Strategic long term planning of asset investments in distribution networks using the ASP tool

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ABSTRACT

This paper describes the ASP tool (Asset Strategy Planning) and the importance of trustable and reliable data from various departments within the company. The ASP tool is using a platform from British telecommunications plc called BT Business Simulation Framework.

This is a long-term planning and simulation tool for the evaluation of different asset strategies and their impact on business.
Assets with different ages are structured according to asset types and geography then assigned with investment, maintenance-costs and error statistics.
By altering the levels of investment for the simulations we get a better control over network conditions and cost picture. We get a possibility to simulate how various efforts in maintenance and / or investments affect the asset stock status, SAIDI and the cost picture for longer periods.

ASP also provides more transparent communications in the organization when it comes to the consequences that the various budget options will give by both short and long term. It is possible to speak a shared language between technology department, maintenance department, facility owners, finance department etc. In the end, we get decision support with clear and common rules for prioritization of budgetary resources between different regions of the organization.
Strategic decisions based on "gut feelings" are a thing of the past and changed to long-term and sustainable strategies.
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INTRODUCTION

ASP is now a commercial software developed by Entellgenio in Germany.
Vattenfall Europe Distribution bought the tool in 2006 and implemented it for the networks in Berlin and Hamburg. In Sweden, we started a pilot project 2009.
ASP is used to optimize new investments and maintenance strategies for local and regional network. It provides the opportunity to evaluate different strategies in a transparent way for the entire organisation, thus providing improved internal communication.

ASP ROLE IN THE ORGANISATION

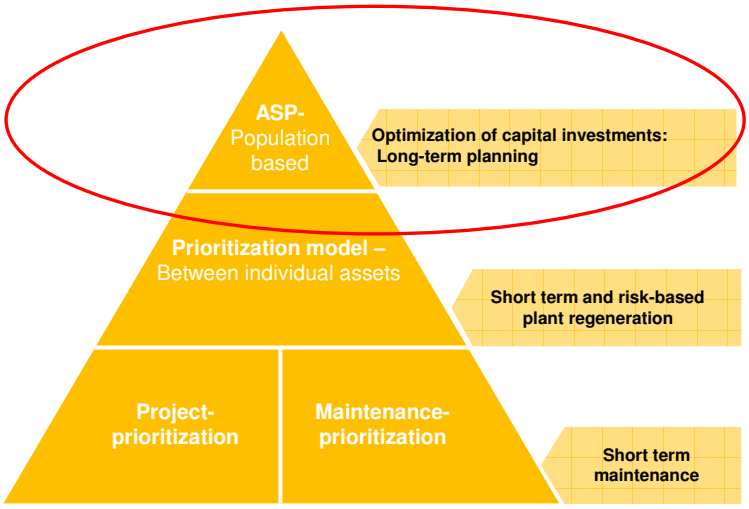

Figure 1

ASP is a long-term planning and simulation tool for the evaluation of different asset strategies and their impact on the business, Figure 1.
ASP program is used to view long-term trends based on alternative strategies. One can then look at the consequences of austerity measures or increases in investment and maintenance budget will provide for 10-20 years.
You may also check on how an asset group behave throughout their life cycle in terms of fault statistics and costs.

ASP INPUT DATA

The input data to ASP is very important and is derived from different departments within the organisation. Different key personnel are responsible for specific input data as for example. Fault statistics, number of assets and their age, budget and management decisions etc. This way we involve many people from different corners of the organisation and get a more reliably input data, Figure 2.

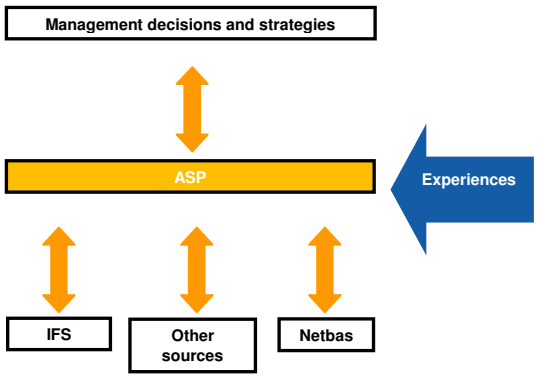

Figure 2

STRUCTURE OF ASP

The assets are divided into groups in an asset hierarchy, Figure 3. The asset "tree" is built of assets that are of importance for us and can be modified from year to year. The Life cycle phases are defined by Construction Group (A to D) Vattenfall use age as the governing parameter.
Each phase (A to D) is described with respect to:

- Maintenance costs
- Errors and interrupt statistics
- Cost of status-enhancing measures
- Cost of replacement to "better" technology / asset group

