City Light Rate Design

Presentation to Review Panel
June 2012

Today's presentation

- Policy Framework for City Light Rates: Resolution 31351 (May 2012)
- Rate Design

Resolution 31351 – Policy Framework

- Adopted May 2012
- Covers rate setting*, rate design** and marginal cost allocation
- Some objectives may conflict—balance needed
- Efficient use of resources—appropriate shares of costs
- Predictability from year to year—avoid large changes in amount and rate structure (Disproportionate impacts? Gradual phase-in)
- Public involvement—information and participation

*Result of revenue requirement + cost allocation

**Relationship of rate schedule elements to achieve class revenue reqmnt

Resolution 31351 – Revenue Requirements

- Consistent with Strategic Plan and financial policies:
  - 1.8 debt service coverage (plan)
  - 40% of CIP paid by cash from operations
  - Rate Stabilization Account
- Rates sufficient to meet annual revenue requirement

Resolution 31351 – Cost Allocation*

- Rates based on marginal cost (MC) of service
- Fair apportionment to classes (equity)
  - 1984 Customer Classification Study (4 + Lights)
  - Historical factors (now 29 classes + Lights)
- Conservation allocated to all classes
- Low-income costs allocated to all classes
- Does not address allocation of net wholesale revenue or allocation of costs incurred for the benefit of specific customers

* Discussed at May 2012 Panel meeting.

Resolution 31351 – Rate Design

- Encourage efficient use of power supply and distribution resources
- Higher rates for higher consumption (blocks of energy)
  - If applied to non-residential classes, should address efficient electric use and encourage economic growth
- No declining demand charges
- Residential 1st block of energy-essential needs, below avg cost of service [SAIC consultant study under way]
- Discounts for transformer ownership and primary metering
- Time-of-use rates where feasible
  - Currently applied to Large and High Demand rates only
- Low-income rates lower by at least 50% (current=60%)

Resolution 31351-Limitations

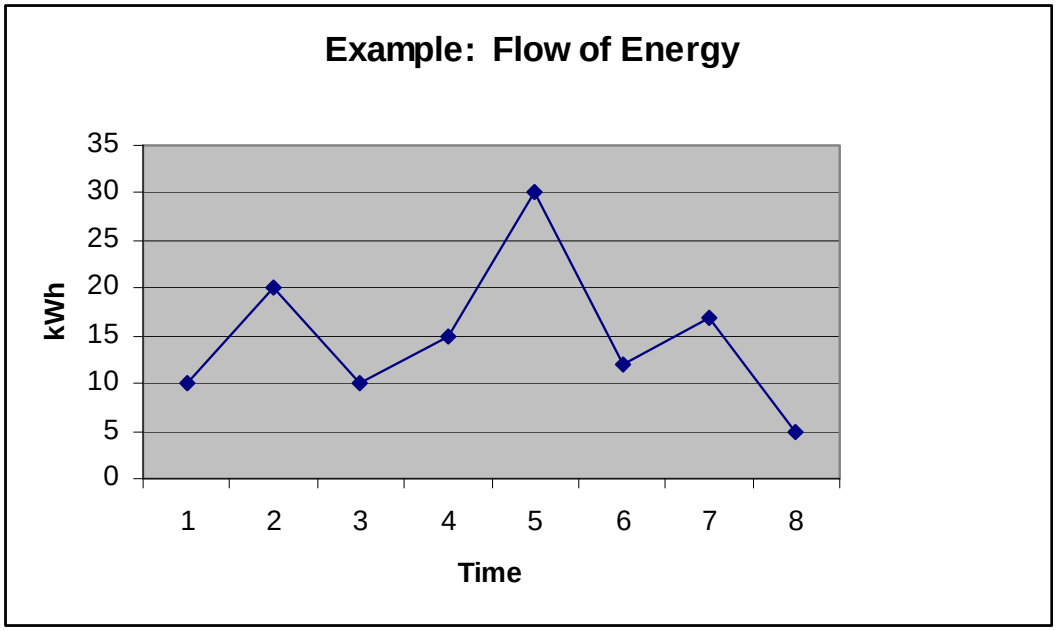
- Does not cover every aspect of cost allocation and rate setting

