Water Rate Review Update 2014
City of Port Alberni

January 2015 (FINAL)
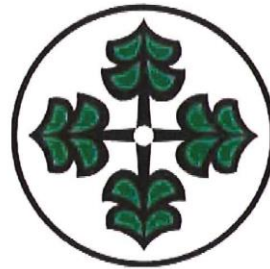
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Contributors to the Project	Econics would like to thank City staff for assistance and support with this project: Director of Financial Services, Accounting Clerk, City Engineer, as well as Engineering Consultants Koers and Associates.

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1.0 OVERVIEW
1.1 OBJECTIVES
1.2 METHODOLOGY
1.3 TERMINOLOGY
1.4 SCALE OF WATER

1.0 Overview

1.1 Objectives

Revenue Sufficiency A prime objective of a rate structure is to ensure that revenue sufficiency is maintained.

Revenue Stability Rate structures with a variable component gives customers more control over their costs. However, this results in revenue variability as demand fluctuates year to year with variances in climate.

Equity & Fairness A rate structure should aim to allocate to the customer groups the costs of providing water services, commensurate with their demand characteristics.

Resource Conservation Promotion of water conservation is a desirable goal and pricing signals can be used to encourage economy in certain instances of water use.

Public Acceptability Any proposed changes in the rate structure should be undertaken in steps, keeping affordability in mind and ensuring a smooth transition to avoid rate shock to the customers.

Easy to Understand A rate structure should aim to be easy to understand and send a clear and strong price signal to customers. This means that the price structure should empower customers to make decisions about water usage that are in line with the goals of the organization. Typically this is aimed at resource conservation and reducing excess water usage.

1.0 Overview

1.2 Methodology

The process of reviewing and setting rates can be described using the analogy of a pie. The first step is to determine how big the pie should be. Next is to determine how to cut the pie into equitable slices representing the customer categories. Step 3 is to determine how to design a rate structure to achieve the required objectives for each slice.

Best Practice	Analogy	Benefits
1 Full Cost Recovery		• Revenue Sufficiency • Long Term Sustainably • Supports Political Stability
2 Establish Cost of Service & Equity		• Establishing Fairness • Public Acceptability
3 Design Rates to Meet Objectives		• Promote Conservation • Reduce Revenue Volatility • Minimize Billing Impacts

1.0 Overview

1.3 Terminology

Definitions for some technical terms and acronyms used in this report.

Cost of Service: this term means how much it costs to deliver a service, and more specifically, how much it costs to deliver the service to a particular group of customers.

Cost Responsibility Redistribution: this term means making adjustments to rates and charges so that one customer category will pay less while another category will pay more. The net effect on overall revenues is typically nil.

Full Cost Recovery: this term means that the sources of revenues to the service are fully covering the costs of owning, maintaining and operating the service, particularly the costs of renewing infrastructure.

LCD: Litres per capita per day. This unit is used to measure consumption on a per person basis. While overall demand may be increasing with population, the LCD is typically decreasing as water efficiencies are gained.

Meter Equivalency ratio: a numerical comparison of different meter sizes with the smallest available meter typically having a value of 1 and larger meters being equivalent to so many base meters. Eg: a 2" meter is equivalent to 8 5/8" meters. CWWA and AWWA provide guidelines for Meter Equivalency ratios.

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1.0 Overview
1.4 Scale of Water

The Cubic Meter	One Megalitre
1,000 Litres = 1 cubic meter (m³)	1,000 cubic meters

1,000 Litres = 1 cubic meter (m^3)

One Megalitre
1,000 cubic meters

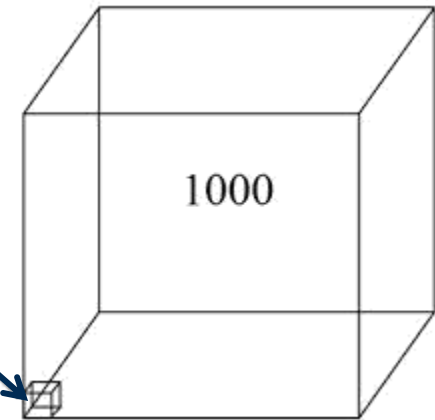

These 5 rain barrels add up to a cubic meter

Five bath tubs full of water is equal to a cubic meter.

Olympic Size Pool

2.5 ML = 2,500 m3 or 2.5 million Litres

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2.0 BASELINE WATER USE

2.1 CUSTOMER CATEGORIES

2.2 POPULATION

2.3 CUSTOMER SUMMARY

2.4 BILLABLE CONSUMPTION

2.5 REVENUES

2.6 REVENUE STABILITY

2.7 PERFORMANCE - EQUITY

2.8 PERFORMANCE – FIXED CHARGE

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2.1 Customer Categories

The following list identifies the different customer categories and provides a brief description for the category.

| Customer Category Name	Details
Single Family Residential	Any service to a single family dwelling unit is billed at the residential unit rate
Multifamily Residential	Any service that is shared by two or more single family dwelling units, including duplexes, apartments and condos, is billed at the multifamily rate.
Commercial	This category also includes commercial and light industrial use.
Industrial	This category is for specific high use customers including Western Forest Products and Catalyst Paper.
City	Water used by the City is metered but not billed.
Outside Res	Outside single family residential retail.
Hupacasath	Bulk provision to Hupacasath via several connections and according to a special agreement.
Tseshaht	Bulk provision to Tseshaht First Nation via 2 connections.
Beaver Creek	Bulk provision to the Beaver Creek community via a single 10" connection.

2.2 Population

2.2.1 Historic Population

City of Port Alberni population has grown at an average annual rate of 0.2% between the two census years 2006 and 2011. The 2012 and 2013 population estimates assume a similar growth rate.
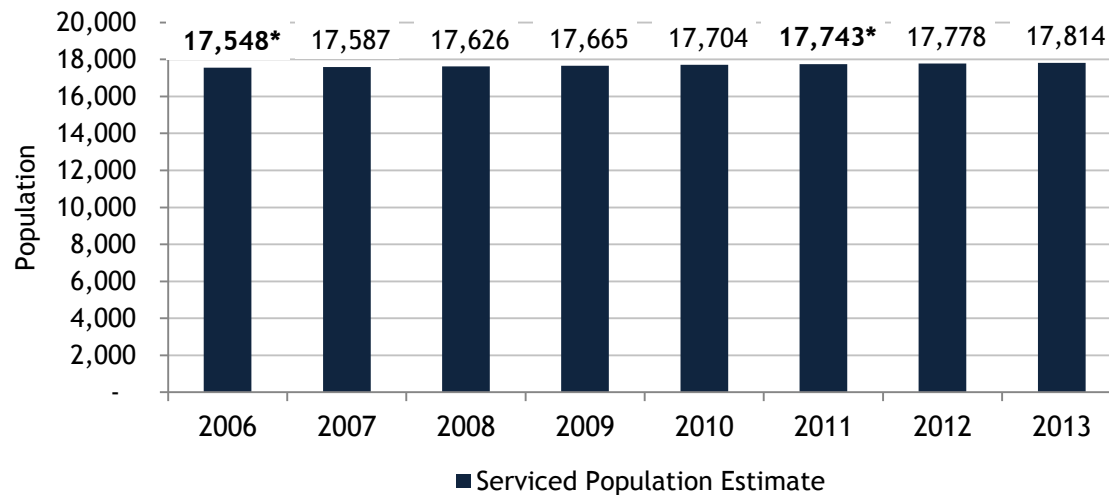
* Statistics Canada Census Population

Figure 1: Historic Serviced Population
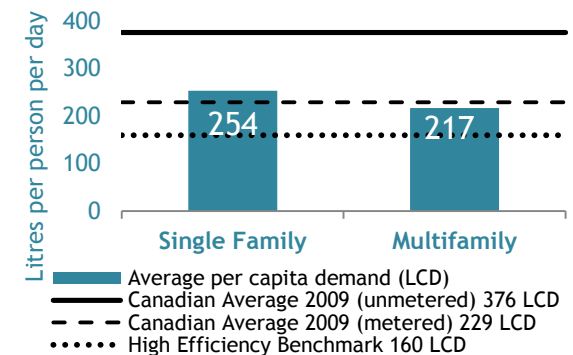
2.2 Population (continued)

2.2.2 Population Calibration

Table 1 below proposes how the estimated 2013 population is apportioned between Single Family and Multifamily residential customer categories. These were calculated by multiplying the number of domestic units in the water billing data by the estimated dwelling density for each housing type.

Table 1: Serviced Population Estimates 2013

	Services		Population		Water Demand	
Customer Class	Total Service Connections	Domestic Units	Density	Population	Annual Water Use (ML)	Average per capita demand (LCD)
Single Family	6,015	6,011	2.33	14,024	1,299	254
Multifamily	166	1,995	1.90	3,791	300	217
total	6,181	8,006		17,814	1,599	

Figure 2: Average Daily Per Capita Demand 2013

Legend:
- Average per capita demand (LCD)
- Canadian Average 2009 (unmetered) 376 LCD
- Canadian Average 2009 (metered) 229 LCD
- High Efficiency Benchmark 160 LCD

As a verification, the average per-capita demand for each residential category is evaluated. The Single Family and Multifamily average per capita consumption figures are shown here to be comparable to the 2009 Statistics Canada reported averages across Canada for metered and unmetered communities.

2.3 Customer Summary

Table 2 below provides a summary of information from the billing system relating to each customer class.

Table 2: Customer Summary (2013)

Customer Class	Total Service Connections	Annual Water Use (m3)	Variable Revenues	Fixed Revenues	Total Revenues	Average Sector Price ($/m3)	% revenue contribution	% water consumption	% total fixed revenues	Average per capita demand (LCD)	Average Day Demand (m3/day)
Single Family	6,015	1,299,000	541,356	849,478	1,390,834	$1.07	66.3%	44.4%	61.1%	254	3,556
Multifamily	166	300,400	116,545	49,314	165,859	$0.55	7.9%	10.3%	29.7%	217	822
Commercial	454	440,800	167,708	115,857	283,565	$0.64	13.5%	15.1%	40.9%	68	1,207
Industrial	10	638,100	154,418	13,597	168,016	$0.26	8.0%	21.8%	8.1%	98	1,747
City	28	53,800						1.8%		8	147
Hupacasath	7	10,700	3,581	10,050	13,631	$1.27	0.6%	0.4%	73.7%	2	29
Outside-Res	48	11,800	6,557	9,110	15,667	$1.33	0.7%	0.4%	58.1%	2	32
Tseshaht	4	169,900	57,021	3,832	60,853	$0.36	2.9%	5.8%	6.3%	26	465
Beaver Creek	1	no data for Beaver Creek at time of baseline analysis									
Total	6,731	2,924,500	$1,047,185	$1,051,240	$2,098,425	$0.72	100.00%	100.00%	50%	450	8,007

2.4 Billable Consumption

2.4.1 Historic Residential Consumption

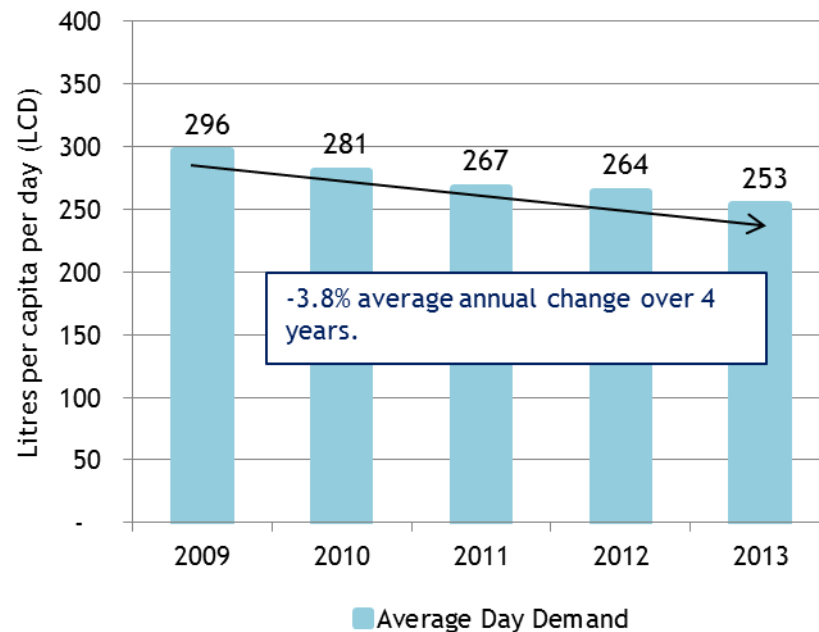The historical water use by the Single Family Residential customer class from 2009 to 2013 is shown below.

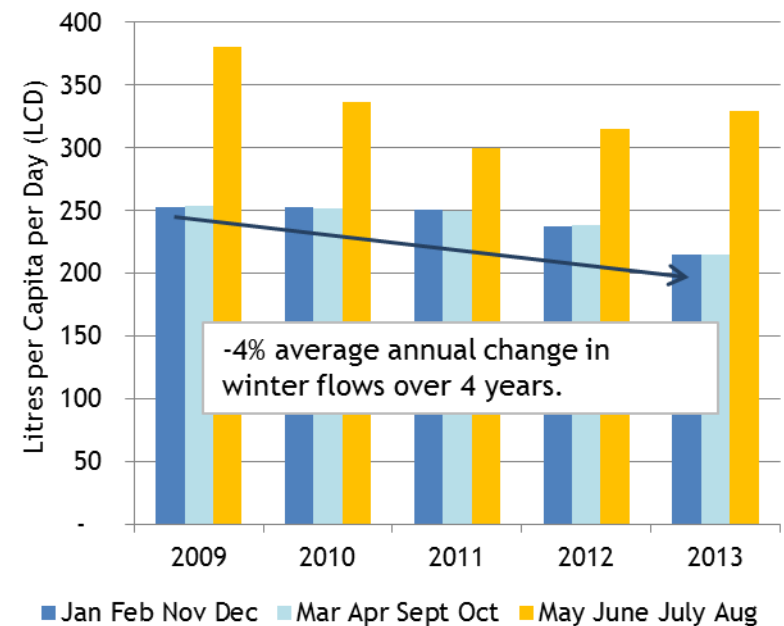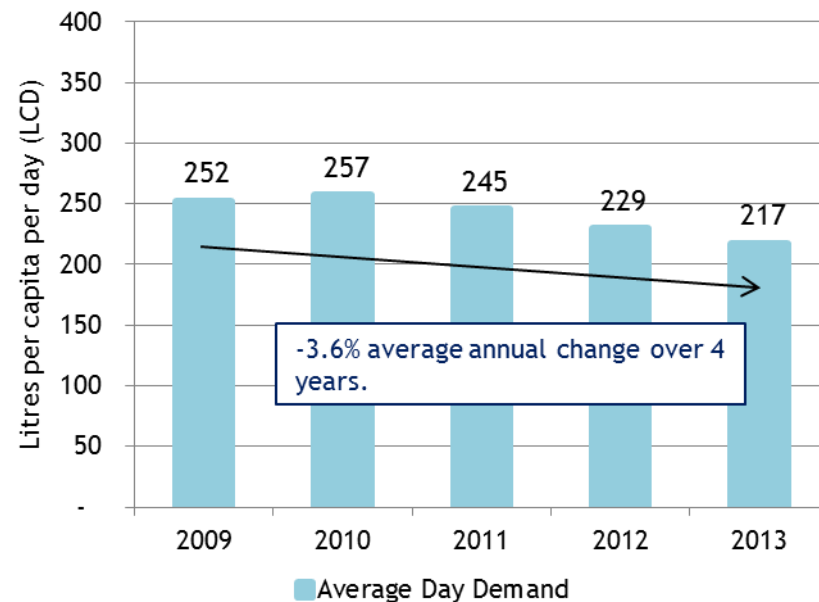**Figure 3: Single Family Residential Annual Per Capita Demand (2009-2013)**

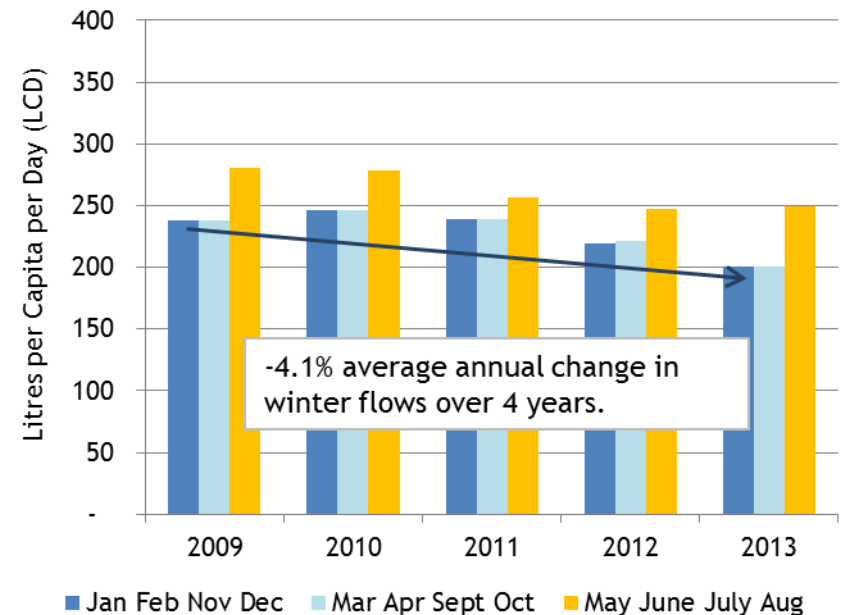**Figure 4: Single Family Residential Demand During Winter, Shoulder and Summer Seasons (2009-2013)**

2.4 Billable Consumption (continued)
2.4.2 Historic Multifamily Consumption

The historical water use by the Multifamily customer class from 2009 to 2013 is shown below.

