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2. Cost of Service
3. Developing Load Data
4. Rate Design
5. Trends in Rate Design
6. Summary and Policy Directives
Section 1
Overview of the Rate Setting Process
Traditional Rate Setting Principles

Rates Should

• Meet revenue requirement
• Be cost based
• Be “just, reasonable and not unduly discriminatory or preferential”—“fair and equitable”
• Be Easy to understand and administer
• Conform to generally accepted rate setting techniques
• Provide revenue stability to the Utility and rate stability to the customer
Rate Setting Process

Step 1 - Aggregate Revenue Requirement (How much?)

Step 2 - Perform Cost of Service Study (Who should pay?)

Step 3 - Design Rates (How to collect?)

Step 4 - Implement Rates
Rate Setting Process – Step 1

- **Revenue Requirement**
  - Forecast loads/revenues
  - Forecast operating expenses – power supply and O&M
  - Forecast capital expenses
    - Depreciation and return on rate base, or
    - Capital improvements and debt service expense
  - Forecast other revenues and contributions
Rate Setting Process – Step 2

[Diagram showing the Rate Setting Process with steps: Functionalization, Classification, Allocation, and Revenue Requirement connected to Production, Transmission, Distribution, Customer Services, and Shared Services.]
Rate Setting Process – Step 3

- Rate Design
  - Take unit costs and calculate rates
  - Considerations other than cost of service sometimes considered in rate design

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Minimum System</th>
<th>100 Percent Demand</th>
<th>Proposed Rate Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Charge ($/HP/year)</td>
<td>$12.71</td>
<td>$24.06</td>
<td>$22.59</td>
<td>$13.21</td>
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<tr>
<td>Energy Charge ($/kWh)</td>
<td>$0.0372</td>
<td>$0.03491</td>
<td>$0.03491</td>
<td>$0.04029</td>
</tr>
<tr>
<td>Rate Change Over Present</td>
<td>19.2%</td>
<td>15.5%</td>
<td>6.8%</td>
<td></td>
</tr>
</tbody>
</table>
Financial Planning

- **Financial Goals**
  - Level of Capital Improvements Plan (CIP)
  - Level of Operation & Maintenance (O&M)
  - Impact on reserve levels/type
  - Target minimum debt service coverage ratio/tier

- **Capital Budget**
  - What drives Capital Improvements Plan and how to pay for it
    - Debt financing/bond issuance
    - Line extensions
    - Other
Input and Review Process

- **Data Request**
  - Rate base and detailed expenses/budget
  - Load and revenue forecast by class
  - Financial goals and objectives
  - Rate design goals and objectives

- **Review Process**
  - EES Prepares overall revenue requirements vs. revenues
  - BEC reviews results and overall rate increases
  - EES prepares COSA
  - BEC reviews methods used and preliminary results
  - EES uses COSA results and rate design objectives to develop rate alternatives
  - BEC reviews alternatives and selects final rate design proposal
Section 2
Cost of Service

![Comic strip showing a conversation about improving service versus investing in promotions.]

- **Brand Camp**: We need to improve service.
- **by Tom Fishburne**: We can’t afford it.
- **Brand Camp**: We’re investing everything into promotions.
- **Consumer**: Consumers only buy from us if we give it away.
- **Consumer**: Why won’t consumers pay full price?
- **Brand Camp**: Because our service is so bad.

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What Does the COSA Do?

- Revenue Requirement (Phase I) – Determines the Size of the Pie – Should Tell You How Much to Raise Rates Overall
- Cost of Service and Rates (Phase II) – It Splits Up the Pie
Developing a COSA—
A Step by Step Approach

- **Collect Load and Customer Data**
  - Number of customers
  - Kilowatt-hour sales
  - Kilowatt sales
  - Customer service specifications

