Asset Management 101


All water and
wastewater
facilities are made
up of many, many
individual assets

An asset is anything that you own that has value. Individual assets can be put into categories, such as buildings, pumps, wells, etc. A category may contain many different individual assets.

It costs money to construct, operate, maintain, repair, rehabilitate and replace the assets

You most likely don't have all the money you need to do everything that needs to be done within the facility……

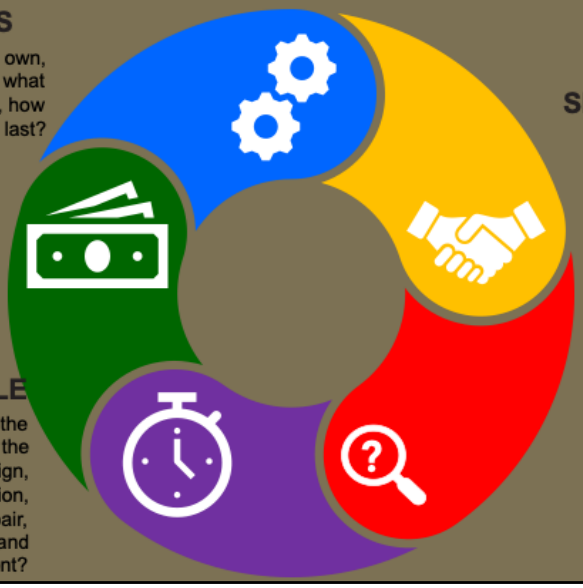
VS

Therefore, you have to make choices about where to spend the money

Asset management helps you determine how, where, and when to spend your money

Asset management is first and foremost a process to help you run your systems in a better way

THE AM THOUGHT PROCESS CONSISTS OF 5 CORE COMPONENTS



ASSETS

What assets do you own, where are they, what condition are they in, how much longer will they last?

FUNDING

Do you have sufficient funding for day to day operation as well as long–term capital replacement of assets?

LIFE CYCLE

Are you considering the entire life cycle of the assets, including design, construction, operation, maintenance, repair, rehabilitation, and replacement?

SERVICE LEVEL

What level of service do you want to provide for your customers? Are you measuring your performance?

CRITICALITY

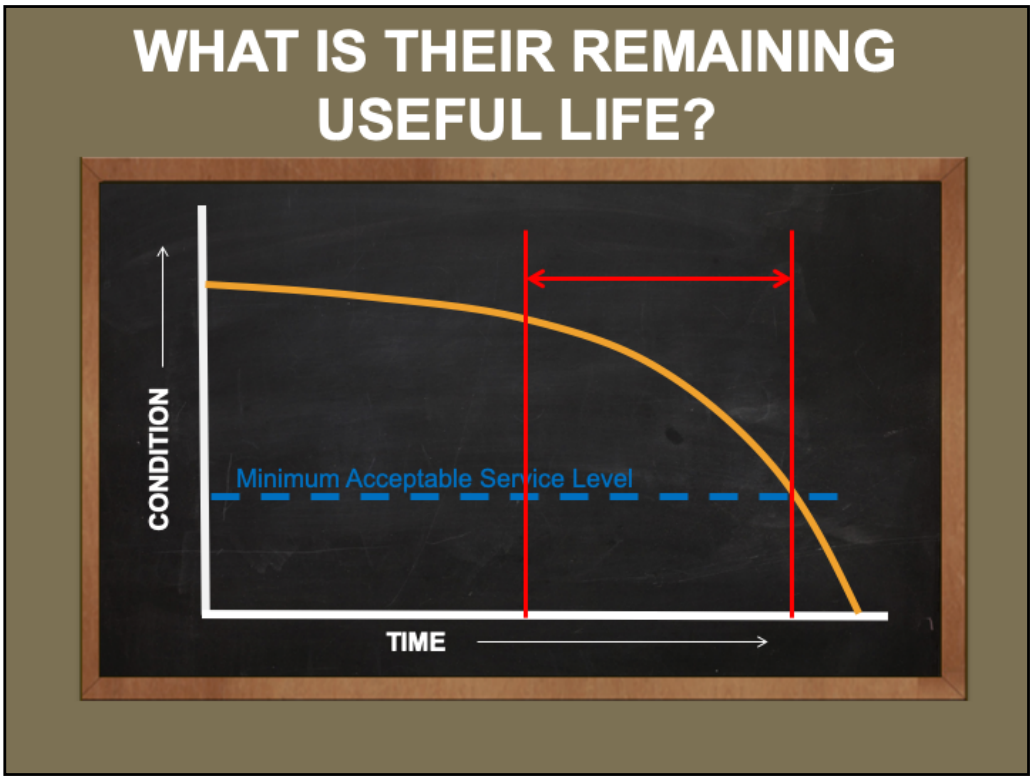
Which assets are critical to the sustained operations of the facility?

CURRENT STATE OF THE ASSETS

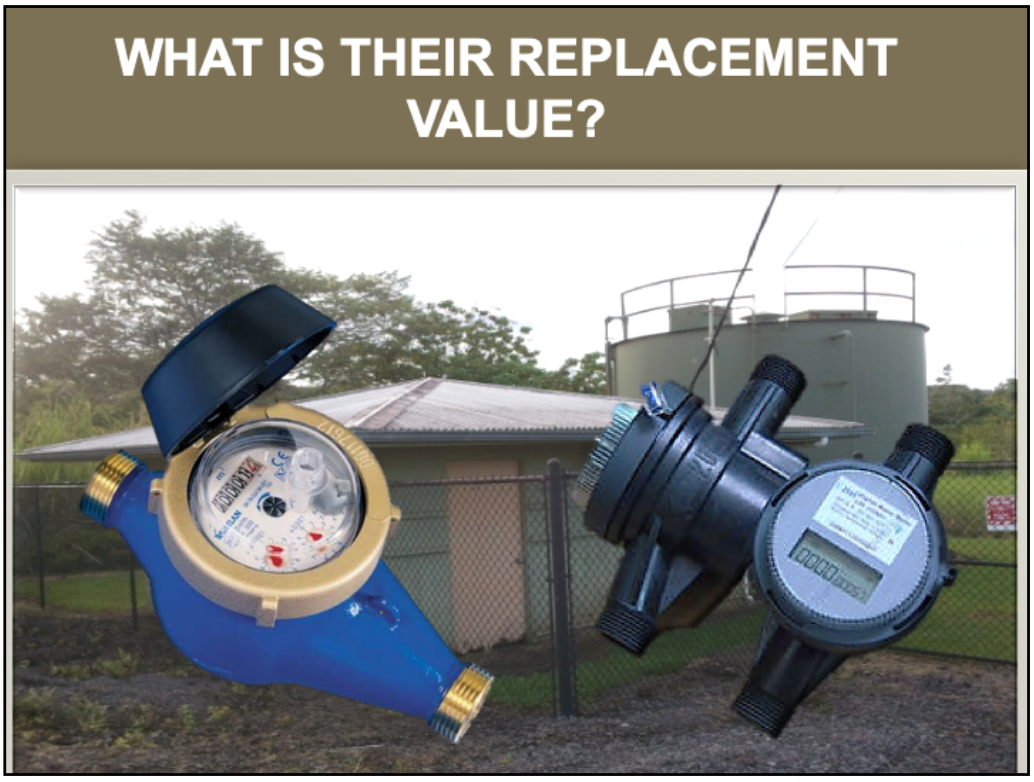
An asset is anything that you own that has value. The slide shows pictures of a variety of assets in the water and wastewater industry. You may have different assets than those shown above. Consider all of the assets that make up your individual system.

