Seattle Public Utilities
Water Demand Forecast Model

September 13, 2012

Bruce Flory
Principal Economist

Seattle Regional Water System

- Serves 1.3 million people
- Retail and wholesale
- 2 main sources:
  - Cedar River
  - South Fork Tolt River
Growth in Population & Water Consumption

- Population: Since 1990, population has increased from 1.1 million to 1.3 million, a 16% increase.
- Total Water Use: Has decreased from 170 mgd to 118 mgd, a 31% decrease.
- Total per capita: Has decreased from 151 gpd to 90 gpd, a 40% decrease.

Lit Review – Forecast Methods

- Trend Extrapolation
- Fixed Flow Per Capita Factor
- Variable Flow Factor
- End Use: Econometric

Cost & Complexity: Low to High

Seattle Public Utilities
Elasticities

Model Overview

- Base Year Flow Factors by Sector
- Future Flow Factors affected by:
  - Projected growth in water and sewer rates
  - Projected growth in household income
  - Planned conservation program savings
  - Passive savings
- Forecasts of households and employment
- Other Adjustments
  - Non-Revenue Water
  - Other Sources of Supply
Model Inputs ➔ Conservation ➔ Passive Savings

Code savings
- 1992 code for showerheads, toilets and aerators
- 2001 code for clothes washers
- 2002 code for aerators
- 2012 code for clothes washers (effective 2016)

Beyond Code – Market Transformation
- Washing Machines: 9.5 gcf ⇐ 6 gcf ⇐ 4 gcf ⇐ 3.3 gcf
- Toilets: 1.6 gpf ⇐ 1.28 gpf
- Showerheads: 2.5 gpm ⇐ 2.0 gpm
- Aerators: 2.2 gpm ⇐ 2.0 gpm

Replacement, New Construction, PSE

Conservation Overlap Function

Price/Programmatic/Passive
- Assumed that half the price effect overlaps with passive and programmatic savings
- Overall effect – reduces total gross conservation savings by 15%
Uncertainty

- Sources of uncertainty
  - Forecasts of input variables
  - Elasticities and other assumptions
- Estimate range of uncertainty around model inputs
- Assign probability distributions
- Run Monte Carlo simulations
Model Validation/Backcasting
Saving Water Partnership – Weather Adjusted

Contact:
Bruce Flory
Seattle Public Utilities
bruce.flory@seattle.gov
(206) 684-5859

Demand Forecast Documentation
http://www.seattle.gov/util/About_SPU/Water_System/Plans/WaterSystemPlan/index.htm