



2017 Integrated Resource Plan Update 2018 Conservation Potential Assessment 2018-19 Conservation Plan

Power Management

10-25-2017



2017 Integrated Resource Plan Update

Ahlmahz Negash

Statutory Requirements

Full IRP - 2015

- Range of forecasts
- Assessment of utility scale resources
- Assessment of demand side resources
- Evaluation of renewable and nonrenewable generation
- *Assessment of renewable integration and overgeneration events*
- Long term load resource balance
- Short-term plan

IRP Update - 2017

- At a minimum:
 1. Update on changing conditions
 2. Progress report on the short-term action plan
- Additional content:
 1. Preview of 2019 topics

2017 IRP Update

Q1



Invitation to Participate

Q2



Public Meeting #1

1. Tacoma Public Schools
2. Tacoma Comm. College
3. Bates College
4. WestRock
5. Pierce Conservation District
6. Bonneville Power Administration
7. WA State Department of Commerce
8. Associated Ministries
9. Goodwill of the Olympic & Rainier Region

Q3



Public Meeting #2

1. Bates College
2. University of Puget Sound
3. Davita
4. Praxair
5. WestRock
6. Multicare
7. City of Tacoma – Office of Sustainability
8. Northwest Energy Coalition
9. Northwest Power and Conservation Council
10. WA State Department of Commerce

Q4



Present to Senior Management
Oct 10



Present to PUB
Oct 25



Request PUB Adopt IRP
Nov 15

Key Takeaways

- Tacoma is **not** projected to need a new generation resource to meet future demand or to meet RPS obligations
- Conservation continues to be Tacoma's preferred resource
- Tacoma has met or is on track to meet all 2015 IRP action items





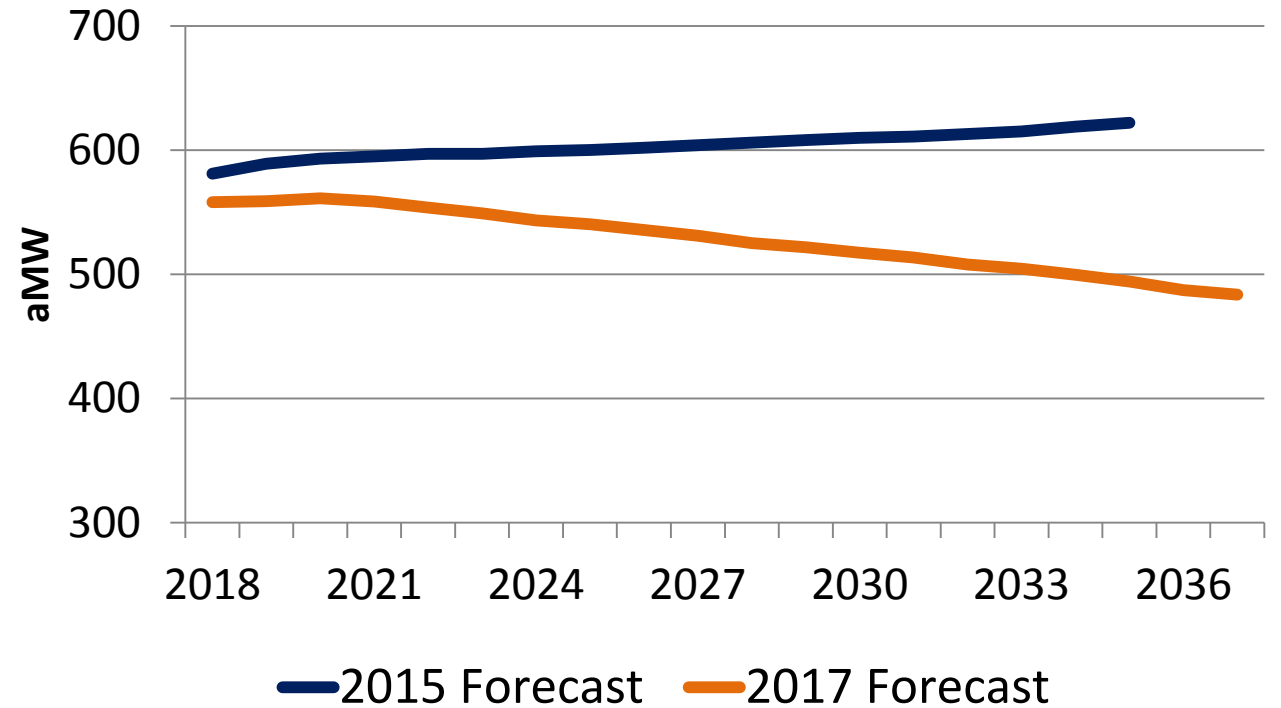
What Has Changed Since 2015?

Changes Since 2015

- **Lower and declining retail demand forecast**

- Declining usage per customer
- Energy efficiency
- Codes and standards
- Adjusted large load assumptions

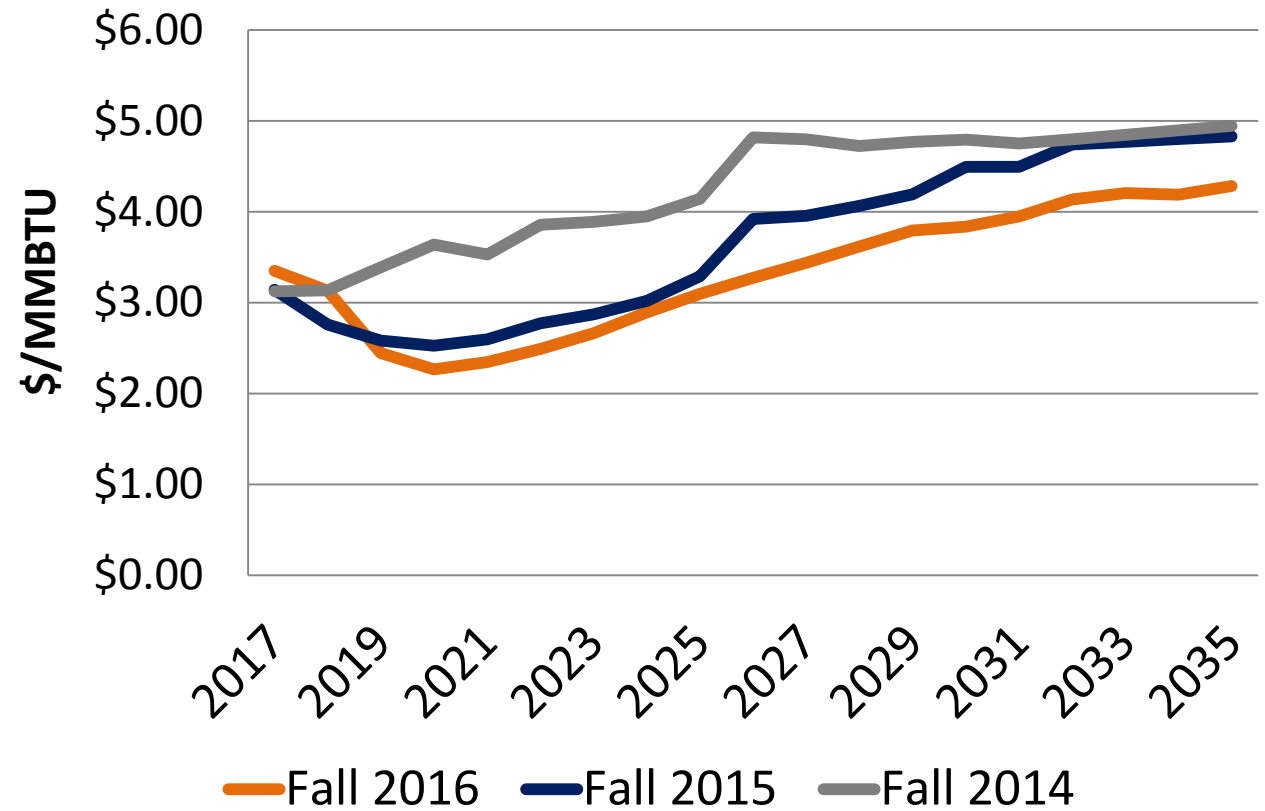
Retail Demand Forecast with Conservation



Changes Since 2015

- Lower and declining retail demand forecast
- **Lower natural gas price forecast**

Natural Gas Price Forecasts

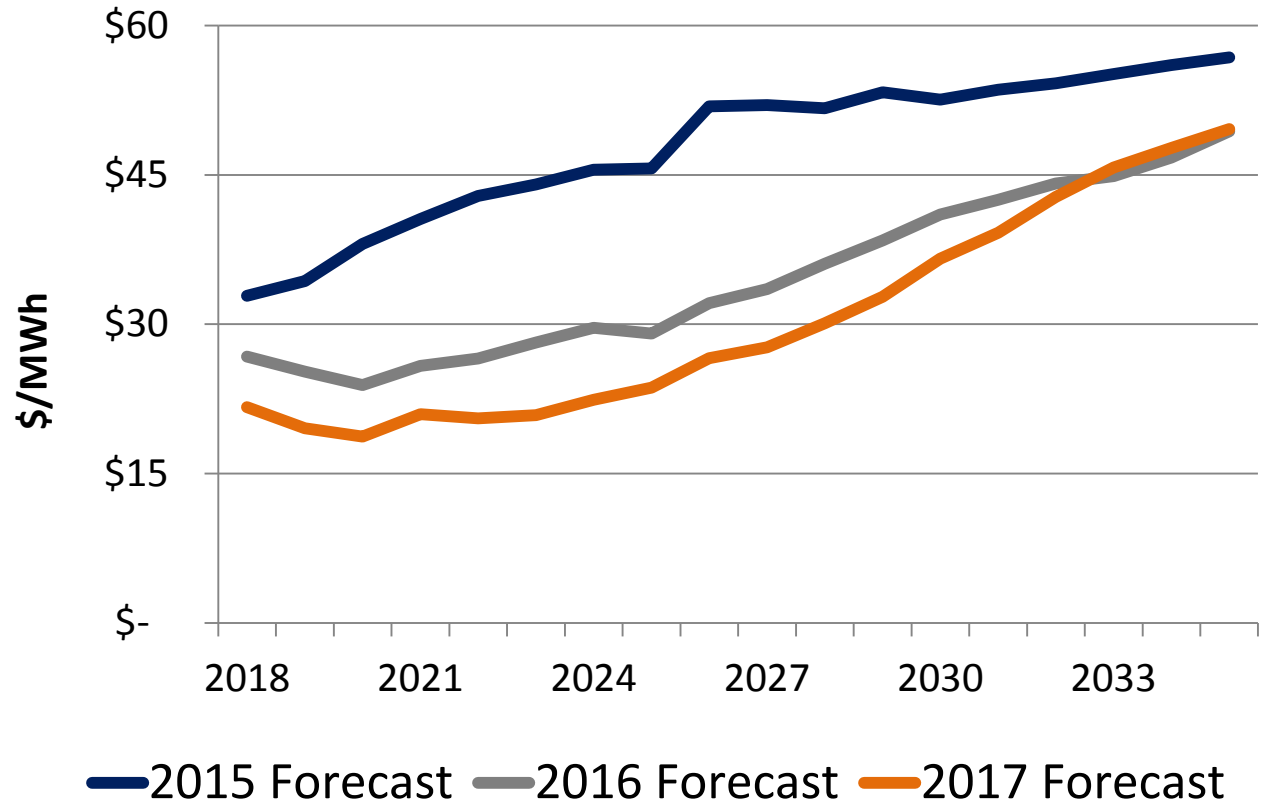


All price forecasts in 2016 dollars

Changes Since 2015

- Lower and declining retail demand forecast
- Lower natural gas price forecast
- **Lower electricity wholesale market price forecast**