- Other guidelines:
  - Historical decisions by Council
  - Seattle Municipal Code
  - Suburban franchise agreements

Overview of Rate Design

Review of Basic Energy Terms

- Watt: a measurement of the rate of electricity use
- Kilowatt (kW): standard unit of electric power = 1000 watts, a short-term measure of maximum demand
- Kilowatt-hour (kWh): a measure of the flow of electricity over an hour--10 100-watt lights on for 1 hour = 1 kWh



Review of Basic Rate Schedule Terms

- Energy charge: a charge per kWh.
- Demand charge (aka “capacity charge”): a charge per peak (“instanteous”) kW.
- Base service charge (aka “customer charge”): a charge that is billed whether any electricity is used or not. Applies to SCL Residential classes.
- Minimum charge: a charge that is billed only if the amount billed for energy use is less than this amount. Like BSC but applies to SCL non-residential classes.

City Light's General Rate-Making Principles: Marginal Cost

- Design rates so that marginal cost, or close to it, is charged for marginal use.
  - Residential end-block rate
  - Large/High Demand peak period rates
  - Medium demand rates cover some high-cost energy
- BSC and minimum charge = 50% of marginal customer service cost (allows energy rates closer to marginal cost)
- Res. 31351: "rates should be based on the marginal cost of service to the customer"

City Light's General Rate-Making Principles: Energy Blocks

- Residential energy blocks
- Residential first block price lower than second block price

- Res. 31351:
  - "Where possible, rates should increase as consumption increases… increasing block rates are intended to encourage the efficient use of electricity."
  - "The residential first block of electricity is intended to meet the essential needs…and should be priced at or below the average cost of service…"

City Light's General Rate-Making Principles: Time-of-Use Rates

- Daily peak and off-peak rates for Large and High Demand General Service

- Res. 31351: "…implement time-of-use rates…where reasonably feasible."

City Light's General Rate-Making Principles: Discounts

- Low-income residential rates
- Customer provision of transformers
- Customer is "primary" metered

- Res. 31351
  - "Rates for qualified low-income residential customers shall continue to be lower than regular residential rates by at least 50%."
  - "When a customer provides a portion of…service infrastructure, or when the customer is metered on the utility's side of the transformer, the customer will receive a discount…reflecting the reduction in the cost of service…"

Residential Rates: Structure

- Two energy blocks
  - Low-cost first block of kWh (kWh/day =10 Summer, 16 Winter)
  - Higher-cost second block of kWh
- Base service charge (BSC)
- Suppose current rate schedule looks like:

1st block per kWh	$0.0525
2nd block per kWh	$0.1030
BSC/day	$0.1200

Residential Rate Design: Example Inputs to Design New Rates to Meet a New Revenue Requirement

Annual kWh load	3,100,000,000
First block load	1,400,000,000
Second block load	1,700,000,000
# Meters	357,000
MC of customer service	$100
Revenue Requirement	$277,000,000

Residential Rate Design: Translating Council Policy Guidance to Rates

- Second block rate should "reflect" marginal cost of energy to the customer
- First block rate should be below average cost of service
- BSC should equal 50% of marginal customer cost (recovery of billing/account costs but not 100% in order to put more MC into 2nd block rate)
- Structure of rate schedule should be modified gradually over time ("predictability")

