

Strategic scenario analysis of long-term asset management planning

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Abstract

Evides Waterbedrijf (Evides) has prepared a long term asset management plan (LTAP) for the 30 year to 2045 in relation to pending investments and future developments. Compilation of an LTAP is in the interests of both consumers and shareholders. Insights from the LTAP, as deduced from asset management practices, can be challenged against strategic decisions for the future. In addition, the LTAP can be used to predict long-term financial and technical resourcing requirements, as well as the resulting price for consumers and dividend for shareholders.

In this paper the process of setting up an LTAP model based on individual asset replacement at the end of their technical lives is described.

The investment plan allows for sufficient possibilities to shuffle investments suitably in relation to risk, without affecting the consumer price directly. Shareholder interests are best served by investing when technically required while spreading investment over time.

Key words: asset management, financial planning, strategic planning

INTRODUCTION

Evides Waterbedrijf (Evides), a public water supply company, supplies potable water to 2.5 million consumers in the southern part of Zuid-Holland Province, as well as Zeeland and the Brabantse Wal, in the Netherlands – see [Figure 1](#). The company is owned by local municipalities and provinces. In addition, its commercial subsidiary Evides Industry Water offers all-in services to the chemical, petrochemical and food industries, and the energy sector, in the Netherlands, Belgium and Germany. The industrial activities include several demineralized water facilities, as well as wastewater treatment plants and city heat projects.

Asset management processes have been implemented to attain a more systematic and transparent overview of maintenance and related costs, in relation to performance risk. Information on assets has been collected and standardized for several years, to enable performance analysis of plant and infrastructure versus maintenance. This has led to standardization of the main maintenance procedures, which resulted in lower, occasionally higher, costs, while improving plant performance and reducing risk.

As part of the annual business cycle, an asset management investment plan is made for the next five years. Insights from the implementation of asset management, however, made it possible to set up long-term investment planning for thirty years ahead for Evides' asset base.

In this study, several investment strategies were transposed to the long-term investment plan to assess the effect on financial planning, shareholders' rate of return, the price of drinking water, and the resulting resourcing and technical risks.

Drinking water in the metropolitan area around Rotterdam is supplied by large surface water treatment plants abstracting from the River Meuse (80%). The more rural areas, which experience extreme



Figure 1 | Dutch water supply companies.

holiday peak demand, are supplied from local groundwater or via long trunk mains. Drinking water is produced at ten treatment plants see [Figure 2](#) and distributed via 13,000 km of pipelines.

Asset management implementation

Asset management can be used to achieve a balance between performance, risks and costs, while providing the service required. Depending on the goals, the asset management focus can be on, say, improving performance, reducing risk, or managing costs, while balancing the other parameters.

Evides started applying asset management in 2010 to attain systematic and transparent insight into asset maintenance. It was also a desire to use asset management for long-term decision-making, e.g., whether to continue maintaining an asset or renovate it. Other anticipated advantages of implementing asset management were improved risk management, focused investment planning, and a more predictable return on investment for shareholders.

When the implementation of asset management began, it required the definition of an organization model, description of asset management roles, and development of key performance indicators. In the model used three roles are distinguished: asset owner, asset manager, and service providers – see [Figure 3](#).

The Asset Owner indicates the organization's strategic goals and the framework of its risk appetite. The Asset Manager uses the framework to identify installation risks and required