Wholesale Price Forecasts



All price forecasts in 2016 dollars

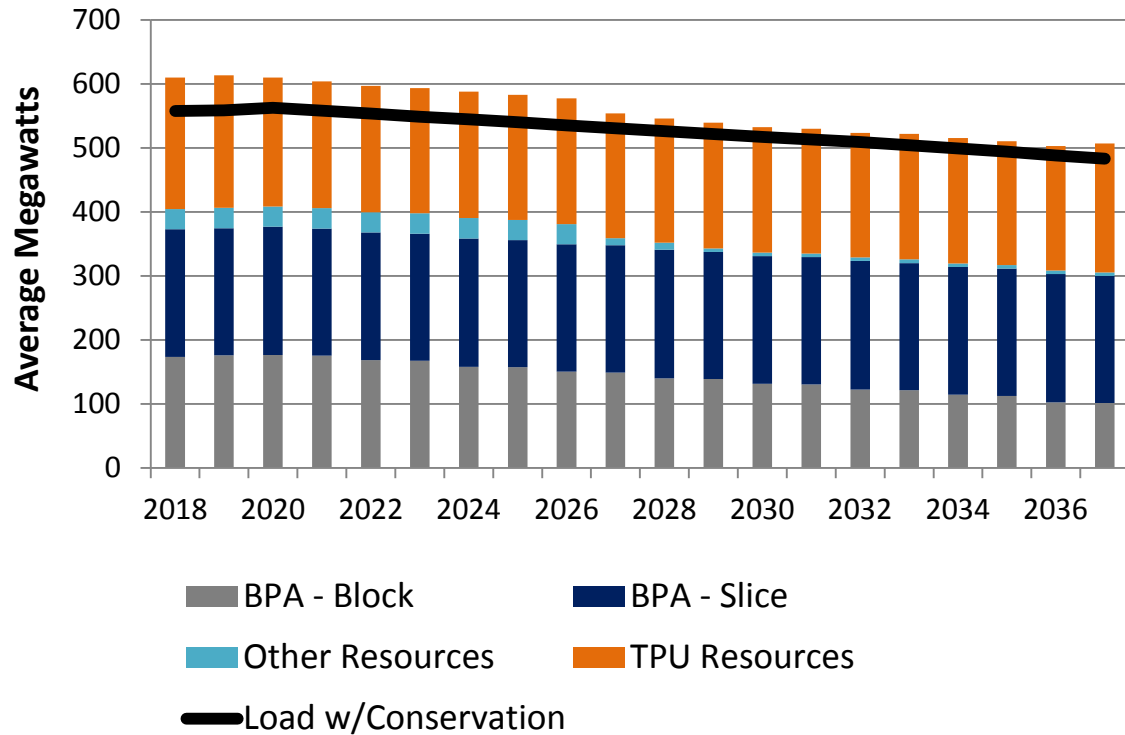
What Do These Changes Mean?



Our forecasted surplus energy is increasing
The market value of surplus sales is declining

Annual Adequacy Metric

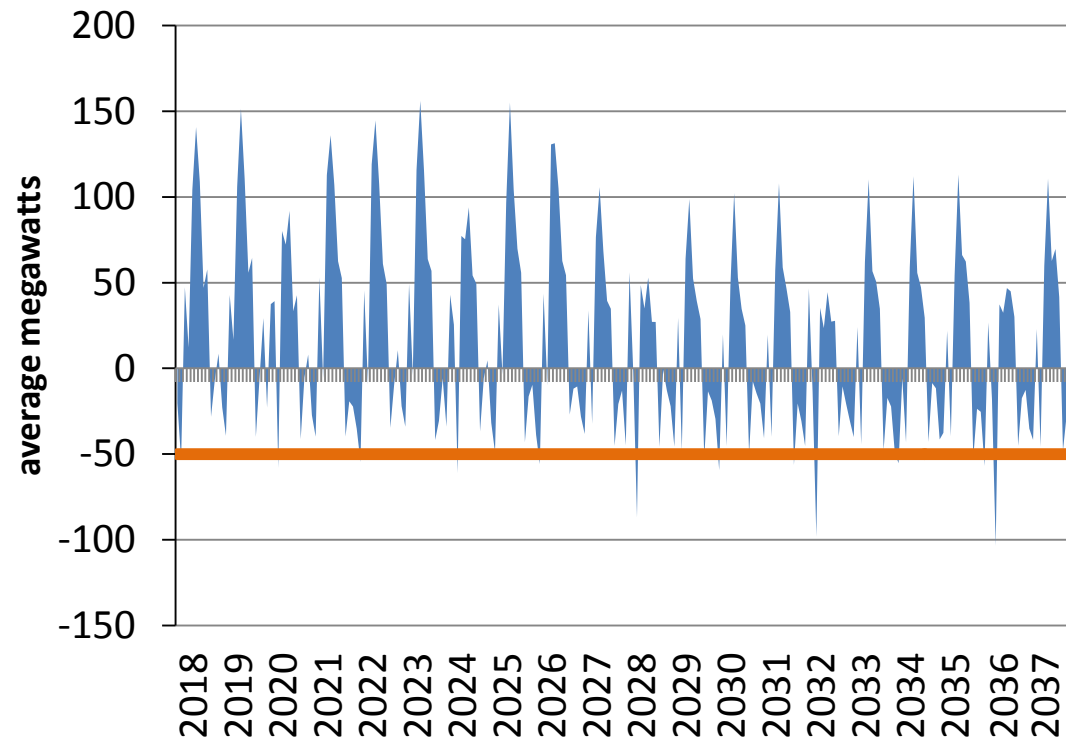
Annual Load Resource Balance (Critical Water)



- Simulated energy supply under critical water conditions exceeds forecasted customer loads over a year
- Ensures we have enough energy to meet retail demand

Monthly Adequacy Metric

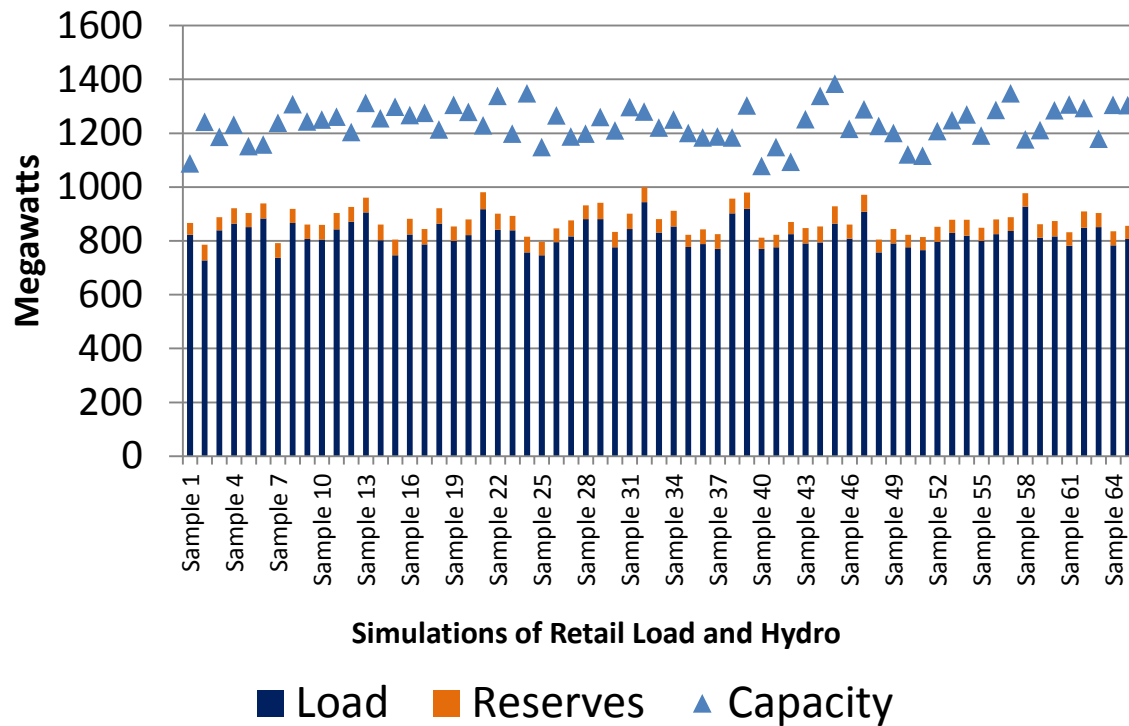
Monthly Load Resource Balance: 5th Percentile



- Simulated energy supply exceeds forecasted customer loads in every month, 19 times out of 20
- Ensures we have the capacity to meet customer need as it varies by season and month
- Worst case scenario

