

GAS DISTRIBUTION FACILITIES DECISION MAKING, DISCUSSING AN ASSET MANAGEMENT APPROACH

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Introduction

In today's environment, utility companies are faced with restructuring business operations due to deregulation, continued merger and acquisition activity, increased competition, and growing pressures to increase shareholder value. In order to be successful, there will be a requirement to optimize the efficiency of all assets, equipment and people, in order to increase shareholder value.

One way to improve the quality of managing and decision making in rehabilitation or maintenance, is to implement effective asset management practices to extend infrastructure service life.

In the Gas Industry we often hear the term "asset management" used as an equivalent to, and as a substitute for, prioritization of main replacement. Asset management is much more than a replacement ranking mechanism; it is a whole discipline of managing the property that gas companies own. In this paper I would like to discuss the approach that asset management brings to a local gas distribution company (LDC).

Background

The effort to rehabilitate and repair the gas industry's infrastructure using innovative materials and processes can be supported by asset management strategies as key to the effective repair and renewal of the existing infrastructure.

The Water and Sewer Industries have, by necessity, already established asset management systems, particularly in Canada, Europe and Australia. An article recently documented that, as part of a Municipal Investment Planning Project by National Research Council in Canada, that: 44% of respondents were unaware of suggested levels of maintenance investment, 70% spend less than the suggested levels of maintenance investment and 31% of respondents could not identify how much maintenance they defer by improvements. (Trenchless Technology, December 2004, p. 62: "InfraGuide: A Strategic Perspective on Asset Management"; Siu and Schlepers). In the gas industry we may find similar trends: how many managers know the O&M cost per mile of cast iron?, per mile of steel mains?, per service?. It is only by knowing these and other parameters of the assets in the ground that we can make informed decisions on repair or replace.

Asset management is a broad and complex subject. The responsible manager must be concerned with establishing and maintaining an inventory of facilities (mains, services, regulator stations, gate stations and so on, could even include vehicles and equipment) and determining whether assets are performing satisfactorily, while considering the risks associated with making a decision that proves unfavorable under some future conditions. These concerns are faced at strategic levels by senior management and at the day-to-day operations level by "hands-on" managers and workers.

Asset management is a key "tool" in the search for economies and operating efficiencies. It includes replacement construction as well as maintenance. Many times in the Gas Industry, it has been easier to obtain approval for capital improvements, than it is to get preventative maintenance budgets. As a result, operators have occasionally had to postpone discretionary maintenance programs. With the appropriate information and planning process, confidence in the asset management process will allow for better allocation of all funding resources.

The challenge

Infrastructure replacement, capital investment for growth, maintenance of facilities, and increased revenue benchmarks, all compete for investment. The ability to implement an optimized investment policy requires detailed plans for future development. There is a substantial cost associated with establishing and maintaining systems to obtain and manipulate data on the condition and needs of an extensive and often buried, utility network infrastructure. Even when such data is available, it is difficult to determine the best way to analyze it to establish an optimal expenditure allocation plan.

Many companies recognize that an integrated asset management approach can reduce costs and improve performance, but they are tentative on the implementation of such an approach. A large amount of capital and operational costs can be attributed to internal processes such as procurement and the poor utilization of asset knowledge. The acquisition of new business is often a primary concern even at the risk of neglecting more appropriate investment in existing infrastructure or improving business processes and internal efficiencies.

What is an Asset Management System?

An Asset Management System is a data management and decision making tool that allows managers to make repair/replace decisions, identify maintenance needs (preventative rather than reactive), identify geographic parameters that could affect management, manpower, equipment, tools and work scheduling.

Once we know this, we must plan how such a system might be used within our own company's environment. There are significant data management issues that each individual company must fit into the strategic planning of the organization.

Application of Best Practices will be key, so a structure that allows for such measurements and implementation will be important. Based upon early data, there may be a need for different planning systems (scheduling, work management), workforce design, use of contractors, material management, and design of work delivery (paperless, dispatch electronically, integrated systems, etc) so we must be prepared to address this. Moreover, the system should be established with embedded performance measures that can come from a combination of Industry benchmarks, local regulatory requirements and goals of the organization.

Decision making on repair/replace may include such factors as present value of future maintenance, land use planning for the different parts of a city, expected remaining life of a facility, and potential growth in throughput of a system. Expected remaining life is a significant topic by itself that could not be given justice in a discussion within this paper. Suffice it to say that although property records may assume a 40 year life, and if we ask gas Operations and Engineering personnel what they consider the life of gas mains, they may typically estimate around 50 years, an examination of gas facilities in service will show that many established utilities are operating mains that are well beyond that 50 year benchmark.

This is the dilemma; we agree that a proactive program is required; we agree that high priority mains and services need to be identified - the question is what can we reliably use to predict the useful life of facilities and then institute appropriate maintenance and rehabilitation/replacement as part of an asset management program?

Data for a system such as this must identify deteriorating conditions, quantify the deterioration of the facilities, describe the functional characteristics, provide the basis for economic assessment and engineering analysis, and measure the performance of the system. Data should thus be available to describe:

- Inventory features (what is the asset, materials, etc.)
- Conditions of the elements
- Location information (spatial coordinates, descriptions, etc.)
- Hazardous situations (condition based or geometry based)
- Benefits of the asset (what does it enable?)
- Value of the asset

Benefits (pro's)

- Holistic approach to documenting the state of the facilities being used.
- Ability to assess specific operating and capital costs, by type.
- Ability to document remaining life expectancy of facility.
- Allows an assessment of management costs of operating facilities.
- Allows benchmarking across a company.
- Allows a full repair versus replace decision making.
- Supports other company functions, rate cases, depreciation property records.

