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

RCW 19.280.030
2017 IRP Update

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

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

Q1
Invitation to Participate

Q2
Q3
Q4

Present to Senior Management
Oct 10

Present to PUB
Oct 25

Request PUB
Adopt IRP
Nov 15
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

- 2015 Forecast
- 2017 Forecast
Changes Since 2015

• Lower and declining retail demand forecast
• Lower natural gas price forecast

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

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

- 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

• 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

- 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 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
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:
  o 10-year achievable economic conservation resource potential
  o 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
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

- Conservation Cost $/MWh
- Avoided cost of Electricity
- Conservation Potential (aMW)

Not Cost Effective Measures
Cost Effective Measures
Metric 1: Ten-Year Conservation Potential 31.7 aMW

<table>
<thead>
<tr>
<th>Sector</th>
<th>Ten-Year Achievable Economic Conservation Potential (aMW)</th>
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</thead>
<tbody>
<tr>
<td>Residential</td>
<td>11.3</td>
</tr>
<tr>
<td>Commercial</td>
<td>10.0</td>
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<tr>
<td>Industrial</td>
<td>6.6</td>
</tr>
<tr>
<td>JBLM</td>
<td>1.0</td>
</tr>
<tr>
<td>Street Lighting</td>
<td>1.0</td>
</tr>
<tr>
<td>Distribution Efficiency</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31.7</strong></td>
</tr>
</tbody>
</table>
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
2018-19 Conservation Plan

Jeremy Stewart
Our Conservation Plan Ensures We Follow Key Principles

• Conservation is analysis driven
  o Update assumptions to ensure a cost effective portfolio
  o Confirm planned programs will meet or exceed the I-937 target

• Programs must satisfy customers
  o Verify products meet customer needs
  o Confirm incentive options meet customer needs and the “right size”
  o Evaluate how customer access programs
  o Promote our programs

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

[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

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

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

**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

### 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
### 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

### 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

**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

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?
## 2017/18 BUDGET REVENUE

<table>
<thead>
<tr>
<th>($ in millions)</th>
<th>15/16 Budget</th>
<th>17/18 Budget</th>
<th>Budget to Budget</th>
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<tbody>
<tr>
<td><strong>Operating Revenue</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• Line hauls and local</td>
<td>$57.2</td>
<td>$57.7</td>
<td>$0.6</td>
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<tr>
<td>• Demurrage</td>
<td>2.1</td>
<td>2.3</td>
<td>0.2</td>
</tr>
<tr>
<td>• Locomotive servicing</td>
<td>2.7</td>
<td>3.7</td>
<td>1.0</td>
</tr>
<tr>
<td>• Miscellaneous</td>
<td>1.0</td>
<td>0.5</td>
<td>-0.5</td>
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<tr>
<td><strong>Total Operating Revenue</strong></td>
<td>$63.0</td>
<td>$64.3</td>
<td>$1.3</td>
</tr>
<tr>
<td><strong>Non-operating Revenue</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Rent income</td>
<td>$2.0</td>
<td>$2.2</td>
<td>$0.2</td>
</tr>
<tr>
<td>• Interest income</td>
<td>0.2</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total Non-Operating Revenue</strong></td>
<td>$2.2</td>
<td>$2.4</td>
<td>$0.2</td>
</tr>
<tr>
<td>• Current Fund Appropriation</td>
<td>0.4</td>
<td>0.0</td>
<td>-0.4</td>
</tr>
<tr>
<td><strong>Total Revenue &amp; Available Funds</strong></td>
<td>$65.6</td>
<td>$66.6</td>
<td>$1.0</td>
</tr>
</tbody>
</table>
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
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 Power & Water

Rate Policy Workshop 1

Ron Amen
Black & Veatch

Christina Leinneweber
Tacoma Power

Sean Senescall
Tacoma Water
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
Overview

Timeline

- **10/1/17**: Provide Board Reading Packet
- **10/11/17**: Provide Draft Power LRFP
- **10/20/17**: Provide Board Reading Packet
- **10/25/17**: Workshop 1: Ratemaking Principles & Cost Allocation
- **11/15/17**: Workshop 2: Water Rate Design
- **12/13/17**: Workshop 3: Power Rate Design #1
- **1/10/18**: Workshop 4: Power Rate Design #2
- **1/24/18**: Workshop 5: Rate Projects
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.

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

Revenue Requirement
“How much money do we need?”
- Identifies revenues needed to sustain operations
- Supported by Long Range Financial Plan (LRFP)
- Ensures achievement of key policy objectives, namely fund balance & debt-service coverage minimums

Cost-of-Service Analysis
“Who pays what?”
- Determines total to be paid by each customer class

Rate Design
“How do customers pay?”
- Design rate structure to collect revenue from customers in class
Legal Thresholds for Utility Rates

Utility Ratemaking: Process & Principles

- Fair
- Just
- Reasonable
- Non-Discriminatory

RCW 80.28: GAS, ELECTRICAL, AND WATER COMPANIES
RCW 35.92: MUNICIPAL UTILITIES
## Principles of Public Utility Rates

<table>
<thead>
<tr>
<th>Category</th>
<th>Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Stability</td>
<td>Effectiveness in recovering the revenue requirement</td>
</tr>
<tr>
<td>Cost Causation</td>
<td>Fairness in apportioning total costs between customer classes</td>
</tr>
<tr>
<td>Economic Efficiency</td>
<td>Prices reflect true cost to serve</td>
</tr>
<tr>
<td>Equity</td>
<td>All customers pay their fair share</td>
</tr>
<tr>
<td>Bill Stability</td>
<td>Stable and predictable customers bills</td>
</tr>
</tbody>
</table>

**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**
- Keep rates as low as prudently possible

**Public Involvement**
- Policymaker review and public process
Cost-of-Service Overview
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?”
Conceptual Considerations

- **Fixed** (Demand, Customer) Costs versus **Variable** (Energy) Costs
- **Joint** Costs versus **Directly-Assigned** Costs
- “Who **Causes** Cost?” ≠ “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
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

**Functionalization**

Financial & Operational Data (FERC & NARUC)

- Production
- Transmission
- Distribution
- A&G
- Customer Service

**Classification**

Cost Driver Information

- Demand, Peak Related
- Energy, Base Related
- Customer Related

**Allocation to Customer Classes**

Demand & Account Data

- Residential
- Commercial
- Industrial

**Rate Design**

Fixed vs. Variable Cost Information
A Closer Look at Cost Allocation: A Phase of COSA
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.