Peak Adequacy Metric

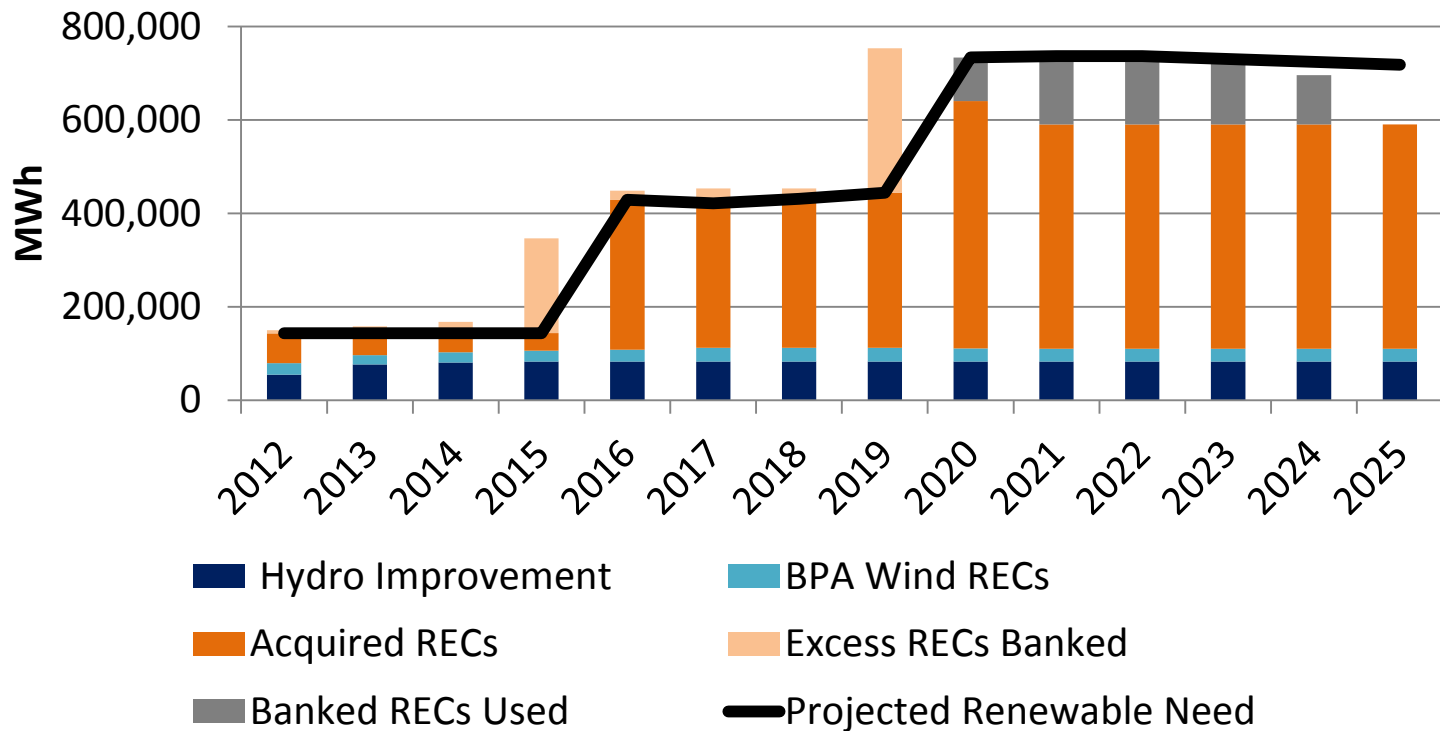
72 Hour Peak Winter Capacity Analysis (2020)



- Simulated energy supply exceeds the highest 72-hour average peak customer load in 19 out of 20 water year simulations
- Ensures we have the capacity to meet the most pressing peak demand
- Represents stressful conditions

Renewable Portfolio Standard (RPS) Obligation

I-937 Renewable Requirement and Compliance Strategy



I-937 Renewable Energy Compliance Options:

1. Renewable generation resource
2. Renewable energy credits (RECs)



Tacoma is not projected to need a new generation resource
Conservation continues to be Tacoma's preferred resource

2015 Action Plan



- ✓ **Acquire** 9.4aMW conservation
- ✓ **Continue** evaluating BPA products
- ✓ **Learn** from small-scale pilots
- ✓ **Monitor** emerging technologies impacting retail load
- ✓ **Explore** methods to incorporate climate change impacts

2017 Action Plan

1. **Acquire** target of 6.4 aMW of conservation as directed by the Conservation Potential Assessment
2. **Investigate** the value of flexible capacity
3. **Explore** distributed energy resource (DER) planning
4. **Improve** resource planning analytical methodologies





Questions?



2018 Conservation Potential Assessment

Rich Arneson

Energy Conservation – State Law

- The Energy Independence Act requires qualifying utilities to determine their conservation potential using “methodologies consistent with those used by the Pacific Northwest Electric Power and conservation planning council” (19.285.040(1)(a) RCW)
- The Energy Independence Act is codified in WAC 194-37 which outlines how utilities are to comply with the law

Conservation Mandate

Washington Administrative Code 194-37

- Requires qualifying utilities to establish:
 - 10-year achievable economic conservation resource potential
 - 2-year conservation target that is “no less than its pro rata share of its ten-year potential.”
- These metrics must be developed every two years

We recommend the Board adopt both metrics prior to January 1, 2018

- The target sets the 2018/19 conservation acquisition baseline against which Tacoma Power will be judged for compliance purposes

Conservation Potential Assessment

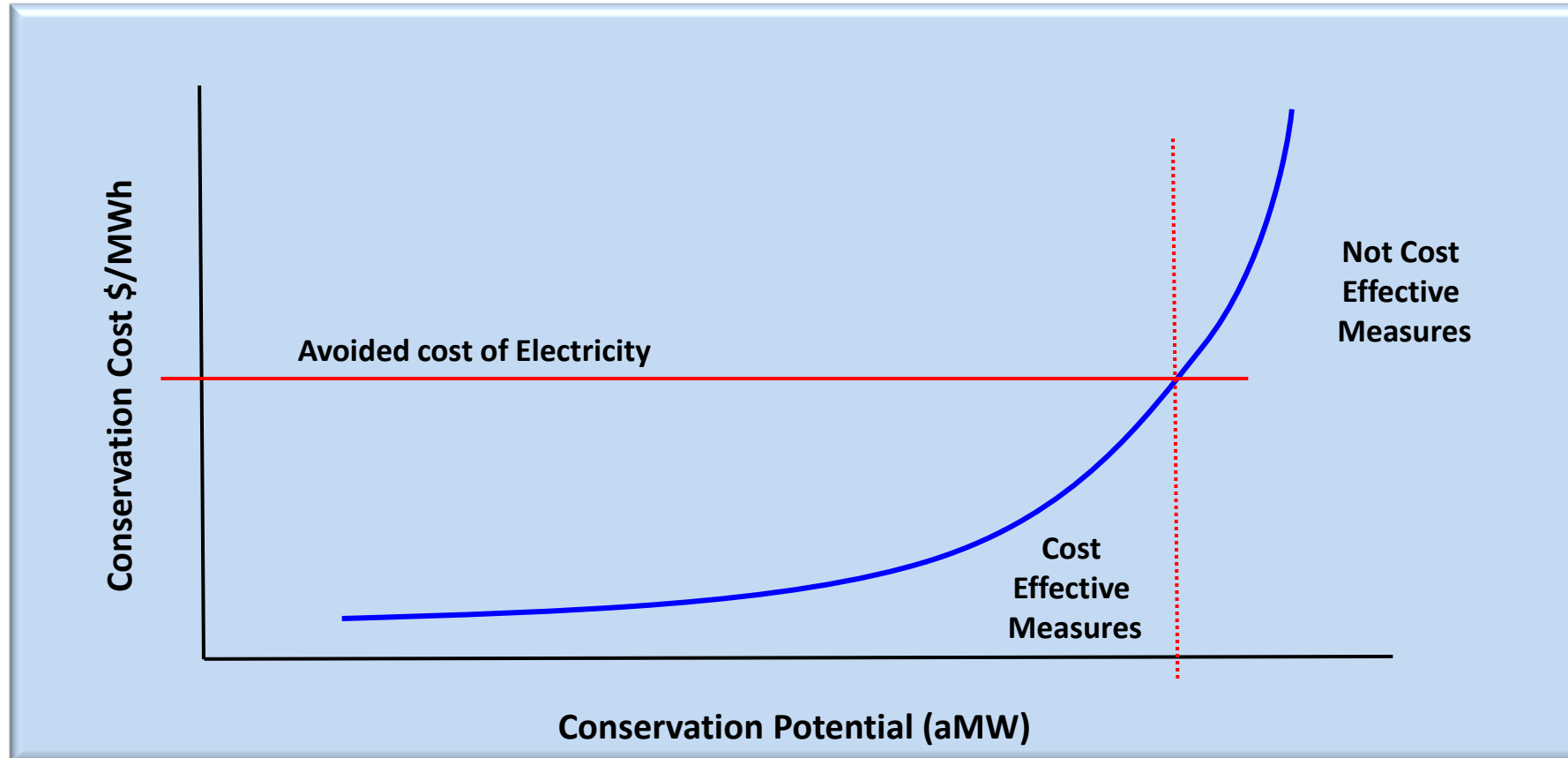
Tacoma Power conducted a conservation potential assessment to determine our 10-year potential

WAC 194-37 requires qualifying utilities to use inputs that “reasonably reflect the specific characteristics of the utility”

- Utility service area specific customer data
- Economic activity and building types
- Current technology assumptions – nearly 8,000 measure permutations
- Enables useful, relevant, detailed conservation planning
- Consistent with NWPCC methodologies

Incorporated the findings of the Conservation Potential Assessment into our Integrated Resource Plan

Conservation Supply Curve



Metric 1: Ten-Year Conservation Potential 31.7 aMW

Sector	Ten-Year Achievable Economic Conservation Potential (aMW)
Residential	11.3
Commercial	10.0
Industrial	6.6
JBLM	1.0
Street Lighting	1.0
Distribution Efficiency	1.8
Total	31.7

Top Ten Measures Ranked by Potential

COM – Interior Linear Lighting – 1.7 aMW

COM – Interior High-Bay Lighting – 1.3 aMW

RES – Exterior Screw-In Lighting – 1.3 aMW

RES – Interior Lighting Exempt – 1.2 aMW

RES – Interior Lighting General Service – 1.2 aMW

COM – Area Lighting – 1.1 aMW

COM-Street Lighting – 1.0 aMW

RES – Insulation Walls – 1.0 aMW

RES – Duct Repair and Sealing – 0.9 aMW

IND – Compressed Air Upgrade – 0.7 aMW



What Changed Since The Last CPA?