Some Con's

- Requires buy-in from all levels of management from the top.
- May need capital investment in information systems.
- May need more training and analytical skills from managers.

Some questions and answers in order to understand asset management

- What are gas infrastructure assets and how do we know they are being productively used?

“Gas Infrastructure assets” have several common characteristics:
First, they represent a substantial investment i.e., they are costly to establish.
Second, they endure for a long time, i.e., they are expected to have long service lives;
Third, they are expected to produce continuing benefits, and require continuing costs for operations and maintenance in addition to the initial costs of their establishing.

- What are requirements for asset management?

In order to manage assets, decision support systems are required. Plainly stated an efficient data gathering and manipulation will be necessary. This might mean acquiring different data sets, establishing specific acceptable parameters for facility performance.

- How can the performance of current gas facilities be enhanced?

Historically, asset management personnel and associated decision support systems have not considered the effects of cumulative actions when making current decisions. For instance, what is the cumulative effect of a parameter on the condition, operation, capacity, and remaining service life of a facility? Cumulative effects have not been considered, due either to a lack of understanding of the physical process or inadequate data availability. Complexity in modeling the physical phenomenon or difficulties in acquiring the necessary data are compounded by existing business processes that typically do not recognize the consideration of such external effects on asset performance.

Technology managers have concluded that significant advancements could be made through the incorporation of advanced technologies developed through other industries, such as the defense industry, and academic research.

Many of these technologies have been applied in other industries, and research could be employed to examine application within infrastructure asset management. Examples include:

- ◆ The use of parallel computing technology and dynamic simulation for asset management decision support.
- ◆ The application of sensors for the non-destructive evaluation of infrastructure components (imbedded sensors and/or remote sensing technologies).
- ◆ The use of GIS and GPS tools.
- ◆ Alternative delivery methods (design/build, design/build/maintain).

➤ What are gas facilities really worth and how are they valued for decision making?

Gas managers agreed that valuation of infrastructure assets is inherently uncertain. There is no market in which value can be directly determined through transactions between willing buyers and sellers. The estimation of value depends unavoidably on the perspectives of those who are making the estimation. However, the purpose of establishing infrastructure asset values is to support decisions about allocation of resources, and for this purpose it is possible to establish meaningful values.

There has been agreement, however, that such models and their supporting information (e.g., deterioration curves) are not by themselves adequate to improve infrastructure management. The underlying concept of infrastructure asset management for some people is that the net benefits of infrastructure over the long-term are positive and infrastructure should be managed to maximize those net benefits. For others, however, infrastructure represents primarily a liability, a long-term stream of future costs that must be paid to secure certain essential services; the goal of management is to minimize these costs. These two concepts can lead to very different management strategies.

➤ How do strategic issues of technology, economic structure and public expectations influence infrastructure asset management?

It is critical to consider how we forecast and deploy new technology. Looking back at the evolution of transportation and other technologies in this country it appears that innovation works almost on a logarithmic scale. Therefore, we should expect that opportunities for deployment of new technology today will have a very short lead, say five years. From an asset management standpoint, this means we may be looking for technology to help us with solving near term problems even though our ability to forecast specific breakthroughs is not exact at this time. The following are some of the key strategic issues that could affect receptivity towards innovative asset management strategies.

- ◆ Narrow focus of asset management in the U.S.
- ◆ Rise of “low growth” or “smart growth” movements
- ◆ Outdated budgeting practices
- ◆ Fractured responsibilities

➤ What specific software and other tools are available to improve infrastructure asset management?

Software and tools are dependent upon effective data management systems. Managers may consider difficulties faced when attempting to implement new data management technologies to be overwhelming. It is frequently difficult to change the current paradigm. Furthermore, when implementing data management techniques, such as large, multi-user relational databases or data warehouses, specialized knowledge is often required to manage and administer the systems.

The currently available systems provide multiple capabilities, including but not limited to the following:

- Develop optimal maintenance, repair, and rehabilitation policies.
- Identify high priority system improvement projects and quantify the costs and benefits of performing these projects.
- Quantify the impact of any deficiencies for the users of the system.
- Determine long- and short-term budget requirements for improvement and replacement activities, and provide an assessment of the benefits of funding these activities.
- Provide performance measures for management of programs.
- Predict future conditions based on planned activities.
- Maintain data and provide search and query ability.

Some current providers of software are listed in Appendix 1.

- Where do we go from here?

It is only in the last few years that asset management approaches have been taken seriously and applied by utility managers as tools for effective infrastructure management. It is no longer acceptable to look at the initial cost of construction apart from the inevitable operation and maintenance costs. Asset management approaches offer practical insights as to how best to make the tradeoffs when considering all operational alternatives.

Conclusions

Asset management promises to be an opportunity to focus on the mission of organizations recognizing constrained resources, and the need for efficient operations. Most importantly, asset management allows managers to support decision making and the need for those resources.

APPENDIX 1

Asset Management Software/Service Providers
(a sampling, not an all-inclusive list)

Accenture
161 North Clark Street
Chicago, Illinois 60601
T: 312 737-8842
F: 312 693-0507
accenture.direct@accenture.com
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TAG (The Asset Group)
380 Interlocken Crescent, Suite 700
Broomfield, Colorado 80021
T: 303 439-2700
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www.mwhglobal.com

Davies Consulting Inc
Miki Deric
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