Methods for addressing revenue attrition associated with efficiency and conservation

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Ratemaking math

- Cost-based rates are a function of both numerator and denominator derived in a test year analysis
  - Numerator: revenue requirements for the rate year
  - Denominator: expected sales for the rate year

- Missing revenue targets can be a function of costs or sales - both require close attention
  - Revenue requirements based on accounting data often get more attention
  - Sales forecasting is based on modeling and can be complicated (e.g., assumptions)
  - Implications for ratemaking and regulatory policy

- Uncertainty in ratemaking is not new
  - Effects of the pandemic (a known risk for utilities) illustrate the challenge – all estimates and allocators are off
  - Lower nonresidential use at lower rates, higher residential use at higher rates

Revenue requirements based on cost analysis
Expected sales based on billing determinants and forecasting
Revenue attrition or erosion can be understood as a form of “lag”
- Formally, lag is the delay between a change in costs or revenues (+/-) and a change in authorized prices charged to ratepayers – which normally triggers a rate review and regulatory filing
- Other definitions reflect various considerations (e.g., related to procedures and policies)

“Regulatory lag” is part of the model by design to motivate cost control and operational efficiency
- Regulation substitutes for competitive pressure
- Lag presents upside and downside potential – “cuts both ways”
- Utilities, rating agencies, other interests promote “constructive” practices to reduce regulatory lag

“Utility lag” is also a problem if managers are not monitoring and responding to trends

Diagram:
- Initial rates
  - Lower costs, higher sales
    - Profit
  - Higher costs, lower sales
    - Loss
- Reset?
Utility managers and regulators need to respond when lag materially jeopardizes
- Financial sustainability and ability to comply with standards and meet obligations to serve
- Reasonable opportunity to earn a fair return (investor-owned)

### Efficiency trend between rate adjustments

<table>
<thead>
<tr>
<th>Cost and sales trends between rate adjustments</th>
<th>Increasing operational efficiency</th>
<th>Decreasing operational efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falling costs and/or rising sales</td>
<td>Achieving revenues/returns is likely</td>
<td>Achieving revenues/returns is possible</td>
</tr>
<tr>
<td>Rising costs and/or falling sales</td>
<td>Achieving revenues/returns is possible</td>
<td>Achieving revenues/returns is unlikely</td>
</tr>
</tbody>
</table>
Characteristics of trends: volatility and stationarity

- Trends can be volatile but stationary (mean value is constant) – short-term risk
- Trends can be non-volatile but non-stationary (mean value changes) – long-term risk
- Moving averages will not inform decision-making if trends are non-stationary – whether or not volatile
Non-stationary trends

- Globally, water is renewable, and its aggregate trend is stationary – *all water ever on earth is still on earth*
- Locally, water is finite, *transient* in time and space, subject to *stress,* and *energy-intensive*
- Efficiency (doing same with less) vs. conservation (implies doing less with less)
  - Even in "water-rich" areas, stewardship and efficiency are *always prudent* – but the rationale for conservation may be conditional (e.g., need to adjust and even sacrifice in the context "scarcity" – a mismatch of supply and demand)

Source: ncdc.noaa.
Supply side: precipitation and drought trends in Connecticut (NOAA)

- Precipitation trends are slightly non-stationary over the long term
- Climate change is expected to exacerbate volatility and extremes – droughts, floods, and water quality
- Water resource management is connected to energy resource management ("nexus") – and climate action

Source: ncdc.noaa.
Demand side: trends in water withdrawals (USGS)

- Impressive efficiency gains across categories appear durable without loss of technical functionality
- Water withdrawals relative to population (per capita) have declined in the U.S. and elsewhere
- Usage is relatively stable even in the context of macroeconomic growth

Source: usgs.gov.
Total water withdrawals in Connecticut (USGS, 2015)

Connecticut
(water withdrawals, million gallons per day)

<table>
<thead>
<tr>
<th>Category</th>
<th>Water Withdrawals (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermoelectric</td>
<td>2,593</td>
</tr>
<tr>
<td>Public supply</td>
<td>240</td>
</tr>
<tr>
<td>Industrial</td>
<td>222</td>
</tr>
<tr>
<td>Other</td>
<td>61</td>
</tr>
<tr>
<td>Irrigation</td>
<td>11</td>
</tr>
</tbody>
</table>

https://owi.usgs.gov/vizlab/water-use-15/
Water use in Connecticut (USGS, 2015)