Figure 5: Multifamily Residential Annual Per Capita Demand (2009-2013)

Figure 6: Multifamily Residential Demand During Winter, Shoulder and Summer Seasons (2009-2013)

2.4 Billable Consumption

2.4.3 Historic Commercial Consumption

The historical water use by the Commercial sector 2009 to 2013 is shown here.
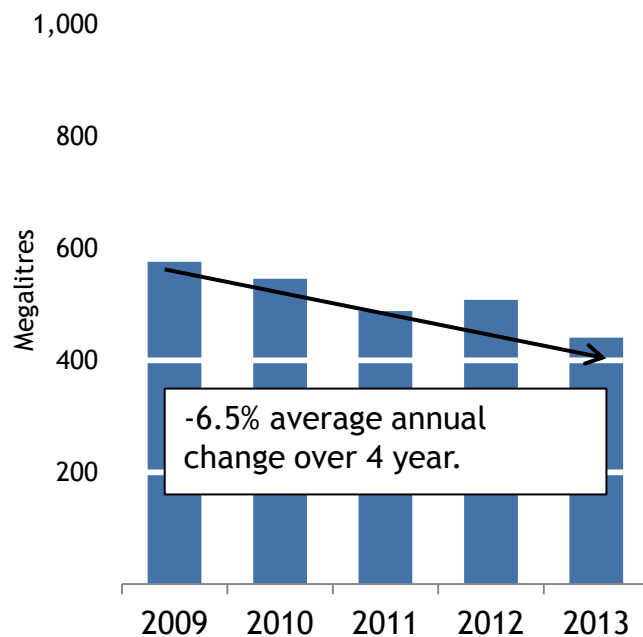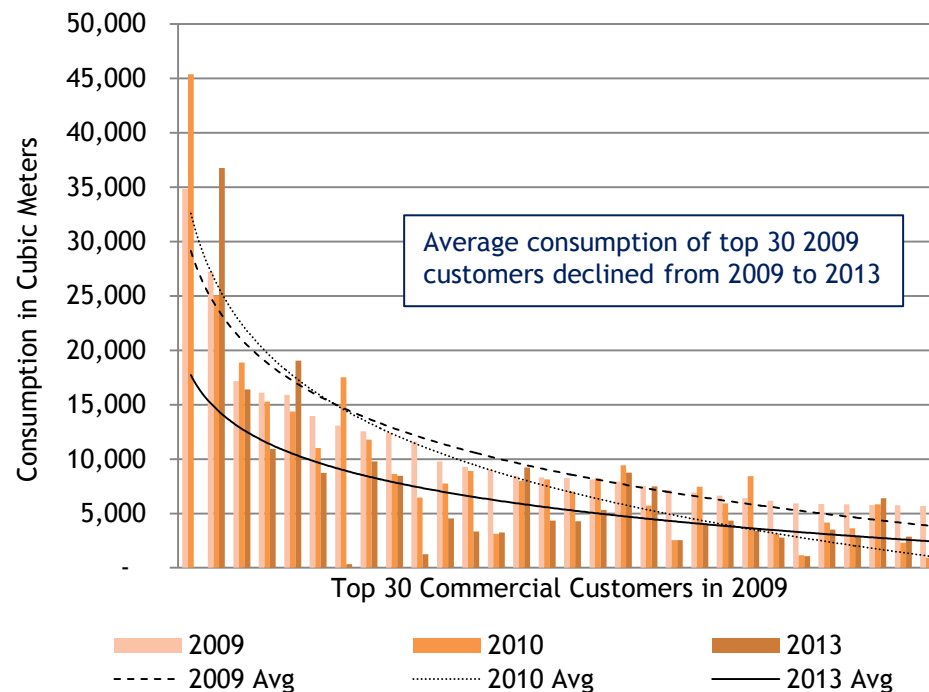

Figure 7: Total Commercial Consumption (2009-2013)

-6.5% average annual change over 4 year.

Average consumption of top 30 2009 customers declined from 2009 to 2013

Figure 8: Consumption of Top 30 Commercial Customers (2009-2013)

2.4 Billable Consumption
2.4.3 Historic Industrial Consumption

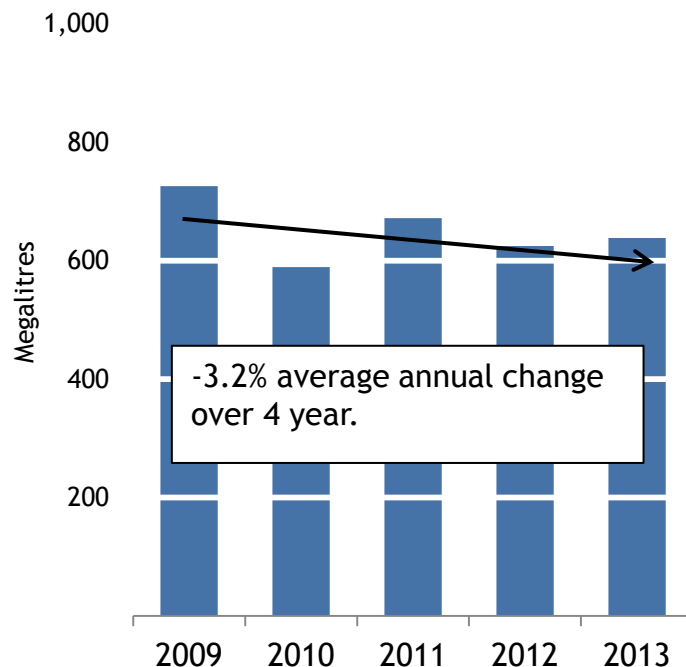The historical water use by the Industrial sector 2009 to 2013 is shown here.

-3.2% average annual change over 4 year.

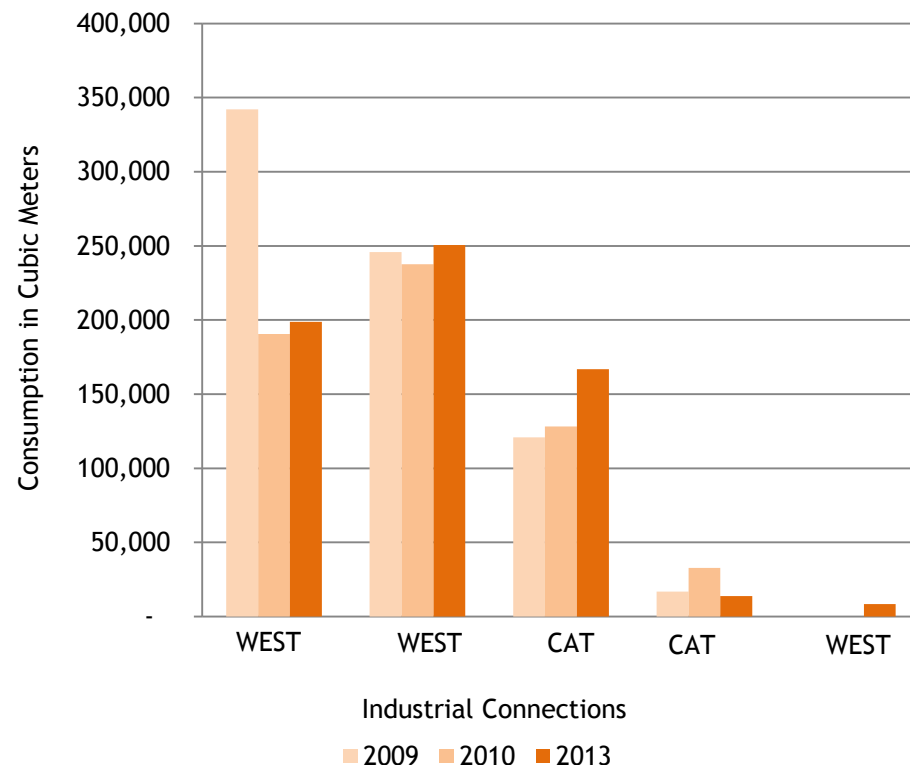**Figure 9: Total Industrial Consumption (2009-2013)**

Figure 10: Consumption of Industrial Customers (2009-2013)

2.4 Billable Consumption

The breakdown of water use by each customer class in 2013 is shown below.
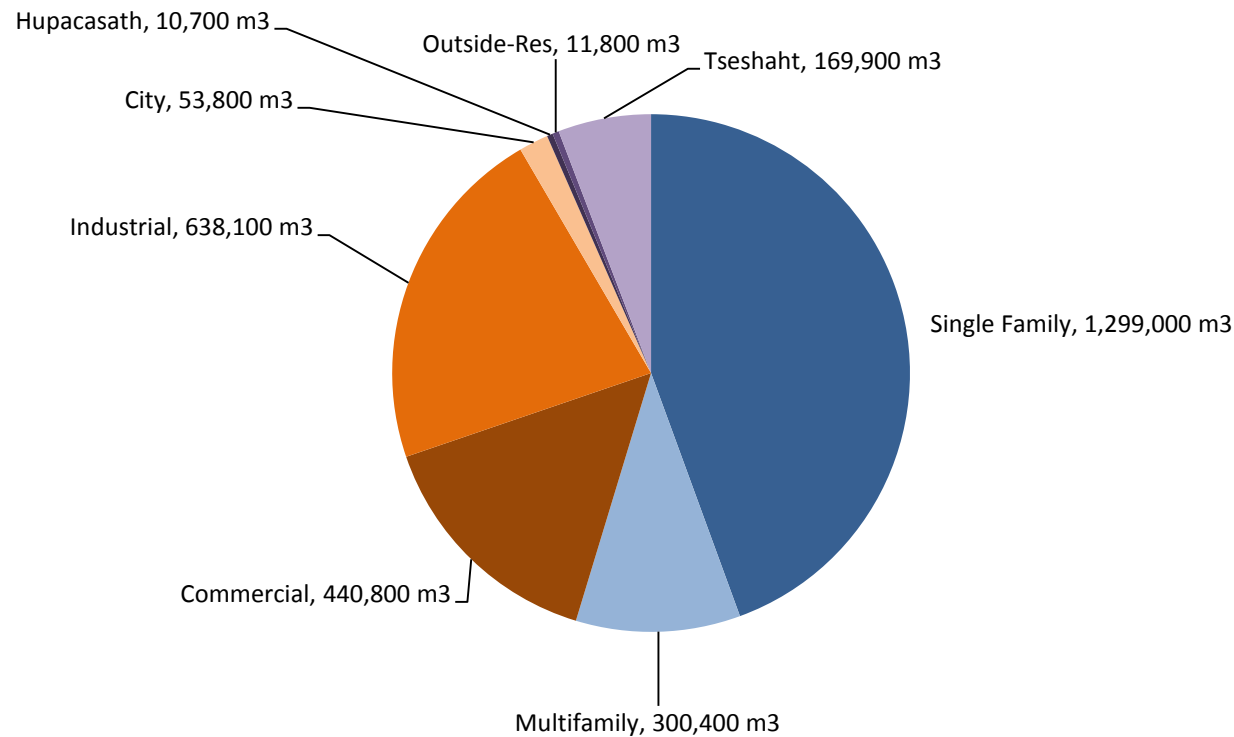
Figure 11: Billable Water Consumed by Customer Class (2013). Total Consumption: 2,924,500 m3

2.5 Revenues

The breakdown of revenues from tolls and taxes in 2013 is shown below.
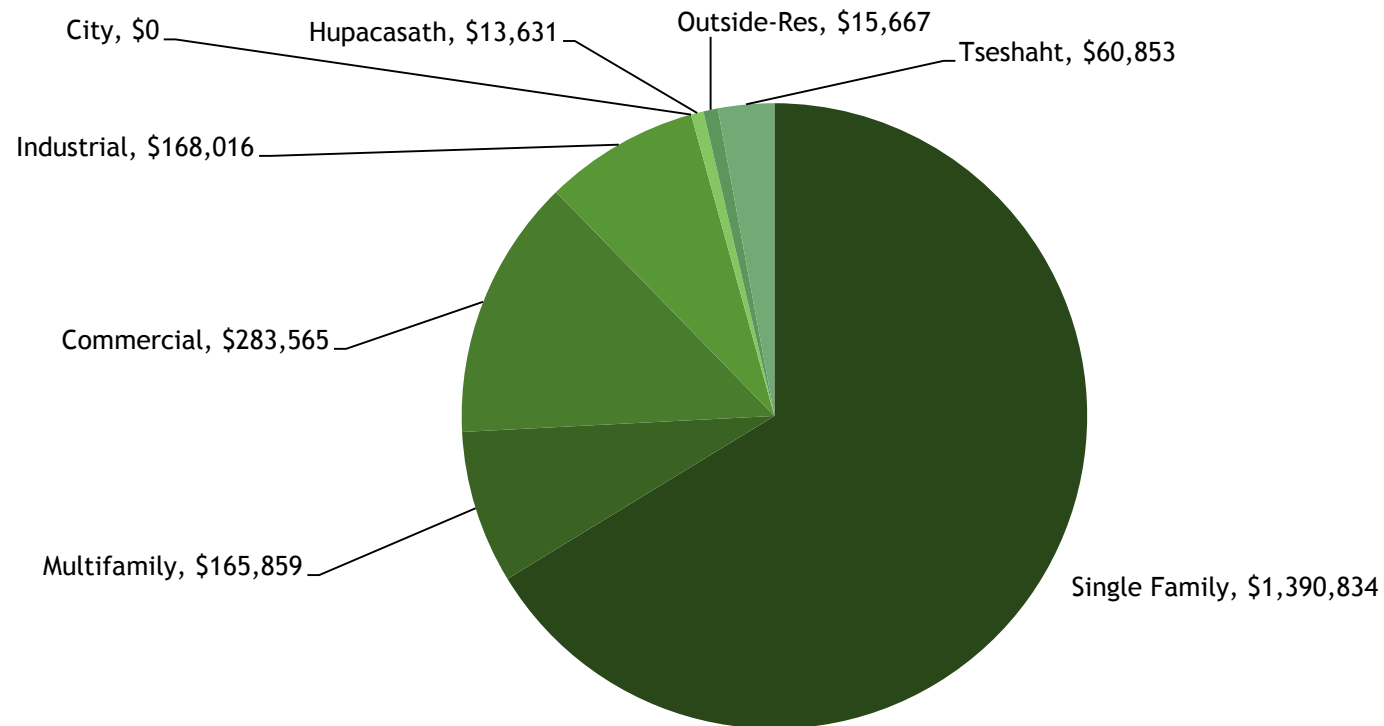

Figure 12: Revenues by Customer Class (2013). Total Revenues: $2,098,425
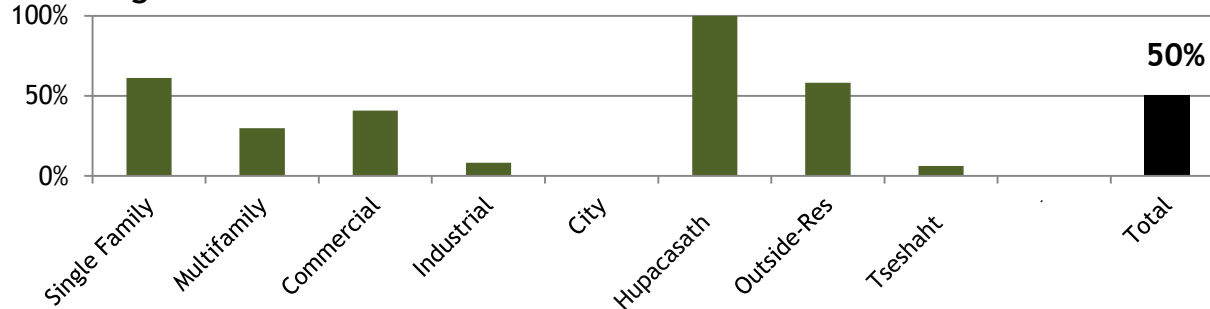
2.6 Revenue Stability

The figures below compare the fixed and variable portion of revenues by customer class. A high portion of fixed revenues contributes to greater revenue stability. A high portion of variable revenues contributes to greater conservation as customers have more control over their costs.

Figure 13: Fixed and Variable Revenue Amounts in $
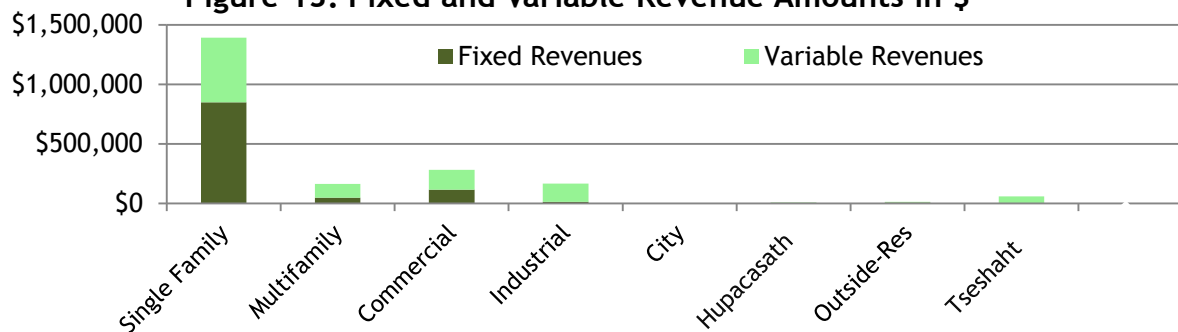
This chart shows us the extend of fixed and variable revenues in dollars contributed towards the total. Note: a certain portion of variable revenues can be viewed as being "as good as fixed" because a minimum amount of usage is non-discretionary (cooking, cleaning, drinking).

Figure 14: Fixed Revenue as % of Total

This chart shows that overall fixed revenues are about 50%. This is generally viewed as reasonable degree of revenue stability; increasing fixed component for Multifamily, Commercial and Industrial would further increase revenue stability.

2.7 Rate Performance - Equity

These figures provide simplified indicators of equity comparing water demand with revenue contributions, and comparing average cost of water to total system average cost.
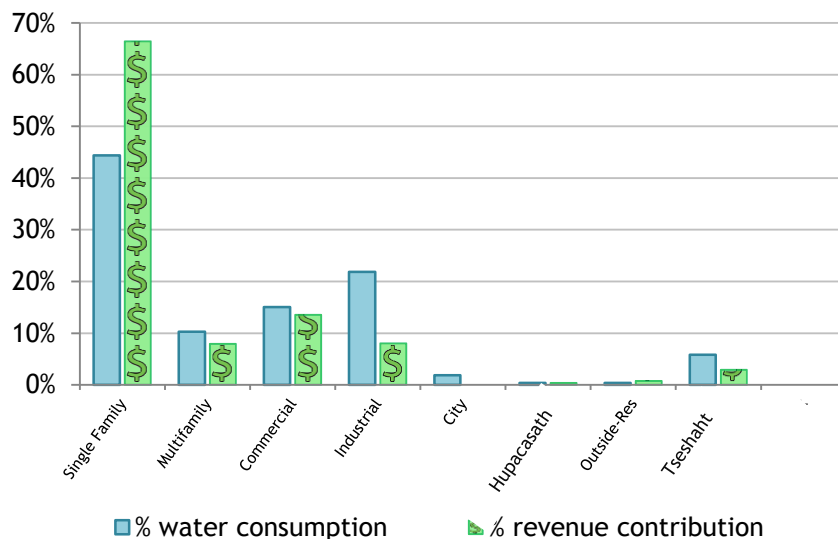

Figure 15: Comparison of Water Use and Revenue Contribution (2013)

Figure 16: Average Price of Water by Category (2013)

The difference between the percentage of water consumed (blue bar) by a customer category and the percentage of revenue contributed (green bar) may indicate inequities in the price structure.
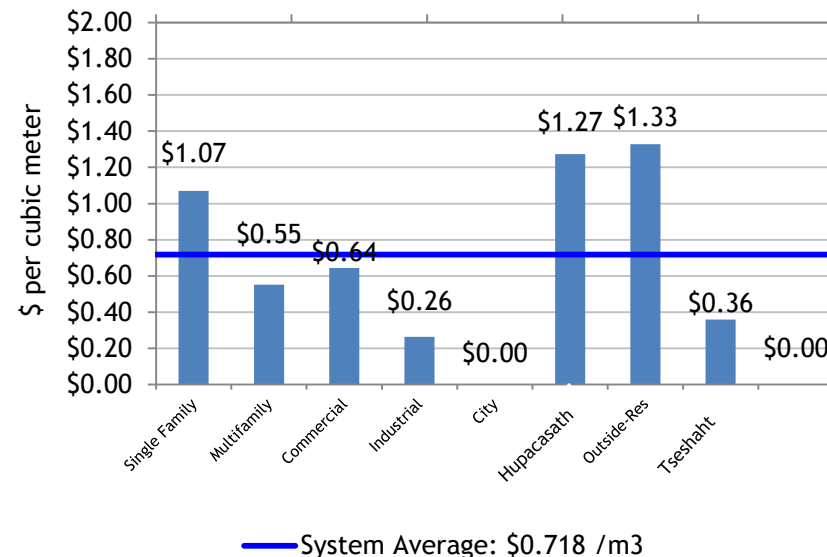
The average price of water for each sector is calculated by dividing the revenue collected from that sector by the volume of water delivered to customers in that sector.