Assets can either be horizontal (field assets like pipe) or vertical (plant assets like pumps, mixers, blowers). Assets that are horizontal are shown on a map. Vertical assets are typically located in a building or within the boundaries of a treatment plant.

The condition of an asset can range from excellent (brand new asset) to poor (an asset that is ready to fail.) The slide shows a variety of assets and their conditions, from good assets, to poor quality assets. Typically, the asset condition is usually rated on a scale, such as 1 to 5 or using words, such as excellent, good, average, fair, or poor.

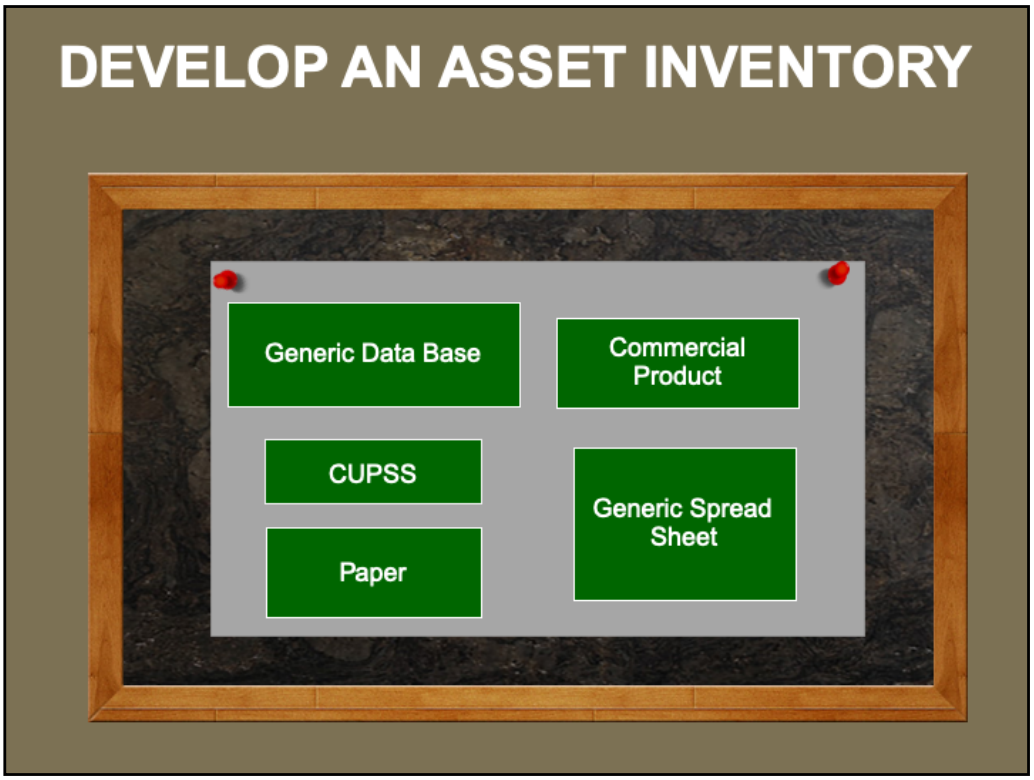


The total useful life of an asset is the time from when the asset is installed until the asset is no longer able to perform its required function for the utility. This amount of time should reflect the real world experience of the utility whenever possible, rather than being an arbitrary amount of time from a manufacturer or industry standard. However, if no other information is known, these types of estimates can be used. The useful life remaining for the assets is the time from today's date until the asset is no longer expected to meet its desired purpose. For example if it is 2020 and the asset is supposed to last until 2024, the useful life remaining is 4 years.



The replacement value should be the cost of replacing the asset with the type of asset that the utility desires to use. It is important to remember that not all assets are replaced by like assets. For example, the utility might have cast iron pipe but will replace it with PVC pipe. In this case, the utility would want to use the cost of the PVC pipe not the cost of a cast iron pipe. The other two types of costs are current value and historical value. These other two values might be important for various reasons, but are not as important from an asset management perspective. The current value might be important to a utility if it is trying to perform a valuation of all of its current assets. The historical value can be interesting but is not that helpful in determining future costs. However, if no other information is known regarding cost except historical costs, the utility could use factors to translate the historic cost into the current dollars for a replacement value.

Not everything a utility has may be considered an asset that needs to be tracked in the inventory. For example, some items may not need to be managed, and others may be of such low value it is not worth putting them in an inventory. A utility may decide what to include in its inventory by considering several factors, such as a money value below which the item is not considered an asset (i.e., a small utility may choose $1,000, while a large one may choose $3,000 or $5,000); whether a work order may be written around that asset (if a work order is written on the item, it should be considered an asset); the criticality (critical items should be included as assets to ensure they are properly tracked and managed); and items for which there are many, many assets (e.g., meters, hydrants, and valves, which may not cost the money amount chosen, but collectively they are so expensive, these assets are included.) The idea is to the items that are worth tracking in the system without putting too many items in the inventory such that you are managing every nut and bolt in the system.



