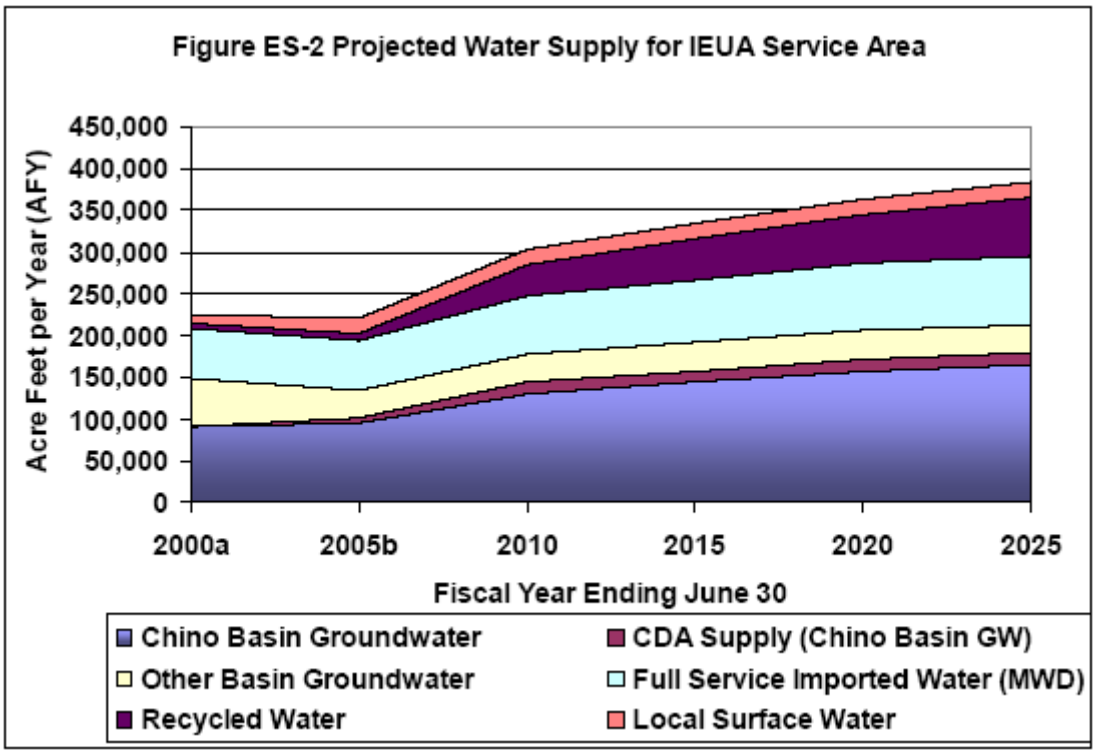
Water supplies in IEUA's service territory come from both local and imported sources. Local sources include surface water, groundwater, desalinated groundwater, and recycled water. Imported supplies are primarily purchased from the Metropolitan Water District of Southern California (MWD), and originate in Northern California (the Sacramento-San Joaquin Delta). IEUA does not use MWD's Colorado River water supplies due to salinity concerns within the Chino Basin. IEUA distributes these water supplies in wholesale form to the retail agencies within its service area. Water is delivered from the State Water Project (SWP) in several locations in IEUA's service territory. Over half of the water, approximately 37,000 AFY, is delivered to the Water Facilities Authority (WFA), which treats the water to potable standards at the Agua de Lejos plant in the Northwestern part of IEUA's service area. Two other treatment facilities, the Royer-Nesbit and Lloyd G. Michael treatment plants in the Cucamonga Valley

[1] IEUA, Urban Water Management Plan (2005), Chapter 2, p. 1
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter2.pdf
[2] City of Fontana, Feasibility Study to Serve Recycled Water in the City of Fontana (May 2006), p. 6
http://cityoffontana.org/main/public_serv/pdf_docs/rw_study0506.pdf

Water District receive water from the MWD via IEUA. In addition, when surplus water is available, several turnouts along the Foothill Feeder pipeline deliver untreated SWP water to groundwater recharge zones.

IEUA, in partnership with the area's cities, retail agencies, and various other agencies (Watermaster, SAWPA, OCWD, MWD, SBRWQCB), has been working on an integrated water management strategy to develop additional local water supplies. The main sources being developed or enhanced include the Chino Basin Desalter, which provides advanced treatment of groundwater; recycled wastewater; and Chino Basin groundwater supplies, which are artificially recharged using recycled water, stormwater runoff, and imported water. By developing more local supplies, IEUA is working to manage demand for imported water. Overall, IEUA projects that in response to growing demand, it will need to increase its water supplies significantly over the next two decades (Figure B-1 and Table B-1). Most notably, IEUA projects that recycled water, Chino Basin Groundwater, and the Chino Desalter will be relied on to fulfill additional demand.

Figure B-1. Projected Water Supplies for the IEUA Service Area[3]



Note: 2000a = actual values; 2005b = estimated values, based on a wet year.

[3] IEUA, Urban Water Management Plan (2005), Executive Summary, p. 6
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/ExecutiveSummary.pdf

Table B-1. Projected Water Supply in IEUA Service Area by Source[4]

Water Source	2005	2010	2015	2020	2025
Urban Water Supply					
Chino Basin Groundwater	94,600	130,900	143,700	157,800	165,000
CDA Supply (Chino Basin GW)	6,250	14,200	14,200	14,200	14,200
Other Basin Groundwater	32,800	32,800	33,600	33,700	33,700
Imported Water (MWD)	60,200	68,800	74,300	80,600	82,500
Recycled Water	7,530	39,000	49,000	58,000	69,000
Local Surface Water	18,700	18,700	18,700	18,700	18,700
Total	220,080	304,400	333,500	363,000	383,100

Note: All above numbers are in acre-feet per year, unless otherwise noted. The above table is important in terms of understanding IEUA's marginal water supplies. Note that the primary sources of additional water supply are projected to be comprised primarily of brackish water desalination from the Chino Basin and additional recycled water. SWP water, as the highest cost water supply, was deemed to be "on the margin" in IEUA's 2005 IRP. Note that IEUA anticipated increasing its allocation from MWD in 2015 to meet its water supply demand. Given the recent federal court decision limiting withdrawals from the Delta to protect the delta smelt, a threatened species, IEUA will need to develop other water supplies to meet its shortfall in 2015. In fact, it is possible that its existing SWP allocation will also be reduced, forcing IEUA to seek other sources much sooner.

Because Chino Basin Groundwater (Figure B-2) represents an important current and future water supply, outlining the basin groundwater rights is important. The Chino Basin was adjudicated by the California Superior Court in 1978. Since then, groundwater quality and quantity has been regulated by the Chino Basin Watermaster.[5] Prior to adjudication, the basin groundwater storage volume had declined by approximately 1,000,000 acre-feet. Since adjudication, levels appear to have stabilized. The Optimum Basin Management Plan (OBMP) states that the basin, therefore, has at least 1,000,000 acre-feet of unused storage capacity. Recycled water represents a viable source for artificial groundwater recharge. All recharged water is not necessarily stored interminably, however. Groundwater flows out of the basin into the Santa Ana River, and increasing basin water levels will increase rates of discharge into the Santa Ana River and its tributaries. These increased rates of discharge should be accounted for in allocating groundwater quantities.[6] Finally, when groundwater supplies are not used by agricultural customers, they are reallocated to the Appropriative Pool.

The quality issues in the Chino Basin also have implications for using recycled water for basin recharge. Because of water quality concerns in the Santa Ana River, the Chino Basin Desalter