- Water use, efficiency, and conservation are relevant to all sectors
- Per-capita public and domestic use saw significant declines in 2015
- Water utility sales data reflect these trends
Declining demand and rising rates

- Declining demand of 1-2% annually pre-pandemic was observable (to ~50 gpcd)
- A nonlinear trend expected to stabilize in the coming decade (~35 to 45 gpcd)
- What will the new normal look like post-pandemic?
Drivers of falling water usage

- **Per-capita or per-function**
  - Efficiency standards (EPAct 1992)
  - Legal ordinances and codes as applicable
  - Commercial, industrial, and irrigation technologies
  - Changing culture, environmental ethic, and preferences

- **Per-connection or per household**
  - Demographic shifts (population, household size)
  - Property (lot) size and growth policies
  - Composition of commercial and industrial activities
  - Cost and price effects on discretionary use (elasticity)
  - Aging water meters that under-register (very minor role)
  - Effects of economic recession (temporary?)

- **No offsetting new uses for potable water (unlike energy) with few exceptions**
  - Water used in new ways for energy development and storage
  - Code-driven public and private fire protection
Consumer prices and expenditures

- Annual consumer expenditures on utilities for four-person households ($nominal, BLS)
- Household expenditures and CPI for water and sewer maintenance

Source: IPUMSU based on BLS data.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Revenue requirements</th>
<th>Rate ($/unit)</th>
<th>Bill ($/customer)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usage decline (other things equal near term)</td>
<td>neutral</td>
<td>↑</td>
<td>neutral</td>
</tr>
<tr>
<td>Economic demand management</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Uneconomic demand management</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td></td>
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</tr>
<tr>
<td>Rising infrastructure or operating costs</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Supply-side efficiency</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td><strong>Market</strong></td>
<td></td>
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</tr>
<tr>
<td>Customer additions (gain scale)</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
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<tr>
<td>Customer losses (lose scale)</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
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<tr>
<td><strong>Rate design</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Price-elastic usage</td>
<td>neutral</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Price-inelastic usage</td>
<td>neutral</td>
<td>↑</td>
<td>↑</td>
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<tr>
<td>Cost reallocation</td>
<td>neutral</td>
<td>↓</td>
<td>↑</td>
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<tr>
<td><strong>Full-cost pricing</strong></td>
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<td></td>
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</tr>
<tr>
<td>Subsidy</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Transfers or loss of subsidy</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>
Efficiency and volatility

- Revenue volatility is primarily a function of weather-sensitive outdoor usage
  - Usage goes up when supplies are constrained – and price response is may be *less* in dry conditions
  - Outdoor usage continues to drive capacity needs – compare to energy
  - Aggressive pricing will reduce discretionary outdoor usage – but also revenues
  - Some utilities may depend on dry weather sales for revenues and earnings ("moral hazard")

- Volatility is reflected in the disparity of seasonal peak and off-peak usage
  - If maximum (outdoor) use persists or rises, volatility will increase
  - If maximum (outdoor) use falls, volatility will decrease

- Outdoor inefficiency (peak) undermines indoor efficiency (base)
Pressure on costs and prices

- **Capital-cost pressures**
  - Combined water, wastewater, and stormwater infrastructure needs
  - Asset valuation at fair value and private investment

- **Operating-cost pressures**
  - Labor, energy, chemicals, and purchased water
  - Quality standards and compliance costs
  - Legacy costs (such as lead service lines)
  - New contamination threats

- **Resource pressures**
  - Water supply constraints
  - Economic or population growth (locational)

- **Demand pressures**
  - Flat or declining usage due to efficiency
  - Economic or population loss (locational)

- **Structural pressures**
  - Fiscal effect of full-cost pricing (vs. tax support)
  - Enterprise models of ownership

Public funding for water infrastructure from 1956 to 2017 (CBO)
Conservation conundrum: acknowledging the issue

- **All else equal, lower usage means higher rates**
  - Short-run revenue neutrality to cover fixed cost of service
  - Bills remain relatively constant but should reflect variable cost savings