Economic Achievable Potential decreased 15.1 aMW

- 2016/2025: 46.8 aMW
- 2018/2027: 31.7 aMW

Baseline: Average efficiency of an end-use improves

- Federal equipment standards
- State building codes
- Customers choosing conservation on their own
- Utility conservation program accomplishments

Measure savings: RTF per unit savings updated due to new study or analysis

Measure Costs: Cost of measure compared to alternative generation resource

Major Subtractions – 14.6 aMW

Baseline Improvement – 8.3 aMW

- Commercial Lighting
- Residential Lighting
- Commercial Water Heating
- Distribution Efficiency

Measure Savings Reduction - 4.6 aMW

- Residential DHPs

Measure Costs – 1.4 aMW

- Commercial HVAC

Metric 2: Two-Year Conservation Target 6.4 aMW

This is the target we are asking the Board to adopt

- Must Hit! Failure will result in fines

Roughly 20% of the 10-year potential

- Meets the pro-rata share requirement
- Modeled in IRP

Annual Objective ~ 3.2 aMW

- About 0.6% of our 2016 retail load



Next Steps

At the November 15 PUB meeting, we will request adoption of:

- Metric 1: A ten-year achievable economic potential of 31.7 aMW
- Metric 2: A two-year conservation target of 6.4 aMW



Questions?



2018-19 Conservation Plan

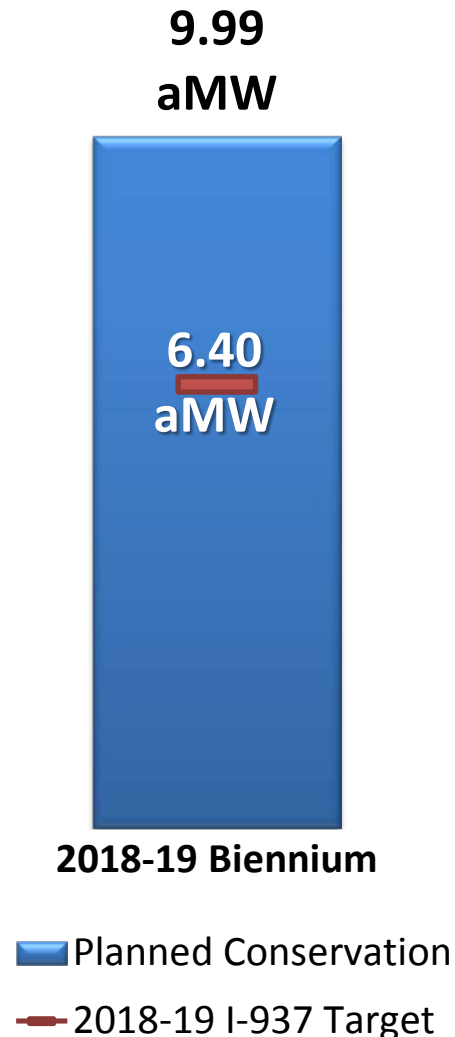
Jeremy Stewart

Our Conservation Plan Ensures We Follow Key Principles

- **Conservation is analysis driven**
 - Update assumptions to ensure a cost effective portfolio
 - Confirm planned programs will meet or exceed the I-937 target
- **Programs must satisfy customers**
 - Verify products meet customer needs
 - Confirm incentive options meet customer needs and the “right size”
 - Evaluate how customer access programs
 - Promote our programs
- **Programs must be equitable**
 - All rate payers fund conservation and should have an opportunity to participate in one or more of our programs



Although the Target is Going Down, We Expect to Exceed Our Target



The portfolio is low cost at less than \$28/MWh

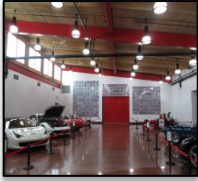
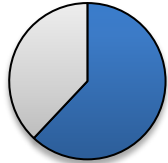



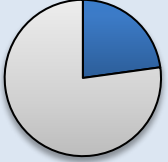

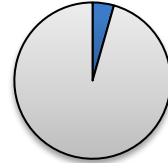




- Less than comparable supply-side resources
- Less than our current BPA contract

We acquire conservation from different sources

Several large project opportunities for 2018-19



2018-19 Conservation Portfolio

Conservation Portfolio		TRC B/C	UCT B/C	Resource Cost (\$/MWh)	Savings (aMW)	Share of savings	Budget	Share of budget ^[1]
	Commercial / Industrial	1.9	2.3	\$21.97/MWh	6.20 aMW		\$13,360,900	
	Residential	1.0	1.5	\$33.54/MWh	1.49 aMW		\$5,331,200	
	Low-income / Hard-to-reach	1.0	1.0	\$50.94/MWh	0.44 aMW		\$3,657,000 ^[2]	
	External energy conservation	1.6	9.7	\$5.12/MWh	1.87 aMW		\$1,019,300	
Conservation totals and averages		1.4	1.9	\$27.15	9.99 aMW		\$28,187,900^[3]	

^[1] Pie charts do not include administrative overhead; only costs directly associated with the sector and its programs

^[2] Low-income / Hard-to-reach administrative overhead included in the residential sector

^[3] Includes \$3,249,500 conservation overhead, \$1,220,000 evaluation and planning overhead, and \$350,000 marketing and communication overhead



Commercial / Industrial Programs

Commercial / Industrial Programs

Bright Rebates

Measures: Exterior and interior LED lighting, lighting controls

What's new:

- Lowered maximum payout
- Simplified rebates

Cost: \$16.79/MWh

Impact:

- 350-450 customers
- 1.85 aMW savings
- \$3,675,900 budget



New Construction

Measures: Interior and exterior lighting, HVAC, advanced design

What's new:

- Adapted to 2015 code baseline

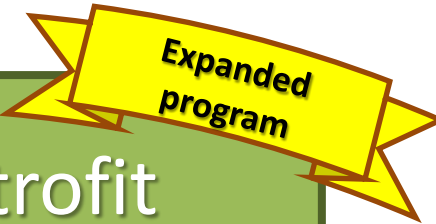
Cost: \$17.08/MWh

Impact:

- 30-50 customers
- 1.72 aMW savings
- \$3,387,400 budget



Custom Retrofit



Measures: Motors, pumps, HVAC, controls, and industrial systems

What's new:

- New utility cost test for measures

Cost: \$23.65/MWh

Impact:

- 30-50 customers
- 1.44 aMW savings
- \$3,695,700 budget



Commercial / Industrial Programs

Expanded program

Strategic Energy Management

Measures: Optimizing operations and maintenance

What's new:

- Expanding to cold storage and commercial customers

Cost: \$29.14/MWh

Impact:

- 12-15 customers
- 1.08 aMW savings
- \$738,700 budget



New Measures

Equipment Rebates

Measures: HVAC, smart t-stats, engine block heaters, commercial cooking, and grocery equipment

What's new:

- HVAC and grocery measures

Cost: \$30.02/MWh

Impact:

- 175-250 customers
- 0.10 aMW savings
- \$269,900 budget





Residential Programs

Residential Programs

Retail

Measures: Lighting, showerheads

What's new:

- New vendor to better serve hard-to-reach customers
- Program approaching end-of-life

Cost: \$22.49/MWh

Impact:

- 450,000-600,000 rebates
- 1.03 aMW savings
- \$2,190,900 budget



Weatherization and Heating

New Measures

Measures: Insulation, windows, and heating equipment

What's new:

- Reduced DHP incentives
- Central heat pumps, smart t-stats, double pane windows

Cost: \$32.36/MWh

Impact:

- 1,000-1,500 projects
- 0.30 aMW savings
- \$1,488,400 budget



Multifamily Common Area

Measures: Exterior lighting, HVAC, and master metered systems

What's new:

- Lowered maximum payout
- Simplified rebates

Cost: \$23.78/MWh

Impact:

- 10-20 projects
- 0.11 aMW savings
- \$251,200 budget



Residential Programs

2018 Pilot Program

Heat Pump Water Heater Pilot

Measures: Heat pump water heaters (HPWH)

Pilot questions:

- Do customers like HPWH's?
- What's the actual cost?
- How should we deliver the program?

Cost: \$45.66/MWh

Impact:

- 50-250 projects
- 0.03 aMW savings
- \$147,200 budget



Product Promotion

Measures: LED light bulbs, showerheads

What's new:

- Focused on outreach

Cost: \$46.92/MWh

Impact:

- 8,000-12,000 products distributed
- 0.02 aMW savings
- \$82,200 budget





Low-Income Hard-To-Reach Programs

Low-Income / Hard-To-Reach Programs

New program

Manufactured Homes

Measures: Ductless heat pumps, lighting, showerheads, duct sealing

What's new:

- Verify savings from 2017 pilot
- Ramp program to full scale

Cost: \$46.25/MWh

Impact:

- 300-800 homes
- 0.21 aMW savings
- \$1,152,600 budget



2018 Pilot Program

Rental Housing Pilot

Measures: Insulation, windows, ductless heat pumps, doors

Pilot questions:

- Will property owners participate?

Cost: \$52.58/MWh

Impact:

- 50-400 homes
- 0.10 aMW
- \$1,109,100 budget



Low-Income and Hard-To-Reach Programs

Low-income

Measures: Insulation and windows

What's new:

- Ductless heat pumps removed
- Custom approach for high users

Cost: \$56.39/MWh

Impact:

- 150 – 250 homes
- 0.09 aMW savings
- \$1,071,900 budget



Apartment Windows Pilot

2018 Pilot Program

Measures: Double pane windows

Pilot questions:

- Will property owners participate?
- Are savings real?