- **Functionalize Costs (Revenue Requirement)**

<table>
<thead>
<tr>
<th></th>
<th>Plant Accounts</th>
<th>Expense Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>300 – 340</td>
<td>500 – 555</td>
</tr>
<tr>
<td>Transmission</td>
<td>350’s</td>
<td>560’s, 570’s</td>
</tr>
<tr>
<td>Distribution</td>
<td>360’s, 370’s</td>
<td>580’s, 590’s</td>
</tr>
<tr>
<td>General Plant</td>
<td>380’s, 390’s</td>
<td></td>
</tr>
<tr>
<td>Customer Service and Accounting</td>
<td></td>
<td>900’s</td>
</tr>
<tr>
<td>Administrative and General</td>
<td></td>
<td>920’s</td>
</tr>
</tbody>
</table>
Developing a COSA—A Step by Step Approach (cont’d)

- **Classify Costs to Cost Components**
  - Customer-related
  - Demand-related
  - Energy-related

- **Calculate Allocation Factors**
  - Number of customers in class/total customers
  - Number of kWh in class/total kWh
  - Number of kW in class/total kW

- **Allocate Assets and Expenses to Each Class on the Basis of Cost Causation**

- **Determine Revenue Excess or Shortfall by Class**
Developing a COSA—
A Step by Step Approach (cont’d)

- **Calculate Unit Costs by Class of Service**
  - Demand - $/kW
  - Energy - ¢/kWh
  - Customer - $/customer/month

- **Calculate Unbundled Cost by Class of Service**
  - Production
  - Transmission
  - Distribution
Classification & Allocation
Overview of Classification

- **Classification**
  - Assignment of functionalized costs (revenue requirements) to demand and energy and customer related cost components

- **Components of Utility Service**
  - Does the cost vary with the kW demand caused by the customer?
  - Does the cost vary with the energy that the customer uses?
  - Does the cost vary directly with the number of customers being served?

- **How Do You Incur the Expense?**
  - Demand-related
  - Energy-related
  - Customer-related
  - Other
Overview of Classification (cont’d)

- Keep in Mind Cost Causation
  - Why did you build the plant?
  - Why did you incur the expense?
  - What determines the need for additions?
  - How did you determine plant size?

- How Is the Asset Used?

- Management Objectives
Generation and Power Supply

- Costs are Generally Split Between Demand (Coincident Peak) and Energy
- Last COSA: Purchased Power Split Based on Demand vs Energy Charges
- Purchased Power Should be Classified as the Costs are Incurred
  - Demand charges
  - Energy charges
- Peak Credit Method
  - Demand = equivalent peaking unit costs
  - Energy = remaining cost
- Average and Excess
- Base/Intermediate/Peaking Split
- Load Factor
- Market Based
Transmission and Distribution System Classification Techniques

- Transmission in Last COSA: Costs were Small and Used 100% Demand (CP)
- Distribution Focus is Typically Upon the Classification of:
  - Poles
  - Conductors
  - Line transformers
- Possible Methods of Classification
  - Generally use non-coincident peak
  - Minimum system analysis % demand, % customer
  - 100% demand
- Last COSA: Presented Results Under Both Methods
Administrative & General Cost Allocations

- Issues for Both General Plant and A&G
- Direct Assignment Preferred but Not Usually Possible
- Options
  - Labor ratios
  - All other plant
  - All other expenses
  - Level of effort studies
  - Activity based accounting
- Last COSA: Used Other Plant and Other Expenses
Allocation Factors

- **Demand Allocators**
  - Coincident peak
    - Maximum Peak method (1 CP method)
    - Sum of the 12 coincidental peaks (12 CP method)
    - Average and excess demand method (A&E method)
  - Non-coincident peak
    - Primary voltage
    - Secondary voltage