- **Rates may rise due to usage reduction, but bills rise due to costs**
  - Efficiency can only promise lower highs

- **Efficiency presents an opportunity to avoid operating costs**
  - Short-run: avoid variable operating inputs – energy and chemicals
  - Long-run: extend asset life and resize, postpone, or avoid new capacity
  - In the long run, all costs are variable

- **Efficiency and conservation cannot avoid all water system costs**
  - Cost of service is driven more by capital intensity than commodity costs
  - Wastewater costs are also affected by concentrations that rise with low flows
  - Capital costs and input inflation will likely offset savings
  - Short-run marginal cost of water is low relative to fixed costs
  - Fire-protection and sanitation parameters set minimum system requirements
  - Hyper-efficiency (<25 gcpd) may result in added operational costs and loss of welfare

- **Water utilities are left with a “conservation conundrum”**
  - Promoting efficiency and conservation is associated with revenue attrition and rate increase
  - Higher rates also mean lower usage (for price-elastic demand)
Methods to address revenue attrition: many tools but no panaceas

<table>
<thead>
<tr>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>System optimization</td>
</tr>
<tr>
<td>Forecasting and planning</td>
</tr>
<tr>
<td>Financial management</td>
</tr>
<tr>
<td>Ratemaking methodologies</td>
</tr>
<tr>
<td>Rate-design alternative</td>
</tr>
<tr>
<td>Adjustment mechanisms</td>
</tr>
<tr>
<td>Non-rate revenue streams</td>
</tr>
</tbody>
</table>
System optimization

- **Infrastructure is at an inflection**
  - (Re)optimization to capture long-run benefits of efficient use and avoid imprudent investment (“right-sizing”)
  - Standards and practices may be lagging
  - Prudence calls for improved capacity utilization
  - Modeling can inform planning and decision-making

- **Structural options**
  - Beneficial regionalization of proximate systems to capture scale economies in production
  - Collaboratives and partnerships

- **Supply-side technologies (lower costs)**
  - Water loss auditing and leak-detection
  - Energy management (pumps and storage)
  - Recharge and reuse

- **Demand-side technologies (lower costs and revenues)**
  - Peak-demand management (e.g., irrigation controls)
  - Advanced metering for pricing and information
  - Water “substitutes” in production processes
Forecasting and planning

- Improved forecasting methodologies for both costs and sales
  - Linear trends or averages are insufficient for non-stationary trends
  - Forecasts used in capital planning and ratemaking should be consistent and synchronized
- Data and models to improve understanding of demand patterns and drivers
  - Statistically adjusted end-use modeling, geographic information systems (GIS), demand elasticity studies
  - “All models are wrong, but some are useful” (U.K. statistician George Box)
- Strategic capital and integrated resource planning, and flexible infrastructure design principles
Financial management

- Depreciation is a noncash expense on tangible assets providing cash flow for debt coverage and reinvestment (see GASB 34 re asset management)

- (Re)finance long-term debt for capital projects to improve cash flow
  - Lower interest rates and longer terms translate to lower revenue requirements and rates to customers
  - Government-backed instruments (SRF, WIFIA, state bond banks)

- Efficiency and conservation are viewed *positively* by credit rating agencies (S&P Global, 2012, 2018)

Source: John Ryan (SSRN, 2020), with permission.
Ratemaking methodologies

- Timely and accurate rate changes to reduce lag in cost recovery – annual if necessary
  - Effective management of oversight processes and rate politics (not necessarily a bad thing)

- Test year for ratemaking – future, forecasted, or projected test year for rates – adjusted as appropriate
  - Revenue-attrition (suppression) adjustments in test year to account for price elasticity effects
  - Multi-year ratemaking with gradual inflation and efficiency adjustments (price-cap model, earnings-sharing bands)

- Regulatory asset moves an expense to the balance sheet (rate base) and allows for its deferral, amortization
  - For probable recovery of a prudent expenditure – regulatory accounting and treatment prevails over FASB 71/GASB

- Strategic rate (revenue) stabilization fund(s) with caps. strict controls, ring-fencing of assets (“hands-off”)
  - Pennichuck (NH) maintains a $5 mil. fund, replenished with 10% coverage charges
  - See guidance on cash reserves from AWWA (2018)