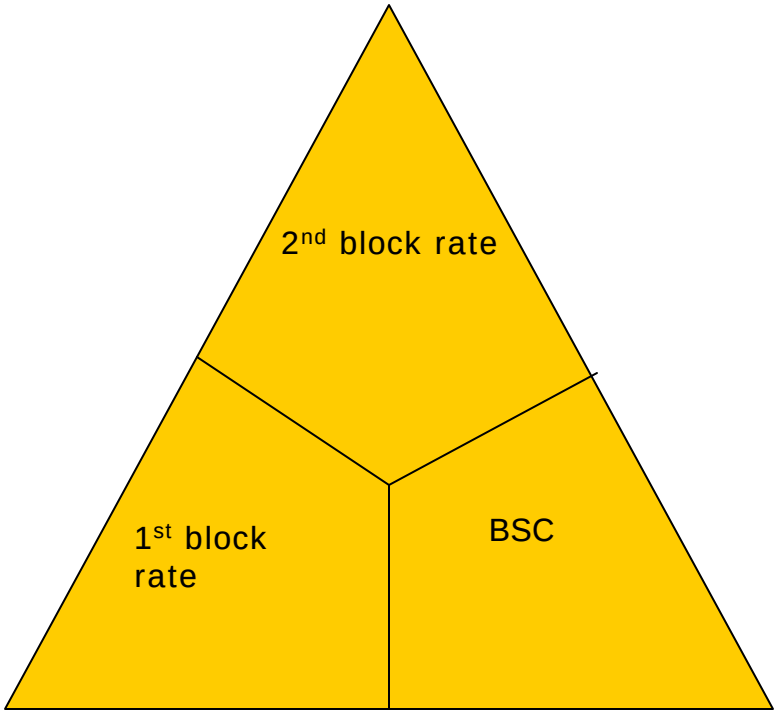
Residential Rate Design: Example

- Goal: Balance 3 rate elements to meet policy goals & revenue requirement

- Step 1: Base Service Charge
  - 357,000 meters x 50% x $100 = $17,850,000
  - And $17,850,000/357,000/365 days = $0.1370/day

- Step 2: 2nd block rate
  - Assume marginal cost is $0.11/kWh = 2nd block rate
  - 1,700,000,000 kWh x $0.11 = $187,000,000

- Step 3: 1st block rate
  - ($277,000,000-$BSC-$2nd block) /1,400,000,000 kWh = $0.0515



Residential Rate Design: Comparison of Old and New Rates

Element	Old	New	Change
1st block per kWh	$0.0525	$0.0515	-1.9%
2nd block per kWh	$0.1030	$0.1100	+6.8%
BSC/day	$0.1200	$0.1370	+14.2%

Residential Rate Design: Bill Analysis

- Compare old and new average rates:

  New average rate: New Rev. Reqmt. $/New kWh = $0.0894

  Old average rate: Old Rev. Reqmt. $/New kWh = $0.0852

  Average rate increase = 4.9%

- Compare some customer bills:

  50 kWh/month:

  New annual bill=BSC $50 + kWh $30.90 = $80.90

  Old annual bill=BSC $43.80 + kWh $31.50=$75.30

  Bill increase = $5.60 = 7.4%

  1,000 kWh/month:

  New annual bill=BSC $50 + kWh $1,046.39 = $1,096.39

  Old annual bill=BSC $43.80 + kWh $999.66=$1,043.46

  Bill increase = $52.93 = 5.1%

- Re-evaluate? (Resolution: disproportionate impacts)

Low-Income Residential Rates

- Same structure as regular Residential (1st & 2nd block energy charges, BSC)
- Set at 40% of Residential rates
- About 15,000 customers
- Eligibility: household income does not exceed 70% of WA state median income for # in household—City's Human Services Dept.
- Annual subsidy ~ $8 M

Small General Service (< 50 kW/month): Structure, Policy and Rate Design

Structure	Example
Flat energy rate/kWh	$0.0730
Minimum charge/day	$0.30

- Translating Policy into Rates:
  - Min. charge = 50% of MC of customer service
  - No BSC allows more $ in energy charge (closer to MC)

- Math:
  - Revenue Requirement $ / forecast kWh = ¢/kWh
  - Example: $73 M / 1,000,000,000 kWh = $0.0730

Medium General Service (50 kW – 999 kW/month): Structure & Policy

Structure	Example
Flat energy rate/kWh	$0.0666
Flat demand rate/kW	$1.50
Minimum charge/day	$0.80

- Translating Policy into Rates:
  - Min. charge = 50% of MC of customer service
  - No BSC allows more $ in energy charge (closer to MC)
  - Marginal transformer and energy costs
  - Statistical analysis: MC energy of high cost periods assigned partially to demand and partially to energy