Cost: \$47.71/MWh

Impact:

- 35-45 buildings
- 0.03 aMW savings
- \$323,500 budget





External Energy Conservation

External Energy Conservation

Projects starts
late 2017

City of Tacoma Street Lighting

Measures: LED street lighting

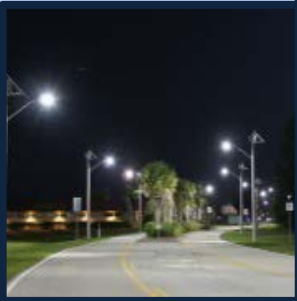
What's new:

- Contracts for products and installation approved

Cost: \$0 – all costs reimbursed via rate design

Impact:

- 16,400 street lights
- 1.08 aMW savings



Northwest Energy Efficiency Alliance

Measures: Emerging technology

Cost: \$29.63/MWh

Impact:

- 0.45 aMW savings
- \$1,001,600 budget



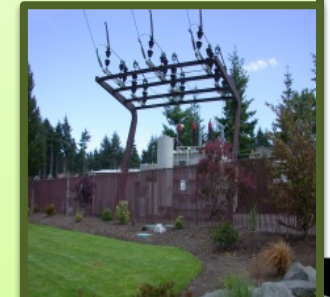
T&D Voltage Optimization

Measures: Substation voltage

Cost: \$0 – included as part of larger substation retrofit projects

Impact:

- 4-6 substations
- 0.34 aMW savings
- \$17,700 budget





Questions?

TARIFF UPDATE PROPOSALS

Dan McCabe, CIO/CFO

October 25th, 2017

DRAFT

TACOMA  RAIL
TACOMA PUBLIC UTILITIES

2017/18 BUDGET REVENUE



(\$ in millions)	15/16 Budget	17/18 Budget	Budget to Budget	
Operating Revenue				
• Line hauls and local	\$57.2	\$57.7	\$0.6	1.0%
• Demurrage	2.1	2.3	0.2	7.1%
• Locomotive servicing	2.7	3.7	1.0	36.9%
• Miscellaneous	1.0	0.5	-0.5	-45.6%
Total Operating Revenue	\$63.0	\$64.3	\$1.3	2.0%
Non-operating Revenue				
• Rent income	\$2.0	\$2.2	\$0.2	7.6%
• Interest income	0.2	0.2	0.0	9.0%
Total Non-Operating Revenue	\$2.2	\$2.4	\$0.2	7.8%
• Current Fund Appropriation	0.4	0.0	-0.4	-100%
Total Revenue & Available Funds	\$65.6	\$66.6	\$1.0	1.5%

PRIMARY RATE PAYERS

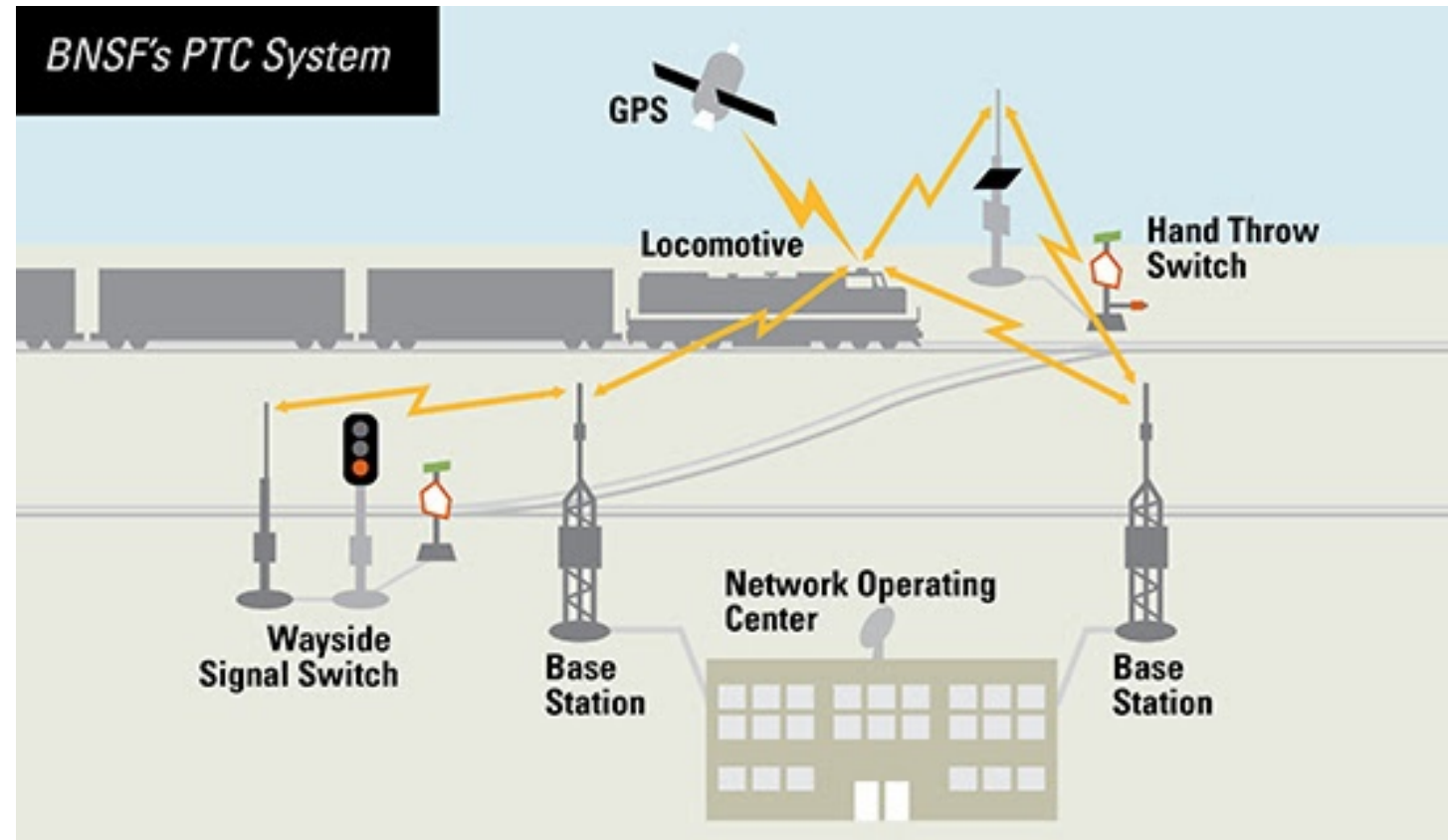
- Line haul rates are 80% of total revenue
- General line haul rate payer breakdown
 - BNSF: 56%
 - UP: 29%
 - US Oil: 10%
 - Other: 5%
- Line haul rate methods
 - Tariff
 - Contract



U.S. Oil & Refining Co.

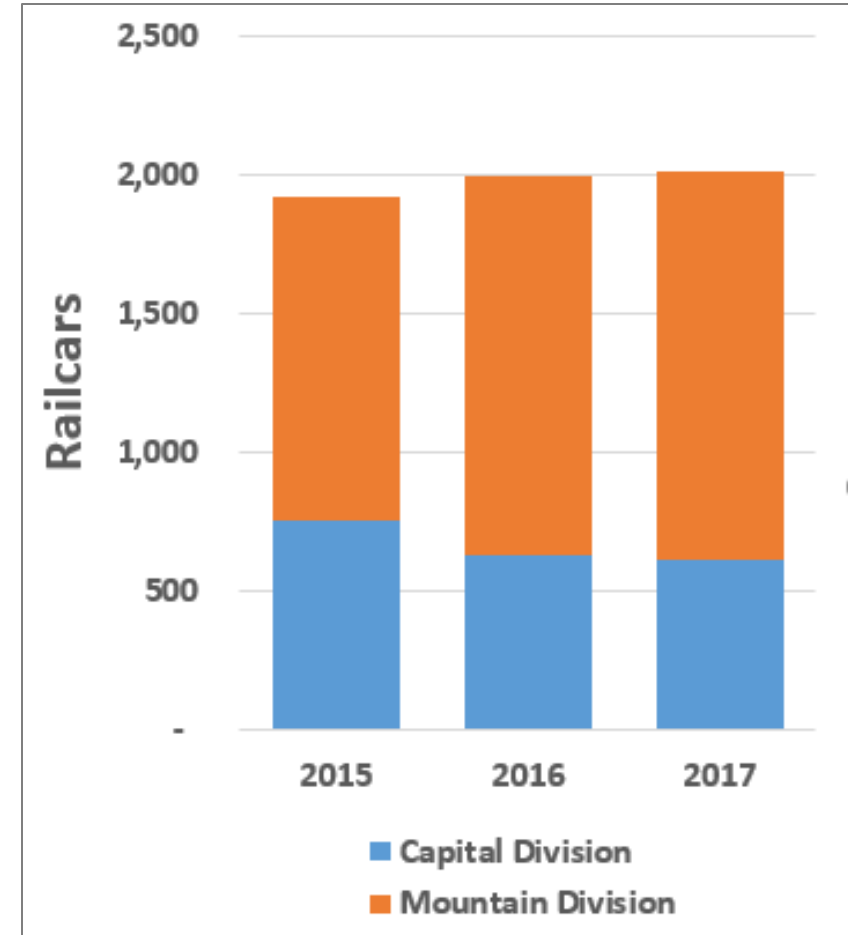
POSITIVE TRAIN CONTROL

- Mandated on Mountain Division (TRMW) and South Tacoma (TMBL) lines
- Presented March 2017
- Partnerships
 - Sound Transit
 - BNSF
- Estimated project cost:
 - \$4.0 million
- Estimated avoided cost:
 - \$2.5 million
- Propose 5 year cost recovery



RATE ADJUSTMENT FOR PTC

- **Associated PTC costs**
 - **Multiple vendors and contracts**
 - **Non disclosure agreements**
 - **Five year aggregated cost: \$1.5 million**
- **Rate implications**
 - **2,000 railcars per year**
 - **\$150 per railcar**
 - **29% average rate increase**
 - **Approximately 3.8% increase on the total rail freight movement**



UNIT TRAIN RATE CHANGE

- **Increased insurance requirements & rates**
 - **\$30K increase since last unit train rate change 2 years ago**
- **Oil Spill Contingency Plan**
 - **Washington State Department of Ecology**
 - **200+ page document currently under review**
 - **\$96K in development**
 - **Require three scheduled drills per year**
 - **\$100K per year budgeted**
 - **1 table top exercise**
 - **2 deployment exercises**
 - **Worst case scenario every 3 years**
 - **Wildlife exercise every 3 years**