Source: NHPUC testimony by Don Ware.
Rate-design alternatives

- Rate design is revenue-neutral and informed by established principles and cost-of-service studies
  - Must be understandable, politically acceptable, and legally defensible – and may be subject to regulatory authority
  - Must comport with generally accepted practices for cost allocation and rate design

- Fixed and variable tariff charges may not match fixed and variable costs
  - Utilities tend to like fixed charges but typically recover a substantial portion fixed costs through variable charges ("absorption") – like competitive firms
  - Cost classification and functionalization guide design of fixed and variable charges but is not determinative
  - Rate design may consider both short-term and long-term average and marginal costs

- Complex rate structures are not necessarily better – marginal benefits and costs
Rate design: fixed charges

<table>
<thead>
<tr>
<th>Recovering more costs from fixed charges</th>
<th>Recovering more costs from variable charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static view of infrastructure</td>
<td>Dynamic view of infrastructure</td>
</tr>
<tr>
<td>(more sunk costs)</td>
<td>(less sunk costs)</td>
</tr>
<tr>
<td>Enhances revenue stability</td>
<td>Reduces revenue stability</td>
</tr>
<tr>
<td>(less sales revenue risk to utility)</td>
<td>(more sales revenue risk to utility)</td>
</tr>
<tr>
<td>Weakens price signals</td>
<td>Strengthens price signals</td>
</tr>
<tr>
<td>(less resource efficiency)</td>
<td>(more resource efficiency)</td>
</tr>
<tr>
<td>Familiar &amp; understandable but less acceptable</td>
<td>Familiar &amp; understandable but more acceptable</td>
</tr>
<tr>
<td>(more predictable and less controllable)</td>
<td>(less predictable and more controllable)</td>
</tr>
<tr>
<td>Less affordable for low-income households</td>
<td>More affordable for low-income households</td>
</tr>
<tr>
<td>(more regressive)</td>
<td>(less regressive)</td>
</tr>
<tr>
<td>Encourages self supply and grid defection</td>
<td>Preserves grid supply and participation</td>
</tr>
<tr>
<td>(may raise some costs)</td>
<td>(may lower some costs)</td>
</tr>
<tr>
<td>Possible advantage for combined households (one fixed customer charge)</td>
<td>Possible stability from first blocks</td>
</tr>
<tr>
<td></td>
<td>(relatively inelastic usage)</td>
</tr>
</tbody>
</table>
Rate design: variable charges

- Rate blocks and tiers (unit prices)
  - Derived by engineering (cost) and economic (elasticity) analyses
  - Different designs have different rationales and policy objectives
  - Details matter to demand effects – and efficiency and equity outcomes

- Innovative rate design may be needed
  - Utility cost profiles are changing
  - Flexibility can allow for community goals and values
  - Customers can be engaged in the process
  - Experiments provide evidence and insight
Rate design innovation: inclining seasonal rates

- Can be designed to address discretionary outdoor and “excessive” usage
- Can be tailored to the household level based on off-season use (as in wastewater pricing)

Source: riversideca.com
Rate design innovation: supply-condition pricing

- Sydney Australia’s “Flexible Water Prices”
  - Rates are set by the Independent Pricing and Regulatory Tribunal New South Wales
  - Designed “to enhance resilience to climatic extremes” (i.e., scarcity conditions)

- “Dynamic” seasonal prices reflect short-run marginal value and cost principles
  - Fixed rate reduced in favor of variable rate based on dam levels
  - Long-run value is not directly affected by dam storage levels
  - Does not require smart metering or real-time pricing

**Figure 1.1** Flexible water usage prices explained

Source: sydneywater.com
Rate design: drought surcharge

- Orange Water And Sewer Authority, North Carolina (not-for-profit public service agency)
  - Excludes essential usage block and applies a simple multiplier
  - Rates are reset every October based on revenue requirements

- Potential issues
  - Excess revenues and earnings if demand is price-inelastic
  - Use of funds for supply augmentation and revenue stabilization – but possible refunds or rebates