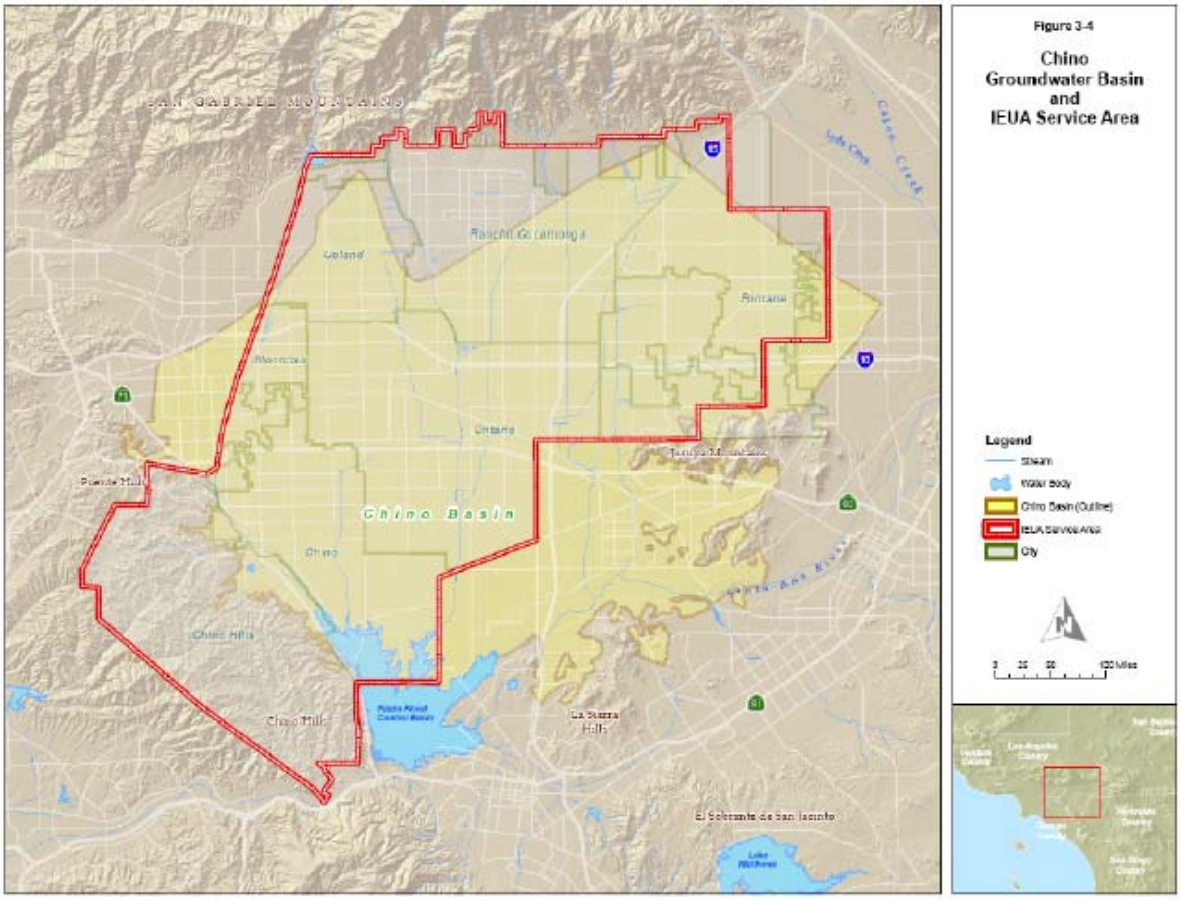
[4] IEUA, Urban Water Management Plan (2005), Table 3-8, page 3-15. Urban Water Supplies: Values are estimates of available supplies from the eight member agencies in their respective UWMP. Other Water Production, Table 3-1.

[5] Miller, Cindy, Scott Burton, and Ken Manning. 2007. "Preserving the Chino Basin", *Civil Engineering*. http://www.cbwm.org/docs/CDA%20Article%20(Civil%20Engineering%20Mag).pdf .

[6] Chino Basin Watermaster (prepared by Wildermuth Environmental, Inc.). 1999. Optimum Basin Management Program, Draft Phase 1 Report, p. 50 – 51. http://www.cbwm.org/docs/engdocs/obmpphas1rep/Text/OBMP_Ph1_Report.pdf

Authority was created in September 2001. The Chino Desalters Project was initiated to withdraw up to 40,000 acre-feet of highly degraded groundwater annually. This water is treated to drinking water quality and distributed to several of IEUA's member agencies. While IEUA does not receive water from the desalters, it does participate in financial aspects of the project and the management of the Chino 1 Desalter.[7]

Figure B-2. Chino Groundwater Basin in IEUA Service Territory[8]



Recycled Water Supply

Currently, IEUA operates four regional recycled water plants that produce tertiary recycled water in compliance with Title 22 of the California Code of Regulations. These plants provide recycled water to the cities of Chino, Chino Hills, Rancho Cucamonga, and Ontario. Currently, most of the effluent flow is discharged into tributaries of the Santa Ana River, which subsequently recharges Orange County's groundwater basin. In 2005, 68,000 acre-feet of

[7] Chino Basin Watermaster (prepared by Wildermuth Environmental, Inc.). 1999. Optimum Basin Management Program, Draft Phase 1 Report. http://www.cbwm.org/docs/engdocs/obmpphas1rep/Text/OBMP_Ph1_Report.pdf

[8] IEUA, Urban Water Management Plan (2005), Chapter 3, p. 6. http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter3.pdf

treated wastewater was produced and used in the following ways: 7,500 acre-feet for outdoor irrigation and industrial processes, 500 acre-feet for groundwater recharge, and 60,000 acre-feet discharged to Santa Ana River.

A 1969 Court judgment requires the discharge of 16,875 acre-feet per year to the Santa Ana River. The discharge goal can be met on an annual basis. As the recycled water system expands, IEUA anticipates that excess flows in summer months may be minimal, as seasonal irrigation demands are significantly higher.

Of the four active wastewater treatment plants, RP-1 has the highest average daily flows at 39.2 mgd. The other three plants, RP-4, RP-5, and CCWRF, have significantly lower daily flows, but their flows are projected to increase substantially over the next ten years (Table B-2). The RP-2 wastewater treatment plant ceased treating wastewater in 2004 due to flood risk created by the Prado Dam Project.[9]

Table B-2. Average Regional Plant Wastewater Daily Flow Projections[10]

Facility	2005 (mgd)	2010 (mgd)	2015 (mgd)
RP-1	39.2	38.9	42.3
RP-4	6.2	12.3	15.0
RP-5	6.6	13.2	15.0
CCWRF	8.8	10.5	10.8
Satellite Plants	-	-	-
Total (mgd)	60.8	74.9	83.1

Recent legal decisions on the Sacramento-San Joaquin Delta and operation of the SWP are expected to reduce SWP deliveries to Southern California. To mitigate the risk of reduced supplies, the IEUA has accelerated expansion of its recycled water treatment and distribution system, as announced in its 2007 Business Plan.[11] The agency proposes facilities that will distribute 50,000 acre-feet per year of recycled water by fiscal year 2010, the maximum available given current treatment plant capacities (Table B-3).

[9] IEUA, Urban Water Management Plan (2005), Chapter 5, p. 8. http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter5.pdf

[10] IEUA, Recycled Water Implementation Plan, November 2005, page ES-2.

[11] IEUA, Recycled Water Three Year Business Plan, November 28, 2007, http://www.ieua.org/docs/Reports/2007/IEUA%20Three%20Year%20RW%20Business%20Plan%20Final%202007.PDF.

Table B-3. Projected Recycled Water Demand Under Accelerated Plan[12]

Annual Goals for Connected Demand and Sales

Year		Connected Demand (AFY)	Increase		Estimated Sales*
			AFY	%	AFY
Base Year	2006/07	13,000		----	----
1	2007/08	21,500	8,500	65%	15,000*
2	2008/09	35,800	22,800	175%	24,000*
3	2009/10	50,000	37,000	285%	35,000*

*Estimated sales lag connections

To meet these goals, IEUA has identified a number of specific actions, including the construction of pipelines, reservoirs, satellite plants, and pumping stations. These actions, outlined in Table B-4 and Figure B-3, are in various stages of completion. Of note, several of the actions are currently awaiting funding or firm commitment from customers. For several of the projects, IEUA has identified funding sources, including the State Revolving Fund (SRF) Loans, State and Federal Grants, U.S. Bureau of Reclamation Title 16 funds, and the Local Resources Program (provided through the MWD).

IEUA's accelerated recycled water development plan will require converting 400-500 irrigation, commercial and industrial sites to recycled water use over a three year period.[13] The cost of this program will be about $123 million, including the cost of developing local laterals. IEUA's member agencies will repay the debt service on the laterals.[14]

[12] IEUA, Recycled Water Three Year Business Plan, November 28, 2007, p.6.
[13] IEUA, Recycled Water Three Year Business Plan, November 28, 2007, p.6.
[14] IEUA, Recycled Water Three Year Business Plan, November 28, 2007, Financial Plan, p.5-6.