2.8 Performance – Fixed Charge

This table compares the Meter Equivalency (ME) ratio of the current monthly fixed charge with the ME ratio recommended by the CWWA and AWWA.

Table 3: Comparison of Meter Equivalency Ratios (2013)

	Meter/ Service Connection Size			Water Meter Equivalency (ME) Ratios		
Typical Customers	Imperial	Metric	# Meters and Services	Current Implied ME Ratios	CWWA/AWWA Recommended ME Ratios	Proposed ME Ratios
Residential Sm. Multifamily & Sm. Commercial	5/8"	16 mm	794	1.0	1.0	
	3/4"	19 mm	5592	1.0	1.5	
	1"	25 mm	86	2.0	2.5	
Sm. Commercial & Multifamily, City Industrial	1.5"	38 mm	81	2.4	5.0	
	2"	50 mm	123	3.0	8.0	
	3"	75 mm	31	4.4	15.0	
Industrial & Bulk	4"	100 mm	10	5.9	25.0	
	6"	150 mm	11	9.2	50.0	
	8"	200 mm	3	12.6	80.0	
	10"	250 mm	2	15.9	115.0	
total			6,731			

2.8 Performance – Variable Charge

2.8.1 Residential Consumption

This figure shows the distribution of Residential billings. In the Summer of 2013, 50% of customer bills where charged for consuming 72 m3 of water or less.
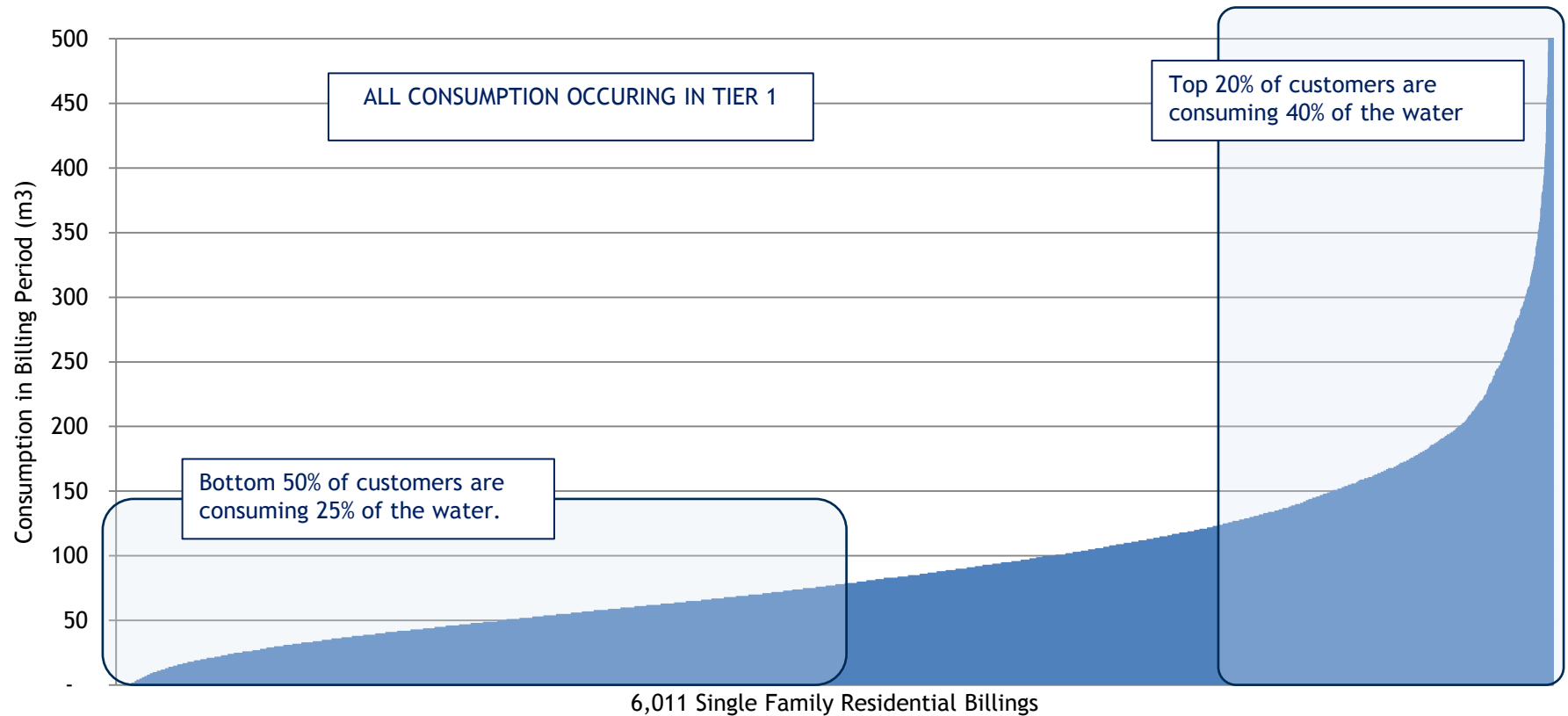

ALL CONSUMPTION OCCURING IN TIER 1

Top 20% of customers are consuming 40% of the water

Bottom 50% of customers are consuming 25% of the water.

6,011 Single Family Residential Billings

Figure 17: Residential Bill Tabulation – Summer 2013

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2.8 Performance – Variable Charge
2.8.1 Commercial Consumption

This figure shows the distribution of Commercial billings.

Top 2% of customers in Tiers 3 and 4 consuming 24% of water

8% of customers in Tier2 consuming 38% of water.

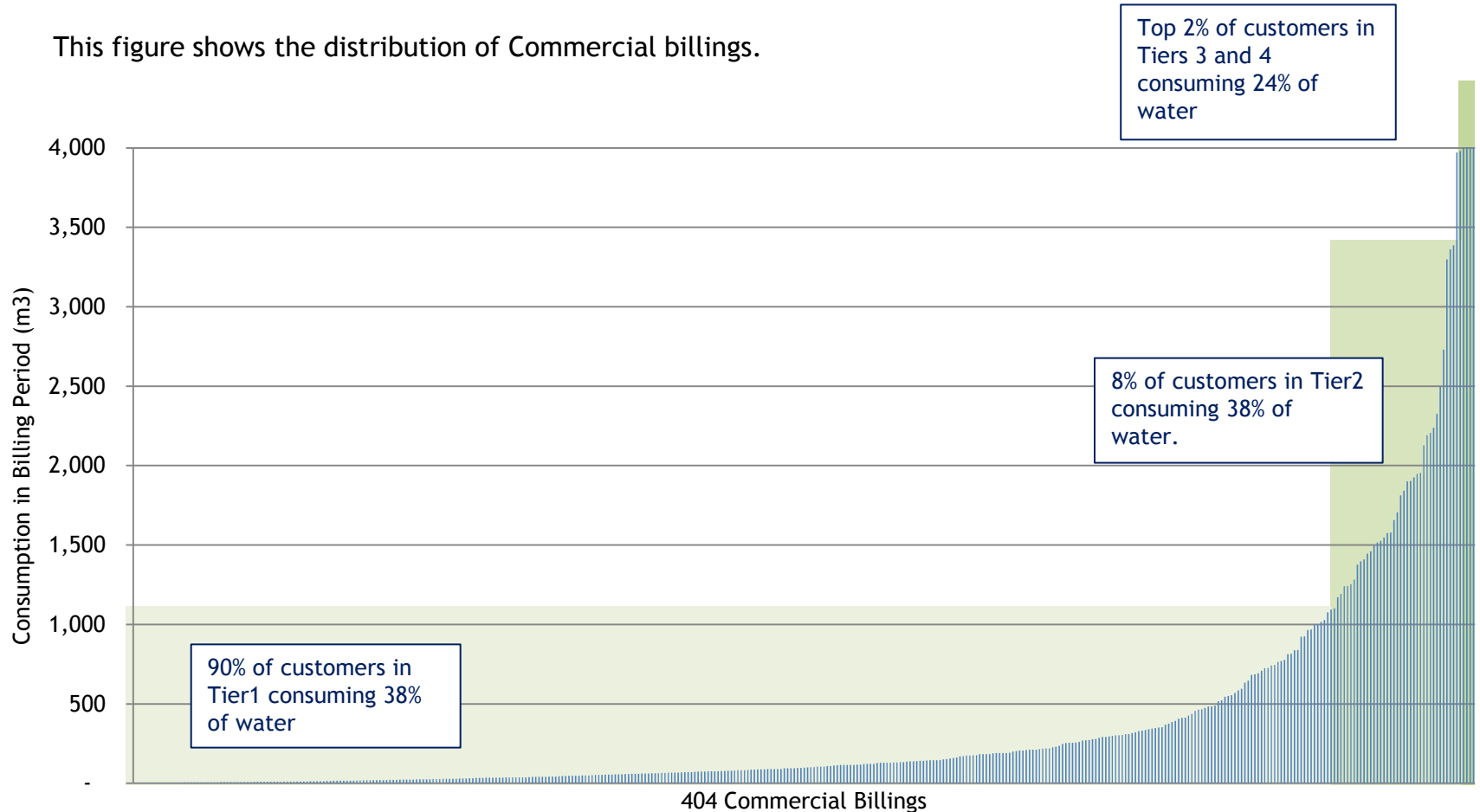90% of customers in Tier1 consuming 38% of water

Figure 18: Commercial Bill Tabulation – Summer 2013

3.0 POPULATION & DEMAND PROJECTIONS

3.1 POPULATION FORECAST
3.2 DEMAND FORECAST 2014
3.3 PER CAPITA 20 YEAR DEMAND FORECAST
3.4 SECTORAL AND TOTAL 20 YEAR DEMAND FORECAST

3.1 Population Forecast

Population growth in the City is expected to be in the range of 0.2% to 0.5% in the near future. For purpose of developing a 20 year rate model, population growth rate of 0.2%*.
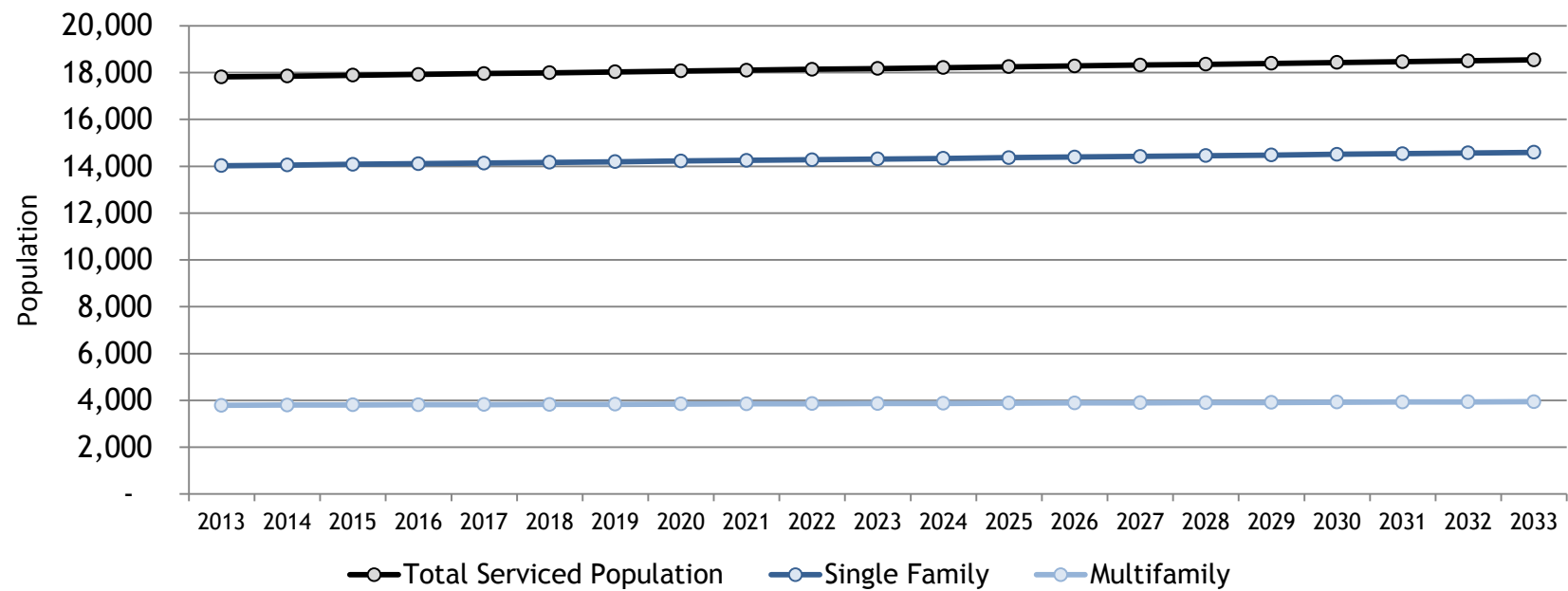

Figure 19: Serviced City Population Forecast (2013-2033)

* Population projections in other documents, such as the OCP or Master Water Plan may use higher population growth rates since they are concerned about reaching capacity limits. For the purposes of setting rates, a lower rate is used to be more conservative with pricing.

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3.2 Demand Forecast 2014

Billable demand for 2014 will increase due to addition of Beaver Creek. Baseline demand from 2013 expected to decrease somewhat due to trends in declining demand.
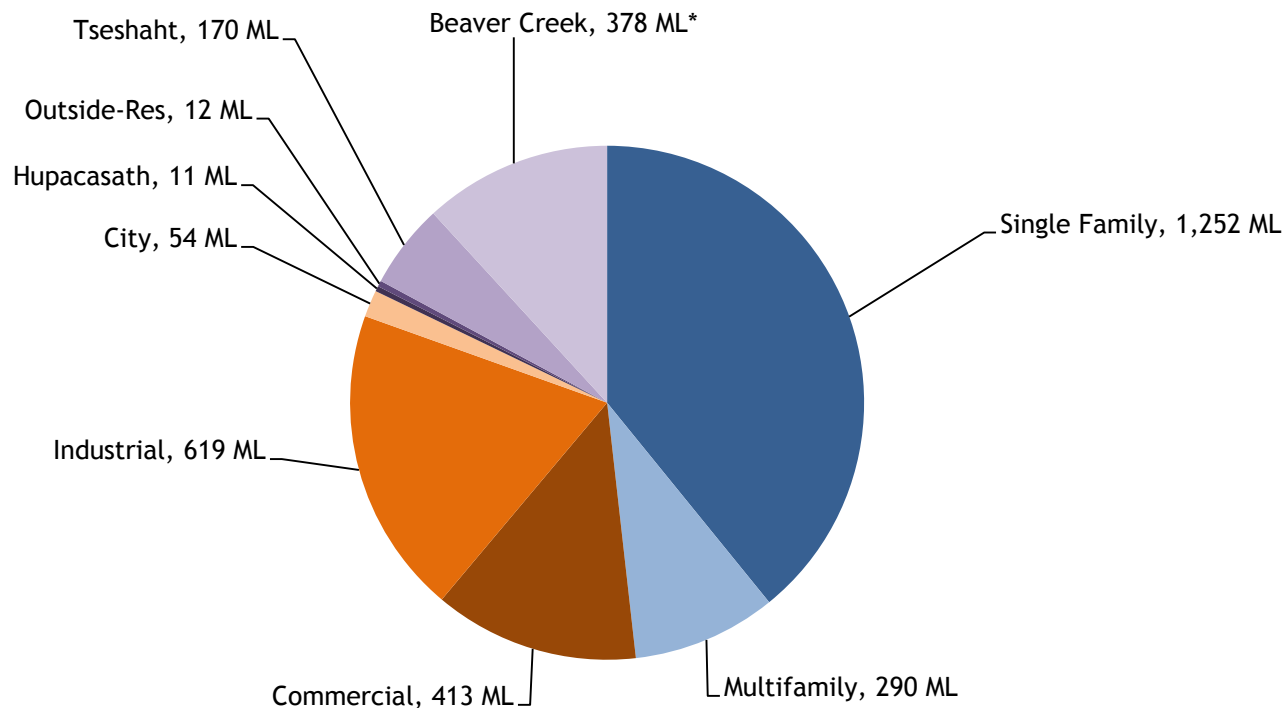

Figure 20: Projected Billable Demand for 2014 (Total 3,199 Megalitres)

* Beaver Creek actually came online in June of 2014. Amount shown includes consumption from Jan through May as well although source of supply was not from City for these months.