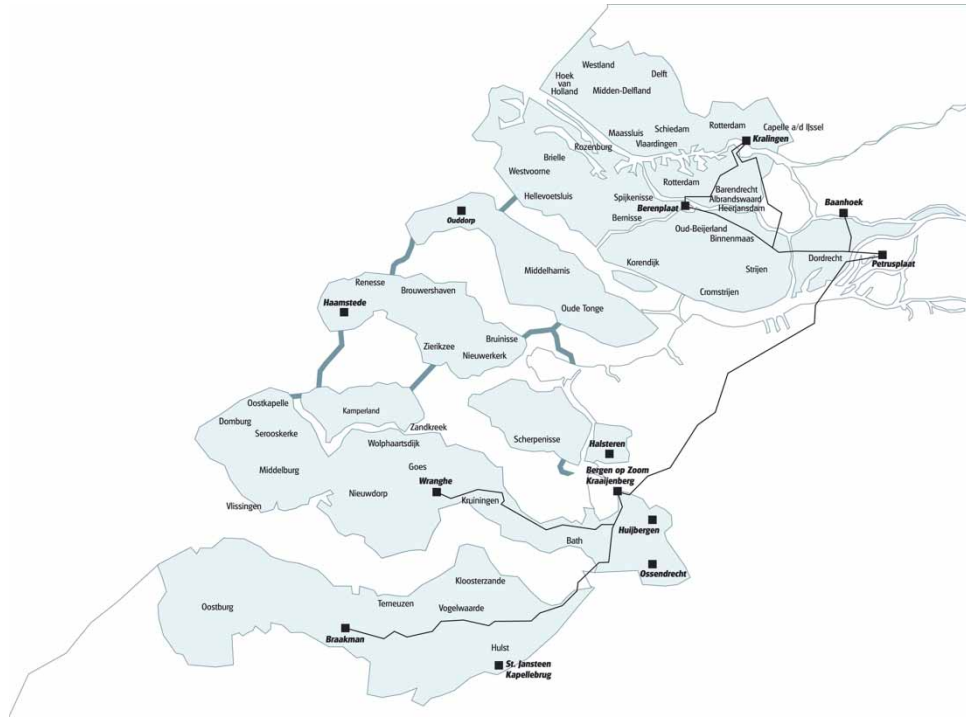


Figure 2 | Main water treatment plants operated by Evides.

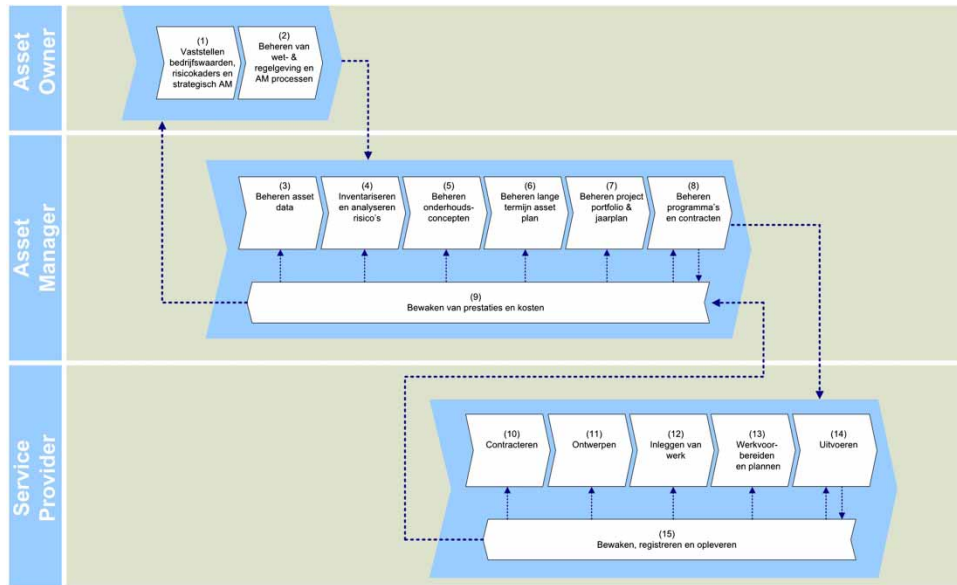


Figure 3 | Asset Management model, showing three main roles: asset owner, asset manager, service provider.

measures. The Service Provider uses knowledge and experience of the system while performing maintenance, etc.

Information on asset condition and maintenance was collected and standardized over several years. It was used to analyze plant performance versus maintenance activities, leading to maintenance procedure standardization. Sometimes this yielded lower costs, sometimes higher, but the risk was more acceptable.

METHODS AND FINDINGS

Every year a 5-year asset management plan is made for Evides. Insights gained from implementing asset management in 2013, made it possible to set up a process for long-term investment planning.

The first version of the long-term asset management plan (LTAP) was based on direct replacement of all current assets at the end of their technical lives. The underlying assumption implies that site production systems and sub-surface infrastructure do not change over time, and assets are replaced when technically written off. In the second version of the LTAP the figures were more accurate as condition assessments were made of current asset state and actual investments required. The data also became more reliable as more specialists became involved in cost modeling – see Figure 4.