- **Energy Allocators**

- **Customer Allocators**
  - Actual
  - Weighted

- **Revenue**
## Allocation Factors

### XYZ Utility

<table>
<thead>
<tr>
<th>Allocation Factors</th>
<th>Coincident Peak (kW)</th>
<th>Non-Coincident Peak (kW)</th>
<th>Energy (MWh)</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential</strong></td>
<td>15,300</td>
<td>16,600</td>
<td>55,573</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>Commercial</strong></td>
<td>900</td>
<td>1,000</td>
<td>7,456</td>
<td>250</td>
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<tr>
<td><strong>Industrial</strong></td>
<td>1,900</td>
<td>2,100</td>
<td>9,677</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18,100</td>
<td>19,700</td>
<td>72,706</td>
<td>4,260</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Allocation %</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential</strong></td>
<td>84.5%</td>
<td>84.3%</td>
<td>76.4%</td>
<td>93.9%</td>
</tr>
<tr>
<td><strong>Commercial</strong></td>
<td>5.0%</td>
<td>5.1%</td>
<td>10.3%</td>
<td>5.9%</td>
</tr>
<tr>
<td><strong>Industrial</strong></td>
<td>10.5%</td>
<td>10.7%</td>
<td>13.3%</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Section 3
Developing Load Data
Use of Load Data in the COSA

- Develop Forecast of Loads – kW, kWh, CP, NCP
- Develop Cost Allocators by Class
- Develop Billing Determinants for Rate Design
- Used to Calculate Unit Costs ($/Customer, $/kW, $/kWh)
- Time-of-Use (TOU), Seasonal and Interruptible Data for Rate Design
Sources for Class Demand Data

- Actual Customer Billing Data
- Internal Load Survey Sampling Metering
- Meters on Distribution Feeders
- Borrowed Load Data – Watch for:
  - Climate
  - Rate levels and design (tiers)
  - Average use
  - Secondary/primary mix
  - Economic/demographic variables
  - Definition of load and coincidence factor
- Bary Curves – Relationship Between Load Factor and Coincidence Factor
Different Types of Peaks

Load Profile Example

- System peak
- Ind. Peak NCP
- Com Peak NCP
- Res. Peak NCP

Residential | Commercial | Industrial
Load Research/Smart Metering

- Hourly Metering of All Meters Through AMI
- Meter a Representative Sample from All Customer Classes
- From Metering Determine
  - Relationship between kWh and NCP by class
  - Relationship between NCP and CP
- Examine On- and Off-Peak Periods from Metering
  - HLH
  - LLH
  - Peaking periods
  - Block usage
Development of Load Data

- Develop by Class of Service and by Month
- Use Known and Accurate Data First (Historical) Followed by Judgmental Data (Surveys) – Known Data
  - Total kWh at input voltage generated and purchased
  - Total kWh sales at the meter for each class of service
  - Individual NCP kW for customer classes with demand meters
  - Billing vs. metered
  - Total system losses
- Reconcile to Historical Data
  - Are kWh sales at meter plus losses equal to kWh purchased/generated?
  - Are class coincident peak contributions plus losses equal to system peak purchases/generation?
Section 4
Rate Design

I didn't have any accurate numbers so I just made up this one.

Studies have shown that accurate numbers aren't any more useful than the ones you make up.

How many studies showed that?

Eighty-seven.
Policy Issues

- **Who Pays for Growth?**
  - Inverted rate structure
  - Line extension policy/hookup fees

- **Competitive Position**
  - Set rates to competition/alternative fuel/neighbors?

- **Income Redistribution Goals**
  - Lifeline rates or low income discounts
  - Interclass subsidies

- **Economic Development Goals**

- **Detailed Costs per Customer vs. Averaging**
  - Number of customer classes
  - Postage stamp vs. regional rates
Equity Among Customers

- **Large Number of Customer Classes**
  - Residential vs. seasonal class, net metering class
  - Need to decide prior to COSA
  - Can add rate design components that only apply to certain customers
  - Use separate classes requires some type of qualification process which might be hard to verify

- **Equity Through Rate Design**
  - Average use and load shapes drive differences in cost
  - If rate components match up with COSA unit costs, no need to have different customer classes
  - May mean higher customer charges, minimum bills and addition of residential demand charges rather than having most cost in the energy charge
  - Using rate design often more difficult to explain or administer
Postage Stamp vs. Regional Rates

**Postage Stamp Rates**
- Postage stamp approach most common
- Treats everyone the same and reflects that regional differences are no greater than differences between customers within a region
- Creates more steady rate increases since capital projects spread among more customers