3.2 Per Capita 20 Year Demand Forecast

Per capita consumption trends in each customer category are shown below. Per capita demand has decreased in recent years mainly across residential customer categories as a result of changes in controls such as fixture efficiency, user behaviour change, and local regulations. These factors will likely continue to reduce per capita demand (albeit at a slower rate as time progresses) as demonstrated by the gradually decreasing per capita demands.
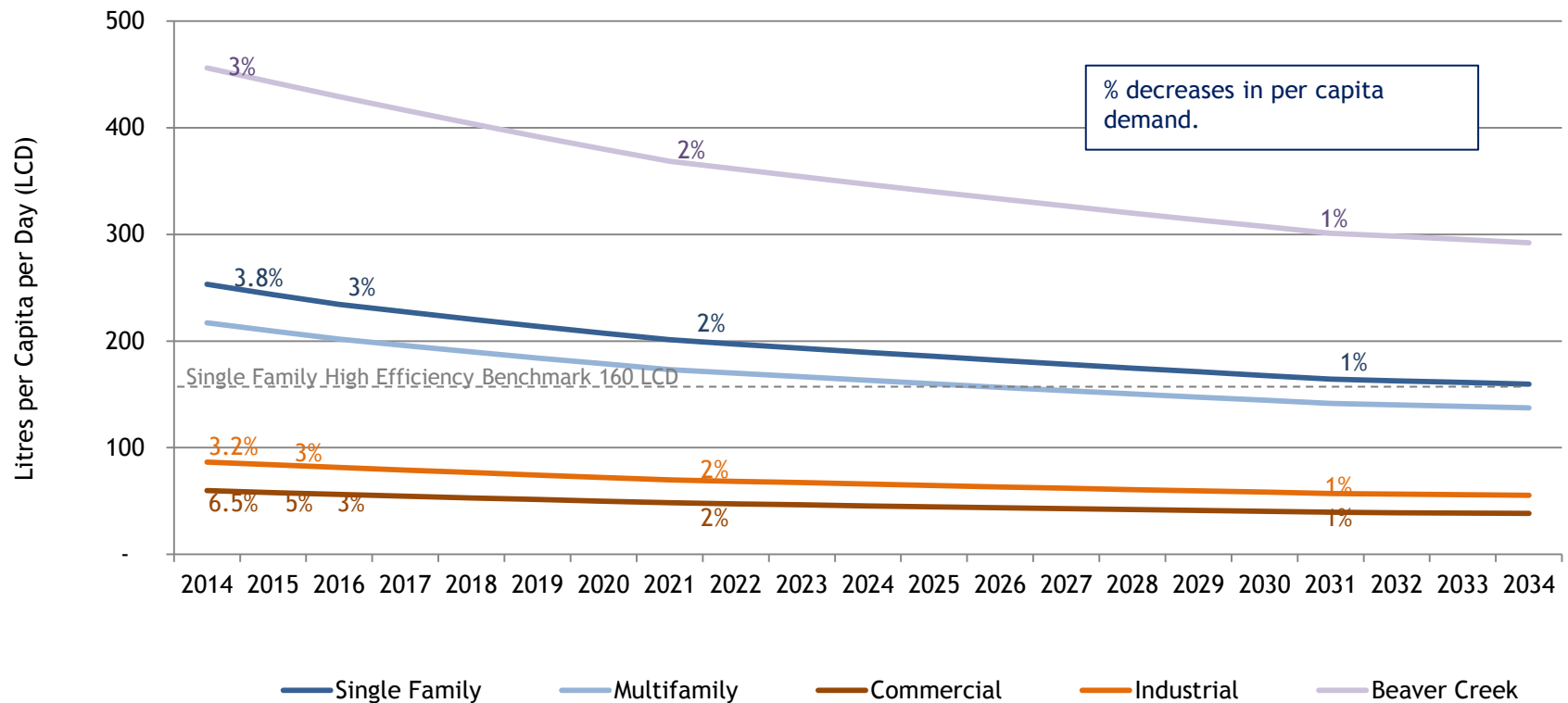

Figure 21: Customer Category per Capita Demand Forecast (2013-2033)

3.3 Sectoral and Total 20 Year Demand Forecast

The forecasted billable demand shown in Figure 11 is developed using population and per capita demand forecasts. Total demand is forecasted to decline steadily over the 20 year time horizon.
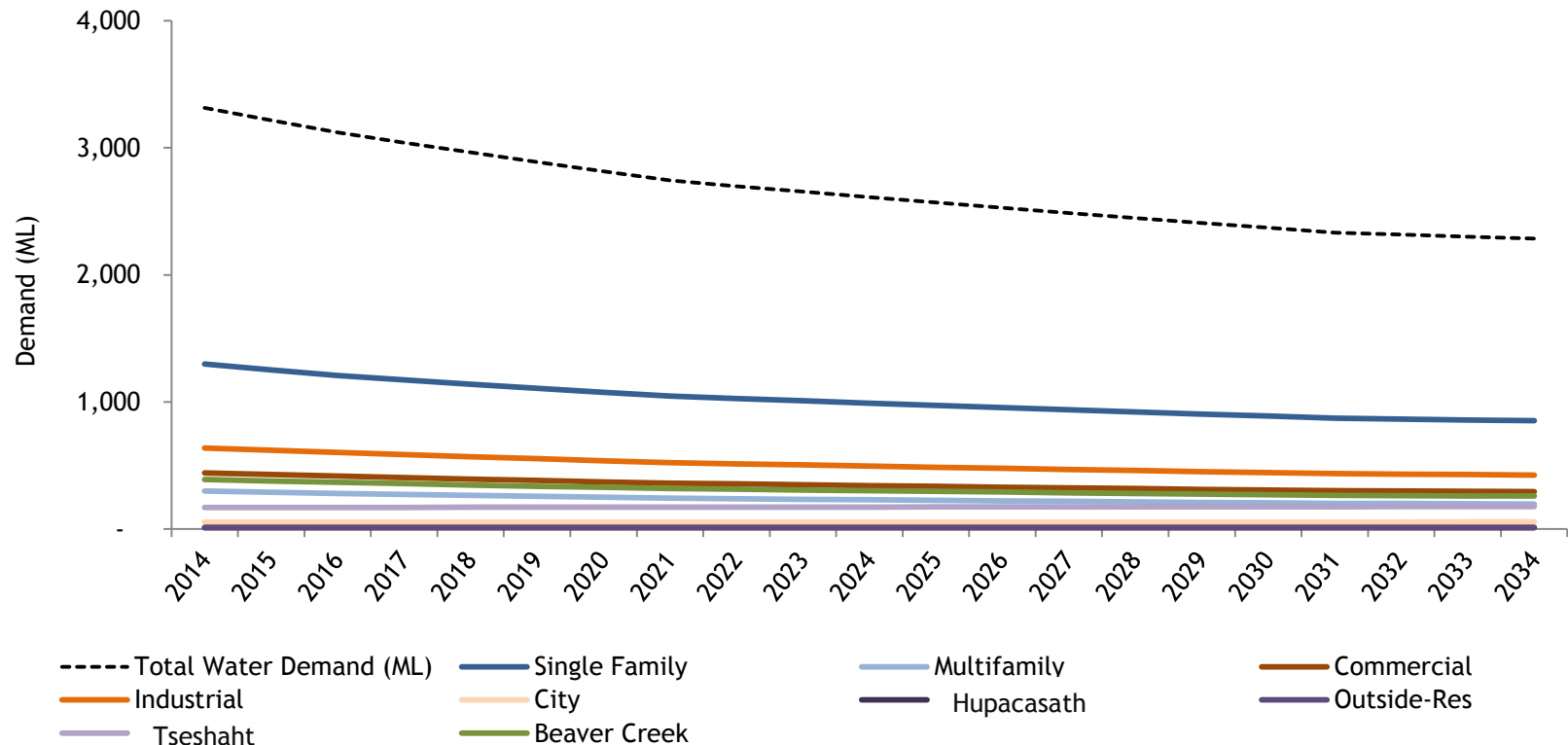

Figure 22: Customer Category and Total Demand Forecast (2013-2033)

4.0 LONG TERM FINANCIAL MODEL
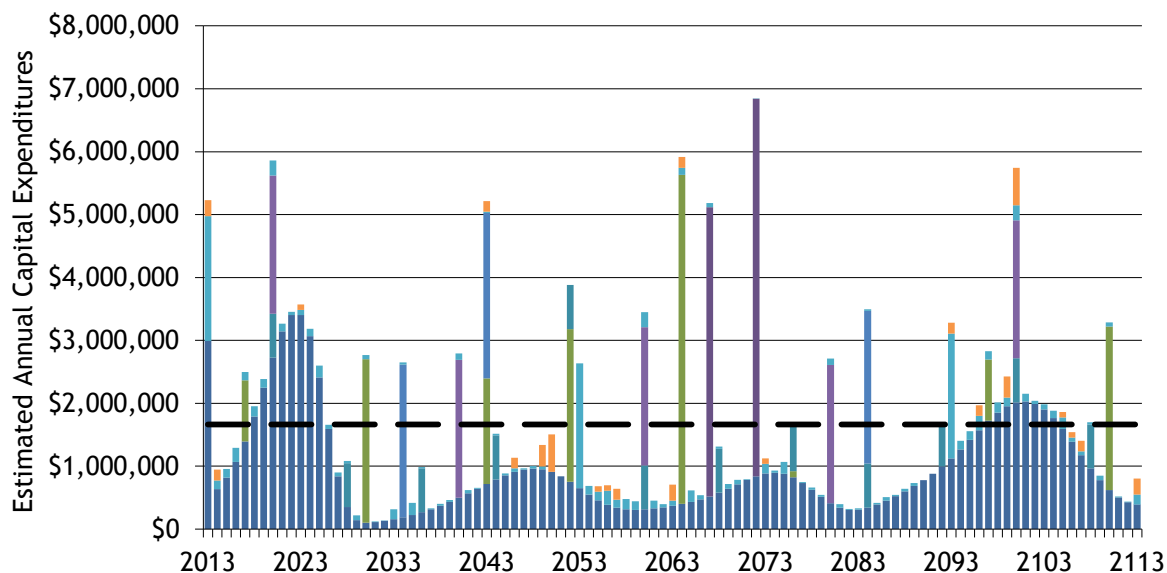## 4.1 ANNUAL CONTRIBUTIONS FOR ASSET REPLACEMENT
4.2 GENERAL WATER FUND ANALYSIS

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4.0 Long Term Financial Model

4.1 Annual Contribution for Asset Replacement

This chart shows anticipated infrastructure expenditures over the next 100 years. The average annual cost in current dollar terms is shown by the dashed line and is equal to $1,66m per year. This amount is termed the Annual Cost of Sustainable Ownership (ACSO). The actual amount budgeted and allocated towards asset renewal is termed the Annual Contribution for Asset Replacement (ACFAR). ACFAR should match ACSO. Presently and over the past few years ACFAR has been about $600,000.

Table 4: Asset Replacement Value

Asset Type	Replacement Value in $2013
	$
Pipes	62,140,386
Reservoirs	13,013,500
New Treatment Plant	10,600,000
SCADA	700,552
Pump Stations	5,055,492
Meters	2,196,675
Hydrants	4,925,484
Pressure Reducing Stations	2,125,000
$	100,757,089

Legend:
- Equipment
- PRV
- Hydrant
- Meter
- Service
- Pumping
- Building
- SCADA
- Treatment
- Storage
- Supply
- Linear
- 100 year average

Figures are in 2013$ and not adjusted for inflation.

Figure 23: Annual Cost of Sustainable Ownership (ACSO)

4.0 Long Term Financial Model

4.2 General Water Fund Analysis

This chart compares operating revenues and operating expenses over the next 20 years. The proposed increases are shown in Table 2. These increases will ensure that the Net Balance of Fund maintains the current balance.

Table 5: Recommended Annual Increases to Operating Revenues

Year	Revenue Increase
2014	8%*
2015	10%
2016	10%
2017	10%
2018	5%
2019	5%

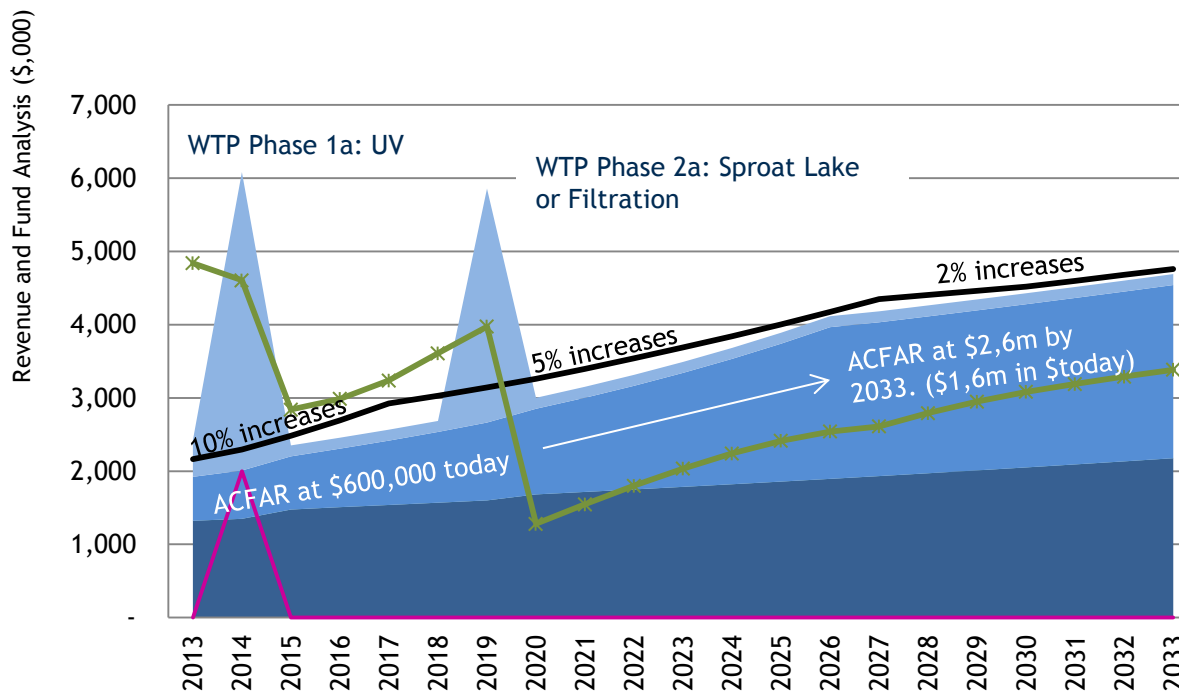* 10% increase applied to only 2 of 3 billings

Figure 24: Revenues and Expenditures with Annual Increases as shown in Table 5.

5.0 COST OF SERVICE ANALYSIS

5.1 LEVELS OF SERVICE
5.2 COSTS OF SERVICE
5.3 COST ALLOCATION
5.4 CROSS SUBSIDY ANALYSIS

5.0 Cost of Service Analysis

5.1 Levels of Service

The water service can be subdivided into several subset components as shown in the table below. The Level of Service provided through each component is described in the table and the Units of Service shown. The Costs apportioned to each service component is shown and the total adds up to the total expected revenues for the year shown. The Cost of Service divided by the Units of Service gives the <u>Unit Cost of Service</u>. These Unit Costs will be applied to each customer category depending on their portion of Units of Service "consumed".

Table 6: 2014 Levels of Service

Service	Description	Units of Service	Cost of Service	Unit Cost of Service
Administration	Administrative and customer support services to customers including: management, planning, call support, billing, and other administrative functions.	6,657 bills	$200,381	$30.10 per bill
Service Connections	Maintenance of service connections and meters. Meter Equivalency (ME) ratio based on CWWA/AWWA recommendations.	12,571 equivalent meters	$366,177	$29.13 per equiv. meters
Base Service	Basic operations: supply, treatment, storage, and distribution.	3,313,590 m3	$1,160,102	$0.35 per m3
Max Day Extra Capacity	Extra capacity provided during peak periods.	4,913 m3/day	$547,965	$111.54 per m3/day
Total Cost			$2,274,625	

5.0 Cost of Service Analysis

5.2 Cost of Service

The cost of service is re-calculated separately for each year throughout the 20 year time horizon so that inflation, population growth and per-capita demand changes are taken into consideration in each year.
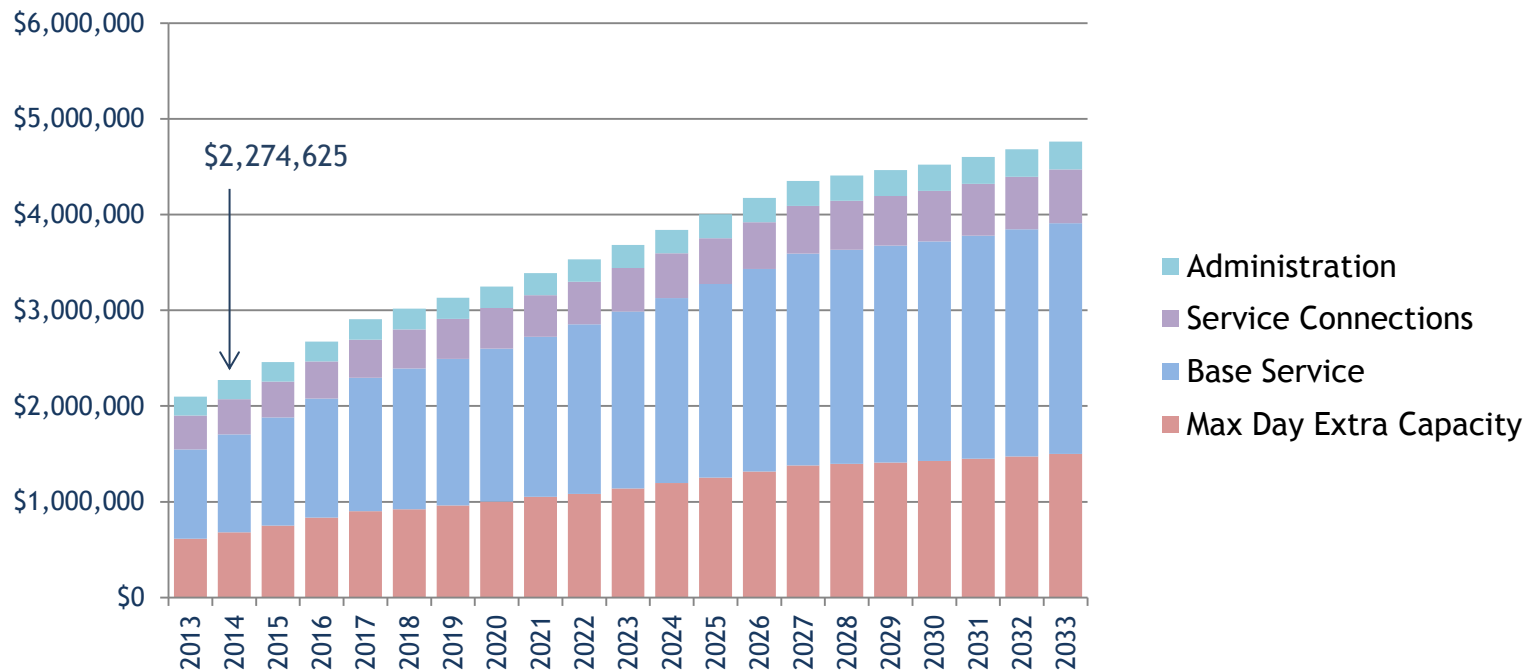

Figure 25: Cost of Service Components over 20 Years.

5.0 Cost of Service Analysis

5.3 Cost Allocations

The units of service shown in the table at the left are "consumed" in varying amounts by the different customer classes. The chart at the right shows the proportion of each service that is "consumed" by each customer class.
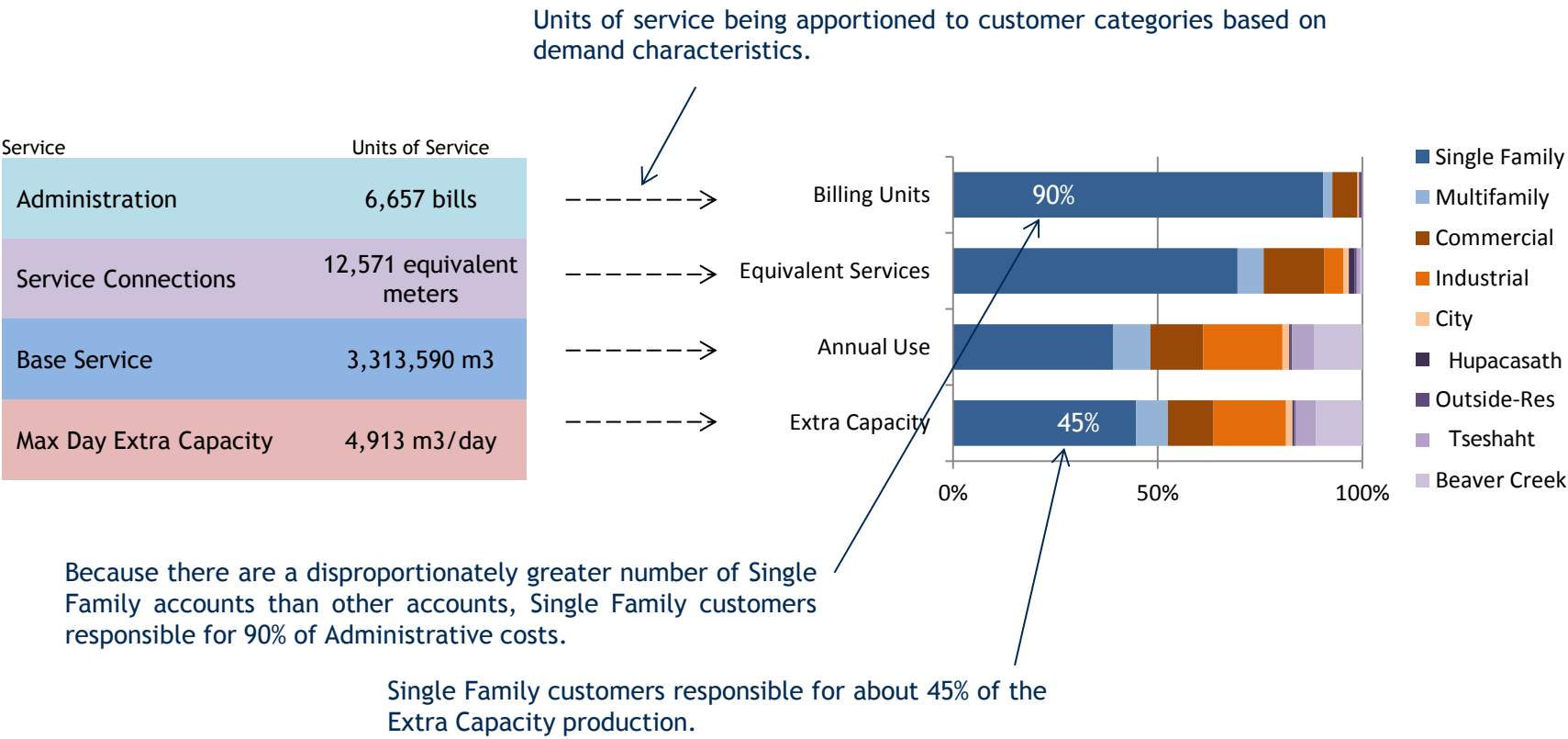
Units of service being apportioned to customer categories based on demand characteristics.