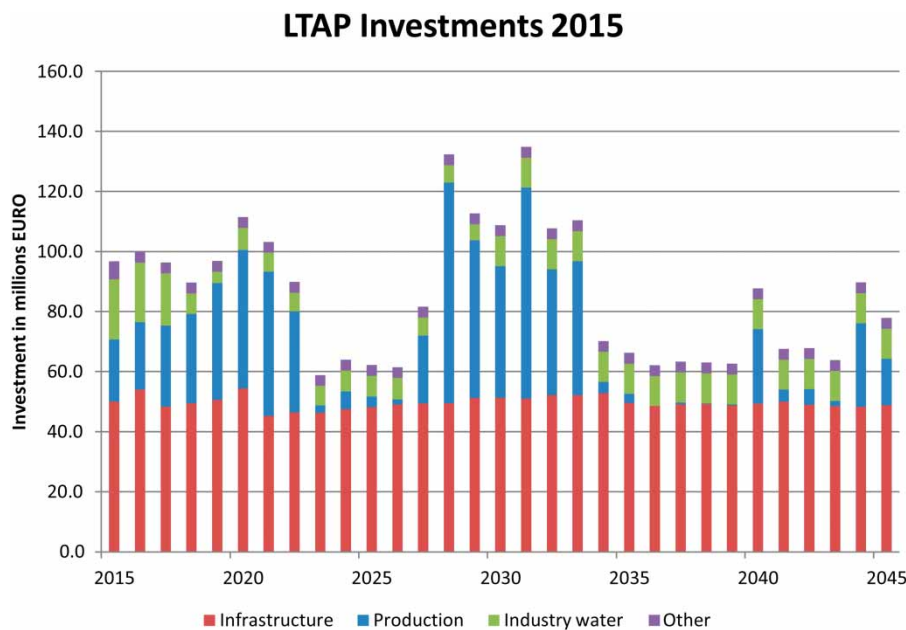


Figure 4 | Base version of long-term investment plan for the period 2015–2045.

The graph in Figure 4 shows a steady flow of infrastructure projects foreseen for the future. The production facility replacements cause several investment peaks during the period modeled.

A further advantage of long-term asset management planning is that, when larger investments are foreseen far enough ahead, financial, technical, and resourcing preparations can be made, as well as communications to all stakeholders.

Using the investment plan's base version, strategic planning investment options can be translated into variations of the long-term investment plan, and each sub-plan assessed regarding its effect on financial requirements, book value, depreciation and the weighted average cost of capital (WACC) for shareholders, as well as the related water price.

The relationship between the parameters used in the calculation are shown in a Causal Loop Diagram (CLD), see Figure 5. A major CLD characteristic is that several closed loops reinforce each other while bringing (dis)balance into the system.

1. **Technical replacement** of all assets at the ends of their lives (base version). In a hypothetical exercise, the assumptions on which the long-term investment plan was based were varied in four scenarios to evaluate the effect of business strategy on investments over time, thus:
2. **Life time extension** of assets by dedicated (additional) maintenance and delayed replacement

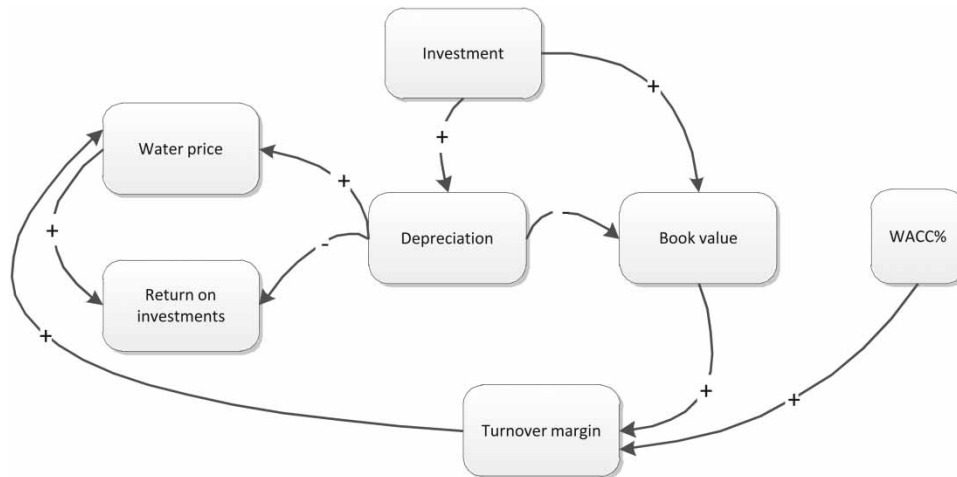


Figure 5 | CLD investment model.