Table B-4. Projected Direct Use & Groundwater Recharge Capacity Added[15]

Projected Direct Reuse Added Capacity By Agency (AFY)

Member Agency	Existing	2007/08	2008/09	2009/10	2010/11	Subtotal (AFY)
Chino	2,304	2,490	750			5,544
Chino Hills	1,631	750		750		3,131
CVWD	600	210	2,919	594		4,323
Fontana				1,656	5,000	6,656
MVWD		366				366
Ontario	3,760	4,194	728			8,682
Upland		40		610		650
IEUA	2,674	200				2,874
Pomona				1,550		1,550
JCSD					1,850	1,850
Total*	**10,969**	**8,200**	**4,400**	**5,200**	**6,800**	**35,600**

*Ready to sell

Annual Recycled Water Added Capacity Summary (AFY)

Type	Existing	2007/08	2008/09	2009/10	2010/11	Subtotal (AFY)
Direct Use	10,969	8,250	4,397	5,160	6,850	35,600
Groundwater Recharge	2,989	1,500	9,700	2,400	1,000	17,500
Total	**13,958**	**9,700**	**14,000**	**7,600**	**7,800**	**53,100**

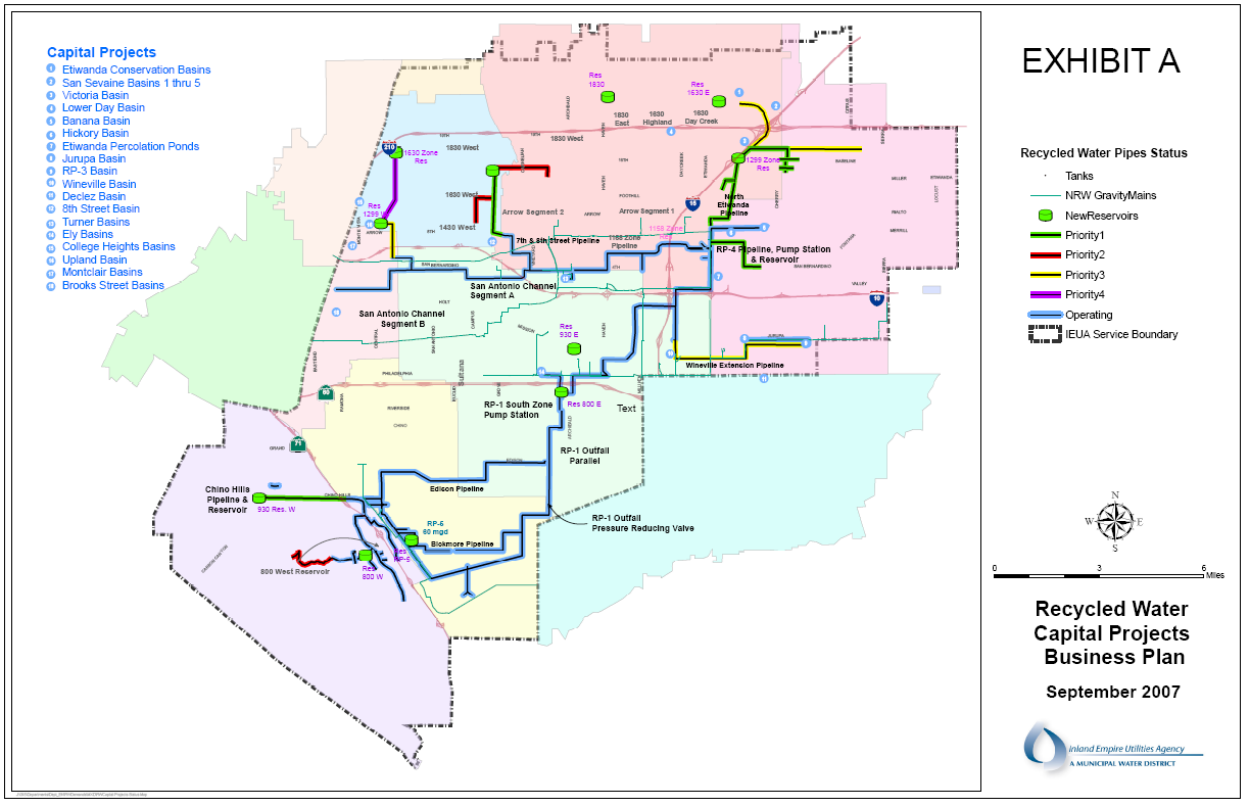
IEUA provides both financial and technical assistance to its recycled water customers. Through its accelerated plan, IEUA will fund local laterals in a manner consistent with the State's low interest loan program (the SRF). Under this program, loans to public and private customers are to be repaid within five years based on the price difference between potable and recycled water. For public facilities, this financing will incur the low interest rates of the SRF program (2.5%), and for private customers, interest rates will be at IEUA's average bond rate (currently 4.5%).

Given the uncertainty surrounding future SWP deliveries, the MWD accelerated its Public Sector Program in August 2007 in an effort to manage demand for potable water supplies. As part of this program, MWD provides an up-front payment of $250 per acre-foot of additional recycled water used through new service connections for two years, as long as it will displace potable demand.[16] Payment is based on historic use of potable water. The eligible facility must demonstrate an operational connection and plumbing system to earn the payment.

[15] IEUA, Recycled Water Three Year Business Plan, November 28, 2007, p.19.

[16] Payments cannot exceed the on-site retrofit cost, and only apply to new connections.

Figure B-3. Current Status and Anticipated Construction Projects in IEUA's Recycled Water System[17]



Water Demand

IEUA provides services to the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, and Upland, in addition to the Monte Vista and Cucamonga Valley Water Districts, the Fontana Water Company, and the San Antonio Water Company. Recycled water is delivered primarily to the Cucamonga Valley Water District and the Cities of Chino, Chino Hills, and Ontario. Eight retail water agencies, described in detail in Table B-5 and illustrated in Figure B-4, provide water service to residents in the IEUA's service area (City of Chino, City of Chino Hills, Cucamonga Valley Water District, Fontana Water Company, Monte Vista Water District, City of Ontario, San Antonio Water Company, and City of Upland). As a wholesale water agency, IEUA does not provide any retail sales to other agencies. IEUA does, however, deliver recycled water to a few large end users, including El Prado Golf Course, Prado Regional Park, and Reliant Energy.

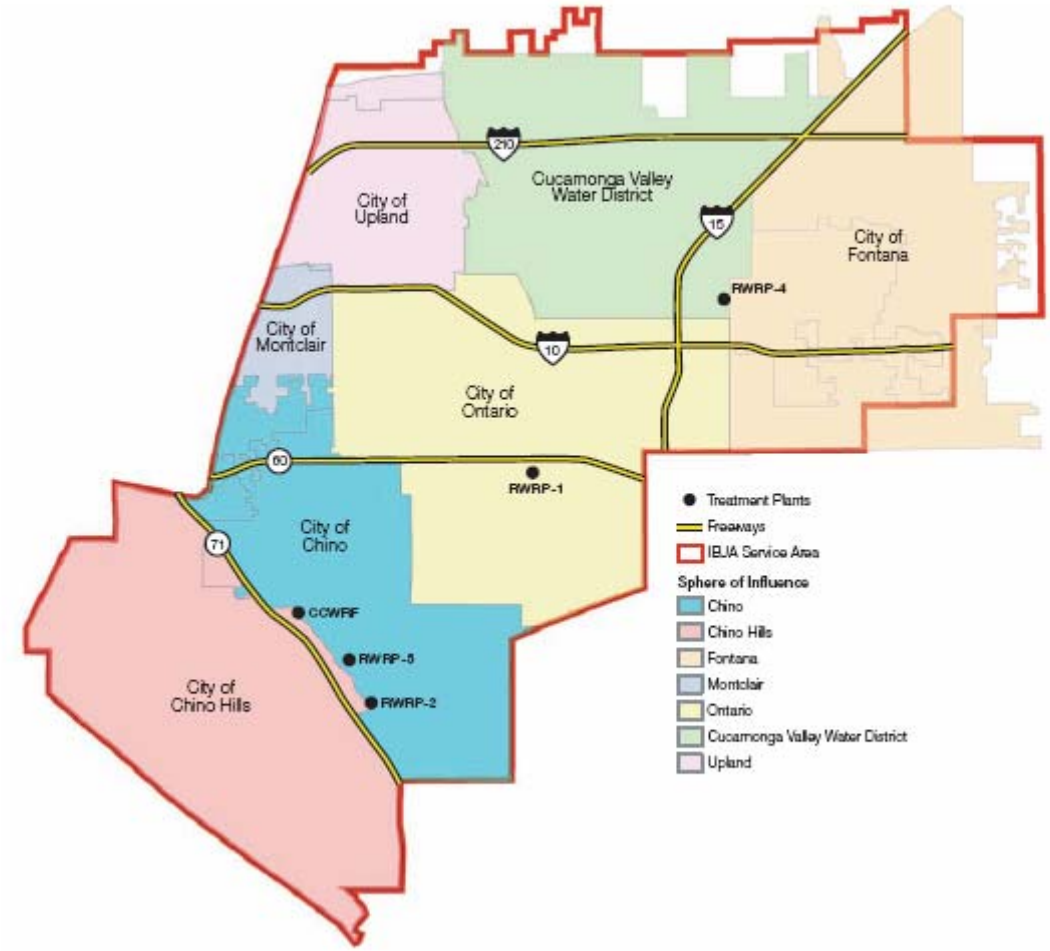
[17] IEUA, Recycled Water Three Year Business Plan, November 28, 2007

Table B-5. Water Agencies Within IEUA Service Area[18]