Need some way to store inventory data

Balance expense of storage system with need for sophistication

- Have the program do what you want it to do, but don't pay for elements you will never use
- Be honest about what you will actually be capable of doing with current staff and current budget
  - It might sound great to have a component that monitors spare parts, but if you don't have anyone that can actually enter the data and maintain the component, don't buy it

Use as much of the capabilities of the program as possible

Make sure all employees who will have to interact with the inventory program know how to use it and what it can do

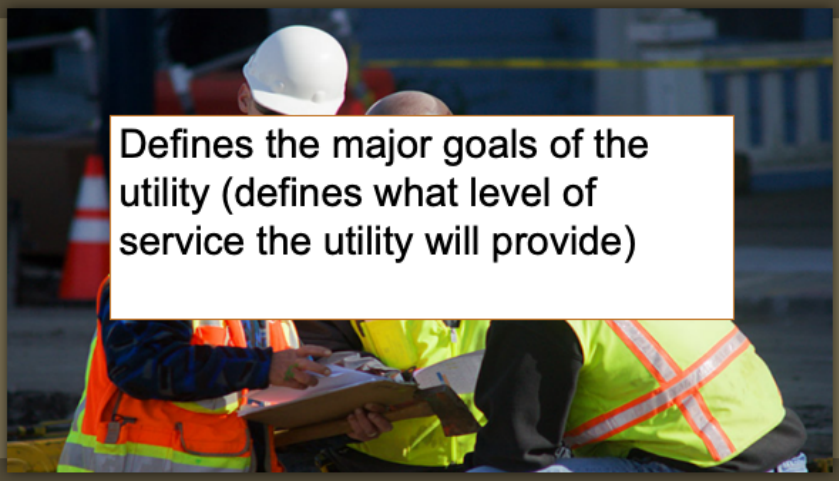
Consider how the inventory can or could tie to other programs in the utility or larger community (HR, Spare Parts, Work Orders, Billing….)

LEVEL OF SERVICE

WATER UTILITIES ARE FIRST AND FOREMOST CUSTOMER SERVICE BUSINESSES

SO IT'S ALL ABOUT THE CUSTOMERS

CUSTOMER SERVICE IN ASSET MANAGEMENT TERMS



CALLED LEVEL OF SERVICE

Customer Service is an opportunity to have a conversation with customers in order to match customer needs/desires related to water with the amount they are willing to pay.

When customers have a say in what they want, they are more willing to pay for it.

Customers can also gain an understanding of how service and cost are related and why costs go up over time

In general,
higher levels of service = higher costs
lower levels of service = lower costs

although, not every service level may follow this pattern.

It is important to select goals for the system regarding how the utility would like the system to provide service to customers. These goals get into what you want your assets to provide for your customers and help to prioritize activities.

Goals should include SMART criteria as shown on the slide. One of the most critical components is the ability to measure your progress towards meeting the goals.

Level or Service should fit the KISS principal

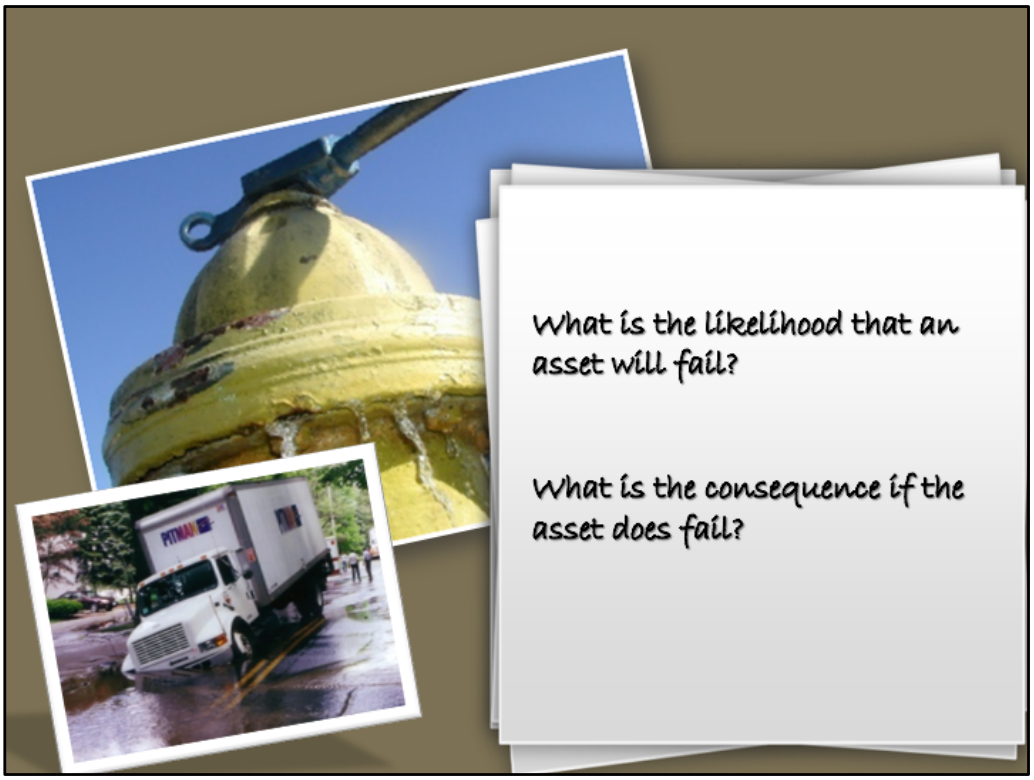
Keep it Simple and Sustainable

Does not have to be complicated
Needs to be easy to measure, report, interpret
Must be something you will be able to do year after year