Service	Units of Service
Administration	6,657 bills
Service Connections	12,571 equivalent meters
Base Service	3,313,590 m3
Max Day Extra Capacity	4,913 m3/day

Because there are a disproportionately greater number of Single Family accounts than other accounts, Single Family customers responsible for 90% of Administrative costs.

Single Family customers responsible for about 45% of the Extra Capacity production.

Figure 26: Apportioning Costs to Customers using Units of Service and Unit Costs.

5.0 Cost of Service Analysis

5.3 Cost Allocations

The customer-category-specific Cost of Service is determined by "multiplying" a 20 year projection of service costs to the customer demand characteristics matrix.
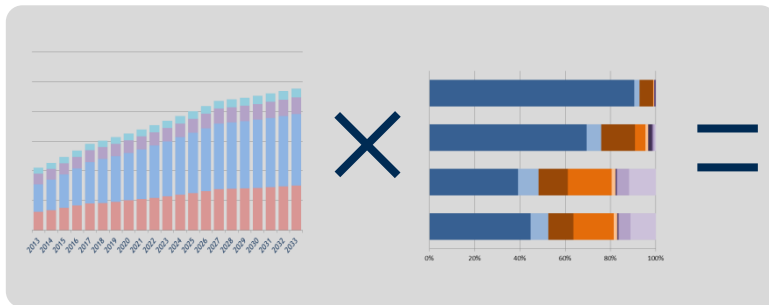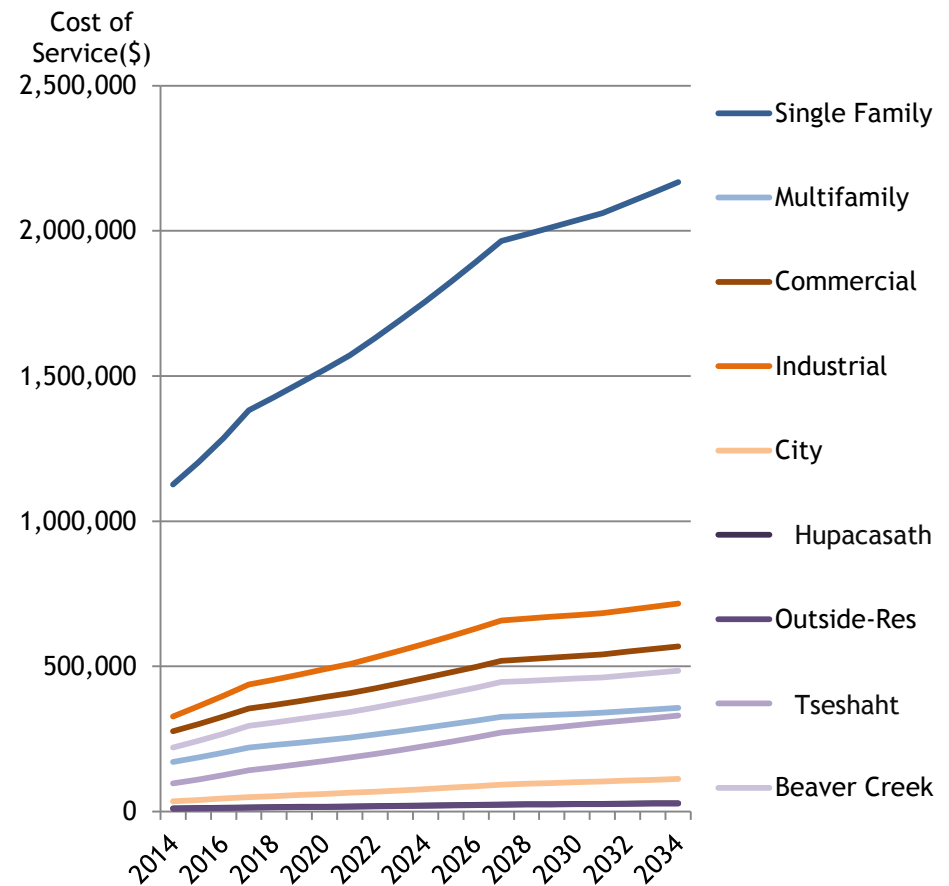

Figure 27: Allocation of 20 year costs to customer categories.

5.0 Cost of Service Analysis

5.4 Cross-Subsidy Analysis

The following graph shows for each customer category, how much their contribution towards revenues matches to the cost of service for the category. Assumes that revenue increases are applied equally to all categories over the next 20 years.
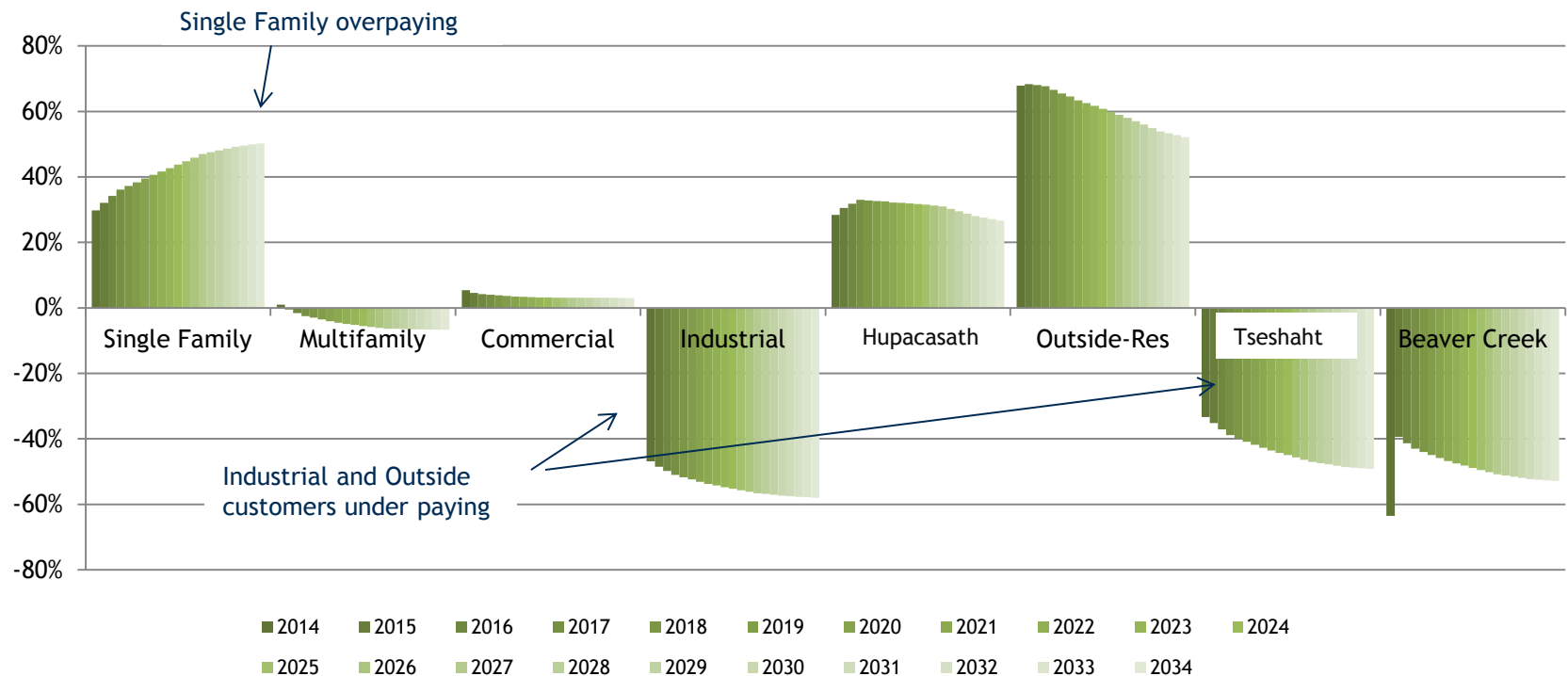
Figure 28: Comparison of over/under Contributions (cross subsidies) by Customer Class.

6.0 RATE STRUCTURE SCENARIOS
6.1 SCENARIO 1
6.2 SCENARIO 2

6.0 Rate Structure Scenarios

6.1 Scenario 1

Methodology:

1. Add Beaver Creek Service Area to rate model. Rate at 75% of Single Family Residential Tier 1 Rate.
2. First step in rebalancing Equity.
3. Increase fixed charge component to bring meter-based fixed charges half-way towards AWWA/CWWA recommendations.
4. Different variable charges for each customer category allows flexibility in achieving objectives. Inclined block rate structure for Single Family Residential, Outside-Res; uniform charge for all other categories.
5. Adjust variable charges to ensure total revenues lines up with planned revenues from long term financial plan.
6. Adjust variable charges differently to maximize equity.
7. Hupcashth agreement remains.

Outcome of presentation of Scenario 1 to Council on July 28, 2014:

1. Meter-based fixed charges went too far and need to be backed off
2. Tseshaht (and Hupacashth??) should be treated same as Beaver Creek

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7.0 Appendix

Port Alberni

6.1 Scenario 1

Table 7: Proposed changes to fixed charges

Typical Customers	Meter/ Service Connection Size Imperial	Metric	# Meters and Services	Current 2014 Charge Rates	Current Implied ME Ratios	CWWA/AWWA Recommended ME Ratios	Proposed ME Ratios	Increase to current charge rate	Proposed 2015 Monthly Charge Rate
Residential Sm. Multifamily & Sm. Commercial	5/8"	16 mm	794	$13.31	1.0	1.0	1.0	0%	$13.31
	3/4"	19 mm	5592	$13.31	1.0	1.5	1.5	0%	$13.31
	1"	25 mm	86	$26.98	2.0	2.5	2.4	18%	$31.84
Sm. Commercial & Multifamily, City Industrial	1.5"	38 mm	81	$32.18	2.4	5.0	3.7	53%	$49.25
	2"	50 mm	123	$39.57	3.0	8.0	5	68%	$66.55
	3"	75 mm	31	$59.14	4.4	15.0	10	125%	$133.00
Industrial & Bulk	4"	100 mm	10	$78.72	5.9	25.0	15	154%	$200.00
	6"	150 mm	11	$123.07	9.2	50.0	30	224%	$400.00
	8"	200 mm	3	$167.41	12.6	80.0	46	266%	$612.00
	10"	250 mm	2	$211.76	15.9	115.0	66	315%	$878.00
total			6,731	Existing					

Scenario 1 changes to fixed charges rebalances rate equity while bringing ME ratios more in line with industry standard.

Increases are too high!

*note: A Water Meter Equivalency (ME) ratio is the multiple of a charge compared to the lowest charge. For example, if the lowest charge (for a 5/8" service) is $13.31 and the charge for the 2" service is $39.57, then the ME ratio for a 2" service is 3 (39.57/13.31=3).
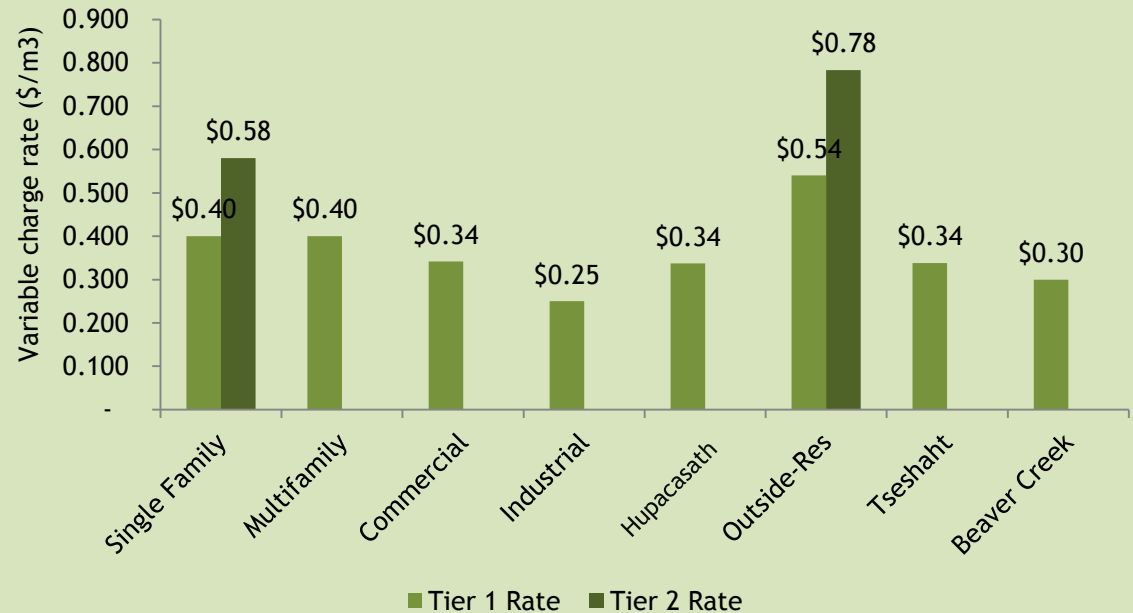
6.1 Scenario 1

Figure 29: Existing and Proposed Variable Charge Rates

Current 2014 Declining Rate Structure

	Inside City	Outside City
Tier 1 First 1,133 m3	$0.47	$0.63
Tier 2 Next 2,266 m3	$0.37	$0.50
Tier 3 Next 5,666 m3	$0.30	$0.41
Tier 4 Over 9,066 m3	$0.26	$0.35

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Port Alberni

6.1 Scenario 1

The two charts below show the effects on <u>average cost of water</u> of applying the recommended updates to the rate structure under scenario 1 as compared with the status quo.
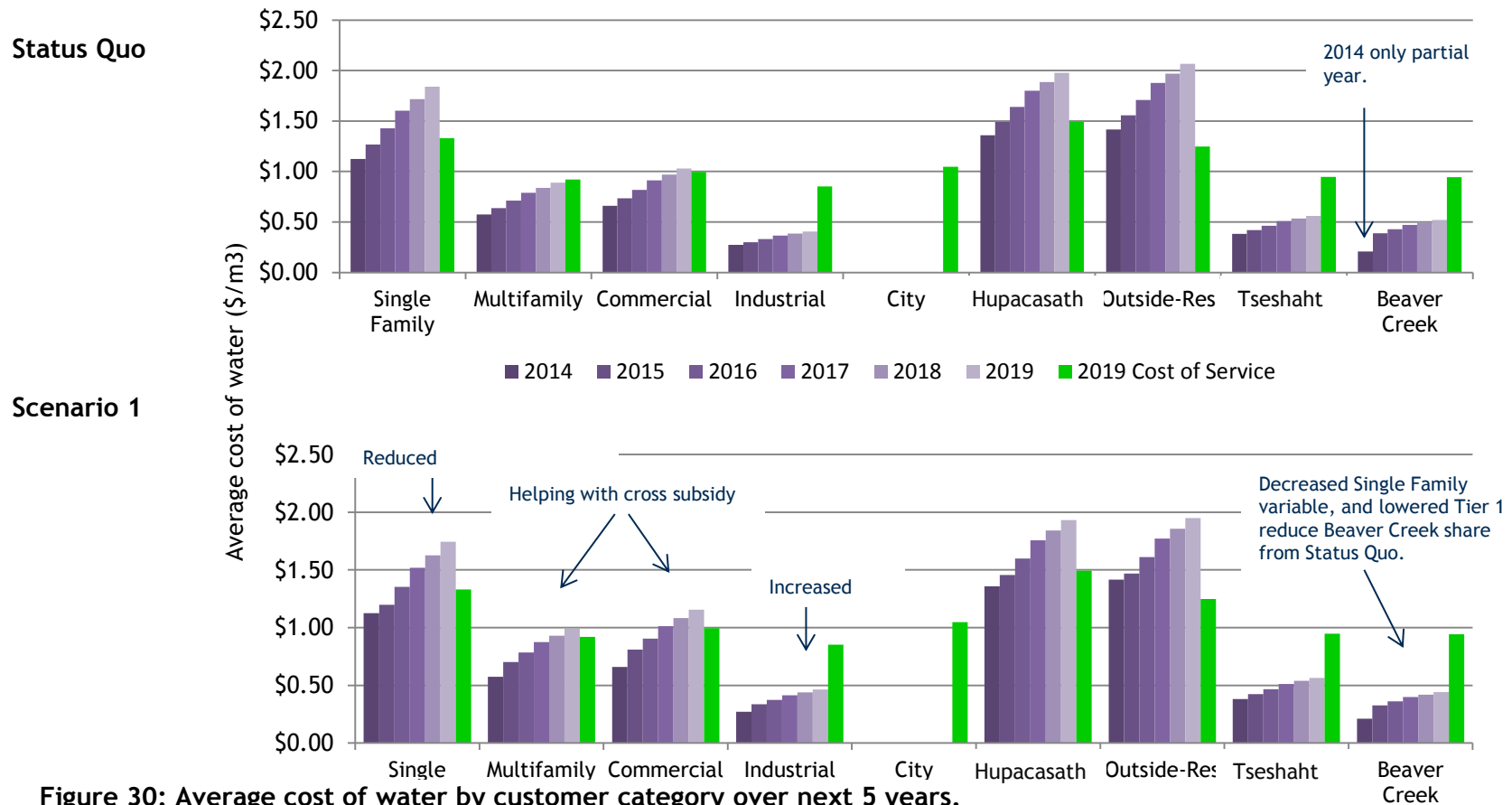

Figure 30: Average cost of water by customer category over next 5 years.