City of Chino	The City of Chino serves water to approximately 73,000 residents of the city and some unincorporated areas in San Bernardino County.
City of Chino Hills	The City of Chino Hills provides water to approximately 79,000 residents of the City within its 46 square mile service area. The City service area also includes small portions of Chino and Pomona.
Cucamonga Valley Water District	Cucamonga Valley Water District is a retail agency that provides water to approximately 160,000 residents within a 47 square mile area comprised mainly of the City of Rancho Cucamonga. The District also provides water to small portions of the cities of Upland, Ontario, Fontana, and unincorporated areas of San Bernardino County.
Fontana Water Company	Fontana Water Company is a retail investor-owned utility company that provides water to approximately 160,000 residents mainly in the City of Fontana, and also serves portions of the cities of Rancho Cucamonga and Rialto, outside the Agency service area.
Monte Vista Water District	Monte Vista Water District is a county water district founded in 1927 that provides retail water services to a population of 46,500 in the City of Montclair, portions of the City of Chino, and unincorporated areas of San Bernardino County between Chino, Ontario, and Pomona. The District is also a wholesale water supplier to the City of Chino Hills, providing up to 21 million gallons of water per day.
City of Ontario	The City of Ontario supplies water to approximately 169,000 residents of the City and some unincorporated areas of San Bernardino County. The City of Ontario also serves a small portion of the City of Rancho Cucamonga.
San Antonio Water Company	San Antonio Water Company is a retail investor-owned utility company that provides water to approximately 3,150 residents in the unincorporated area of the City of Upland.
City of Upland	The City of Upland encompasses 15 square miles and serves approximately 73,000 residents.

[18] IEUA, Urban Water Management Plan (2005), Table 1-2, page 1-6.

Figure B-4. IEUA Service Area and Contracting Agencies' Spheres of Influence[19]



The primary driver of growth in water demand in the IEUA service area is high urban population growth. The annual average population growth between 2000 and 2005 was over 2.5%, corresponding to an absolute increase from 708,000 people in 2000 to approximately 814,000 in 2005.[20] The population within IEUA's service area is expected to continue to grow over the next ten years, reaching 983,000 by 2015, a population increase of 21%.[21]

IEUA's service area has urbanized substantially since 1950. In fact, urban areas now constitute about 55% of the total land use within the Chino Basin. In recent years, urban use has dominated water demands within the Agency's service area (88% of total demand in 2005). The

[19] IEUA, Operating and Capital Program Budget Fiscal Year 2006/07, Volume 2 June 2006, page 12.
[20] IEUA, Urban Water Management Plan, 2005, page 2-2. http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter2.pdf.
[21] Despite population growth, total water demand decreased between 2004 and 2005. This decrease may be attributable, in part, to 2005 being a particularly wet hydrological year, but also likely results from the IEUA's conservation programs.

remaining water has been used for agricultural purposes (12% in 2005). Further conversion of agricultural lands to urban use will increase municipal and industrial demand for water, with projections of 95% of water for urban uses in 2015 and the remaining 5% for agricultural uses. One of the challenges in the transition from agricultural to urban has been an increase in urban hardscape, diverting about 50,000 acre-feet of runoff that ordinarily would have recharged the local groundwater basin to storm drains.

IEUA has implemented conservation programs to offset a portion of the growing water demand. By 2015, projected conservation savings are 28,700 acre-feet per year, which reduces total urban demand from 287,000 acre-feet per year to 258,300 acre-feet per year. Water used for agricultural purposes, which is pumped directly from private wells, is expected to decline from 30,000 acre-feet per year in 2005 to 15,000 acre-feet per year in 2015.

Within the IEUA service district, single family residences represent the single largest sector of demand, at 57%. Commercial and industrial use follows with 20% of total demand, multifamily residences account for 11% of water demands, and "other uses," primarily system losses, account for the remaining 12% of water demanded (Figure B-5).[22] As land in the IEUA service area continues to be converted from agricultural to urban uses, characteristics of water demand will change. By 2025, 98% of water demanded is projected to be for urban uses, with the remaining 2% for agricultural uses.[23]

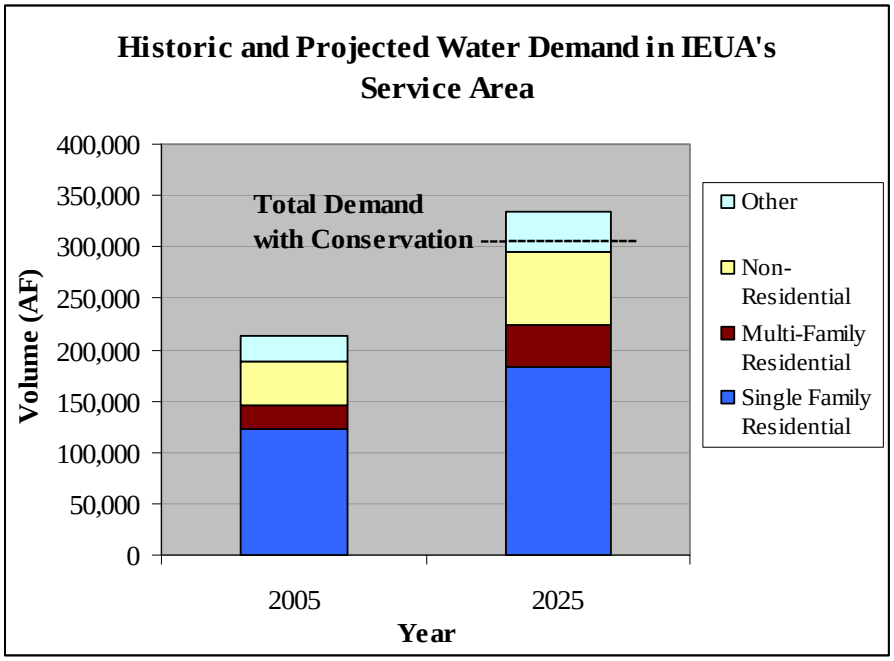
The IEUA projects that within its service area, the Cucamonga Valley Water District will have the largest demand in 2015, at 72,000 acre-feet per year (Table B-6). IEUA projects that demand in the City of Ontario will reach 66,600 acre-feet per year by 2015 and by 2025, will be 97 percent greater than the volume demanded in 2005. The City of Ontario projects a slightly lower total water demand in 2015—52,100 acre-feet per year of potable water and 8,800 acre-feet per year of recycled water. (These projections may differ because of slightly different accounting methodologies (e.g., including water losses) or the population growth model employed).[24]

[22] IEUA, Urban Water Management Plan, 2005, page 2-8 http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter2.pdf.

[23] IEUA, Urban Water Management Plan, 2005, page 2-13 http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter2.pdf

[24] Because of its unusually high load growth, the City of Ontario was selected for further study. That case study is in Appendix D.

Figure B-5. Urban Water Use[25]



Note: The 2025 estimates do not include IEUA's projected conservation savings through demand management programs, which are estimated at 33,000 acre-feet (making total demand in 2025 only 301,000 acre-feet).

[25] IEUA, Urban Water Management Plan, 2005, page 2-16
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter2.pdf

Table B-6. Water Demand in IEUA's Service Area[26]

Demand	2005	2010	2015	2020	2025
Municipal					
Agency					
City of Chino	18,400	21,900	26,200	29,900	30,100
City of Chino Hills	16,726	22,700	24,700	25,400	26,400
Cucamonga Valley Water District	51,500	65,400	72,500	79,500	86,000
Fontana Water Company	46,600	52,000	57,000	62,700	66,000
Monte Vista Water District	12,463	13,200	14,100	14,800	15,500
City of Ontario	43,000	61,300	66,600	76,600	84,300
San Antonio Water Company	3,500	3,600	3,400	3,400	3,500
City of Upland	22,000	22,500	22,500	22,600	22,600
Subtotal	214,189	262,600	287,000	314,900	334,400
Projected Conservation Savings	8,600	26,260	28,700	31,490	33,440
Adjusted Projected Demand	205,589	236,340	258,300	283,410	300,960
Agricultural	30,000	22,000	15,000	7,000	7,000
Total	235,189	258,340	273,300	290,410	307,960

Note: All above numbers are in acre-feet per year, unless otherwise noted. Note that while the amount of demand presently being met through conservation is about 4%, IEUA's IRP targets meeting 10% of its water supply demand through conservation by 2010.

Recycled Water Demand

Currently over 100 customers in the cities of Chino, Chino Hills, Ontario, and Rancho Cucamonga are receiving recycled water. These customers have a combined recycled water demand of about 8,000 AFY, about half of which was used for municipal irrigation in 2005 (Figure B-6). Potential users include both customers that currently rely solely on potable water and customers in areas of new development. The potential customers are classified into the following five categories:

- Agricultural Users
- Spreading Basins (Groundwater Recharge)
- Industrial Users
- New Developments
- Irrigation Users (Municipal)

In its 2005 Recycled Water Implementation Plan, IEUA estimated demand for about 2,000 users could exceed 93,000 acre-feet per year. Current uses total 7,942 acre-feet per year.