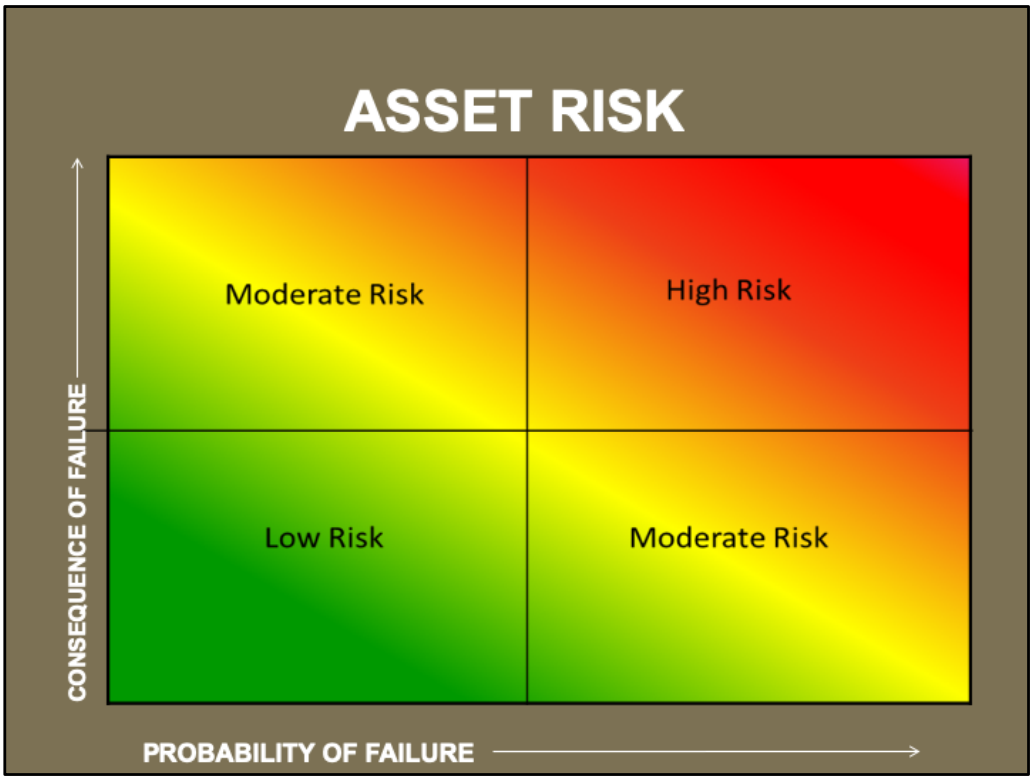
Having goals and measuring them sets up a discussion regarding what to do if the goals are met or if they are not met. If the goals are not met, the reasons for not meeting the goals can be discussed and resources or changes can be made to help meet the goals.