PROPOSED SWITCHING TARIFF CHANGES

- **Current TMBL tariff**

- **Capital rates not included**

- \$420 per railcar

- **Unit train rate**

- \$210 per railcar

- **Current TRMW tariff**

- **BNSF rates not included**

- Range from \$496 to \$1,540

- **\$495 for UP traffic**

- **Miscellaneous rates 3% below TMBL**

- **Proposed TMBL tariff**

- **Capital rates**

- \$570 per railcar

- **Unit train rate**

- \$220 per railcar

- **Proposed TRMW tariff**

- **Transfer BNSF contract rates**

- Include \$150 increase

- **UP rates to match BNSF rates**

- **Update miscellaneous rates to match TMBL 3% increase**

PROPOSED DEMURRAGE TARIFF CHANGES

- **Demurrage is the charge for detaining a railcar. It's charged per CFR 49 U.S.C. § 10746 for freight car use and supply.**
- **No rate changes since tariff implementation in 1998.**
- **Change to align closer to service schedules**
- **Paid directly by the facilities receiving the railcars**

- **Current tariff**

- **\$50 per day**
- **6 demurrage days per week**
- **Total per week: \$300**

- **Proposed tariff**

- **\$60 per day**
- **5 demurrage days per week**
- **Total per week: \$300**

SCHEDULE

- **October to December**
 - **Customer involvement**
- **October**
 - **25th : TPU Board Study Session**
- **November**
 - **15th : TPU Board action**
 - **28th : City Council first reading**
- **December**
 - **5th : City Council second reading**
 - **10th : Issue tariffs**
- **January**
 - **1st : Tariff effective date**

TACOMA RAIL
TACOMA PUBLIC UTILITIES

FT TMBL 6004-C

TACOMA MUNICIPAL BELT LINE RAILWAY

FREIGHT TARIFF TMBL 6004-C
Supersedes and Cancels TMBL 6004-B (including all supplements)
WWW.TACOMARAIL.COM

NAMING
DEMURRAGE RULES AND CHARGES

APPLYING AT ALL LOCATIONS ON THE
TACOMA MUNICIPAL BELT LINE RAILWAY (TMBL)
and
TACOMA RAIL MOUNTAIN DIVISION (TRMW)

This tariff is also applicable on export, import, interstate and intrastate except where expressly provided to the contrary in connection with items.

ISSUED: December 1, 2017

Dale W. King, Superintendent
2601 SR 509 North Frontage Road
Tacoma, WA 98421

TACOMA RAIL
TACOMA PUBLIC UTILITIES

FT TMBL 8807-H

TACOMA MUNICIPAL BELT LINE RAILWAY

FREIGHT TARIFF TMBL 8807-H
(Cancels Tariff TMBL 8807-G)

NAMING
SWITCHING AND OTHER TERMINAL CHARGES
AS PROVIDED IN SECTION 1 HEREIN

APPLYING AT ALL LOCATIONS ON THE
TACOMA MUNICIPAL BELT LINE RAILWAY
(TACOMA RAIL)

This tariff is also applicable on intrastate traffic, except where expressly provided to the contrary in connection with particular items.

ISSUED: December 10, 2017

Dale W. King, Superintendent
2601 SR 509 North Frontage Road
Tacoma, WA 98421

EFFECTIVE: January 1, 2018

Tacoma Power & Water

Rate Policy Workshop 1

Ron Amen

Black & Veatch

Christina Leineweber

Tacoma Power

Sean Senescall

Tacoma Water



BLACK & VEATCH



TACOMA WATER
TACOMA PUBLIC UTILITIES



TACOMA POWER
TACOMA PUBLIC UTILITIES

Agenda

1

Overview

2

Utility Ratemaking: Process & Principles

3

Cost-of-Service Overview

4

A Closer Look at Cost Allocation: A Phase of COSA

5

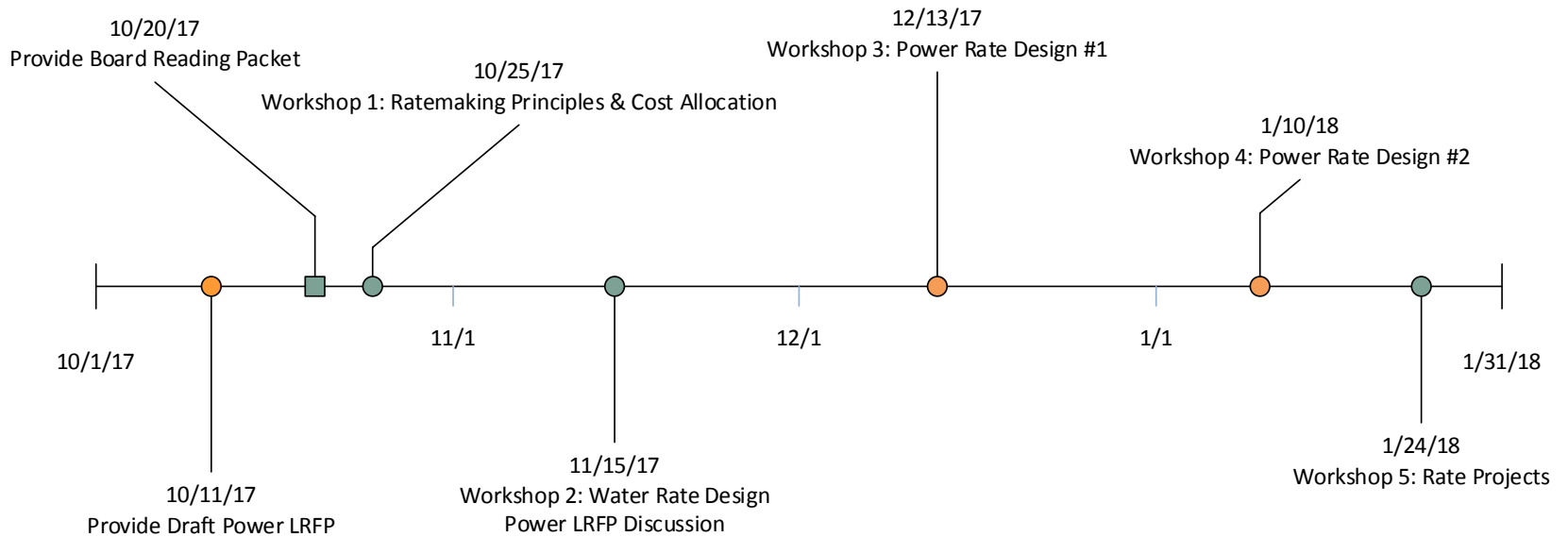
Appendix

Overview

Section 1

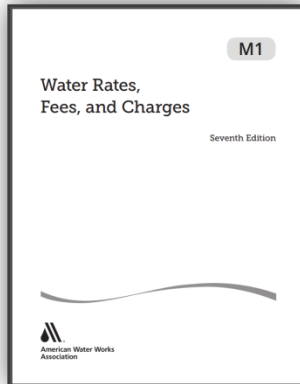
Overview

Timeline



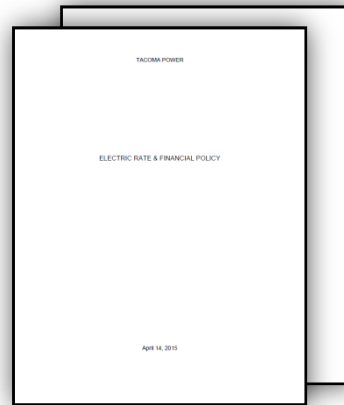
Overview

Board Reading Packet



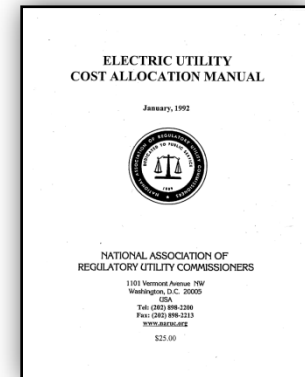
AWWA Principles of Water Rates, Fees and Charges

Excerpts that provide an overview of water utility cost of service studies and summarizes the cost allocation process.



Power, Water Rate & Financial Policy

Current rate and financial policies for Water and Power.



NARUC Electric Utility Cost Allocation Manual

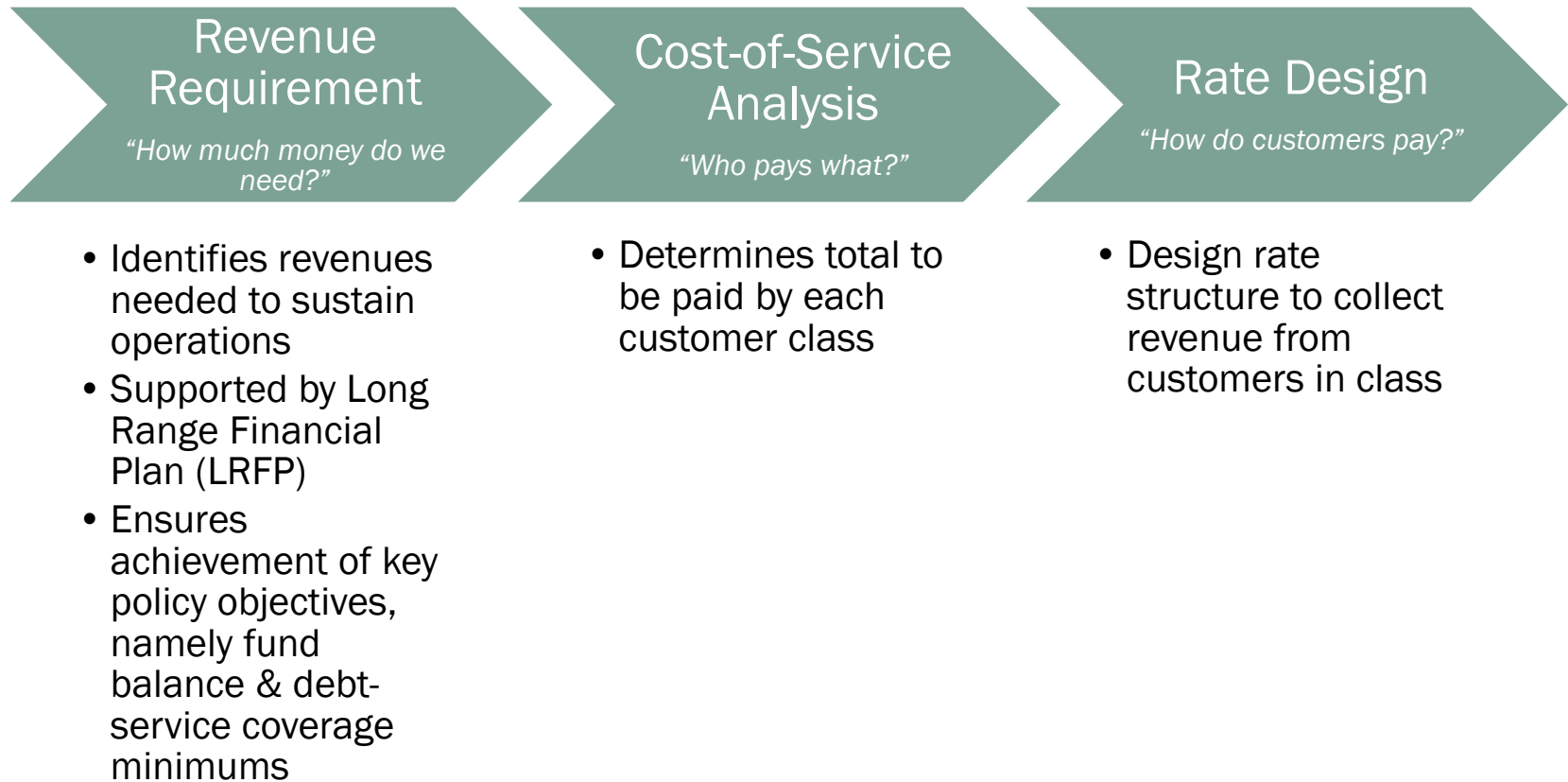
Excerpts that provide an overview of electric utility cost of service studies and summarizes the cost allocation process.