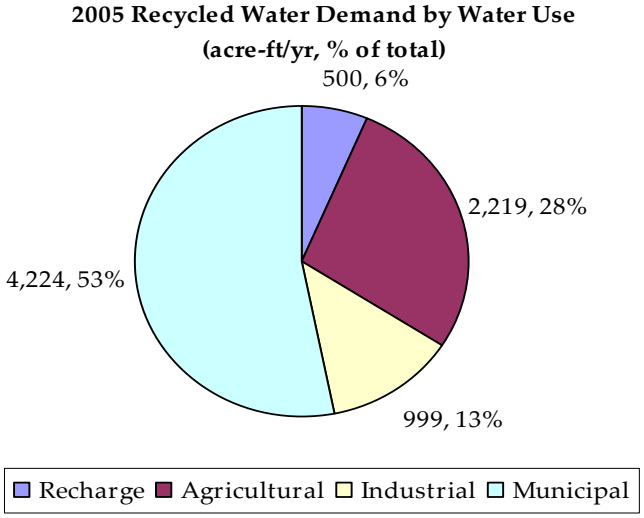
[26] IEUA, 2005 Urban Water Management Plan. Years 2010-2025 compiled from Table 2-7, Water Demand Projection by Local Retail Agencies and Table 2-8, 2005-2025 Projected Water Demand with Conservation. 2005 data is from Table 2-3 Data from IEUA Annual Production Reports. Total is estimated and does not include IEUA recycled water use. 2010 and 2015 data, Table 2-7, page 2-15. Demand projections taken from local agency's UWMPs.

Table B-7. Summary of Projected Recycled Water Use[27]

User Category	Number of Customers		Demand (acre-ft/yr)	
	Existing	Future	Existing	Future
Agricultural	6	126	2,219	6,975
Groundwater Recharge	1	17	500	26,800
Industrial	8	62	1,002	5,843
New Developments	0	12	0	15,014
Irrigation (Municipal)	87	1,798	4,221	38,407
Total	102	2,015	7,942	93,038

Note: Future customers and demand will be added to IEUA's distribution system as projects are constructed. For comparison, existing available flows are 50,000 acre-feet/yr.

Figure B-6. Recycled Water Demand by End Use In 2005

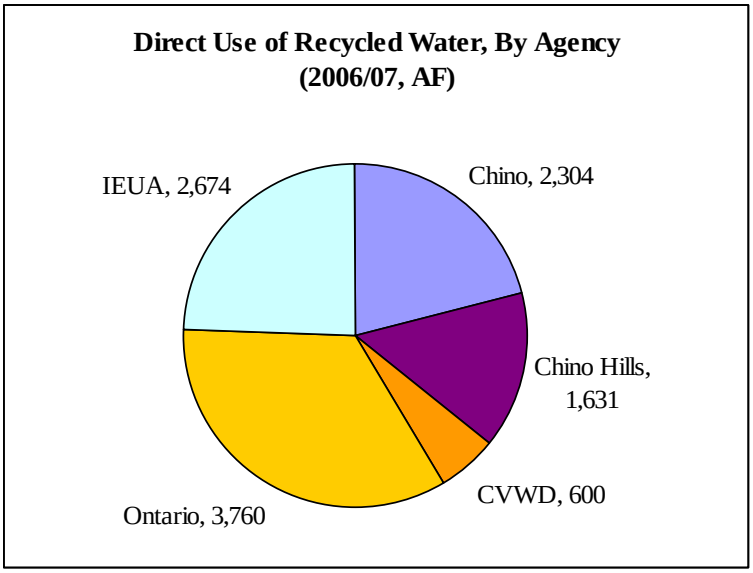


In 2006/2007, most recycled water in the IEUA service area was used in the City of Ontario (Figure B-7). Although IEUA is a wholesale agency, the agency has several direct (retail) customers.[28] The largest of these customers are the El Prado Park and the Reliant Energy Corporation's Etiwanda Plant, a 1,030 MW natural gas-fired power plant that uses recycled water for cooling and other needs. The IEUA projects increased demand for recycled water in all agencies, with the Cities of Ontario, Fontana, and Chino representing the biggest customers in 2010-2011 (Figure B-8).

[27] IEUA, Recycled Water Implementation Plan, November 2005, Table ES-2.

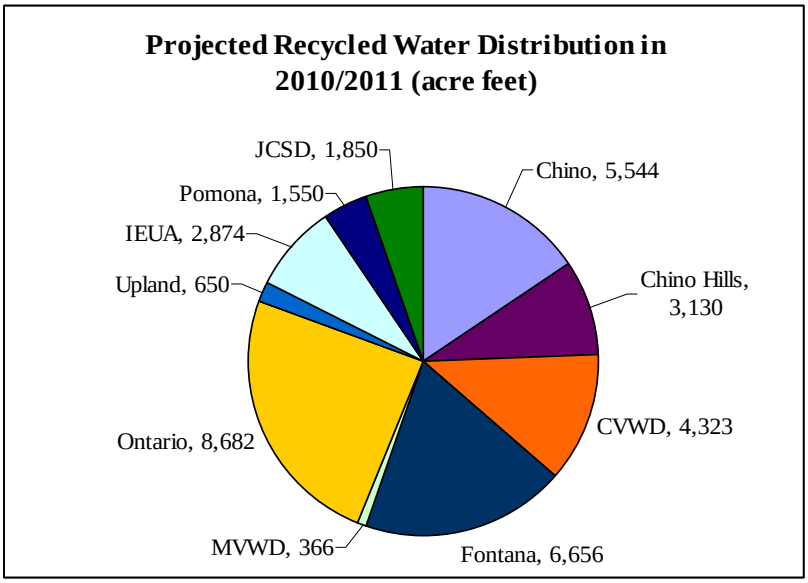
[28] As a regional wholesaler, IEUA's default policy is to deal only with cities or water retailers. They have made some exceptions – e.g., if a very large water user requested connection to its regional recycled water pipeline.

Figure B-7. Direct Use of Recycled Water in IEUA's Service Area 2006-2007[29]



Note: The above excludes groundwater recharge operations.

Figure B-8. Projected Distribution of Recycled Water for Direct Use 2010/1011[30]



Note: These figures do not include recycled water used in groundwater recharge basins (5,390 acre-feet for existing basins, and an additional 18,560 for an expanded system in 2010/2011).

[29] IEUA, Recycled Water Three Year Business Plan, November 28, 2007.
[30] IEUA, Recycled Water Three Year Business Plan, November 28, 2007.

Additional Factors

According to IEUA, after customer perception, costs are the most significant barrier to greater recycled water development. Public health and safety regulations require that recycled water supplies be kept separate from potable water supplies. Dual plumbing is very expensive.

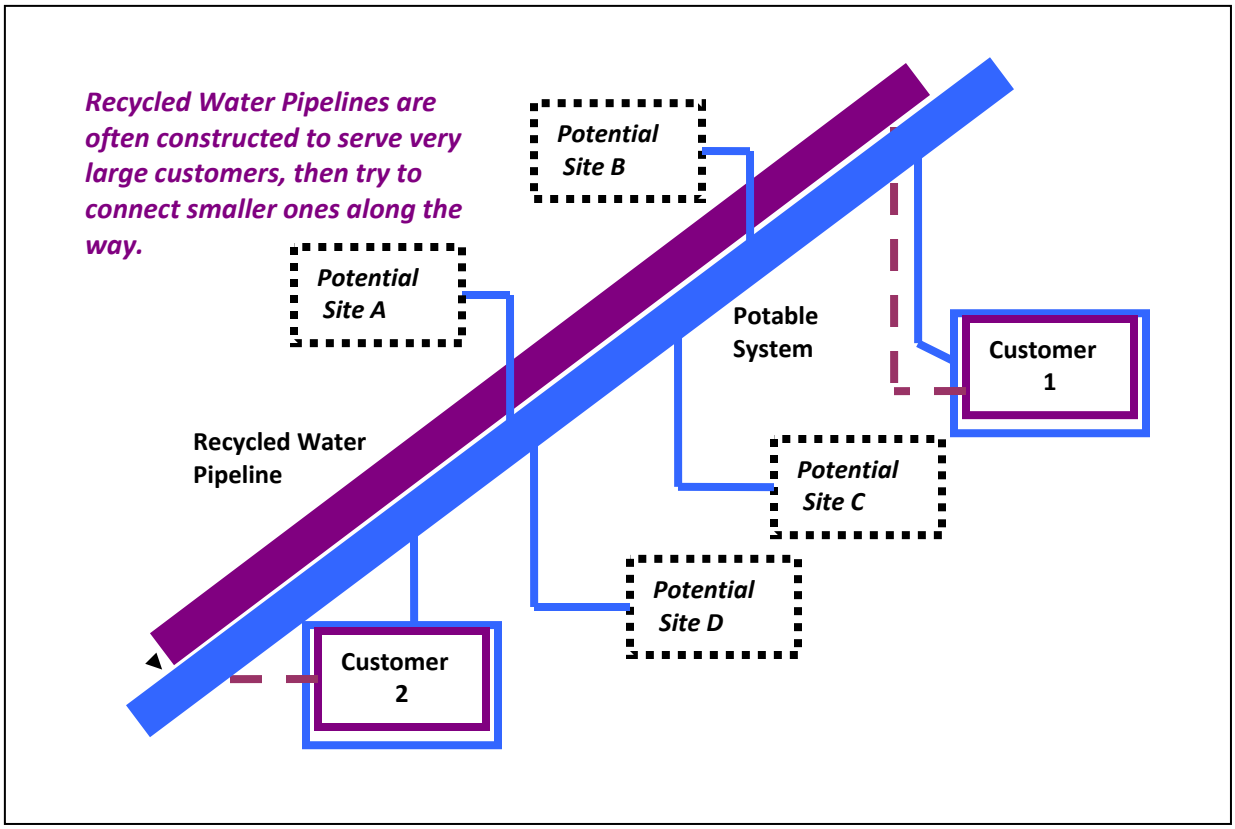
Three primary types of systems are needed to use recycled water:

- Agencies and wholesalers must construct or extend recycled water pipelines;
- Customers must connect to recycled water mains; and
- Customers may need to retrofit plumbing systems.