Key is: must meet what customers want and match what they are willing to pay for

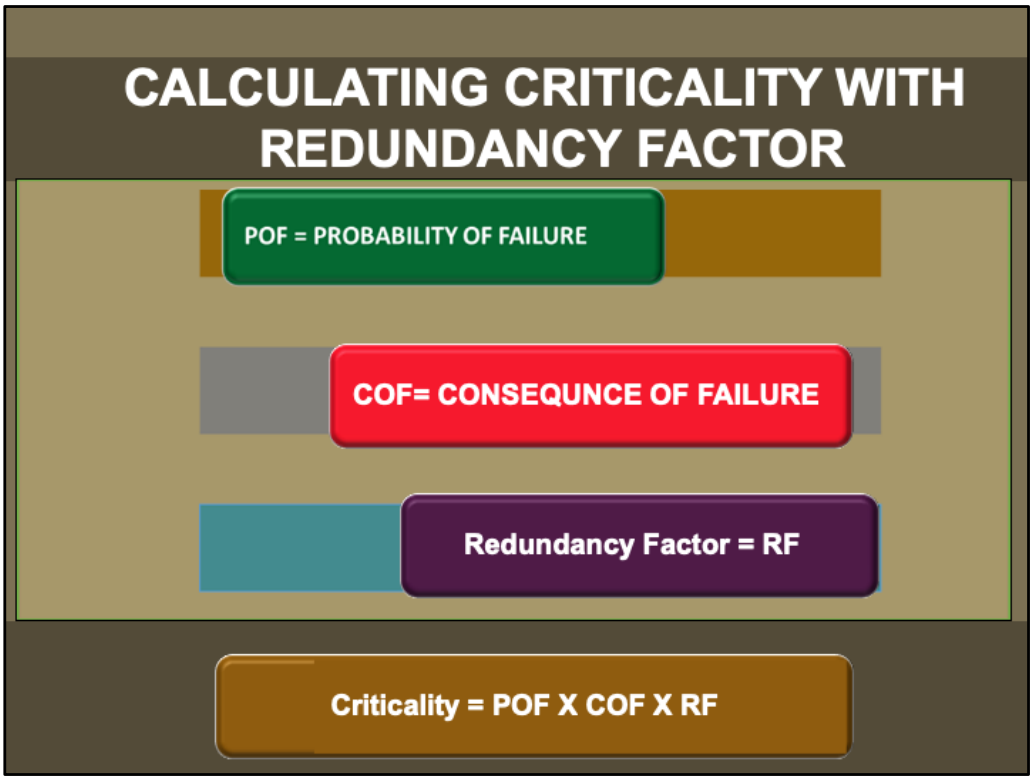
CRITICALITY



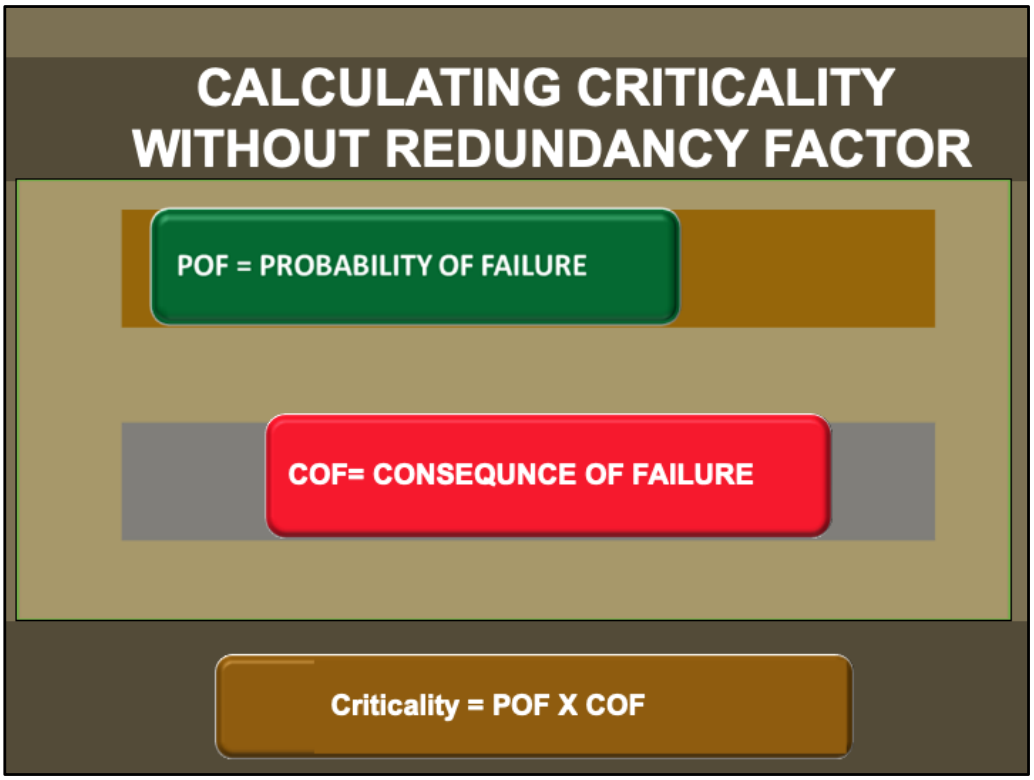
Not all assets are equal in importance to the utility. Some are very important to operations and some are not. As an example, a small water or wastewater pipe that serves a few houses is not as important to a utility as a single pump that supplies the entire water system. If the single pump fails the whole town is out of water. It's important for each utility to determine what its critical assets are. The two components of criticality are the likelihood that a given asset will fail and the consequences if the asset does fail. The types of considerations that go into the determination of likelihood of failure are ways in which an asset fails, the condition of the assets, age of the assets, repair history, historical knowledge, and operation and maintenance history. The second component is the consequence of the failure. The components of consequences include cost of repair, social impacts or costs associated with the failure, costs related to collateral damage, legal costs, environmental costs, reductions in level of service, and any other costs or impacts associated with failure. One way to reduce the consequences is through redundancy. If there are redundant assets, if one asset fails another one is there to fill in. In this manner, the consequences are reduced because the failure of one of the assets will not cause a problem. As an example, there are three pumps available and only 2 are needed to meet the demand. If one pump fails, the standby pump will start so the demand will still be met.



The risk can be plotted on a chart such as this one where high risk assets are in the upper right quadrant and low risk assets are in the lower left corner. It is easy to see visually that the higher risk the asset is, the more the utility needs to address that asset (whether that is O&M, repair, replacement, or rehabilitation.). If the assets are not addressed, there is the risk that bad consequences will occur. It should also be understood that addressing high risk assets improves the overall riskiness of the utility but addressing assets in the low risk box does not.



Criticality is calculated by multiplying the probability of failure by the consequence of failure and the redundancy factor. A redundancy factor (a number between 0 and 1) can be used to reduce the risk of assets with redundancy. However, this factor can be incorporated within the consequence of failure in which case the Redundancy factor is eliminated and the criticality is just POF X COF as shown on the next slide.



Criticality is calculated by multiplying the probability of failure by the consequence of failure. In this case, redundancy is included in consequence portion of the equation.


WAYS TO REDUCE RISK
Routine & Preventative Maintenance
Redundancy
Spare Parts
Specialized Training
Replace Assets Early
Monitoring

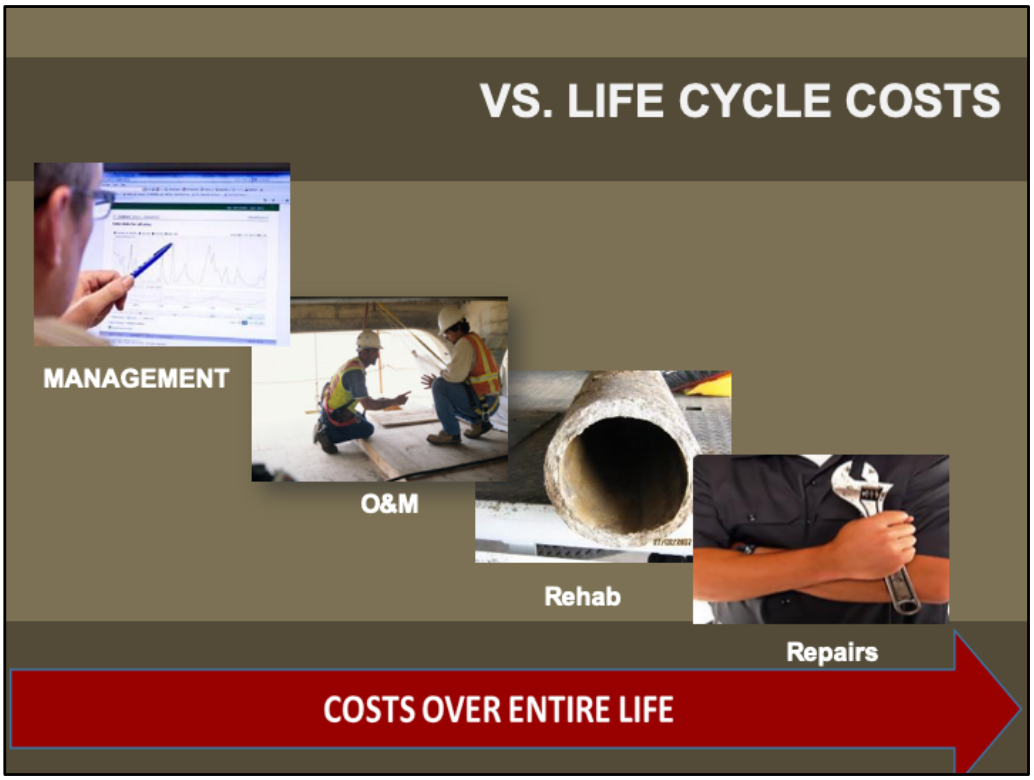
CRITICALITY CHANGES

- ✓ CRITICALITY IS NOT STATIC
- ✓ EACH DAY CRITICALITY CHANGES SLIGHTLY
- ✓ NEED TO REASSESS CRITICALITY AT LEAST EVERY YEAR IF NOT SOONER
- ✓ REASSESS WHEN MAJOR CHANGES ARE MADE (UPGRADES, REPLACEMENTS, MAJOR CONSTRUCTION, REHABILITATION, REDUNDANCY ADDED)