6.1 Scenario 1

The two charts below show the effects on <u>percent subsidy</u> of applying the recommended updates to the rate structure under scenario 1 as compared with the status quo.
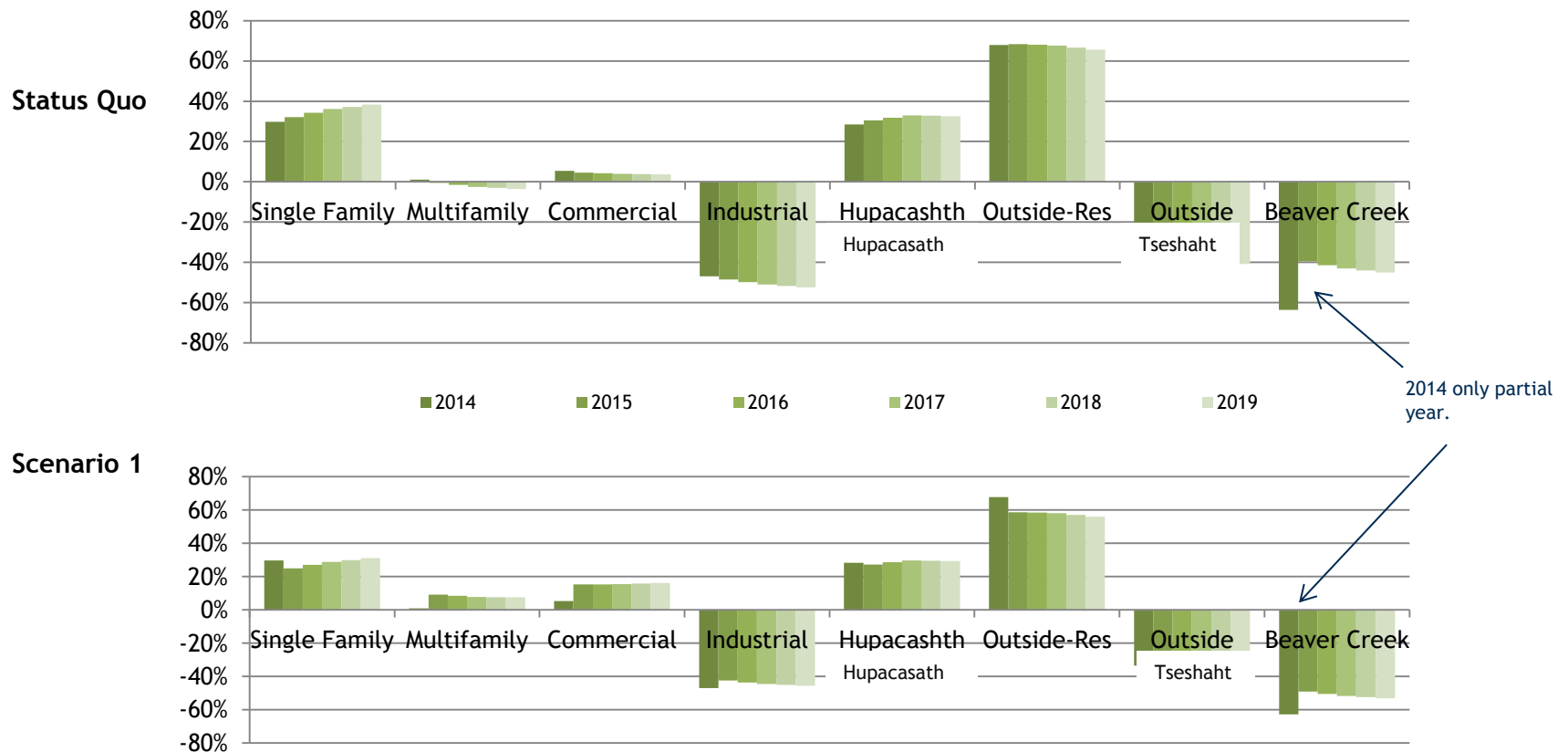
Figure 31: Percent over/under payment (cross subsidies) from cost of service.

6.1 Scenario 1

The two charts below show the effects on <u>fixed portion of revenues</u> of applying the recommended updates to the rate structure under scenario 1 as compared with the status quo.

Status Quo
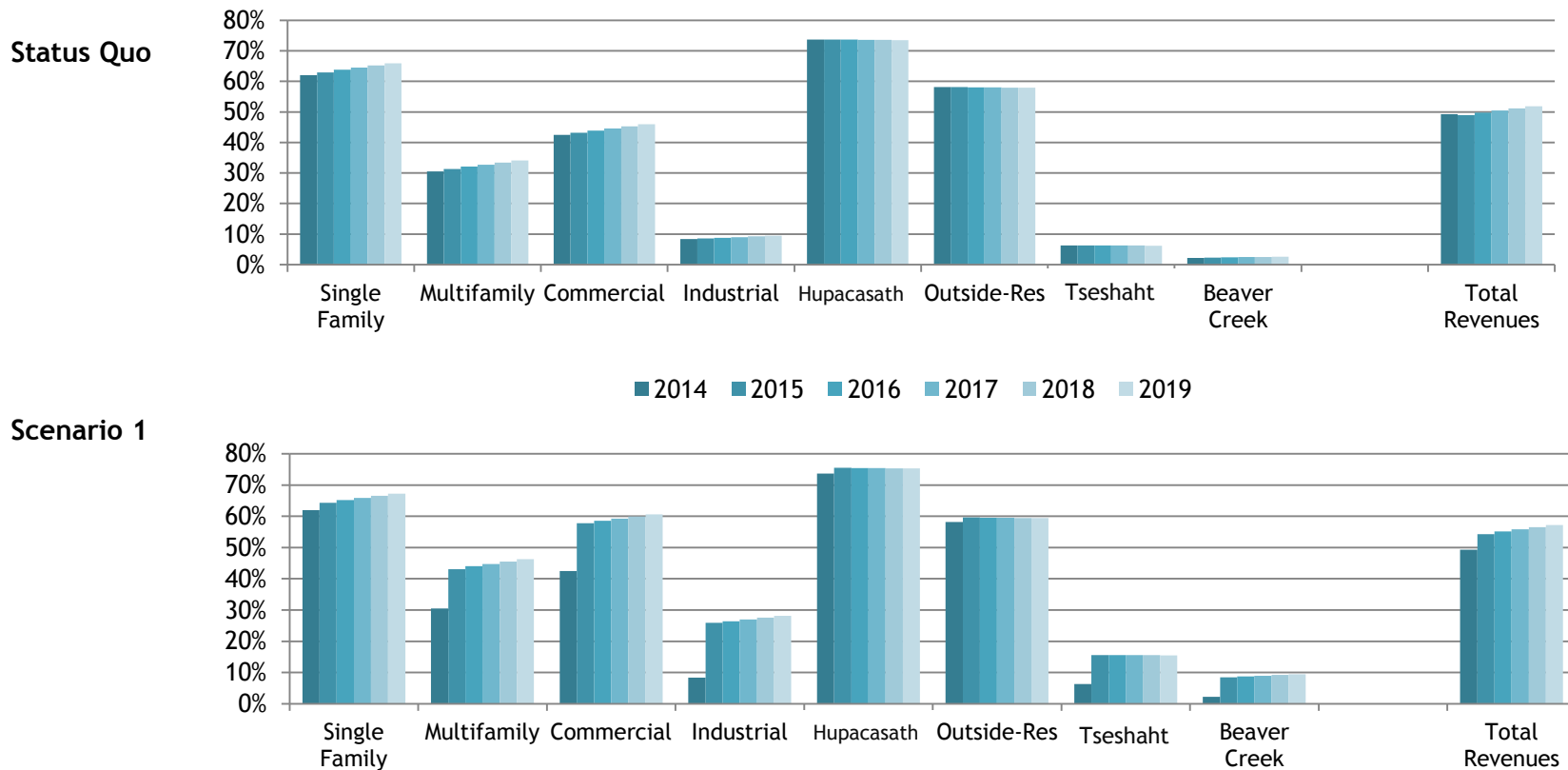
Scenario 1

Figure 32: Percent portion of charges that are fixed.

6.0 Rate Structure Scenarios (continued)

6.2 Scenario 2

Methodology:

1. Reduced the increase to fixed charge component to about 10% towards AWWA/CWWA recommendations.
2. Updated Tseshaht and Hupacasath rate structure to be same as Beaver Creek.
3. Reviewed other jurisdictions to compare rates.

6.0 Rate Structure Scenarios

6.2 Scenario 2

Table 8: Proposed changes to fixed charges

| Typical Customers | Meter/ Service Connection Size | | # Meters and Services | Water Meter Equivalency (ME) Ratios | | | | | |
	Imperial	Metric		Current 2014 Charge Rates	Current Implied ME Ratios	CWWA/AWWA Recommended ME Ratios	Proposed ME Ratios	Increase to current charge rate	Proposed 2015 Monthly Charge Rate
Residential Sm. Multifamily & Sm. Commercial	5/8"	16 mm	794	$13.31	1.0	1.0	1.0		$13.31
	3/4"	19 mm	5592	$13.31	1.0	1.5	1.0		$13.31
	1"	25 mm	86	$26.98	2.0	2.5	2.1	2.5%	$27.66
Sm. Commercial & Multifamily, City Industrial	1.5"	38 mm	81	$32.18	2.4	5.0	2.7	11%	$35.71
	2"	50 mm	123	$39.57	3.0	8.0	3.5	18%	$46.69
	3"	75 mm	31	$59.14	4.4	15.0	5.6	25%	$73.92
Industrial & Bulk	4"	100 mm	10	$78.72	5.9	25.0	7.9	33%	$104.69
	6"	150 mm	11	$123.07	9.2	50.0	13.3	44%	$177.22
	8"	200 mm	3	$167.41	12.6	80.0	19.5	55%	$259.48
	10"	250 mm	2	$211.76	15.9	115.0	26.4	66%	$351.52
total			6,731	Existing					

Proposed changes to fixed charges rebalances rate equity while bringing ME ratios 10% closer to industry standard.

*note: A Water Meter Equivalency (ME) ratio is the multiple of a charge compared to the lowest charge. For example, if the lowest charge (for a 5/8" service) is $13.31 and the charge for the 2" service is $39.57, then the ME ratio for a 2" service is 3 (39.57/13.31=3).
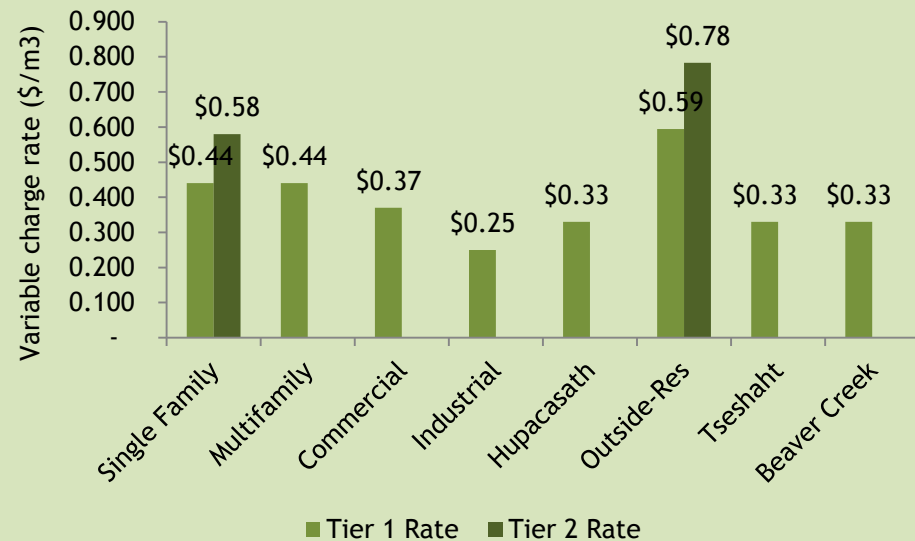
6.0 Rate Structure Scenarios

6.2 Scenario 2

Figure 33: Existing and Proposed Variable Charge Rates

Residential volume charge increase from $0.40 in scenario 1 to $0.44 in scenario 2; but rate is still less than current 2014 rate of $0.47

Current 2014 Declining Rate Structure

	Inside City	Outside City
Tier 1 First 1,133 m3	$0.47	$0.63
Tier 2 Next 2,266 m3	$0.37	$0.50
Tier 3 Next 5,666 m3	$0.30	$0.41
Tier 4 Over 9,066 m3	$0.26	$0.35

6.0 Rate Structure Scenarios

6.2 Scenario 2

Table 9: Comparison of monthly fixed charges based on meter size

	2014 Schedule	PA Proposed S1	Victoria	PA scenario 2
5/8"	$13.31	$13.31	$8.35	$13.31
3/4"	$13.31	$13.31	$9.48	$13.31
1"	$26.98	$31.84	$13.89	$27.66
1.5"	$32.18	$49.25	$17.36	$35.71
2" (8.0)	$39.57 **(3)**	$66.55 **(5)**	$27.68 **(3.3)**	$46.69 **(3.5)**
3"	$59.14	$133.00	$52.06	$73.92
4"	$78.72	$200.00	$83.20	$104.69
6"	$123.07	$400.00	$155.60	$177.22
8" (80.0)	$167.41 **(13)**	$612.00 **(46)**	345.67 (41)	$259.48 **(20)**
10" (115.0)	$211.76	$878.00		$351.52

*note: figures in bold parentheses correspond to Water Meter Equivalency (ME) ratios which are also presented on page 47. The ME ratio is the multiple of a charge compared to the lowest charge. For example, if the lowest charge (for a 5/8" service) is $13.31 and the charge for the 2" service is $39.57, then the ME ratio for a 2" service is 3 (39.57/13.31=3).

Port Alberni

6.0 Rate Structure Scenarios

6.2 Scenario 2

Table 10: Billing Impact of Scenario 2 for a 4 month period in the summer

Customer Category	Courtenay	Powell River	Ladysmith	Campbell River	North Cowichan (Chemainus)	Port Alberni 2014	Proposed Scenario 2 Billing
Single Family Avg. summer consumption (75m3)	$116 flat	$98 flat	$56	$64 flat	$63 flat	$13.31x4 + $0.471 x 75m3 = $88	$13.31x4 + $0.44 x 60m3 + $0.58 x 15m3 = $88
High consumption (125m3)	$116 flat	$98 flat	$99	$64 flat	$63 flat	$13.31x4 + $0.471 x 125m3 = $112	$13.31x4 + $0.44 x 60m3 + $0.58 x 65m3 = $117 Paying $5 more
Commercial 1" connection avg. summer consumption (175m3)	$226	Not metered; Varies - depends on type of business: $93 to $427	$102	$84	$124	$26.98x4 + $0.471 x 175m3 = $190	$27.66x4 + $0.37 x 125m3 = $175 Paying $15 less
2" connection high consumption (1,000m3)	$1,258		$514	$480	$561	$39.57x4 + $0.471 x 1,000m3 = $629	$46.69x4 + $0.37 x 1,000m3 = $556 Paying $73 less

*note: Some rate structures are based on 3 month periods. The calculations in this table are all normalized to 4 months in order to match the City of Port Alberni 4 month billing cycle. In order to do this, the quarterly rate structures were recalculated to incorporate an extra month.

6.2 Scenario 2

The two charts below show the effects on <u>average cost of water</u> of applying the recommended updates to the rate structure under scenario 1 as compared with the status quo.
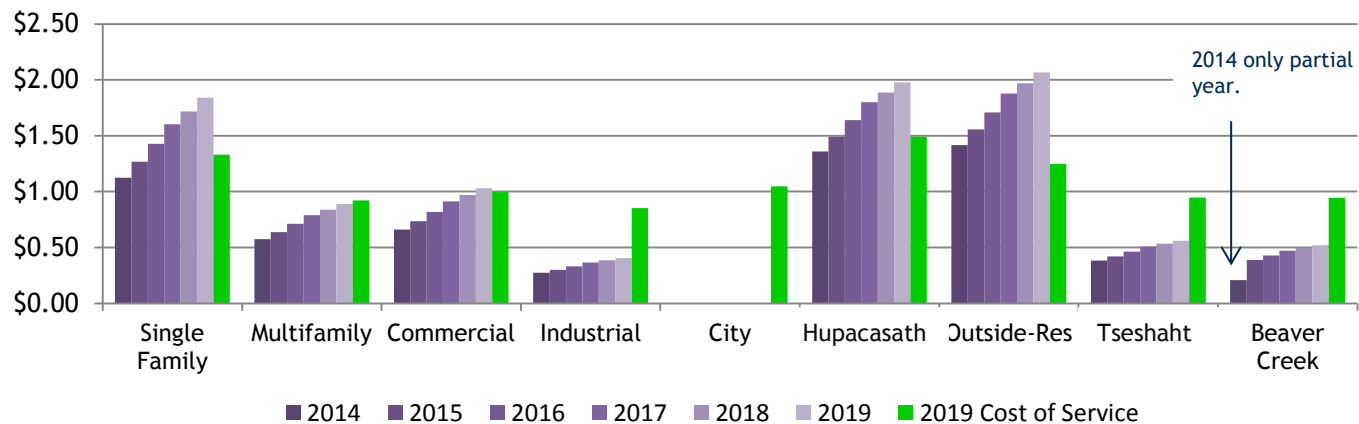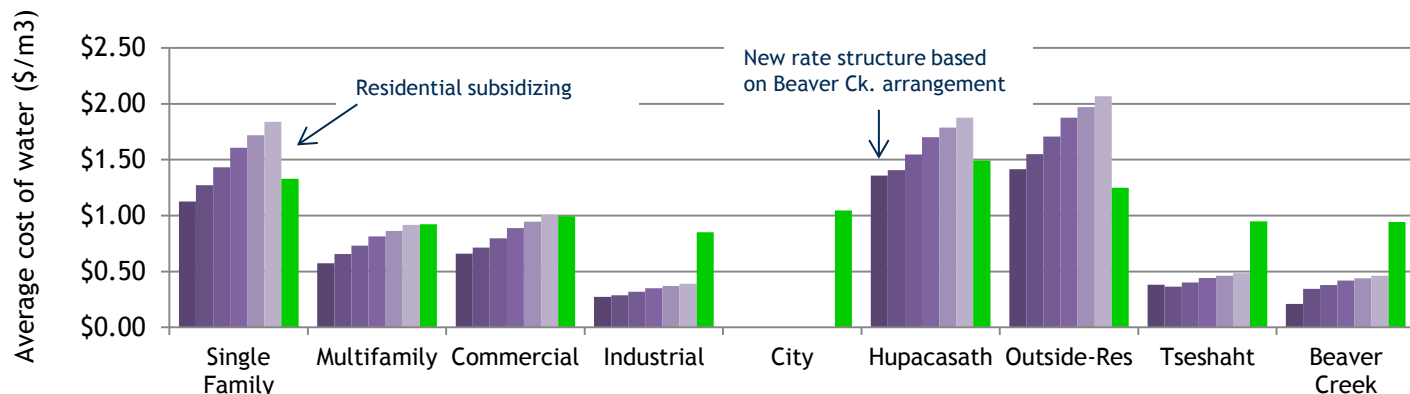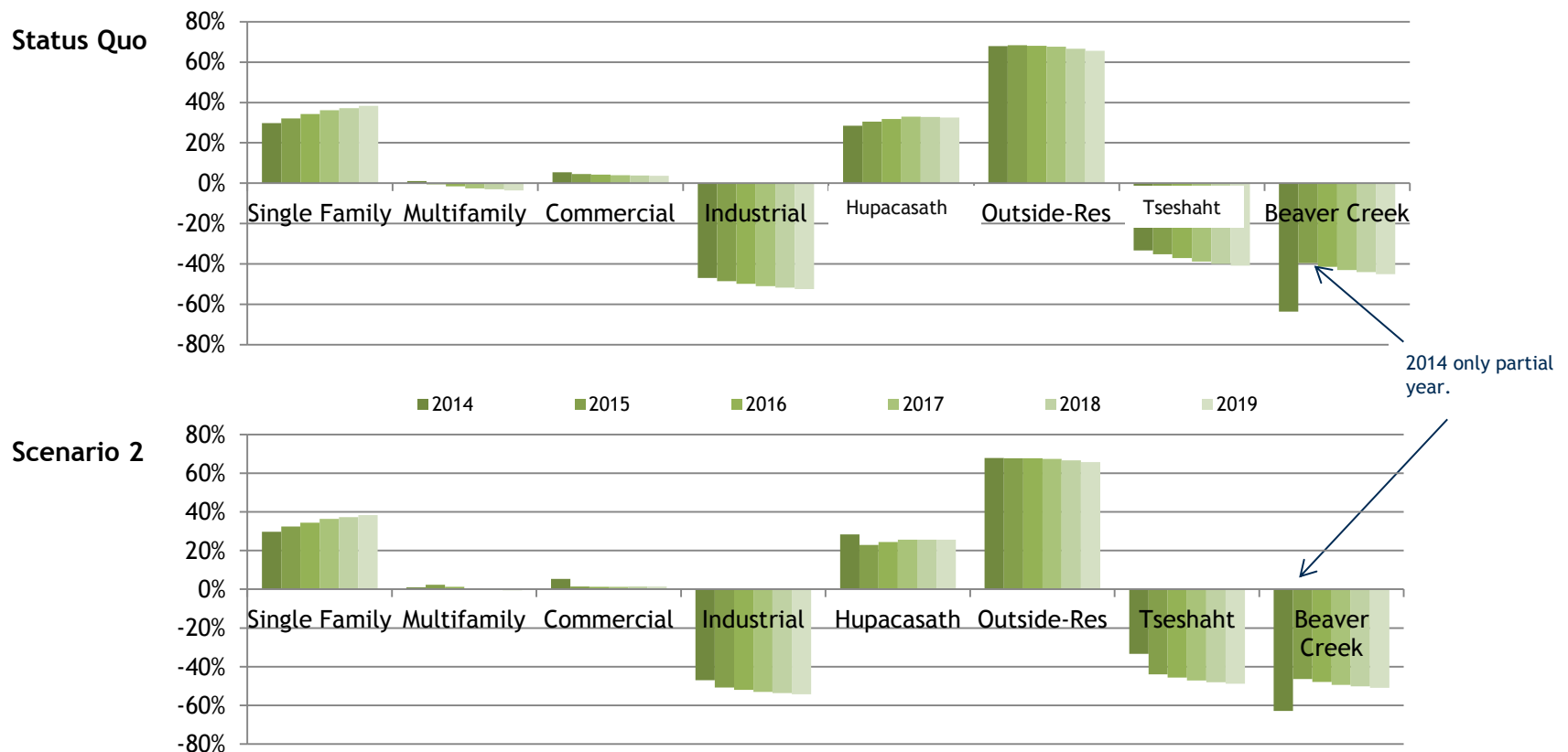

Figure 34: Average cost of water by customer category over next 5 years.