Utility Ratemaking: Process & Principles

Section 2

Utility Ratemaking: Process & Principles

Utility Ratemaking Process



Utility Rate-making: Process & Principles

Legal Thresholds for Utility Rates



RCW 80.28: GAS, ELECTRICAL, AND WATER COMPANIES
RCW 35.92: MUNICIPAL UTILITIES

Principles of Public Utility Rates

Revenue Stability

- Effectiveness in recovering the revenue requirement

Cost Causation

- Fairness in apportioning total costs between customer classes

Economic Efficiency

- Prices reflect true cost to serve

Equity

- All customers pay their fair share

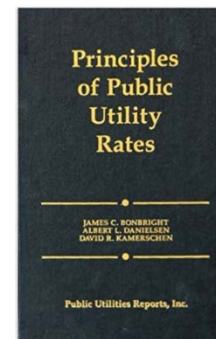
Bill Stability

- Stable and predictable customers bills

FROM THE DEFINITIVE SCHOLARLY TEXT:

Principles of Public Utility Rates

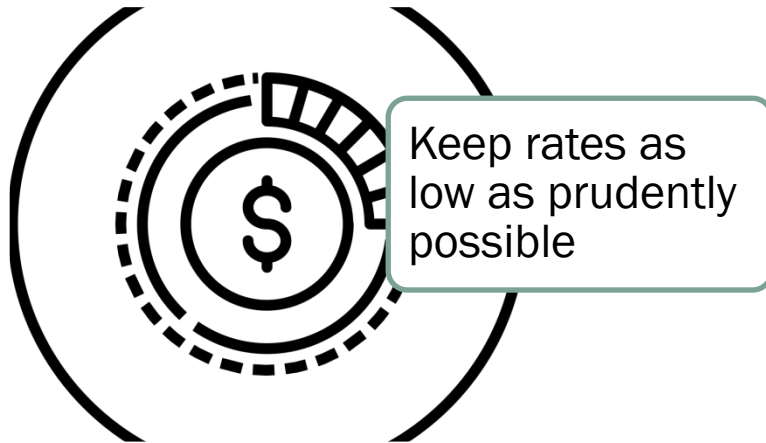
James Bonbright, Albert Danielsen
David Kamerschen



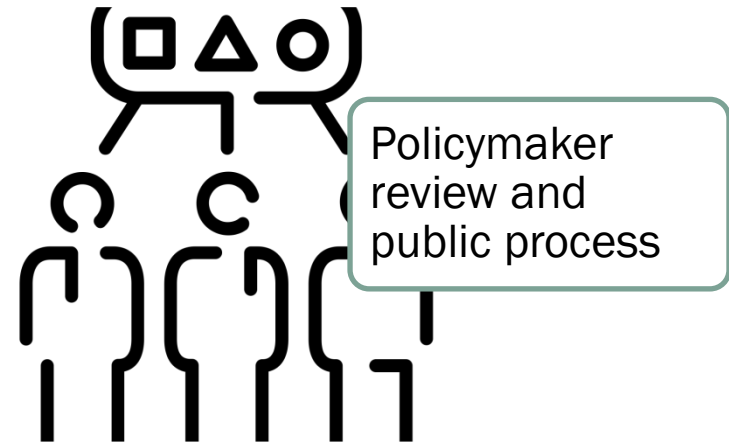
Utility Ratemaking: Process & Principles

Additional Tacoma Public Utilities Principles

Affordability



Public Involvement



Cost-of- Service Overview

Section 3

Cost-of-Service Overview

Why do we conduct a Cost-of-Service Study?

□ Purpose of a Cost-of-Service Study

- Different customer groups use TPU systems in different ways
- Assign to each customer class its **share of the utility's total cost of service**
- Answer the question: “Which customer or group of customers **causes the utility to incur** a particular cost?”

Cost-of-Service Overview

Conceptual Considerations

- ❑ **Fixed** (Demand, Customer) Costs versus **Variable** (Energy) Costs
- ❑ **Joint** Costs versus **Directly-Assigned** Costs
- ❑ “Who **Causes** Cost?” \neq “Who **Benefits** from the Expenditure?”
 - Sometimes, costs incurred to serve one customer class have spillover benefits to other customer classes.
- ❑ **Other Factors**
 - **Physical** configuration of the system
 - **Data availability** within the utility

Cost-of-Service Overview

Data Requirements for Conducting a Cost-of-Service Study

- ❑ Uniform System of Accounts (FERC accounts for **Power**, NARUC for **Water**)
- ❑ Detailed Plant-in-Service Data (both financial & operational)
- ❑ Operating Expense and Capital Investment Information
- ❑ Cost Drivers (allocation factors)
 - Number of customers / bills
 - Peak period demands
 - Monthly consumption
- ❑ System Operation Data
- ❑ Special Studies
 - Production fixed versus variable cost studies
 - Minimum distribution system (**Power**)
 - Fire protection liability (**Water**)

Cost-of-Service Overview

The Three Phases



Functionalization

Arranging costs and plant values according to function, such as production, distribution, administrative & general, and customer service.



Classification

Classifying functionalized costs to cost components such as demand (peak), energy (base), and customer cost components.

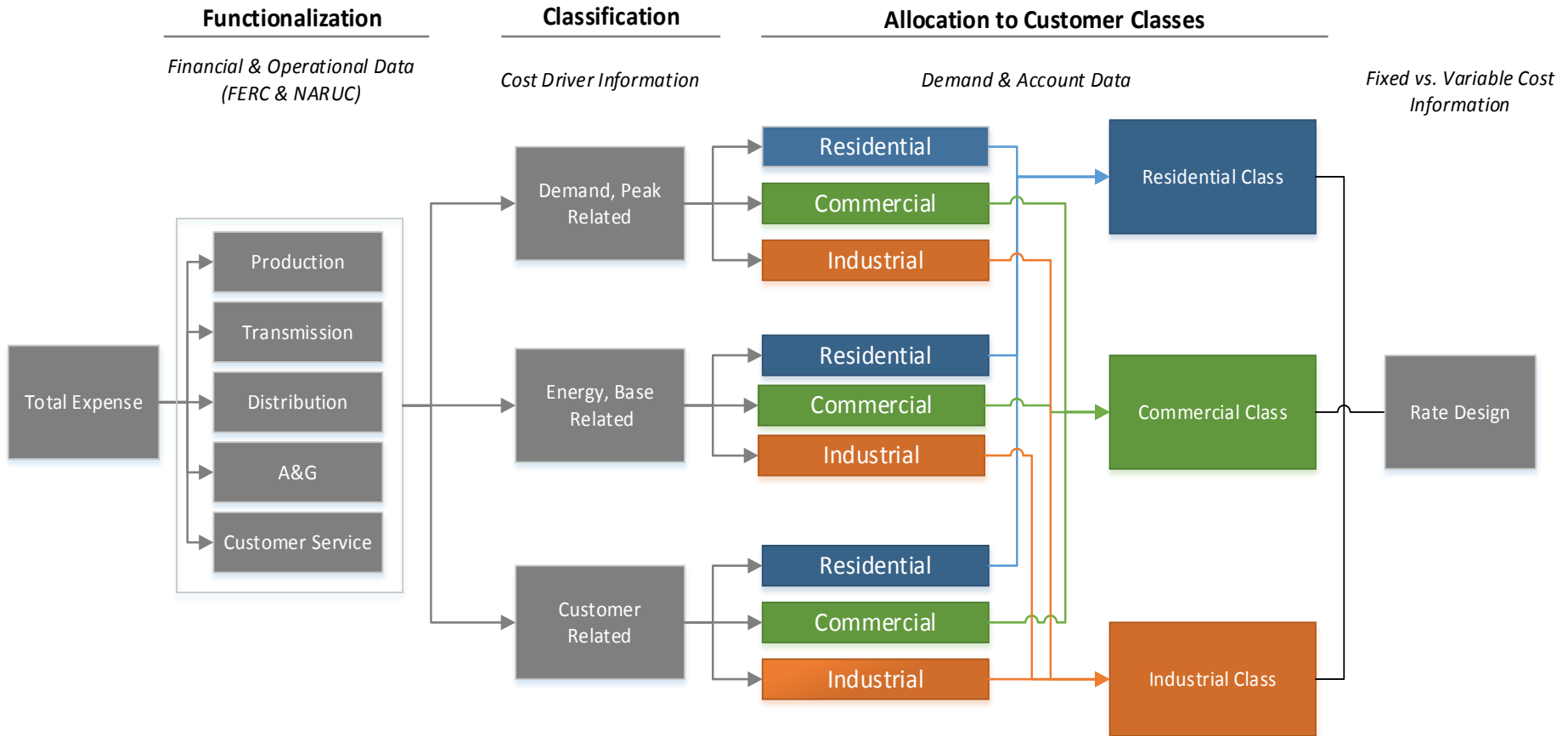


Allocation

The assignment of classified cost to customer classes (Residential, Commercial, Industrial).