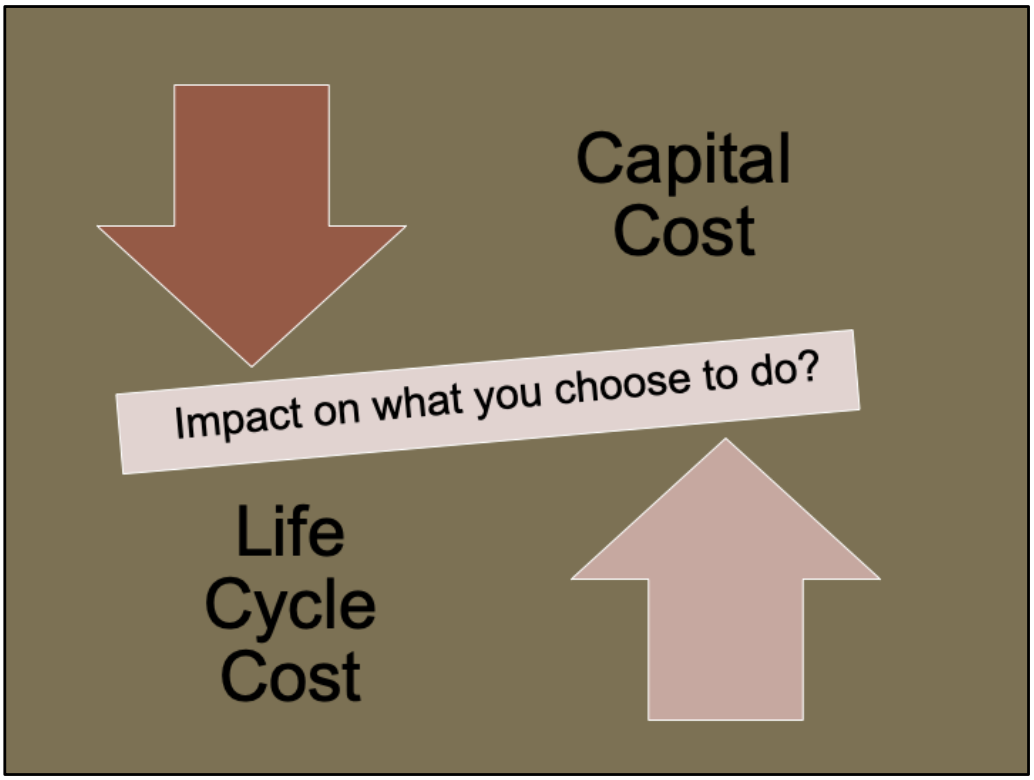
Life Cycle Costing

CAPITAL COSTS ONLY

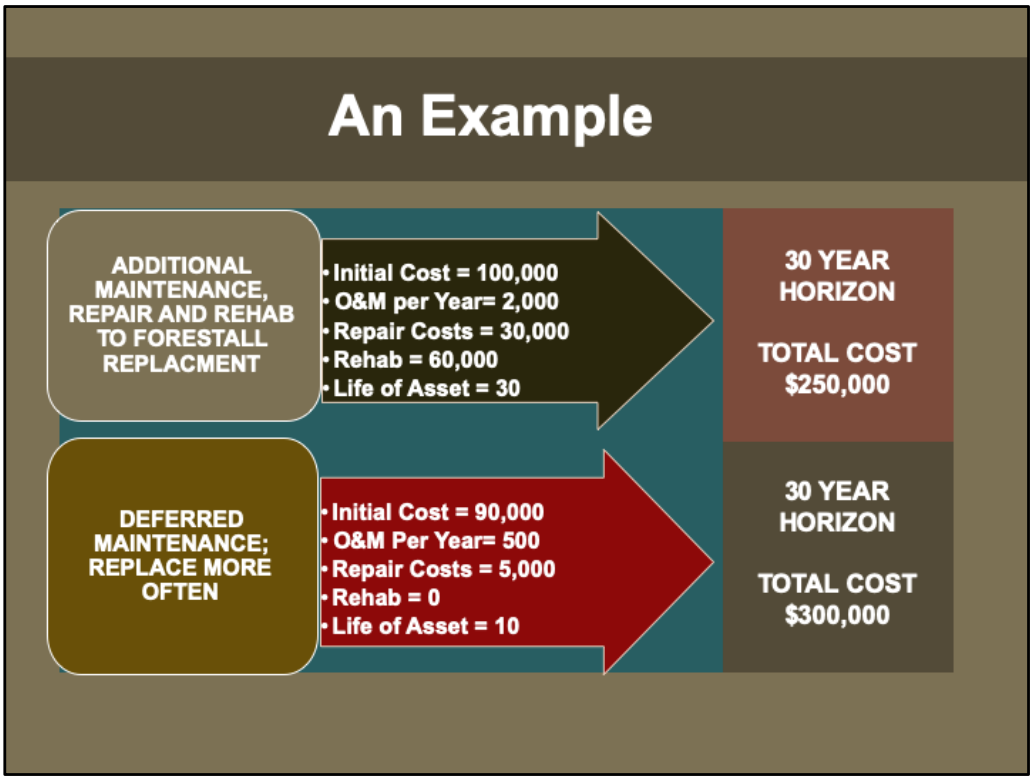
Many projects only consider the capital costs.