The magnitude of these costs and the responsibility for paying them vary widely with the system characteristics of the recycled water providers (water and wastewater agencies), the distance and topography between the recycled water source(s) and qualified end uses, and the complexity of dual piping systems that are needed to enable use of recycled water at the end use customer's site. In addition, there is significant variability among water and wastewater agencies as to how cost responsibilities are allocated between the water retailer and its customer, the types and extent of technical assistance offered, and the magnitude and types of financial incentives available.

In developing recycled water infrastructure, providers often seek large water users such as golf courses or industrial customers that can use recycled water in their processes. They then construct the pipeline in hopes of identifying other customers along the route that can switch at least a portion of their water demand to recycled water. Often, customers that are financially stressed, such as schools, are interested in accessing lower cost recycled water supplies to serve outdoor irrigation purposes. However, the dual plumbing costs may be prohibitive.

Figure B-9. "Typical" Build-Out of Recycled Water Distribution Systems



IEUA explains: "The objective at each potential use site is the conversion of potable water use (in part or whole) to recycled water use. In order to minimize the effect of conversion on the end user, the differences between potable water service and recycled water service should be evaluated during preliminary assessments. Differences in service pressure and water quality are usually negligible, but should be examined before conversion. Depending on the complexity of the site, and the available information, the tasks that are required and the associated resources will be adjusted."[31]

The following work is needed to convert a retrofit site to recycled water use:[32]

Basic Tasks

1. Initial customer contact and ongoing customer development and prioritize the largest users
2. Water service connection design
3. Site assessment, condition documentation, and as-built drawings
4. Preparation of an Engineer's Report
5. Obtain approval of the retrofit from the Department of Public Health (DPH)

[31] IEUA, Recycled Water Three Year Business Plan, November 28, 2007, p. 20.
[32] IEUA, Recycled Water Three Year Business Plan, November 28, 2007, p. 23.

6. Construction of onsite retrofit connections and system marking
7. Cross Connection Shutdown Testing
8. Onsite Supervisor and Member Agency Staff Training
9. Customer service program

Program Management Tasks

1. IEUA program management assistance and inter-departmental/inter-agency communication
2. Administrative Support and Record Keeping/Data Input/Information Bulletins
3. Onsite Retrofit Financing Assistance Support
4. Finance agreements, as appropriate, with local and public agencies for each site

Actual costs to retrofit a customer's site for dual plumbing depend on the complexity of the end user's water system. The below table used by IEUA for internal planning purposes illustrates the wide variability in customer costs that they have observed.

Table B-8. Costs of Retrofitting Customer Sites for Recycled Water

Type	Subtype	Site Assessment/ As-built Drawings	Engineer's Reports	Onsite Retrofit Construction	Cross Connection Testing (5)	Total
Irrigation	Landscape Irrigation	$0 - $5,000	$1,000 - $10,000	$5,000 - $15,000	$1,500 - $3,000	$7,500 - $33,000
	Parks & Schools	$2,500 - $7,500	$ 2,000 - $25,000	$10,000 - $50,000	$3,000 - $6,000	$17,500 - $88,500
	Golf Course	$ 5,000 - $15,000	$15,000 - $50,000	$ 50,000 - $250,000	$ 3,000 - $10,000	$ 73,000 - $325,000
Industrial	Cooling Towers	$ 5,000 - $20,000	$15,000 - $50,000	$ 5,000 - $250,000	$ 3,000 - $10,000	$ 28,000 - $330,000
	Industrial Process	$75,000	$ 50,000 - $100,000	$ 50,000 - $500,000	$ 3,000 - $10,000	$178,000 - $685,000

Source: IEUA

In recent years, IEUA has invested heavily in recycled water infrastructure. These projects have been financed primarily by grants and low interest state loans. State Revolving Fund (SRF) loans, used for development of Phase 2 projects, charge a 2.5% annual interest rate. The debt must be repaid over 20 years. The IEUA's application to receive these loans assumes that recycled supplies are fully used within six years of project construction. In addition, the MWD offsets some of the cost of delivering recycled water, offering $154/acre-feet to member agencies for any recycled water that is applied to direct use, up to 13,500 acre-feet per year. This rebate does not apply to groundwater recharge.

IEUA, a wholesale water retailer, sells recycled water to its member agencies at $63 per acre-foot, 20% of the cost of imported potable water. IEUA funds the cost of the recycled water pipeline. Its wholesale customers decide whether to pay for the costs to connect retail water

users to the recycled water system or whether it is a customer cost. Typically, the retail water customer pays all costs of re-plumbing its own facilities (i.e., after meter delivery point to the perimeter of its premises).

Previously, the IEUA sold recycled water at 80% of the cost of potable water supplies, but this did not create a sufficient financial incentive. Member agencies, in turn, charge end users a higher rate (typically 30 to 50% of potable water costs), which varies from agency to agency depending on their individual financial needs (i.e., costs of distribution, operation, and maintenance, potable water costs, and other factors).[33]

IEUA has implemented several financial incentive and penalty programs. Most notably, large water customers that have the option to use recycled water but choose *not* to use it may be subject to a surcharge on the amount of potable water used of 50% of the highest wholesale potable water rate.[34] Some industrial customers generate non-reclaimable wastewater (NRW). These customers who elect to use recycled water will receive a "pass through" rate of $45 per acre-foot if they use the brine disposal system. NRW customers that choose not to use recycled water will pay the normal NRW water rates. Once they convert to using recycled water, however, they will receive a credit for the difference (accumulated over time) between the NRW rate and the "pass through" rate. This credit is intended to offset initial engineering fees and incremental infrastructure costs incurred to use recycled water.[35]

Policies

All California water agencies are subject to California's statewide recycled water policies, described in "The Purple Book."[36] In addition, the IEUA has developed a number of policies to further encourage recycled water use. Several of these policies are manifest in the rate structures described above; others are described below.

To enhance development of recycled water, the IEUA has committed to constructing (and owning) regional water recycling facilities. These facilities may include pumps, distribution pipelines, and treatment facilities that serve more than one contracting agency or are used for groundwater recharge. Local agencies, in turn, are responsible for designing and constructing local laterals or distribution lines that serve only one member agency or customers within an

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[33] IEUA, 2005 Urban Water Management Plan, p. 5-20.
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter5.pdf

[34] Ordinance #75, as of May 2002. Ordinance 75 states that various California laws require the beneficial use of water, and establishes that using potable water for irrigation and industrial uses, when recycled water is available, qualifies as a waste, not a beneficial use. Given this, IEUA and its contracting agencies agreed to maximize the use of recycled water for beneficial uses, through various financial penalties.

