

# “Excel”-ing Beyond Your Goals: Using Modeling to Optimize CIP Planning



HDR’s article series on water economics, *Two-Handed Economics*, explores how an economic mindset can help utilities optimize and deliver complex projects with confidence.

## USING AN ECONOMIC FRAMEWORK TAKES A UTILITY FROM ALTERNATIVES ANALYSIS THROUGH DECISION MAKING AND INTO IMPLEMENTATION

Optimizing the implementation of Capital Improvement Programs (CIPs) ensures that projects align with community goals while bringing best value for cost. For example, imagine the “Glass Half-Full Water Agency” provides water to more than 100,000 customers and owns over \$1 billion in assets. Many of their treatment facilities were built in the 1970s, and their pipelines are nearly 100-years-old.

Glass Half-Full is undertaking a large program to replace aging infrastructure and keep pipes pressurized. They are looking for a way to prioritize these improvements to address the most critical items first without breaking the bank for their ratepayers.

Optimizing a CIP starts by evaluating value and risk for each project or alternative. Identifying how projects add value and reduce risk leads to prioritization and smart, phased implementation. Through this analysis, we can target and prioritize improvements that bring the highest benefit to a community.

We then work to identify resource constraints, such as funding and ratepayer affordability. These constraints tell us how much work we can reasonably accomplish each year. Making improvements in priority order and within our resource constraints means that public funds will be spent efficiently to meet goals.

## MAKING DECISIONS BY BALANCING UNIQUE, AND OFTEN COMPETING, CONSTRAINTS

Models help us make sure goals and constraints are satisfied, from meeting a regulatory deadline to replacing aging infrastructure while keeping rates manageable. Through modeling we test different scenarios without having to do it manually, saving considerable time and effort, and converge on optimal solutions. Modern utilities are operating under many different constraints, some unique and some ubiquitous. These may include:

- Budget (annual financial capacity for debt funding and other funding source availability)
- Project management and construction management resources
- Contractor availability
- Rate payer affordability
- Project dependencies (upstream/downstream needs)

Utilities also deal with complex and changing variables, including:

- Growth (supply and demand)
- Inflation
- Market competition for contractors
- Regulatory deadlines
- Political will and stakeholder understanding
- Likelihood and consequence of failure
- Levels of service goals
- Social costs and benefits of projects

In the case of Glass Half-Full, they are not only trying to replace aging infrastructure but make sure improvements last and provide service for projected future growth. They also want to be sure they equitably serve all areas of their community with efficient delivery, collaborating with street and other utility projects in the community. Building these variables into the model gives a holistic view of the CIP to help answer those burning “what if” questions that keep managers up at night.

### A NEW WAY OF MODELING CIPS

We’ve developed a new water resources economic modeling platform that helps utilities manage the complexities of their CIP. EconH2O™ frames your decision-making process and takes you step-by-step through each layer of complexity. Steps in the framework include:

1. Define drivers and goals
2. Quantify costs and benefits
3. Prioritize to achieve goals and reduce risk
4. Optimize project phasing within constraints
5. Evaluate alternatives in real time
6. Communicate results to stakeholders
7. Implement the CIP!

Our model takes a risk-conscious and value-driven approach to help meet social, environmental and economic needs while operating within constraints and maintaining key levels of service.



### VISUALIZE HOW DIFFERENT VARIABLES IMPACT IMPLEMENTATION AND AFFECT STAKEHOLDERS THROUGH A DASHBOARD

Imagine being able to see all of the key performance indicators needed to make a decision in one spot. There is a single screen with user inputs and a selection menu to manage variables in real time to provide feedback. Our model culminates in a dashboard that provides a one-stop shop visualization for decision making.

We work with utilities to customize the dashboard to their specifications so that it reports the key performance indicators that will help them make decisions. It overlays capital, operations and maintenance (O&M), and finances so that decisions are made holistically. We can measure trade-offs and understand the marginal impact of changes in different variables. Because the model is built in Microsoft Excel, it is transparent and drilling into the data is easy.



### ECONH2O™ ANSWERS COMMON QUESTIONS:

- How do different revenue/rate profiles affect CIP delivery?
- What is the optimal way to phase a series of projects?
- How do regulatory-required projects affect customers’ ability to pay?
- Which alternative most aligns with our mission, vision and goals?
- What order of projects meets our short and long-term goals?
- How do different operational strategies affect repair, replacement and rehabilitation needs?
- What risk is mitigated with this CIP?
- What benefits are achieved through these projects?

To help justify budgets, the dashboard includes an Annual CIP Investment graph that demonstrates pressure points in cash flow that may trigger a rate evaluation by comparing capital investment to revenues, expenses and debt service.

The first chart below shows that Glass Half-Full revenues are forecasted to be just enough to meet expenses and debt service. This year is the financial pressure point, but with a modest, phased-in rate increase, they are able to maintain debt service coverage and cash on hand targets. The agency evaluated compressing the schedule, but was concerned the rate impact would be too high.

Therefore, the agency is phasing improvements over 10 years and raising rates no more than 7% per year.