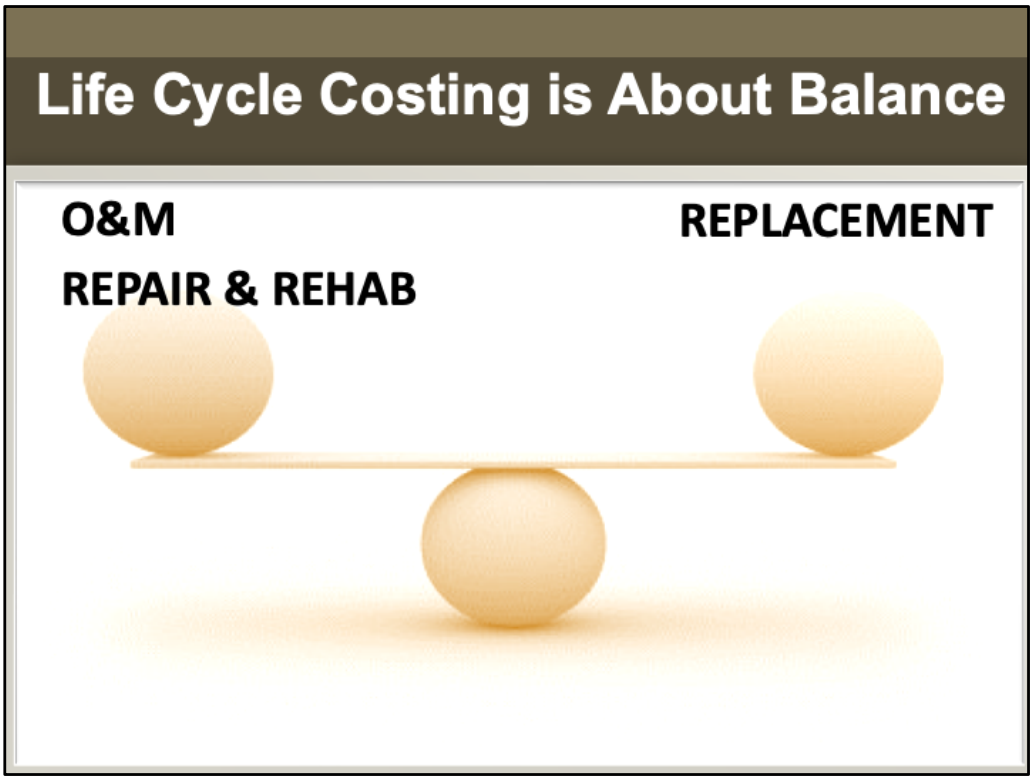
It is important to consider the entire life cycle of costs so that decisions are made using the full life cost not just capital costs.



Looking at capital costs vs. life cycle costs does have an impact on what you choose to do.



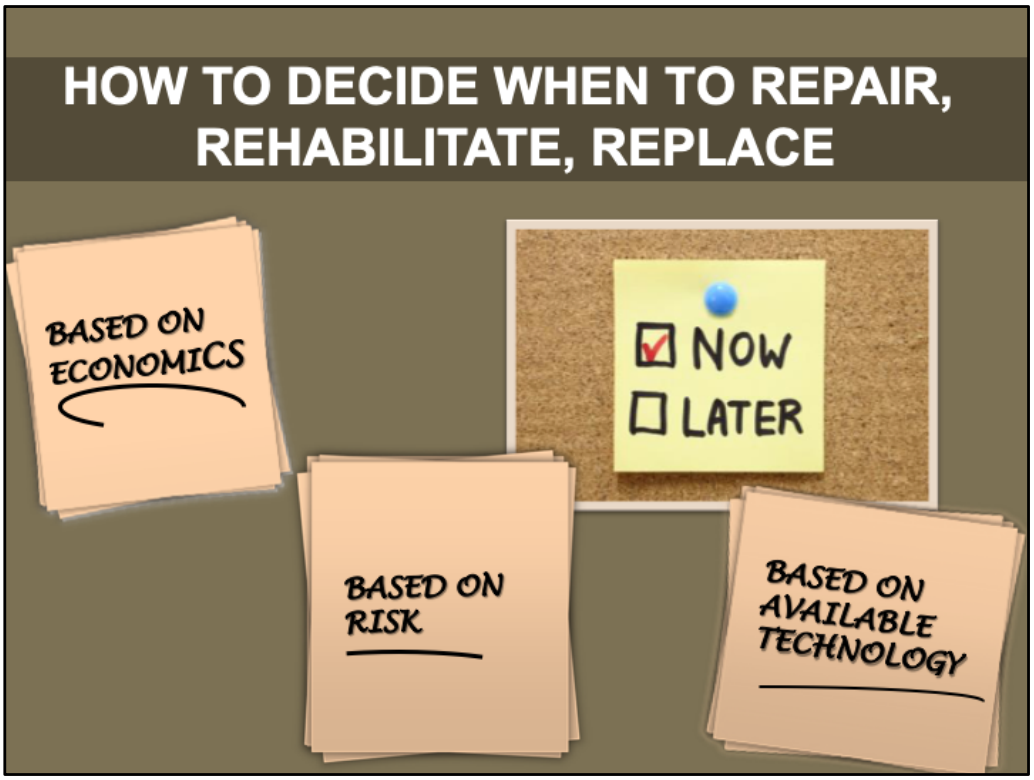
While the capital cost of the bottom option is cheaper, the overall cost (life cycle cost) of the top option is cheaper over a 30 year time horizon. The 30 year time horizon is the life of the top asset.



These two activities are related. If we do more of one we can do less of the other. Typically replacement if more expensive, but we want to make sure we aren't over maintaining, or replacing too often.

Routine – changing oil - the stuff we do on a day to day basis to keep the assets operating smoothly.
Preventative – changing a packing gland, taking a pump apart and cleaning it out - what we do to try to intervene before an asset fails
Predictive – try to predict when an asset will fail, some type of technology that can investigate an asset. Examples include: vibration analysis, thermal analysis, use of technology to look inside a pipe or determine pipe thickness. Helps make an educated guess about when an asset might fail.
Maintenance gets cut out of the budget, which changes you to a reactive operation and you are going to be doing more replacements instead of maintenance which will be more expensive overall.