6.0 Rate Structure Scenarios

6.2 Scenario 2

The two charts below show the effects on <u>percent subsidy</u> of applying the recommended updates to the rate structure under scenario 1 as compared with the status quo.

Figure 35: Percent over/under payment (cross subsidies) from cost of service.

6.0 Rate Structure Scenarios

6.2 Scenario 2

The two charts below show the effects on <u>fixed portion of revenues</u> of applying the recommended updates to the rate structure under scenario 1 as compared with the status quo.
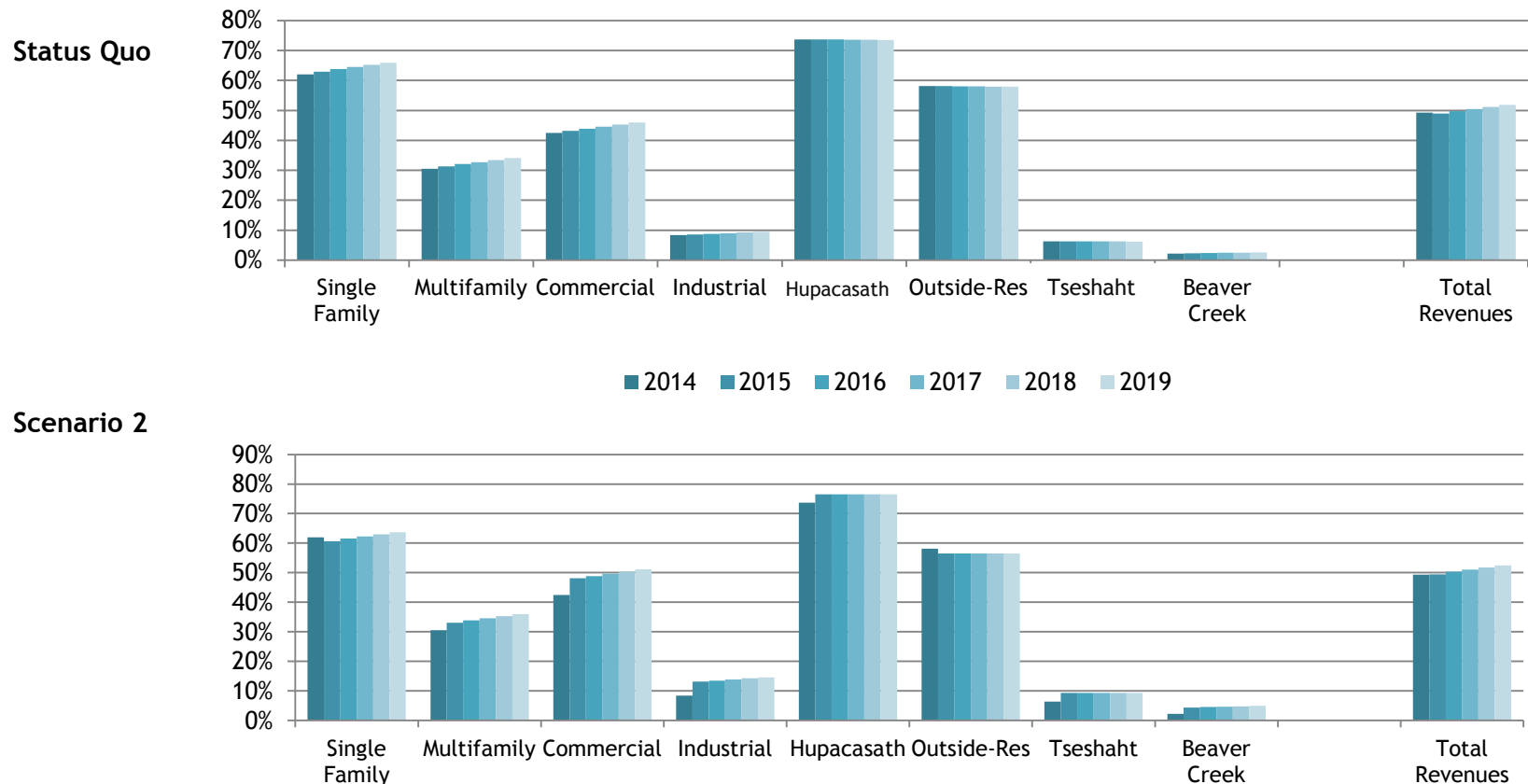
Figure 36: Percent portion of charges that are fixed.

6.2 Scenario 2

6.2.1 Single Family Residential

+9.0%
Revenue Requirements

Revenue Requirement	2014	2015
fixed	905,544	965,811
variable	555,500	626,494
	1,461,043	1,592,305
		9.0%

Minimum Charge

There is a minimum fixed charge billed regardless of water use which is based on meter size.

Meter Size	Metric	Services	2015
5/8"	16mm	737	$13.31
3/4"	19mm	5276	$13.31
1"	25mm	4	$27.66
1.5"	38mm	3	$35.71
2"	50mm	5	$46.69

No change to most Single Family customers' fixed monthly charge.

15 m³/month

Total cost ($)

Demand   m³
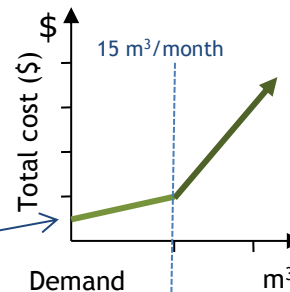
Sample Billing

Sample Triannual Bill (75m3)

5/8" Meter	$13.31 x 4	$53
Tier 1	60m3@$0.44/m3	$26
Tier 2	15m3@$0.58/m3	$9
		$88

Variable Charge

unit price $/m3

Tier 2
$0.58

Tier 1
$0.44

Demand   m³
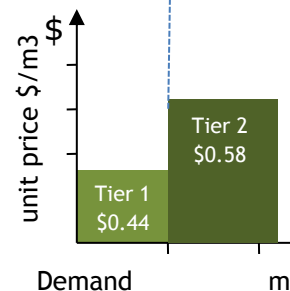
Tier 1 lower than 2014 rate of $0.471. Tier 2 not much higher than 2015 status quo rate of $0.518.

Port Alberni

6.2 Scenario 2

6.2.2 Multifamily Residential

+10.6%
Revenue Requirements

Revenue Requirement	2014	2015
fixed	52,569	63,041
variable	119,838	127,672
	172,408	190,713
		10.6%

Minimum Charge

There is a minimum fixed charge billed regardless of water use which is based on meter size.

Meter Size	Metric	Services	2015
5/8"	16mm	9	$13.31
3/4"	19mm	54	$13.31
1"	25mm	33	$27.66
1.5"	38mm	21	$35.71
2"	50mm	38	$46.69
3"	75mm	8	$73.92
4"	100mm	2	$104.69
6"	150mm	1	$177.22
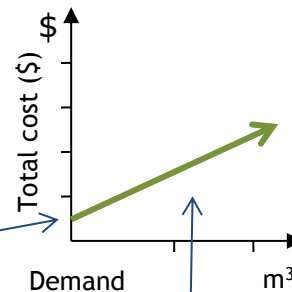
Sample Billing

Sample Triannual Bill (2,852m3) - 38 units

2" Meter	$46.69 x 4	$187
Tier 1	2852m3@$0.44/m3	$1,255
		$1,442
	per unit cost	$38

Variable Charge
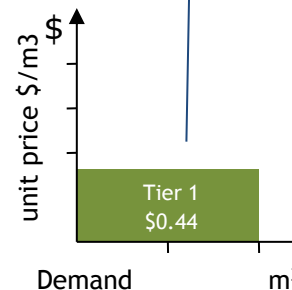
Tier 1
$0.44

Tier 1 lower than 2014 rate of $0.471
No longer have decreasing tiers.

6.2 Scenario 2

6.2.3 Commercial

+5.0%
Revenue Requirements

Revenue Requirement	2014	2015
fixed	123,504	146,781
variable	167,260	158,520
	290,764	305,301
		5.0%

Minimum Charge

There is a minimum fixed charge billed regardless of water use which is based on meter size.

Meter Size	Metric	Services	2015
5/8"	16mm	35	$13.31
3/4"	19mm	228	$13.31
1"	25mm	45	$27.66
1.5"	38mm	51	$35.71
2"	50mm	68	$46.69
3"	75mm	18	$73.92
4"	100mm	6	$104.69
6"	150mm	3	$177.22

No change to half Commercial customers' fixed monthly charge.
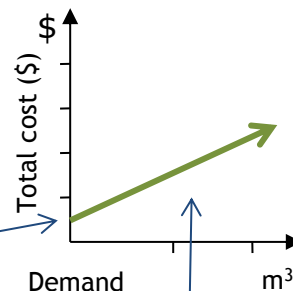
Sample Billing

Sample Triannual Bill (175m3)

1" Meter	$27.66 x 4	$111
Tier 1	175m3@$0.37/m3	$65
		$175

Variable Charge

Tier 1 lower than 2014 rate of $0.471
No longer have decreasing tiers. Lowest consuming half of Commercial customers will see a decrease in their billing.
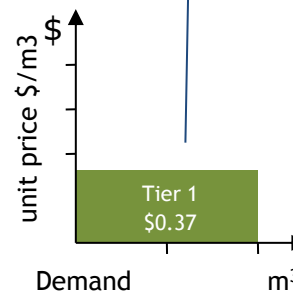
6.2 Scenario 2

6.2.4 Industrial

+2.6%
Revenue Requirements

Revenue Requirement	2014	2015
fixed	14,495	23,378
variable	159,441	155,049
	173,936	178,427
		2.6%

Minimum Charge

There is a minimum fixed charge billed regardless of water use which is based on meter size.

Meter Size	Metric	Services	2015
5/8"	16mm	0	$13.31
3/4"	19mm	0	$13.31
1"	25mm	0	$27.66
1.5"	38mm	0	$35.71
2"	50mm	1	$46.69
3"	75mm	2	$73.92
4"	100mm	0	$104.69
6"	150mm	3	$177.22
8"	200mm	2	$259.48
10"	250mm	2	$351.52
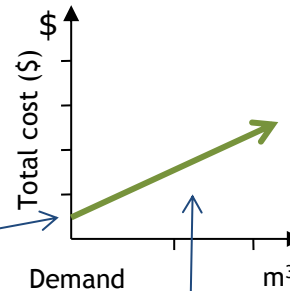
Sample Billing

Sample Triannual Bill (50,000m3)

10" Meter	$351.52 x 4	$1,406
Tier 1	50000m3@$0.25/m3	$12,500
		$13,906

Variable Charge
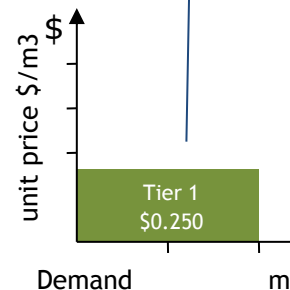
Tier 1 lower than 2014 lowest tier rate of $0.262. No longer have decreasing tiers.

Tier 1 $0.250

6.2 Scenario 2

6.2.5 Hupacasath

3.7%
Revenue Requirements

Revenue Requirement	2014	2015
fixed	10,713	11,539
variable	3,819	3,538
	14,533	15,077
		3.7%

Minimum Charge

Meter Size	Metric	Services	2015
5/8"	16mm	0	$17.97
3/4"	19mm	1	$17.97
1"	25mm	0	$37.34
1.5"	38mm	0	$48.21
2"	50mm	2	$63.03
3"	75mm	1	$99.79
4"	100mm	0	$141.33
6"	150mm	3	$239.24

Sample Billing

Variable Charge
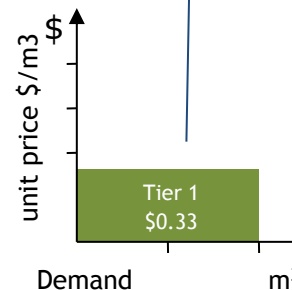
Tier 1
$0.33

Variable rate 75% of Residential Tier 1 rate

6.2 Scenario 2

6.2.6 Outside Residential

+9.8%
Revenue Requirements

Revenue Requirement	2014	2015
fixed	9,712	10,350
variable	6,994	7,986
	16,706	18,336
		9.8%

Minimum Charge

Based on meter size and marked up 35% from inside city customers.

Meter Size	Metric	Services	2015
5/8"	16mm	12	$17.97
3/4"	19mm	36	$17.97

15 m³/month

Total cost ($) — Demand — m³
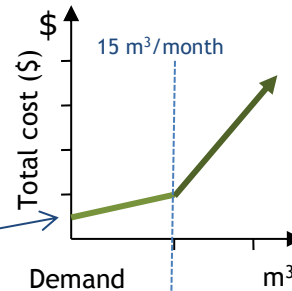
Sample Billing

Sample Triannual Bill (75m3)

5/8" Meter	$17.97 x 4	$72
Tier 1	60m3@$/m3	$36
Tier 2	15m3@$/m3	$12
		$119

Variable Charge

Tier 2 $0.783

Tier 1 $0.594

unit price $/m3 — Demand — m³
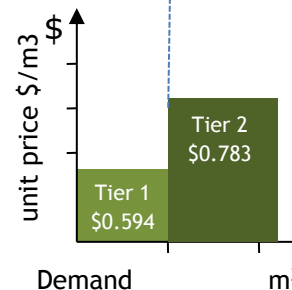
Tier 1 and Tier 2 charges based on 35% markup from Single Family Residential customers.

6.2 Scenario 2

6.2.7 Tseshaht

-4.6%
Revenue Requirements

Revenue Requirement	2014	2015
fixed	4,085	5,771
variable	60,822	56,179
	64,907	61,950
		-4.6%

Minimum Charge

Based on meter size and marked up 35% from inside city customers.

Meter Size	Metric	Services	2015
5/8"	16mm	0	$17.97
3/4"	19mm	0	$17.97
1"	25mm	1	$37.34
1.5"	38mm	0	$48.21
2"	50mm	1	$63.03
3"	75mm	0	$99.79
4"	100mm	1	$141.33
6"	150mm	1	$239.24

Sample Billing

Variable Charge

Tier 1 $0.33
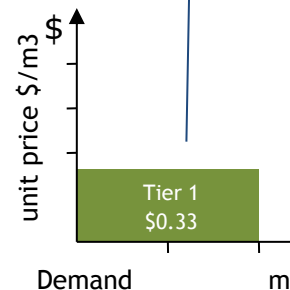
Variable rate 75% of Residential Tier 1 rate

6.2 Scenario 2

6.2.8 Beaver Creek

Revenue Requirement	2014	2015
fixed	1,800	5,695
variable	80,330	124,797
	82,130	130,492

Minimum Charge

Based on meter size and marked up 35% from inside city customers.

Meter Size	Metric	Services	2015
10"	250mm	1	$474.56
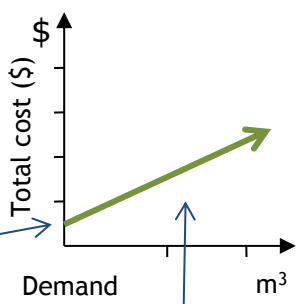
Sample Billing

Variable Charge

Variable rate 75% of Residential Tier 1 rate.

Tier 1
$0.330

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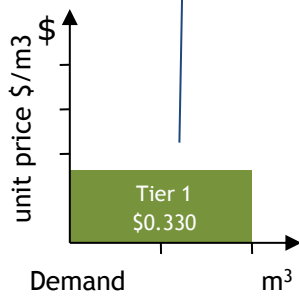
APPENDIX

Indoor Household Efficiency Benchmark

Table 11: Indoor Household Efficiency Benchmark

Category	Per Household Average Monthly Demand*	Per Person (Litres per Capita per day)	Description
Baseline Home	21.6 m3/month (@ 3 pph)	240	Existing homes in the general population built prior to 2000.
City of Port Alberni – Proposed Tier 1 threshold	15 m3/month (@ 2.33 pph)	215	Average indoor demand for City homes
High Efficiency Home	12.5 m3/month (@ 3 pph)	139	Homes meeting the WaterSense New Home specification for fixtures and appliances.