[35] IEUA, Urban Water Management Plan, 2005, p. 5-20
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter5.pdf

[36] California Department of Health Services Division of Drinking Water and Environmental Management, June 2001. *California Health Laws Related to Recycled Water: "The Purple Book"*
http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Recharge/Purplebookupdate6-01.PDF

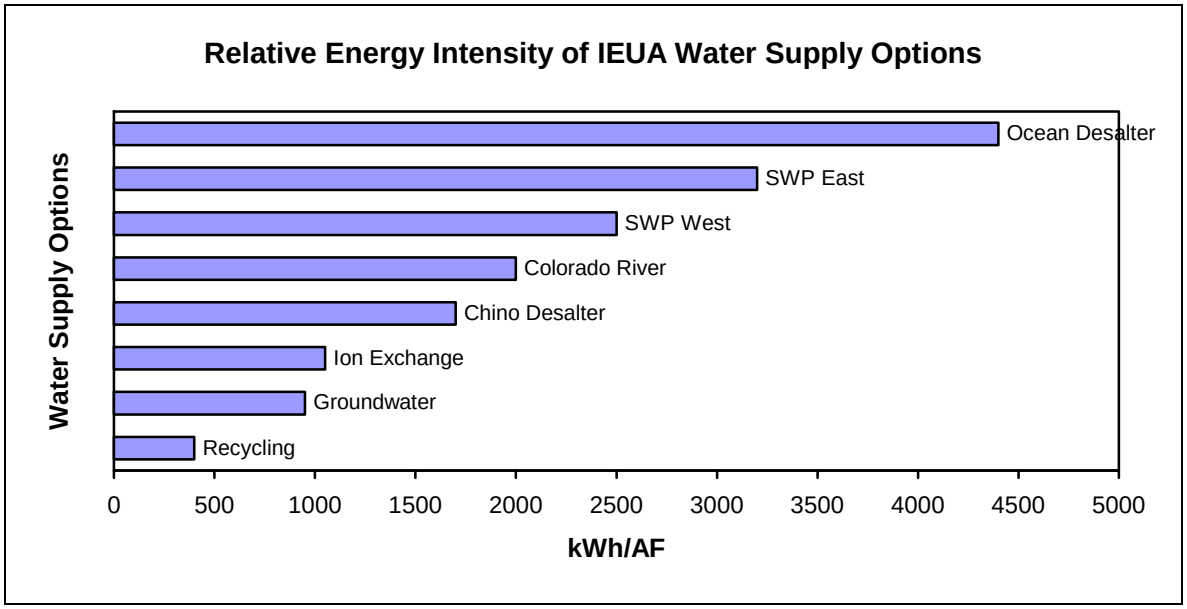
agency. The IEUA does, however, provide financial or technical assistance to member agencies.[37]

Currently, recycled water supplies are primarily used for irrigation and groundwater recharge. While groundwater recharge is a reliable end user (agencies are allowed to recharge throughout the year except during major storm events), the IEUA encourages direct use of recycled water, a higher value use than groundwater recharge. Member agencies receive recycled water for groundwater recharge depending on annual flow conditions and availability. Deliveries are determined by annual flow contributions from member agencies and are allocated on a pro rata basis.[38] To further encourage direct use, all new developments, including residential, commercial, and industrial, are constructed with dual plumbing to enable switching to recycled water once it becomes available.[39]

Energy Profile

In 2001, IEUA hired Professor Bob Wilkinson of the University of California's Bren School of Environmental Science and Management to evaluate the energy intensity of IEUA's water supply options in 2001. The table below resulted from that collaboration.

Figure B-10. Relative Energy Intensity of IEUA Water Supply Options



Courtesy of Prof. Bob Wilkinson, UCSB and Martha Davis, IEUA.

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[37] IEUA, 2005 Urban Water Management Plan, p. 5-2 and 5-3.
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter5.pdf
[38] IEUA, 2005 Urban Water Management Plan, p. 5-16
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter5.pdf
[39]IEUA, 2005 Urban Water Management Plan, p. 5-18
http://www.ieua.org/docs/Reports/2005%20UWMP/chapters/Chapter5.pdf

As shown in Professor Wilkinson's study, energy is used throughout the water production process. It is used to convey, treat, distribute, and pressurize water for the customer. After its end use, energy is used to process and dispose of wastewater.

For this study, three main sources of IEUA water were analyzed: State Water Project supplies from the Sacramento-San Joaquin River Delta, recycled water, and groundwater pumped and treated by the Chino Desalter Authority.

Table B-9. Build-Up of Energy Along the Water Cycle in IEUA's Primary Water Supplies

Source	Energy Use (kWh/acre-feet)			
	Conveyance	Treatment	Distribution	Total
State Water Project, East Branch	3,200	24	0	3,224
Groundwater from the Chino Desalter Authority (CDA)	(included in treatment estimate)	1,816	333	2,149
Recycled Water	0	0	333	534

Note: Recycled water is a by-product of wastewater treatment. The energy used to treat wastewater for safe discharge is incurred whether or not the effluent is used for a beneficial purpose. Consequently, the energy used to treat water to the level of quality required by regulation for safe discharge is not considered in the energy intensity of the recycled water supply.

State Water Project Supplies

State Project water is conveyed from the Sacramento-San Joaquin Delta to Southern California via the California Aqueduct. In the process, water is lifted over 3,000 feet by a series of pumping plants. South of the Tehachapi Pass and the Edmonston pumping station, the aqueduct splits into the West and East Branches. IEUA receives water from the East Branch, which is pumped through three more stations before collecting in Silverwood Lake (a reservoir). Water is released from the lake, passes through the Devil's Canyon generating station, and is diverted to the IEUA service territory through the Rialto and Etiwanda pipelines.

From the Devil's Canyon after-bay, the Rialto Feeder diverts water to the Agua de Lejos Plant, managed by the Water Facilities Authority (WFA), where it is treated to potable standards. The water is then delivered to five cities or water agencies in the IEUA service area: the cities of Chino, Chino Hills, Ontario, Upland, and the Monte Vista Water District. The water flows by gravity to these five cities/agencies, requiring no additional energy inputs. Within each city or agency's service territory, additional pumping may be necessary, but this is managed by each city or agency.

In addition to the supplies treated by the WFA at the Agua de Lejos Plant, IEUA has rights to SWP water delivered to two treatment plants in the Cucamonga Valley Water District (CVWD) – the Royer-Nesbit and Lloyd G. Michael plants. Water flows to these pipes via the Etiwanda Pipeline which originates in the Devil's Canyon after-bay. Because IEUA does not provide the energy for these plants and their supplies do not service the City of Ontario, the energy used for treatment in each of these plants is not quantified.

Finally, several agricultural users receive SWP water from IEUA. Agricultural users receive water from numerous turnouts on the Etiwanda Pipeline. IEUA does not treat or pump any of this water.

The water delivered by the SWP is purchased through the MWD, which supplies wholesale water to its 26 member agencies. IEUA does not have firm, long-term contracts with MWD. For IEUA and the Chino Basin, the imported SWP supplies are a marginal source of water; i.e., due to its high cost, it is the last water supply used by IEUA to meet its demand. Since IEUA has neither a firm right nor a firm obligation to take a prescribed quantity of SWP water, IEUA can reduce its SWP purchases by reducing water consumption through conservation and efficiency, and/or by increasing local supplies.[40]

Chino Desalter Authority Supplies[41]

The Chino Desalter pumps brackish groundwater from the Chino Basin, treats it, and delivers it to several water agencies. After treatment the water is of potable quality.

The Chino Desalter Authority (CDA) was established in 2001 by seven cities and water agencies in the Chino Basin. The CDA has multiple purposes and benefits.

- CDA wells withdraw Chino Basin groundwater, which is high in dissolved salts and nitrates. CDA then treats it to potable standards and delivers the desalted water to end users in the Chino Basin.

- Through this process, the CDA improves groundwater basin quality and provides hydraulic management of groundwater discharge into the Santa Ana River and downstream basins.

- The CDA also provides a local supply of water to local cities and agencies.

The CDA's wells and desalter are located at the southern end of the Chino Basin. The groundwater aquifer is recharged in the northern parts of the basin, and groundwater flows toward the south. The wells and desalter withdraw the brackish groundwater and treat it using reverse osmosis. Potable water is then distributed to member agencies, and the concentrated brine is discharged to the Pacific Ocean via the Santa Ana Regional Interceptor line (aka "SARI").

The CDA has two desalters. The first, Chino I Desalter, began operating in 2000 and was expanded in 2005. The Chino II Desalter began operating in 2006. Both operate continuously and are managed to maximize throughput, using as much of the facilities' capacity as possible.

[40] Historically, IEUA also received supplies from the Colorado River (also purchased through the MWD). In recent years, however, salinity concerns in the Chino Basin caused IEUA to discontinue Colorado River deliveries.

[41] Data Sources: Chino Desalter Authority, Urban Water Management Plan and Personal Communication, Gary Bankston (IEUA) on January 7, 2008.

Power needs for the Chino I Desalter in 2005, 2006, and 2007 are listed in Table B-9. Approximately 25% of the facility's power needs is generated using methane produced by the IEUA from its digesters. In the future, IEUA plans to eventually provide enough biogas to meet 75% of the CDA's power requirements.

Table B-10. Power Use at the Chino I Desalter

Year	Power Use (MWh)
2005	11,349
2006	14,627
2007	13,580*

Note: Power use increased between 2005 and 2006 because of facility expansion. 2007 power use was projected based on information available as of July 2007.

Increases in recycled water are not likely to offset potable supplies from the desalters, which are treated as a base-loaded supply in IEUA's integrated resource plan.