3. Focus on **predictable and stable financial planning** resulting in controlled, phased replacement of assets
4. **Prioritized increased investments** due to specific focus to client requirements

To model the future water prices and rates of return on investments several assumptions were made, including:

- drinking water demand does not change substantially;
- WACC is regulated for water supply companies in the Netherlands and the permissible level will fall from the current 6% to 4% in future;
- cost inflation is excluded;
- interaction between Evides Waterbedrijf (public water supply) and Evides Industry Water (commercial subsidiary) is simplified.

All four scenarios were iterated to determine the stable drinking water price at which the rate of return can be maximized within the permissible WACC, given the other variables. In the same calculation, comparison of realized profits due to the fixed water price with the potential profits as a percentage of book value, indicates the potential for achieving a higher rate of return for shareholders and a variable water price. Lastly, it is easy to determine, for each scenario, the (minimal) drinking water price that would give no return on investments.

RESULTS AND DISCUSSION

Comparison of the scenarios shows several things:

- when asset lifetime is extended by increasing dedicated maintenance while maintaining the same risk level, total annual investment decreases, leading to both a lower water cost and a lower rate of return on investments;
- if the necessary investments are spread evenly in time, this leads to a lower rate of return on investments because of the gradual increase in book value depreciation of the company;
- the company's operating results can be optimized if the price is varied through time. In the Netherlands the water supply companies tend to maintain fixed water prices for efficiency reasons and because it is perceived as confirming their reliability.

In addition several questions regarding long-term asset planning can be discussed.

Are the planned investments in line with company goals?

The original LTAP is based on one-on-one replacement of current assets at the end of their technical lives, to secure reliability of supply. Other reasons to invest, like changes in the supply source, developments in technology and/or legislation, or water quality requirements were not included. The model, as defined, is thus a simplified version of reality.

For a water supply company, investments directly related to reliability of supply and water quality will always be prioritized. Analysis of the four scenarios confirmed that investments related to risk reduction related to other drivers can often be put off by improved maintenance, while contributing to more predictable financial and resource planning.

Shareholders are interested in investing in a company's assets and maintaining that company's book value, to allow for sufficient turnover margin. Allowing for a stable rate of return while servicing the technical replacement requirements is a balancing act. Stable company performance also relies on other drivers like reliability of supply, water quality, legislation, safety, and client appreciation.

Investments in the LTAP should be in line with the risks and risk appetite of the company. Evides has been developing its planning process to ensure that investment focuses on reducing risks in both the short- and long-term.

The opportunity to prioritize investments strategically over longer periods should be used to smooth them over time and to address technical risks in a balanced manner.

Does the LTAP change if the company changes its asset management policy?

At Evides the asset management policy includes criteria such as:

1. Preventative maintenance and replacement is applied for critical components. This makes it relatively easy to predict the workload, as well as related costs and risks.
2. For all other components replacement is initiated when disruptions due to failure become unacceptable. Investment can be delayed and asset life extended for a part of this group by intensifying maintenance. Evides does not yet apply dedicated maintenance structurally in order to extend the lifetimes of specific assets.

Currently, the LTAP includes only capital investments, maintenance costs are not optimized versus investments at this level. A case by case evaluation is made within company departments by applying life-cycle costing, including capital and operating expenditure over the asset's life-time.

How does the LTAP change when the strategic asset management is changed?

One of the purposes of an LTAP is to forecast the required investments at a strategic level. As drinking water is produced at large plants, asset replacement has a large impact on investment development over time. In practice large-scale plants are expected to be replaced gradually over time, reducing the financial stretch and allowing for adequate resourcing.

In an internal research program scenarios are investigated for the future. External developments in demography, society, economics and technology will affect the drinking water requirements that need to be met. A related question is whether the current setup of large-scale production plants, large trunk mains and reticulation networks is future proof? While investigating this, the options for transition to an alternative infrastructure can be explored, by adjusting the LTAP and calculating the effect of the change on net present value. The measures considered are augmented depreciation of current assets, selected additional investment or modular replacement, and transition to smaller scale plants.

CONCLUSIONS

The alignment of strategic options for the future with a long-term investment plan can be presented. The long-term investment plan was analyzed for four scenarios for its effect on the company's book value, the related water price and the turnover margin for stakeholders. Thus, the effect of strategic choices and technical implementation could be related to financial foresight, making it possible to plan ahead for major investments and communicate plans to stakeholders.

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