Medium General Service Rate Design: Example Inputs to Design New Rates to Meet a New Revenue Requirement

Annual kWh load	1,600,000,000
Annual kW of peak demand	4,300,000
Revenue Requirement	$116,920,000

Medium General Service Rate Design:
Step 1

Marginal Cost Component	Assignment/Allocation	
	Demand Charge ($/kW)	Energy Charge (cents/kWh)
	Annual	Annual
Transformer Cost	$3.565	
Transformer Losses	0.122	
Base Energy Cost		13.500
Cost of Higher-Cost Periods	**0.313**	**0.032**
Total	$4.000	13.532

= from regression, demand=intercept, energy=coefficient

Medium General Service Rate Design: Next Steps

- Step 2: Billing determinants (kW and kWh) x marginal costs
  - 4,300,000 kW x $4.00 = $17,200,000
  - 1,600,000,000 kWh x $0.13532 = $216,512,000
  - Total = $233,712,000 marginal cost

- Step 3: Scale down MC of kW and kWh to just satisfy revenue requirement, e.g, by 50%
  - $4.00 MC/kW x 50% = $2.00 rate/kW
  - 13.532¢ MC/kWh x 50% = 6.77¢ rate/kWh
  - Check: $2.00 x 4.3 M kW + $0.0677 x 1.6 B kWh = $116,920,000 Revenue Requirement

Medium General Service: Bill Analysis

- Compare old and new rates:

	Old	New	% Change
kWh rate	$0.0666	$0.0677	2%
kW rate	$1.50	$2.00	33%
Avg/kWh	$0.0706	$0.0731	3.5%
Rev req	$113,010,000	$116,920,000	3.5%

- Compare annual bills:

  Old: $0.0666 x 200,000 kWh + $1.50 x 10,000 kW = $28,320
  New: $0.0677 x 200,000 kWh + $2.00 x 10,000 kW = $33,540
  Bill increase: $5,220 = 18.4% Load factor=3%

  Old: $0.0666 x 7,000,000 kWh + $1.50 x 10,000 kW = $481,200
  New: $0.0677 x 7,000,000 kWh + $2.00 x 10,000 kW = $493,900
  Bill increase: $12,700 = 2.6% Load factor=89%

- Re-evaluate? (Resolution: disproportionate impacts)

Note: Load factor = Avg. demand/peak demand (avg=kWh/8760, assume peak = 900 kW)

Large (1,000-9,999 kW/mo) and High Demand General Service (10,000+ kW/month)

Structure	Example
Peak energy charge/kWh	$0.0668
Off-peak energy charge/kWh	$0.0452
Peak demand charge/kW	$0.98
Off-peak demand charge/kW	$0.26
Minimum charge/day	$34.21

Large and HD General Service

- Translating Policy into Rates:
  - Min. charge = 50% of MC of customer service
  - No BSC allows more $ in energy charge (closer to MC)
  - Peak kW rate: Marginal transformer cost
  - Peak kWh rate: Marginal energy cost

- Rate Design:
  - Peak kW rate = MC of transformer + ?
  - Off-peak kW rate = Transformer ownership discount rate
  - Peak/off-peak energy rate differential = peak/off-peak marginal energy cost differential (e.g., 1.5:1)
  - Sum of rates x forecast kW/kWh = revenue requirement

- Analyze bill impacts and re-evaluate if necessary

Network Rates

- Downtown only – Medium and Large
- Higher wires and transformer costs
  - Redundancy (= more reliability)
  - All underground
- Eventually will include First Hill and North Downtown networked customers
  - When reliability = downtown reliability
  - When they actually receive network service

Other Rates

- Streetlight and floodlight rates:
  - Energy only
  - Energy + maintenance
  - Energy + maintenance + capital (+ pole)
- Transformer ownership discount rate
- Power factor rate
- Pole attachment rental rates
- Duct/vault rental rates
- Reserved distribution capacity charge