<table>
<thead>
<tr>
<th></th>
<th>Customers</th>
<th>Allocation 1: Customer Count</th>
<th>Meter Cost</th>
<th>Allocation 2: Weighted Customer Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>150,000</td>
<td>75%</td>
<td>$50.00</td>
<td>60%</td>
</tr>
<tr>
<td>Commercial</td>
<td>50,000</td>
<td>25%</td>
<td>$100.00</td>
<td>40%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>200,000</td>
<td>100%</td>
<td>$300,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

Bar chart showing distribution of meter costs between residential and commercial customers using two different allocation methods.
Establishing Customer Classes

**A Closer Look at Cost Allocation: A Phase of COSA**

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

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Small General</th>
<th>General</th>
<th>High-Voltage General</th>
<th>Contract Power</th>
<th>Lighting (H1 &amp; H2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$347,824,085</td>
<td>$56,291,995</td>
<td>$210,649,221</td>
<td>$42,625,355</td>
<td>$46,006,952</td>
<td>$5,700,937</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Irrigation</th>
<th>Commercial</th>
<th>Large Volume Commercial</th>
<th>Wholesale</th>
<th>Fire Protection</th>
<th>Pulp Mill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$99,442,660</td>
<td>$6,157,484</td>
<td>$21,392,777</td>
<td>$3,512,136</td>
<td>$4,242,415</td>
<td>$11,752,478</td>
<td>$13,263,201</td>
</tr>
</tbody>
</table>

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

Power COSA results for the time period 1 April 2017 to 31 March 2019. Based on 2017/2018 Budget.

Water COSA results for the time period 1 January 2017 through 31 December 2018.
### Definitions

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Costs</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Demand-Related Costs</strong></td>
<td>Costs which relate to peak usage.</td>
</tr>
<tr>
<td><strong>Customer-Related Costs</strong></td>
<td>Costs which relate to the number of customers.</td>
</tr>
<tr>
<td><strong>Variable Costs</strong></td>
<td>Costs that tend to vary in total as output varies and which are generally considered to be energy related.</td>
</tr>
</tbody>
</table>
### Impact of Various Cost Allocation Methods on a Power Utility’s Cost of Service

#### Appendix

<table>
<thead>
<tr>
<th>Method</th>
<th>Peak</th>
<th>Average &amp; Excess</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td><img src="image1" alt="Peak Residential" /></td>
<td><img src="image2" alt="Average &amp; Excess Residential" /></td>
<td><img src="image3" alt="Average Residential" /></td>
</tr>
<tr>
<td>Commercial</td>
<td><img src="image4" alt="Peak Commercial" /></td>
<td><img src="image5" alt="Average &amp; Excess Commercial" /></td>
<td><img src="image6" alt="Average Commercial" /></td>
</tr>
<tr>
<td>Industrial</td>
<td><img src="image7" alt="Peak Industrial" /></td>
<td><img src="image8" alt="Average &amp; Excess Industrial" /></td>
<td><img src="image9" alt="Average Industrial" /></td>
</tr>
<tr>
<td>Interruptible</td>
<td><img src="image10" alt="Peak Interruptible" /></td>
<td><img src="image11" alt="Average &amp; Excess Interruptible" /></td>
<td><img src="image12" alt="Average Interruptible" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Interruptible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Factor</td>
<td>Low</td>
<td>Above Average</td>
<td>High</td>
<td>Very High</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>COST FUNCTION</th>
<th>COST TYPE</th>
<th>CAUSAL FACTOR(S)</th>
<th>PRICING STRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation Plant</td>
<td>Fixed, Semi</td>
<td>Demand</td>
<td>kW Charge</td>
</tr>
<tr>
<td>Transmission Plant</td>
<td>Fixed, Semi</td>
<td>Demand</td>
<td>kW Charge</td>
</tr>
<tr>
<td>Distribution Plant</td>
<td>Fixed, Semi</td>
<td>Demand, Customers</td>
<td>kW Charge and Customer Charge</td>
</tr>
<tr>
<td>General Plant</td>
<td>Fixed</td>
<td>Demand, Customers</td>
<td>kW Charge and Customer Charge</td>
</tr>
<tr>
<td>Generation O&amp;M</td>
<td>Fixed, Variable</td>
<td>Demand, Energy</td>
<td>kW Charge and kWh Charge</td>
</tr>
<tr>
<td>Transmission O&amp;M</td>
<td>Fixed</td>
<td>Demand</td>
<td>kW Charge</td>
</tr>
<tr>
<td>Distribution O&amp;M</td>
<td>Fixed</td>
<td>Demand, Customers</td>
<td>kW Charge and Customer Charge</td>
</tr>
<tr>
<td>A&amp;G Costs</td>
<td>Fixed</td>
<td>Demand, Customers</td>
<td>kW Charge and Customer Charge</td>
</tr>
</tbody>
</table>