* pph = persons per household

Based on Aquacraft (2011). *Analysis of Water Use in New Single Family Homes*. Prepared for the US EPA and Salt Lake City. Boulder CO.
http://www.aquacraft.com/sites/default/files/pub/Analysis-of-Water-Use-in-New-Single-Family-Homes.pdf

Water Use Distribution inside Typical Household
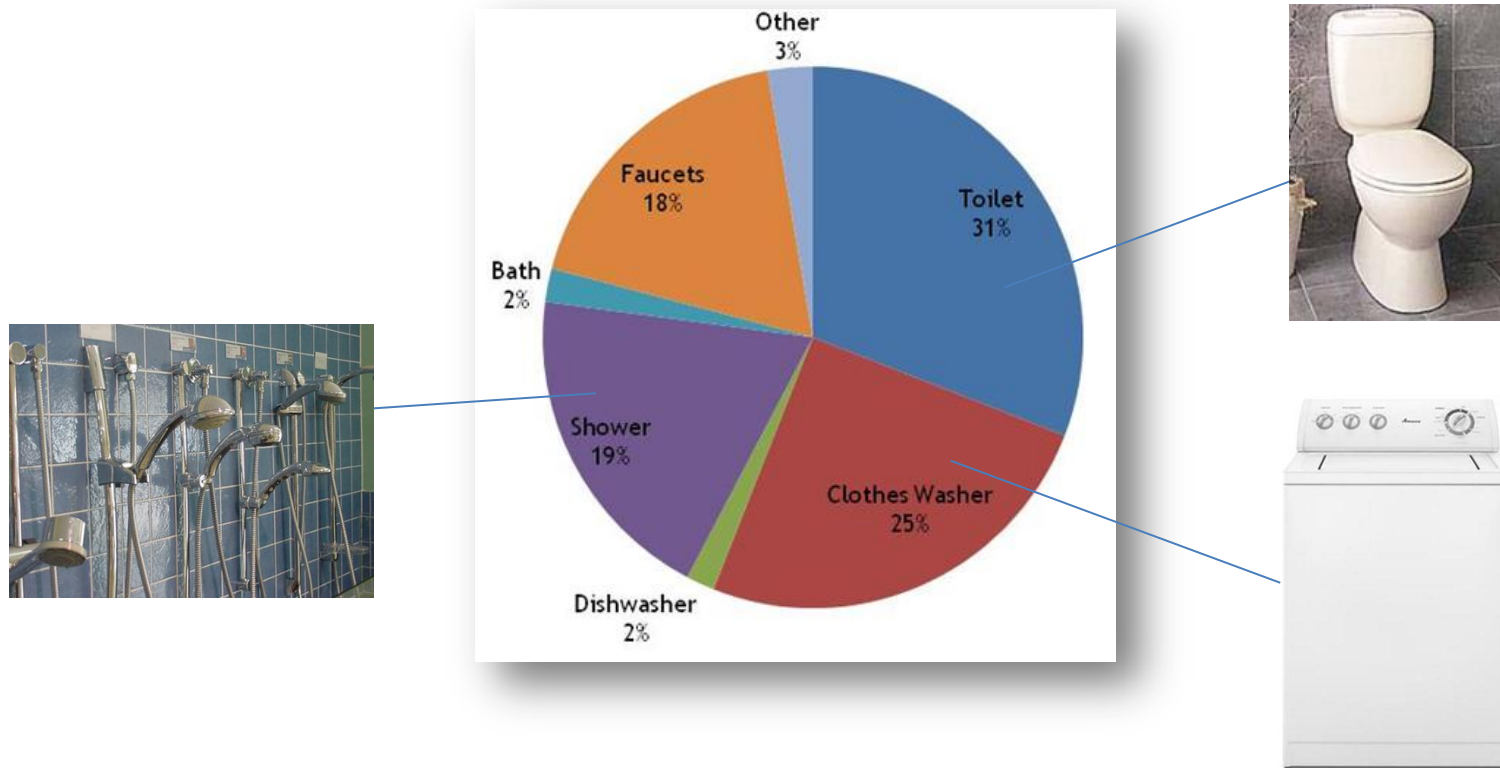
Figure 37: Percent distribution of different end uses within a Single Family household.
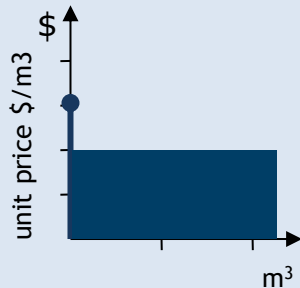
Rate Structures 101

Flat Rate
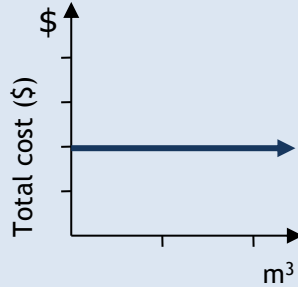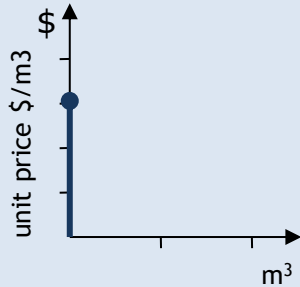
- Fixed price doesn't change with consumption
- 100% reliable revenues
- Does not promote conservation
- Only rate structure available when customers are not metered

Uniform Rate
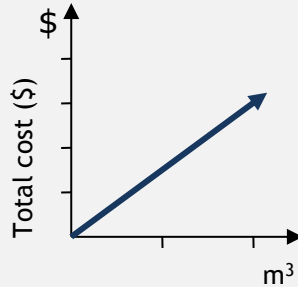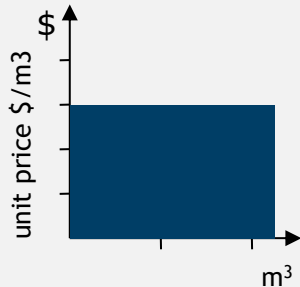
- No fixed charge
- 100% variable revenues
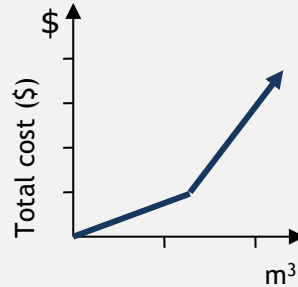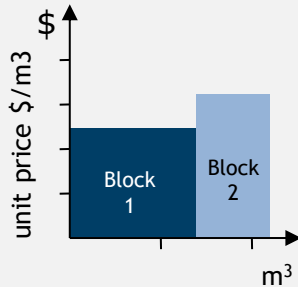- Promotes conservation
- Typically used for bulk water service

Base Charge + Uniform Rate
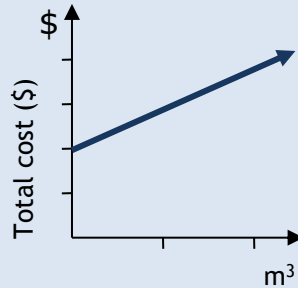
- Combines fixed and variable charges
- Promotes conservation
- Balances need for revenue reliability with need to send conservation signal to customers
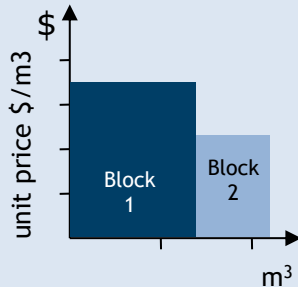- Most common rate structure

Rate Structures 101

Inclining Block Rate

- Unit price of water increases in blocks as customers use more water.
- Sends a strong signal to conserve water
- Typically used with Residential customers
- Can implement more than 2 blocks
- Can also be combined with a fixed charge

Declining Block Rate
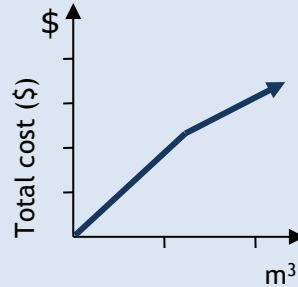
- Unit price of water decreases in blocks as customers use more water.
- Does not promote water conservation

Base with Allowance + Uniform Rate
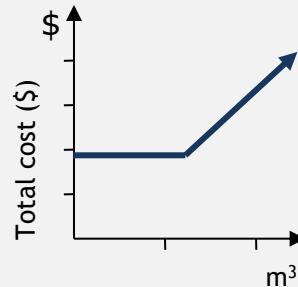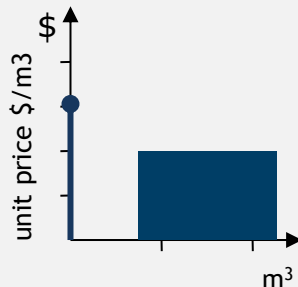
- Can provide customers with a fixed, predictable bill for basic consumption while also promoting conservation at higher uses.
- Can be challenging to communicate, understand and to justify

2.8 Performance – Variable Charge

2.8.1 Residential Consumption

This figure shows the distribution of Residential billings. Each blue bar shows how many bills were issued for the corresponding consumption amount. For example, 274 customers consumed 60 m3 during this billing period.
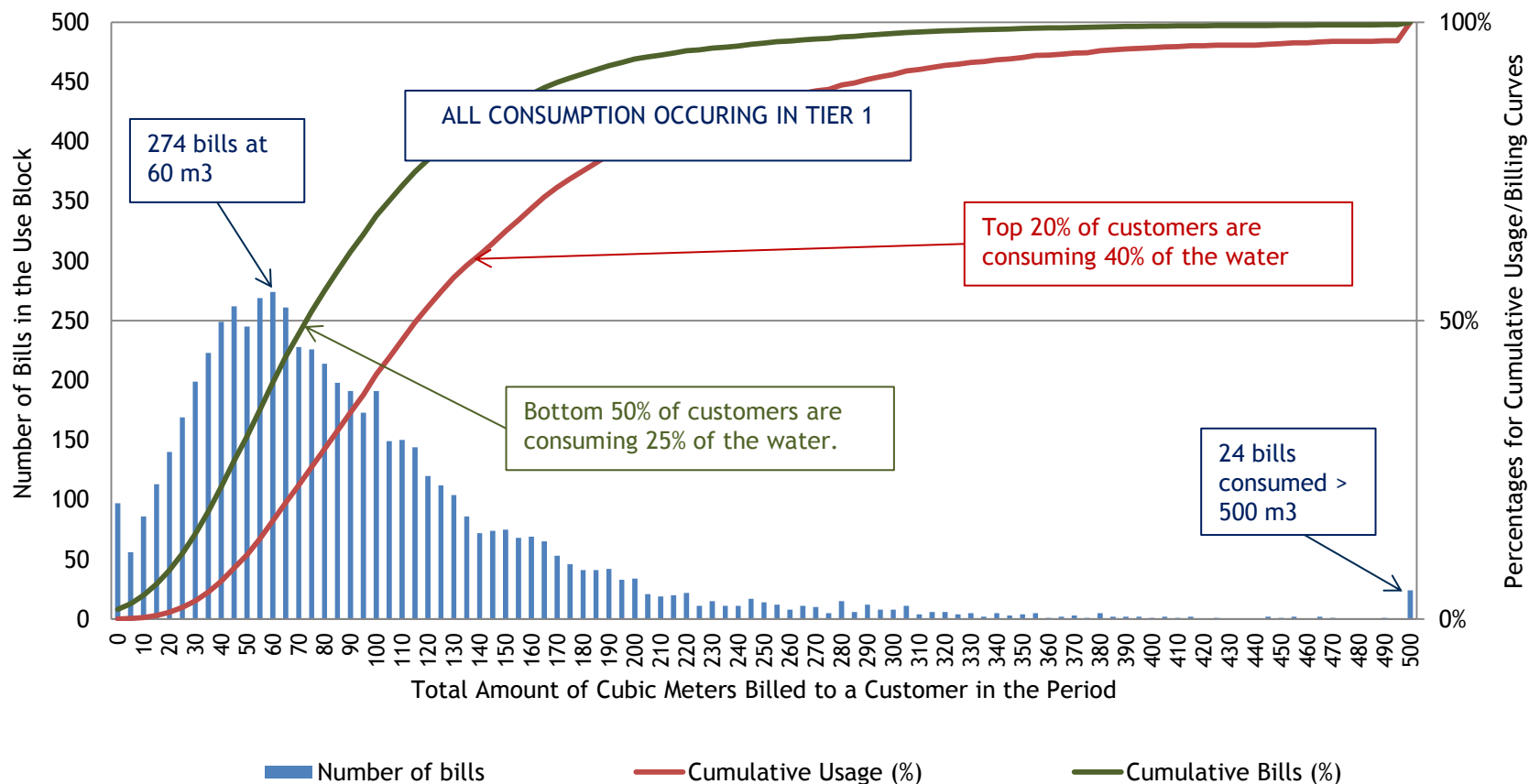

Figure 38: Residential Bill Tabulation – Summer 2013

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2.8 Performance – Variable Charge

2.8.1 Commercial Consumption

This figure shows the distribution of Commercial billings.

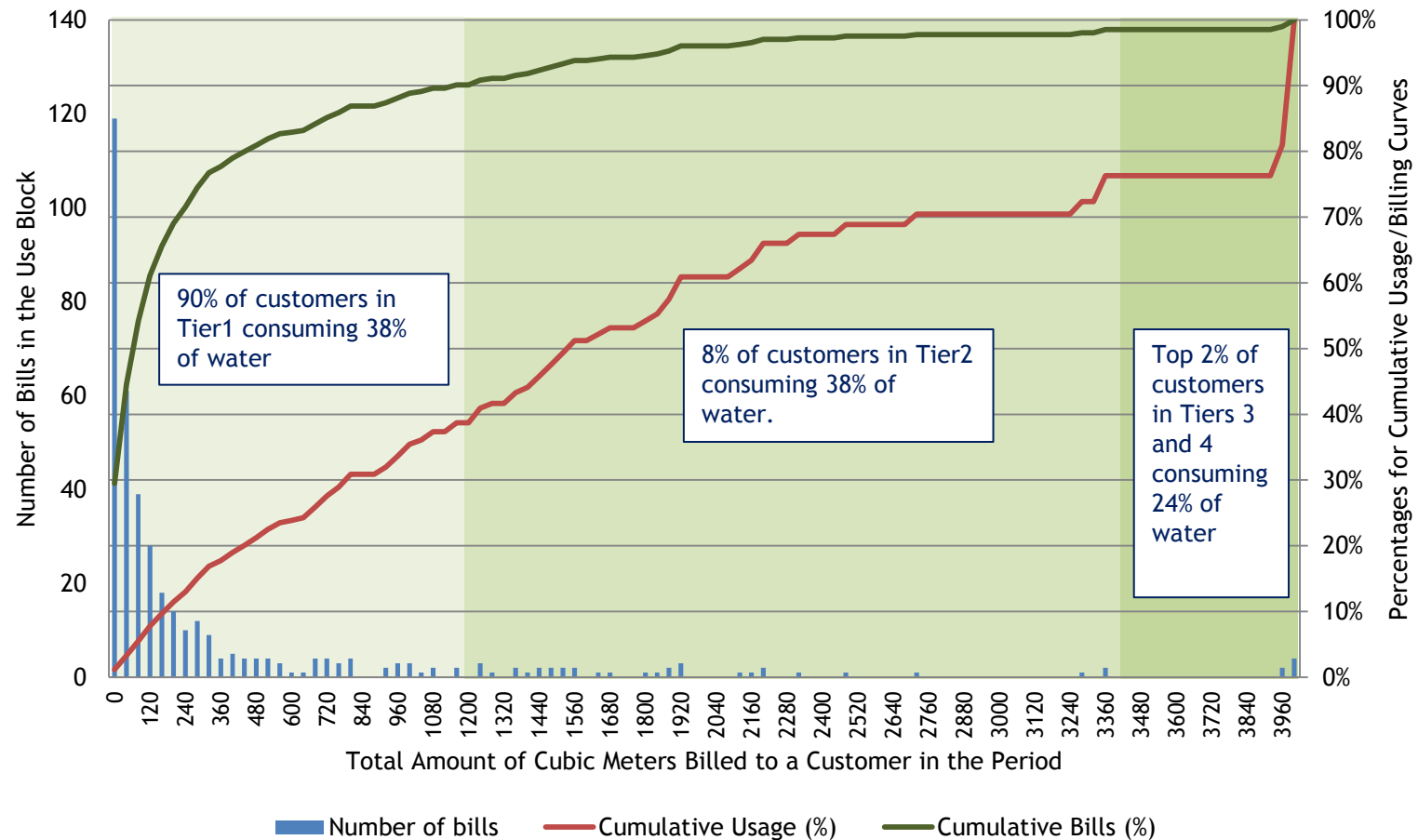**Figure 39: Commercial Bill Tabulation – Summer 2013**

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2.8 Performance – Variable Charge
2.8.1 Commercial Consumption

This figure shows the distribution of Commercial revenues in each tier, for each billing period, as well as for the whole year.
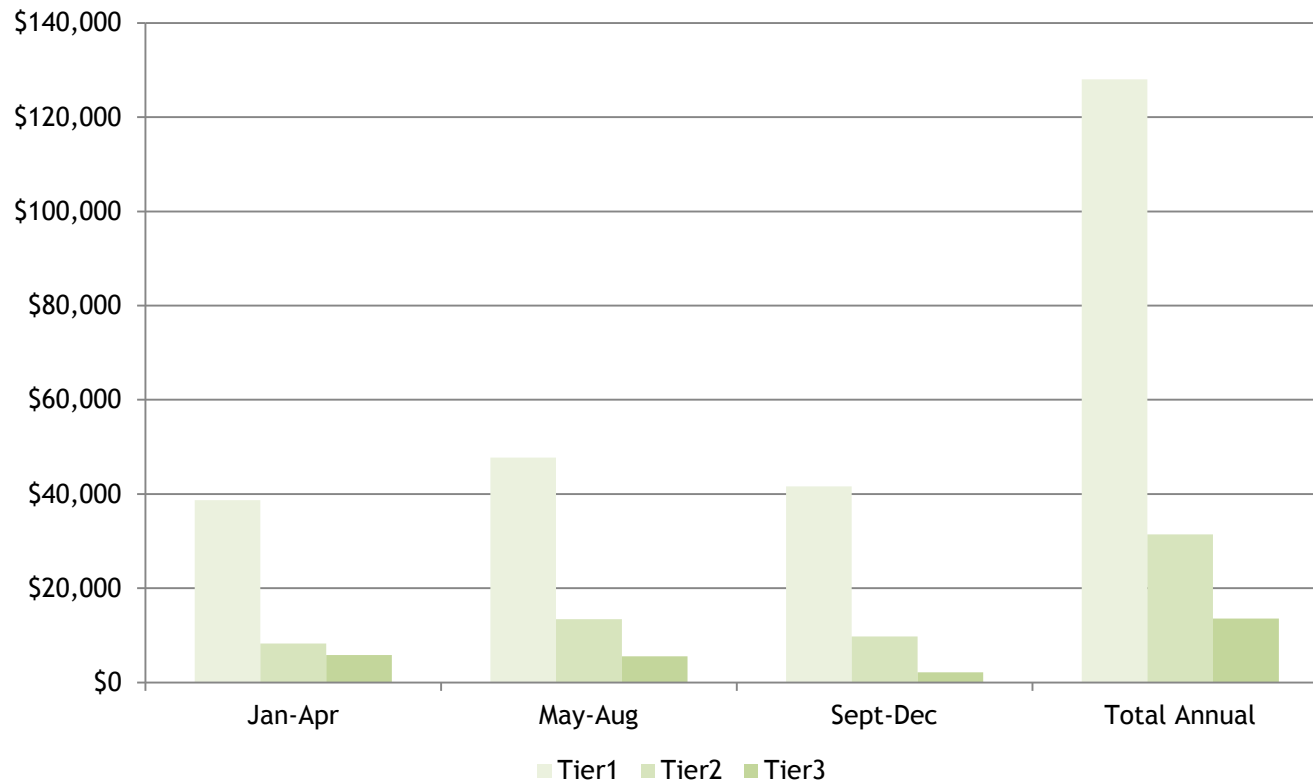

Figure 40: Commercial Customer Revenues in each Tier