**Regional Rates**
- Often used when utilities merge and utility wants to maintain separate rates or when large geographical differences create very different costs
- Requires careful tracking of costs by region, which is often hard when resources are shared
- Possible to have rate adder if one region requires an expensive project that will never be used by other regions
- Differences in capital costs can be partially offset through line extension charges
- Difference is consumption can be offset with proper rate design
Rate Design Issues

- Customer vs. Demand vs. Higher Energy Charge
- Impacts on Different Income Levels and Customer Groups
- Price Elasticity
- Residential Demand Charges
- Inclining vs. Declining Energy Block Rates
- Net Metering Customers
- Time–of–Day or Time-of-Use Rates
- Seasonal
- Lifeline Rates, Senior Discounts
Methods for Setting Rates

- Across-the-Board Increases
- Use Policy Goals to Make Rate Changes
- Cost of Service
- Competitive Pricing
- Blend of All of the Above
Non-Cost Based Rate Setting Approaches

- **Across-the-Board is Appropriate if:**
  - Rate design already reflects COSA
  - Large increases are needed (hard to shift costs at the same time)
  - No time/budget for COSA

- **Using Policy Goals is Appropriate if:**
  - Policy makers will not accept COSA
  - There is an overriding need to correct political problems
  - Should always be considered

- **Cautions**
  - May not provide right price signals
  - May continue cross-subsidization
  - May face opposition from large customers who want to pay only COSA
COSA/Market Rate Setting Approaches

- **Cost Basis (COSA)**
  - Revenue requirement equals actual or forecast annual costs
  - Revenue requirement can also be based on marginal costs
  - Cost of service per customer class by cost component
  - Unit costs per cost component (customer, demand, energy)

- **Market Based Rates**
  - No cost basis
  - Purely competitive
  - May be same as marginal cost for power supply
  - Works best when no monopoly exists
  - May be one consideration in addition to costs
Traditional Rate Design Options

- **Fixed Costs**
  - Customer charge
  - Minimum bill/charge

- **Demand Costs**
  - Connected load - kV or kW, CP or NCP
  - Critical peak pricing
  - Ratchet - 85% ratchet

- **Energy Rates**
  - Flat, inverted or declining block rates
  - Seasonal or Time of Use
Section 5
Trends in Rate Design
Trends in Rate Design

- Used to be Very Basic
- During Early 2000 Trends Included
  - Market based rates
  - Unbundled rates
  - Increased complexity
  - Inclining block rates
- Back to Basics
  - Increase pressure on demand costs in the Northwest
  - RPS/conservation requirements
  - Demand response
  - Renewable portfolio standards
  - Distributed generation/net metering pressures
Fixed charges varied from $0 to $40, with increasing values.
January 2015 PNUCC Retail Rate Structure Survey (cont’d)

- 50% of utilities surveyed have flat energy rates; vary from 2.3 to 10.9 cents/kWh
50% of utilities surveyed have tiered energy rates; vary from 1.2 to 11.4 cents/kWh
Demand Charges - What is Demand?

- 1 Gallon per minute

- 5 Gallons per minute

- Same Consumption

- 5 Gallons

- 5 Gallons
Demand Rates Impact

Some of the appliances are inflexible
Use of other appliances could be staggered to reduce demand
Could potentially save approximately 40% (from 8.5 kW to 5 kW)

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Avg. Demand (kW)</th>
<th>Flexible Load (7.5 kW)</th>
<th>Inflexible Load (1 kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dryer</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oven</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stove</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand iron</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misc. plug loads</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerator</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8.5</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Residential Demand Rates

- In Two-Part Rate Revenues that Should be Collected through Demand Charge are Collected through Energy Charge
- Rates in Example are Revenue Neutral
- Calculated Based on Hourly Load Research Data
- Demand is Maximum Monthly Metered Non-Coincident Peak