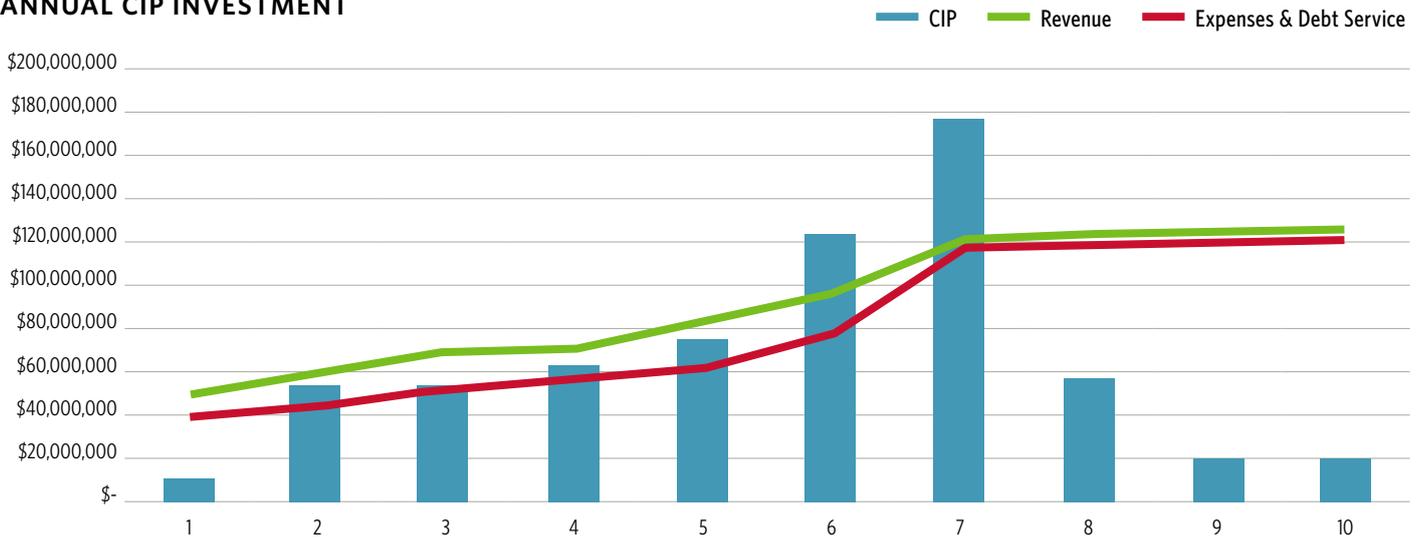
To help visualize stakeholder buy-in, the second chart illustrates the program's positive impacts to the community, customer service and risk mitigation through addressing aging infrastructure. In the case of Glass Half-Full, the focus of the first several years was customer service and aging infrastructure.

The model prioritized projects that brought benefit in these areas while keeping rates within the 5 to 7% target.

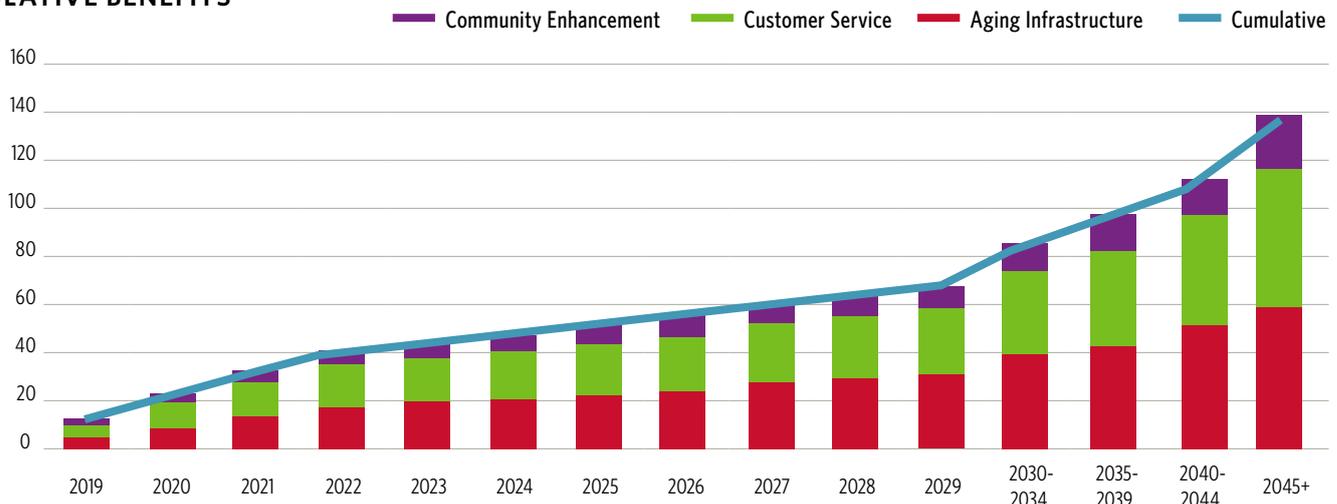
### MAKE INFORMED, DEFENSIBLE CIP DECISIONS

Our ultimate goal is to empower utility managers to make data-driven decisions in the context of everything they must consider. An economic approach captures the relevant variables, constraints and helps manage complexity. Our framework addresses goals and mitigates risk while the dashboard eases stakeholder communication.

#### ANNUAL CIP INVESTMENT



#### CUMULATIVE BENEFITS



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