Recycled Water

As described earlier, IEUA has four primary water recycling facilities. These facilities collect wastewater from the IEUA's service area and treat the wastewater to tertiary standards. The wastewater flows primarily by gravity to the treatment plants. The treatment plants use energy to treat the water to tertiary standards, then either distribute the reclaimed water to end users or discharge it into the Santa Ana River.

Because recycled water is created through the process of wastewater treatment, the energy intensity of recycled water is computed after treating wastewater to the level of quality required by regulations for safe discharge. The energy intensity of recycled water is thus:

- The amount of energy needed to treat wastewater effluent to a quality higher than that required by regulation for safe discharge (e.g., treating secondary effluent to tertiary for the purpose of being able to apply the recycled water to higher beneficial uses), and

- The amount of energy needed to deliver the recycled water to customers.

In the IEUA's service area, wastewater must be treated to tertiary standards before being discharged in the Santa Ana River. The incremental energy required to produce recycled water, therefore, is zero. The energy needed to deliver recycled water to customers is higher than zero since in most cases, wastewater treatment plants are sited at lower elevations to allow collection of wastewater via gravity. Consequently, recycled water must often be pumped uphill to end uses. The amount of distribution energy needed to deliver recycled water to qualified end uses is about 333 kilowatt hours per acre-foot.

Energy Requirements by Segment of the Water Use Cycle

The energy requirements of IEUA's three primary water supply sources – SWP, Chino Desalter, and recycled water – vary significantly. The water supplies are conveyed, treated, and distributed to member agencies or end users in the IEUA service area. Where possible, the energy intensity of each of these steps is presented in Table B-10.

Table B-11. Energy Used in Developing IEUA's Water Supplies

Stage	Facility		Water Type	Annual Production (af/yr)	Energy Intensity (kWh/af)	Annual Energy Usage (MWh)	Principal Energy Supplier
Conveyance	SWP – East Branch to Devil's Canyon		Raw	60,200	3,200	192,640	DWR
	Groundwater via CDA (included in treatment estimate)		Potable	6,250	See treatment estimate	0	SCE
	Waste Water (conveyance to WWTP)	RP-1	Waste	43,910	0	0	SCE/IEUA
		RP-4	Waste	6,945		0	SCE/IEUA
		RP-5	Waste	7,393		0	SCE/IEUA
		CCWRF	Waste	9,857		0	SCE/IEUA
Treatment	Agua de Lejos Plant (WFA)		Potable	37,071	24	890	DWR/SCE
	Groundwater via CDA (withdrawal and treatment)		Potable	6,250	1,816	12,612	SCE
	Recycled Water	RP-1	Tertiary	43,910	0	13,689	SCE/IEUA
		RP-4	Tertiary	6,945			SCE/IEUA
		RP-5	Tertiary	7,393			SCE/IEUA
		CCWRF	Tertiary	9,857			SCE/IEUA
Distribution	Agua de Lejos Plant (WFA)		Potable	37,071	0	0	DWR
	Groundwater via CDA		Potable	6,250	333	2,088	SCE
	Recycled Water	RP-1	Tertiary	43,910	333	22,679	SCE/IEUA
		RP-4	Tertiary	6,945			SCE/IEUA
		RP-5	Tertiary	7,393			SCE/IEUA
		CCWRF	Tertiary	9,857			SCE/IEUA

Notes:

[1] IEUA is required to treat all wastewater to tertiary standards before discharging into the Santa Ana River. Therefore, energy used to treat wastewater is a "sunk cost" that is not considered in the energy intensity of recycled water.

[2] Most of the currently available recycled water is being discharged into the Santa Ana River for environmental purposes. The volumes shown above are based on estimated daily flows at the WWTPs as reported by IEUA.

[3] Flow from the WFA treatment plant to water agencies/utilities is gravity driven. The individual water agencies provide the subsequent energy needed to pump/distribute the water to end users.

[4] Energy required for distribution from the Chino Desalter is assumed to be the same as that needed for recycled water.

[5] The average energy intensity value of IEUA's recycled water is based on a weighted average of all pressure zones in the IEUA service area. The weighted average is determined based on the total energy used annually to distribute water and the total volume of water distributed.

[6] IEUA self-provides a significant portion of its own energy requirements through on-site cogeneration that utilizes a combination of biogas from its digesters and pipeline natural gas.

Planned Investments in Recycled Water Infrastructure

As noted above, a significant portion of IEUA's tertiary-treated recycled water is currently discharged into the Santa Ana River. The amount being discharged exceeds the amount needed to support the environment (i.e., "environmental water"). In order to take full advantage of this valuable water resource, IEUA has embarked upon an aggressive recycled water capital improvement program.

IEUA's existing regional recycled water system consists of about 35 miles of recycled water pipelines serving four different pressure zones. In November 2005, IEUA developed a detailed Recycled Water Implementation Plan in November 2005. In this plan, IEUA presented a phased development plan designed to optimize its infrastructure investments.

Table B-12. Phased Recycled Water Development Plan as of 2005[42]

Phased Projects	Constr. Cost $Millions	Capital Cost $Millions	Recycled Water Demand (afy)	Cumulative Demand (afy)	Total Est. Demand
Existing Facilities	$0.0	$0.0	31,900	31,900	7,942
A (2 pipeline projects, 1 pump station & 1 reservoir)	$29.6	$44.8	7,900	39,800	21,300
B (9 pipeline projects, 1 reservoir, 1 booster station, land)	$26.1	$37.6	6,900	46,700	28,100
C (1 pipeline, 1 reservoir, 1 booster station & land)	$13.5	$19.3	100	46,800	32,600
D (1 pipeline, 1 reservoir & land)	$20.4	$29.0	8,500	55,300	36,500
E (4 pipeline projects, 1 reservoir, 1 booster station)	$15.6	$23.3	8,600	63,900	45,100
F (2 pipeline projects, 1 reservoir, 1 booster station)	$12.4	$18.6	5,300	69,200	53,000
G (5 pipeline projects, 4 reservoir projects, land)	$23.1	$33.8	12,300	81,500	62,600
Total	$140.6	$206.5	81,500	81,500	62,600

IEUA's phased development plan is informative of the types of recycled water facilities needed. Key facilities include booster pump stations and pipelines needed to move recycled water supplies to reservoirs serving demand centers. IEUA's plan focused first on maximizing utilization of existing infrastructure, and then building out to major demand centers, serving as many customers as possible along the way.

As discussed previously, IEUA has decided to expedite the development of recycled water infrastructure, accelerating development of infrastructure needed to deliver all of its currently available recycled water over a 3 year period, instead of the original 10 years planned. Under this accelerated plan, an additional 37,000 acre-feet per year of new water supply will be

[42] IEUA, Recycled Water Three Year Business Plan, compiled from data in Chapter 8, Implementation Plan.

developed and available for direct use. (The total amount of additional recycled water is 50,000 acre-feet per year when including groundwater recharge.)

In order to serve the additional 400-500 sites planned, one site will need to be converted to recycled water every 1-2 days over the next 2-3 years. To expedite this program, IEUA assumed the responsibility of constructing and financing the local laterals needed to connect end users to its regional recycled water pipeline. (Ordinarily, this would be the responsibility of its member agencies that deliver retail water supplies to end users.) IEUA's member agencies will assume responsibility for paying the debt service associated with the accelerated construction of recycled water laterals.[43] A list of projects that are either planned or already under construction is presented in the following table.

Table B-13. Recycled Water System Expansion Projects

	System Element	Planned Facility	Annual Production (af)	Annual Energy Usage (MWh)	Capital Cost ($M)
Under Construction	Storage/ Pumping	RP-4 Reservoirs (2)	7,000	2,331	$19.5
		RP-4 Pumping Stations (2)			
		RP-1 South Zone Pumping Station	7,500	2,498	$4.6
	Distribution	Edison and Eucalyptus Pipelines	2,633	877	$9.1
		San Antonio Channel Pipeline (Segment B)	1,844	614	$9.4
	Subtotals		*18,977*	*6,319*	*$42.6*
Planned	Treatment	Red Hill Satellite Plant	28,500	9,491	$40.1
	Storage/ Pumping/ Distribution	North Etiwanda Pipeline, 1299 Reservoir, and Pump Station			$15.0
		Chino Hills Reservoir and Pipeline (930 Zone)			$16.1
	Storage/ Pumping	1430 Zone Reservoir and Pumping Station			$8.0
		1630 Zone Reservoir and Pumping Station			$15.4
	Pumping	RP-5 Utility Water Pressure Station			$3.0
	Distribution	Wineville Extension Pipeline			$8.3
		Local Laterals			$18.1
	Subtotals		*28,500*	*9,491*	*$124.0*
	Totals		*47,477*	*15,810*	*$166.6*

The estimated capital cost of facilities under construction is $42.6 million. If the additional projects identified above are implemented, IEUA's capital costs for recycled water infrastructure are expected to exceed $166 million.

[43] IEUA Recycled Water Three Year Business Plan, November 28, 2007, p.20.