<table>
<thead>
<tr>
<th>Table</th>
<th>Old Two-Part Rate</th>
<th>New Three-Part Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed charge</td>
<td>$10/month</td>
<td>$10/month</td>
</tr>
<tr>
<td>Volumetric charge</td>
<td>11 cents/kWh</td>
<td>6 cents/kWh</td>
</tr>
<tr>
<td>Demand charge</td>
<td>$0</td>
<td>$9/kW-month</td>
</tr>
</tbody>
</table>
Three-Part Rate Setting Questions

- Should New Three-Part Rates be Designed?
- How Does the New Rate Design Compare to That of Other Utilities?
- How Will Customer Bills be Impacted?
- Who Will be the “Winners” and “Losers”?
- Can “Vulnerable” Customers be Protected?
- How Will Owners of Distributed Generation be Impacted?
- Should the Rate be Opt-In, Opt-Out, or Mandatory?
- Should Customers be Offered a Menu of Rate Options?
  - If there is rate choice, how will utility revenue be impacted?
- Should the Rate be Piloted Before Full-Scale Deployment?
Northwest Residential Demand Rate Case Studies

- Orcas Power & Light - $0/kW-month, purely educational
- Sun River Electric Cooperative - $1/kW-month
- Douglas PUD - $1.70/kW of demand in excess of 50 kW
- Oregon Trail Coop – Pilot program for 100 customer at $4/kW
- Pacific Power – Only 3-phase customers at $2.20/kW
Demand Response/Peak Shaving Resources

- **Smart Grid Will also Allow Utilities to Communicate with Customers Regarding**
  - Time of utility peak demands
  - Market prices

- **Communication Should Provide Opportunities**
  - Shave utility system peaks (reduce utility’s exposure to high market prices)
  - Reduce consumer costs (pass savings on to participants)

- **As Capacity Becomes More Constrained on a Generating System the Magnitude of Future Demand Charges Provides an Incentive for Reducing Peaks Using:**
  - Peaking resources
  - Demand-side resources (example: water heaters)
Net Metering

- Net Metering Customers Remain in Current Rate Schedule
  - Is there a justification for different rates?

- Rate Design Options
  - Energy
    - Customer pays only for net energy requirements (kWh use – kWh export)
    - Customer pays for energy use and receives avoided cost as credit for energy exports to the utility system
    - Customer pays for all energy use BEFORE generation (including own use), receives avoided cost for all generation
  - Basic charge
    - Increase basis charge, impact on other customers
    - Include minimum charge to ensure collection of fixed costs
  - Demand charge
    - Adding a demand charge will impact all customers within the rate schedule
  - Wheeling charge
    - On all energy exports
What is the Impact of Net Metering?

- **Consumption**
  - Based on a sample data set
  - Reduction in customer energy requirements from the utility equal to 19%
  - Overall reduction of customer energy purchased from the utility, including generation exports, equal to 37%

- **Power Supply Impacts**
  - Increased unit cost due to fixed charges and reduced consumption
  - Every 2 years power costs are adjusted to account for load changes

- **Non-Power Supply Impacts**
  - Under-recovery of fixed costs included in the variable charge

- **Renewable Energy Credits**
  - A benefit if the utility maintains ownership
Section 6
Summary and Policy Directives
Next Steps and Requested Policy Directives

- **Step 1 – Revenue Requirement**
  - No overall rate increase over next 5-10 years
  - Still need detailed costs/budget for COSA
  - Need to decide on test year
  - EES will provide data request

- **Step 2 – COSA**
  - EES will perform COSA using data provided by BEC
  - Any changes to customer classes? (Net metering?)
  - Discussion of available AMI data and timing
  - Use of Minimum System and/or 100% Demand approach?
  - Examine revenue to cost ratios to decide if rebalancing is needed between classes
Next Steps and Requested Policy Directives (cont’d)

■ **Step 3 – Rate Design Options**
  - What are the goals?
  - One time change or phase-in of changes?
  - Unit costs from COSA ($/customer, $/kW, $/kWh)
  - Rates of neighboring utilities/trends
  - Develop several options for review
  - Examine bill Impacts of proposed alternatives

■ **Step 4 – Public Process and Implementation**
  - EES will provide reports/presentations as requested
  - Will request Board/staff review of results along the way
  - Board will make final decisions