Cost-of-Service Overview

Data Flow Diagram



A Closer Look at Cost Allocation: A Phase of COSA

Section 4

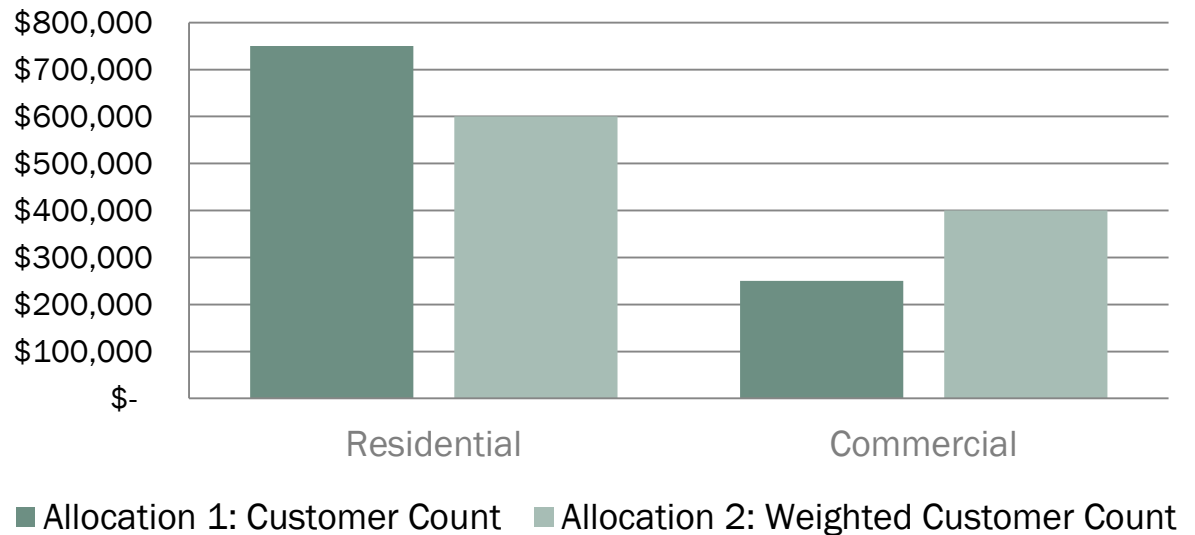
A Closer Look at Cost Allocation: A Phase of COSA

Impact of Cost Allocation Choices on Cost of Service

Illustrative Example:

Utility XZY is allocating \$1,000,000 of meter cost to three classes. Each customer has one meter, but commercial meters are twice as expensive.

	Customers	<i>Allocation 1: Customer Count</i>	Meter Cost	<i>Allocation 2: Weighted Customer Count</i>
Residential	150,000	75%	\$50.00	60%
Commercial	50,000	25%	\$100.00	40%
TOTAL	200,000	100%		100%



A Closer Look at Cost Allocation: A Phase of COSA

Establishing Customer Classes



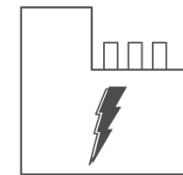
Option 1: End-Use Based

- ✓ Residential
- ✓ Commercial
- ✓ Industrial
- ✓ Irrigation
- ✓ Fire Protection Service



Option 2: Consumption Based

- ✓ Small General Service
- ✓ Large Volume Service



Option 3: Combined Basis

- ✓ Street Lighting Service

A Closer Look at Cost Allocation: A Phase of COSA

Separate Customer Classes for Addressing Unique Characteristics

Grouping similar customers together isolates the specific costs of serving a unique customer or customer group.

Methods:

- End-Use Based
 - Irrigation
 - Residential/Commercial/Industrial
- Consumption-Based
 - Load Factor (spikiness of usage within day/month)
 - Standby/Partial Service
 - Seasonality (variance in usage during year)
- DG customer (e.g., rooftop solar customer)
- Special contract customer(s)

A Closer Look at Cost Allocation: A Phase of COSA

Interpretation of Cost-of-Service Study Results

Residential	Small General	General	High-Voltage General	Contract Power	Lighting (H1 & H2)
\$347,824,085	\$56,291,995	\$210,649,221	\$42,625,355	\$46,006,952	\$5,700,937

Residential	Irrigation	Commercial	Large Volume Commercial	Wholesale	Fire Protection	Pulp Mill
\$99,442,660	\$6,157,484	\$21,392,777	\$3,512,136	\$4,242,415	\$11,752,478	\$13,263,201



- Interclass considerations
- Revenue-to-cost ratios
- Range of reasonableness
- Gradualism

Appendix

Section 5

Appendix

Definitions

Fixed Costs

Costs that tend to remain constant in total in the short run regardless of changes in the output and which are generally considered to be demand-related.

Demand-Related Costs

Costs which relate to peak usage.

Customer-Related Costs

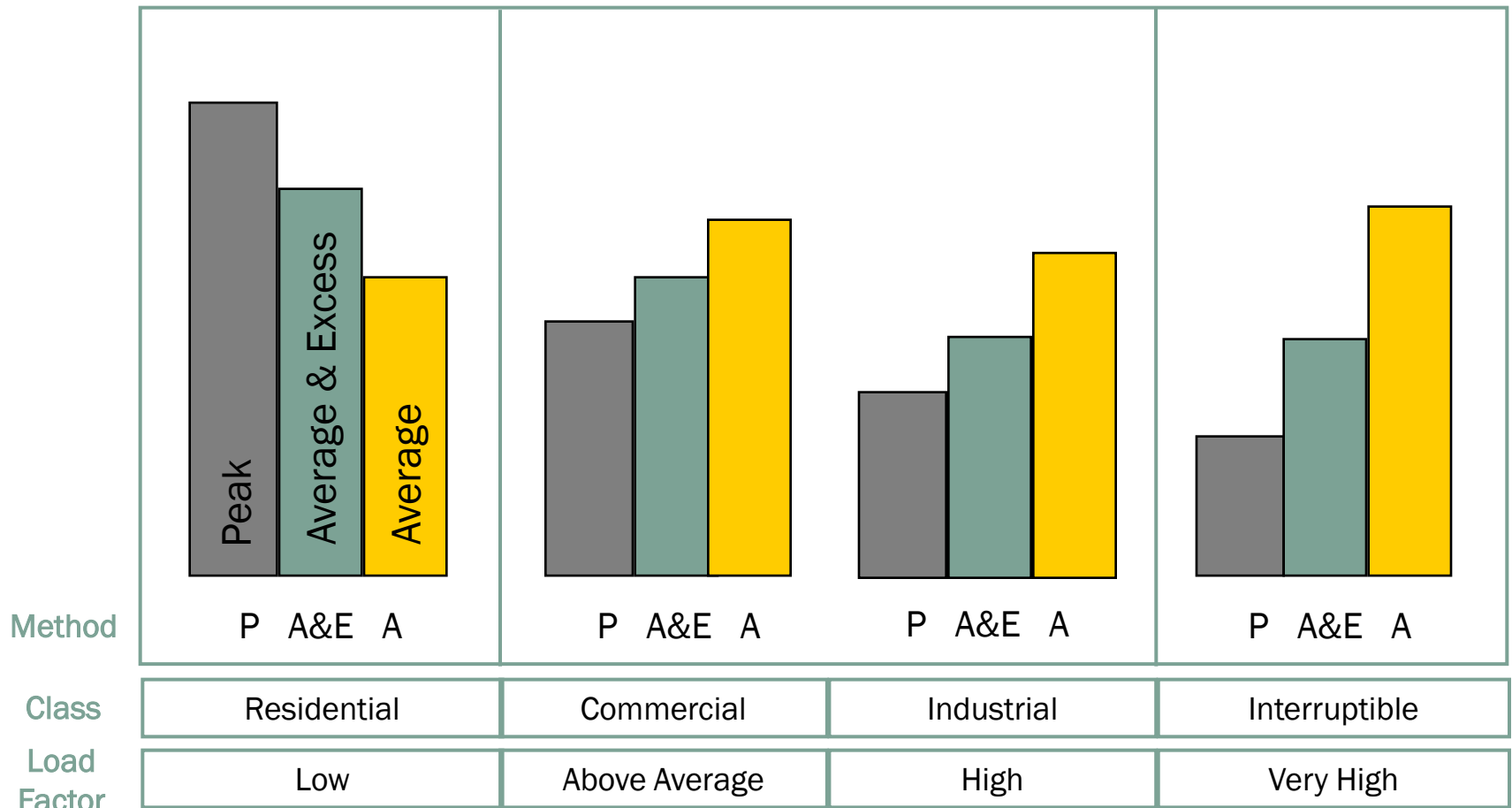
Costs which relate to the number of customers.

Variable Costs

Costs that tend to vary in total as output varies and which are generally considered to be energy related.

Appendix

Impact of Various Cost Allocation Methods on a Power Utility's Cost of Service



Appendix

Translating Unbundled Costs into Unbundled Rates

The unbundled costs can be translated into the following rate components to address intra-class subsidies:

- Customer Charge
- Production Demand Charge
- Transmission Demand Charge
- Distribution Demand Charges
 - Distribution substation service
 - Distribution primary service
 - Secondary distribution service
- Energy Charges
 - Energy service at transmission voltage
 - Energy service at substation delivery
 - Energy service at primary delivery (with and without transformation)
 - Energy service at secondary voltage

Appendix

Intra-class Considerations - Unbundled Costs and Services: Tacoma Power

COST FUNCTION	COST TYPE	CAUSAL FACTOR(S)	PRICING STRUCTURE
Generation Plant	Fixed, Semi	Demand	kW Charge
Transmission Plant	Fixed, Semi	Demand	kW Charge
Distribution Plant	Fixed, Semi	Demand, Customers	kW Charge and Customer Charge
General Plant	Fixed	Demand, Customers	kW Charge and Customer Charge
Generation O&M	Fixed, Variable	Demand, Energy	kW Charge and kWh Charge
Transmission O&M	Fixed	Demand	kW Charge
Distribution O&M	Fixed	Demand, Customers	kW Charge and Customer Charge
A&G Costs	Fixed	Demand, Customers	kW Charge and Customer Charge