### Water Shortage (Drought) Surcharges

<table>
<thead>
<tr>
<th>Gallons of Water Used</th>
<th>Water Shortage Stage 1</th>
<th>Water Shortage Stage 2</th>
<th>Water Shortage Stage 3 (Emergency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block 1</td>
<td>0 - 2,000</td>
<td>No Surcharge</td>
<td>No Surcharge</td>
</tr>
<tr>
<td>Block 2</td>
<td>3,000 - 5,000</td>
<td>No Surcharge</td>
<td>1.25 * Block 2 Rate</td>
</tr>
<tr>
<td>Block 3</td>
<td>6,000 - 10,000</td>
<td>1.25 * Block 3 Rate</td>
<td>1.5 * Block 3 Rate</td>
</tr>
<tr>
<td>Block 4</td>
<td>11,000 - 15,000</td>
<td>1.5 * Block 4 Rate</td>
<td>2 * Block 4 Rate</td>
</tr>
<tr>
<td>Block 5</td>
<td>16,000+</td>
<td>2 * Block 5 Rate</td>
<td>3 * Block 5 Rate</td>
</tr>
</tbody>
</table>

Source: owasa.org
Rate design innovation: equity-efficiency pricing (Beecher, 2020)

- Universal, principled, and defensible – applicable to all water customers
  - Theoretical, practical, and normative rationales – possible stakeholder appeal
  - May become more relevant for capital-intensive industries for stable recovery of network costs

- Five elements
  - Recognize public functionality in cost allocation (scope economies)
  - Calibrate a minimum bill to property assessment (capacity value)
  - Provide an essential-use allowance for all households (public health) – 25 gpcd * 2.6/hh = ~2000/mo.
  - Design cost-based rates for variable water usage (resource management)
  - Prohibit disconnection and deploy service limiters instead (water security)
Adjustment mechanisms: two types

Cost-adjustment mechanisms
Water Infrastructure and Conservation Adjustment (WICA)

Revenue requirements based on cost analysis
Expected sales based on billing determinants and forecasting

Revenue-assurance mechanisms
Revenue Adjustment Mechanism (RAM)
Connecticut’s WICA (costs) and RAM (revenues)

- WICA or Water Infrastructure and Conservation Adjustment is defined in Section 16-262v (2007)
  - To cover the replacement of water distribution system pipes and related infrastructure that have either reached the end of their useful life or are negatively affecting water quality or service reliability.
  - The legislation limits the surcharge increase to 5% in any given year, and 10% overall between full rate cases. For increases beyond these amounts, water companies must submit full application for a formal rate case.
  - The benefits of WICA to water customers are two-fold. First, the customer will see timelier, smaller increases to your water bill than previously. Second, water customers will benefit from enhanced quality and reliability, because improving water infrastructure enables a water utility to improve their service and delivery.
  - WICA may change throughout a year depending on infrastructure improvements and the approval of PURA for these increases.

- RAM or Revenue Adjustment Mechanism (also referenced as the Water Revenue Adjustment or WRA) (2015)
  - The RAM allows a company to reconcile any differences between its PURA-approved revenue and its actual revenues through an annual rate adjustment without going through a full case proceeding each year (e.g., if a company earns less than PURA allowed it to earn, it can adjust rates the following year to make up the difference). In essence, it is an annual “true up”.
  - The RAM is reviewed annually and may be a charge or credit on customer’s bills based on actual revenues in the prior year (newhartfordct.gov).

- For more information, see presentation by R. Sobolewski (NASUCA, 2018)
Cost-adjustment mechanisms

- Cost-adjustment mechanisms are also known as riders, trackers, and surcharges
  - Reduce rate cases and to some extent their scope (e.g., disputes over forecasts)
  - Favored by investors and rating agencies (credit positive)

- Cost adjustment mechanisms originally applied only to variable operating costs meeting four criteria
  - Expanded to include capital-related costs that do not meet these criteria
  - Potential pushback if oversight is lax (e.g., natural gas in Illinois)

- Implementation considerations
  - Projects that serve the public interest, meet standards, improve service
  - Prudent in the context of an optimized capital improvement plan
  - Approved capital financing and budget
  - Capped by period (monthly, annually, cumulative)
  - Subject to review and reconciliation (not “automatic”)
  - Consideration of cost savings (lower expenses)
  - Earnings monitoring and earnings sharing
  - Involvement of consumer advocates
  - Customer outreach and education
Revenue-assurance mechanisms