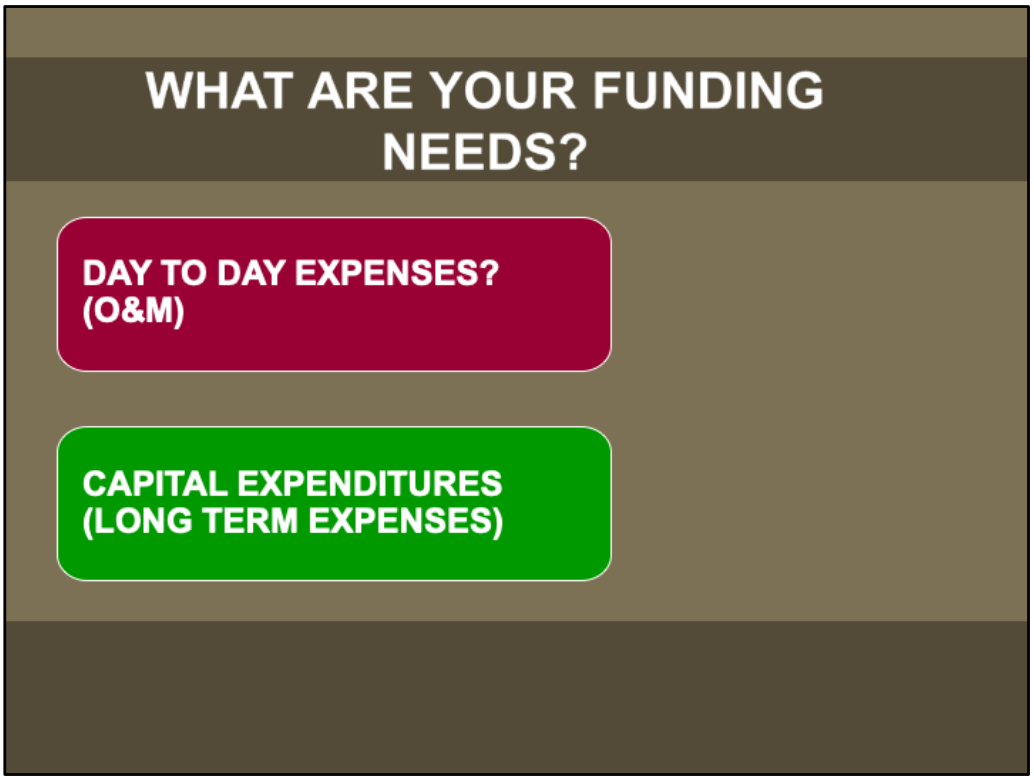
When an asset fails, you have the option of repairing it, replacing it, or rehabilitating it. That decision is based on many factors, some of which are shown on the next slide.

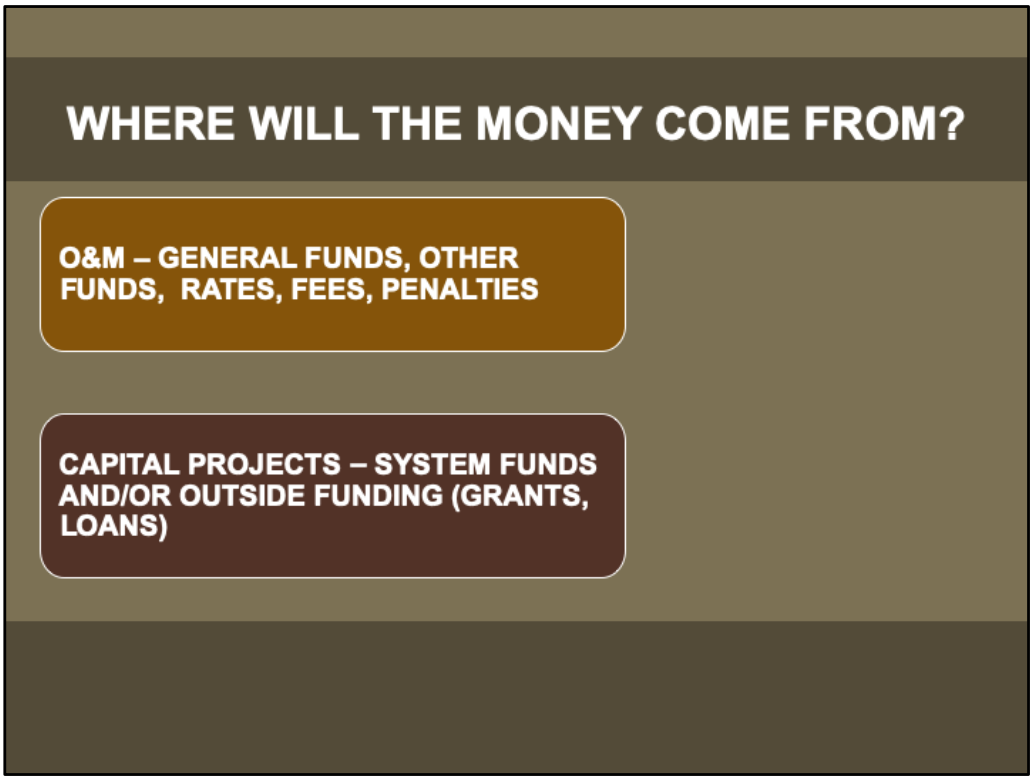


The cost of the three options is part of the decision-making on what to do. It also matters what the risk of the asset is. If the risk is higher, it might be better to replace, if the risk is lower, it might be better to repair. It also matters what technologies are available for repair, rehabilitation and replacement. Sometimes there aren't options for one of these things which changes the decision-making.

Sometimes called the Business Case Evaluation
Potential large dollar savings if capital projects are examined
Provides the ability to dig deeper into the proposed projects and ensure they are the right ones at the right time prior to spending the money
Is the Project needed at all?
Is it needed now?
Is there an alternative you could use that would be cheaper over the long term?
Could you use O&M practices to forestall the replacement for a while?
What is the risk of not doing the project?
What is the benefit of doing it?
How does the risk and benefit related to this project compare to other projects within the system?

Long Term Funding Strategies


WHAT ARE YOUR FUNDING NEEDS?
DAY TO DAY EXPENSES? (O&M)
CAPITAL EXPENDITURES (LONG TERM EXPENSES)



Funding is needed for the general day to day operations of the plant and for capital expenditures related to rehabilitation or replacement of the assets. The funding for day to day operations is considered internal funding. This type of funding will come from the consumers in the form of customer rates, fees, taxes or similar. The funding for capital can be internal or external funding. Generally, it is external funding in the form of grants, loans, special funds, bonds, or similar. With the exception of grants, the utility will ultimately need to repay the external funds through utility rates.


Develop your funding story
Based on data and information

WHY DO YOU NEED THE FUNDING? WHAT IS THE BENEFIT?

WHAT IS THE RISK IF YOU DON'T GET THE MONEY? NEED SPECIFICS

CONTACT US IF YOU WANT HELP IN AM

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