- Decoupling is largely a reactive response to ongoing trend revenue attrition in the context of capital intensity
  - RAMs are revenue caps that detach sales from revenues and profit potential (vs. price caps)
  - Maintains overall or per-customer revenues – revenue neutrality
  - Similar to weather normalization or other revenue-related mechanisms

- Meant to address the presumed “throughput incentive” (to sell more)
  - Neutralizes negative incentives but does not provide positive incentives to reduce sales, peaking, or investment
  - Rationale varies by sector and over time – not all utilities are inclined to seek or use them
  - CPUC discontinued for Class-A water in 2020 (also Ohio for energy)
  - Alternative tools can address the revenue and incentive issues

Traditional rate formula:
Revenues = fixed price * sales

Decoupling rate formula:
Price = fixed revenue / sales
### Adjustment mechanisms: advantages and disadvantages

- **Cost-adjustment and revenue-assurance mechanisms** are designed for different policy purposes
  - Both address the revenue attrition challenge to align revenues with costs
  - Their usage has expanded with (necessary) legislative and regulatory consent and altered cost recovery

- **Regulatory considerations**
  - Risk-bearing, incentives, returns, and automation - less relevant for not-for-profit (publicly owned) utilities
  - Some suggest that an earnings-sharing band would be more comprehensive and easier to implement
  - Criteria for use and safeguards such as time-based caps, review and reconciliation, earnings sharing

<table>
<thead>
<tr>
<th>Possible advantages</th>
<th>Possible disadvantages</th>
</tr>
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<tbody>
<tr>
<td>Provides stability and gradualism avoids rate shock</td>
<td>Shifts risks from owners/shareholders to ratepayers</td>
</tr>
<tr>
<td>May improve accuracy of price signals to customers</td>
<td>Difficult to isolate costs and demand factors (e.g., preferences)</td>
</tr>
<tr>
<td>Lowers risk and thus cost of capital (debt)</td>
<td>Asymmetrical relative to dynamic cost and risk effects</td>
</tr>
<tr>
<td>Prevents “windfall” revenues to utilities</td>
<td>Weakens incentives and distorts decision-making</td>
</tr>
<tr>
<td>Reduce rate case frequency and expense</td>
<td>Narrows the scope of review (single-issue, formulaic)</td>
</tr>
<tr>
<td>Reduces need for regulatory deferrals (accounting)</td>
<td>Need to revisit authorized returns and monitor earnings</td>
</tr>
</tbody>
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Non-rate revenue streams

- Use of some tax support for public water and other infrastructure vs. “full-cost pricing”
  - Taxes are less regressive and could be used to improve equity and affordability
- Hedging (derivatives) and revenue insurance instruments – at a cost to ratepayers
- Technological opportunities and revenue streams
  - Solar and other renewable energy projects
  - Water tower leasing for cellular service
  - Wastewater reclamation and recovery of energy, minerals, and nutrients

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<thead>
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<tbody>
<tr>
<td>Funding: Who pays for infrastructure</td>
<td>Financing: How infrastructure is paid for</td>
</tr>
<tr>
<td>Methods: Taxes, user fees, other</td>
<td>Methods: Debt, equity, other</td>
</tr>
<tr>
<td>Implications: Distributional burdens and consumer incentives</td>
<td>Implications: Cost of capital and provider incentives</td>
</tr>
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A long-term perspective

- Water demand should eventually find a new normal or new equilibrium (~35 gpcd?)
  - Revenue stability can be achieved over time with end-use efficiency and sound pricing
  - Outdoor usage in relation to weather, climate, and culture remains the wildcard in the game
  - Long-term effects of the pandemic on the economy and work are relevant but not known

- Benefits of stable and efficient water usage to utilities – maintained by standards, pricing, and other policies
  - Demand forecasting becomes easier
  - Weather and climate becomes less determinative
  - Rate design becomes less determinative
  - Customer bills flatten (“organic decoupling”)
  - Revenues become more predictable (credit positive)
  - Securing lower-cost financial capital becomes easier
  - Hedging for revenue instability becomes unnecessary

- Policy focus may be turning from efficiency to equity
  - Universal affordable access to essential water services while protecting public health and the environment

Thanks! Questions?