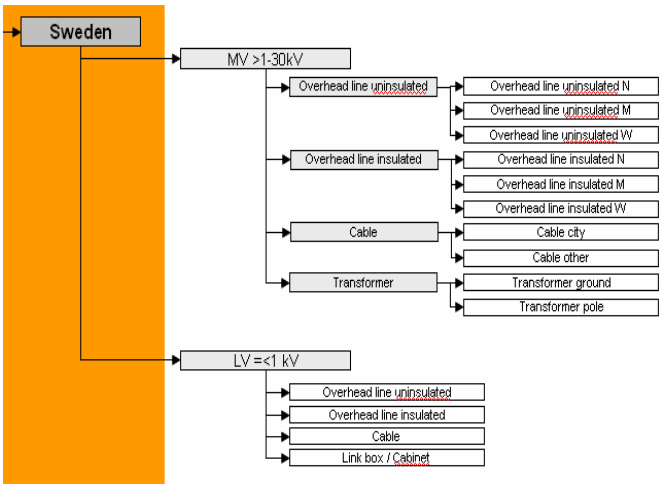

Figure 3

SIMULATION PRINCIPLE

- Asset Individuals moves through the model. When the asset ages it moves to a later life cycle phase of the ASP calculation
- Each life cycle phase has its specific characteristics (failure rate, etc)
- Based on Investment budget the assets moves also in the opposite direction. Witch means that the standard is raised in the system. (replacement, reconstruction etc.). Figure 4.

WORKFLOW EVERY YEAR

1. Define the simulated asset groups
2. Collect age distribution data
3. Define aging model
4. Collect costs for investments and maintenance, failure statistics
5. Translate and enter Investment budget
6. Simulate on a 20 year horizon

ASP ROLE IN YEARLY BUDGET CYCLE

Q1

- Evaluation of last year's operating experience compared to projected ASP results
- Update parameters based on the new fault statistics and costs of unplanned measures

Q2

- Simulate the concepts and ideas in the development of new investment budget

Q3

- Simulate the proposed capital budget and possible alternatives and consider such suggestions

Q4

- Simulate the final budget levels and include the results in decision-making

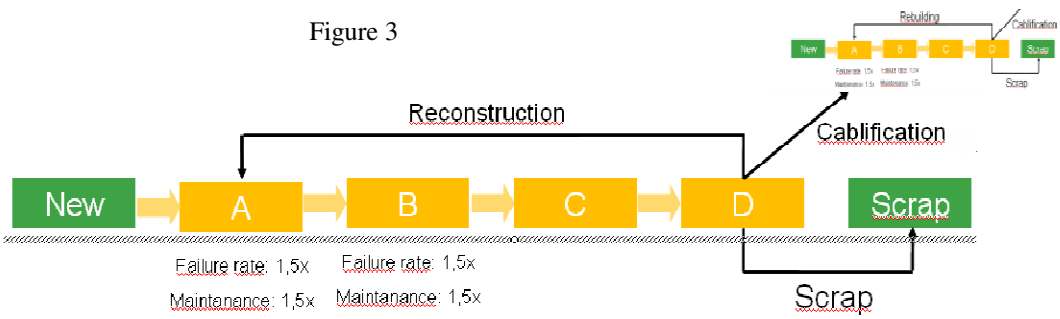

Figure 4

RESULTS FROM SIMULATIONS

From the simulations it is easy to get a report with the comparison from different strategies.
Age distribution of a specific asset or as a total. Figure 5 show a certain asset and how many there is in each state (A tot D) year 0 to year 20.

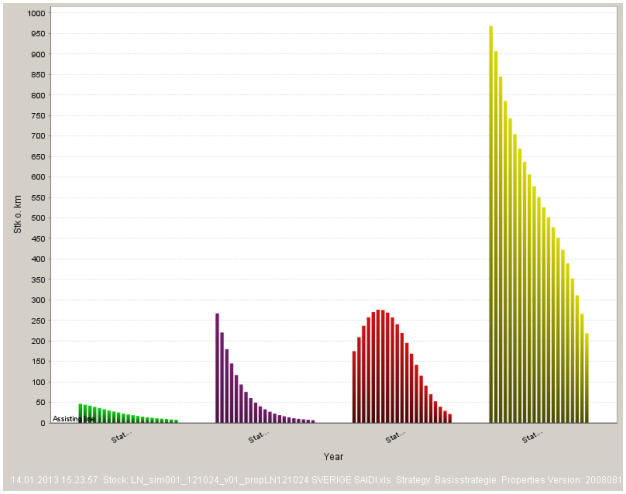

Figure 5

Comparison from different strategies

Investment costs from 3 strategies are visualized in different graphs.

- Investment costs comparison, Figure 6.
- SAIDI reduction, Figure 7.
- SAIDI due to overhead line uninsulated, Figure 8.
- Cost due to unplanned event on overhead line uninsulated, Figure 9.

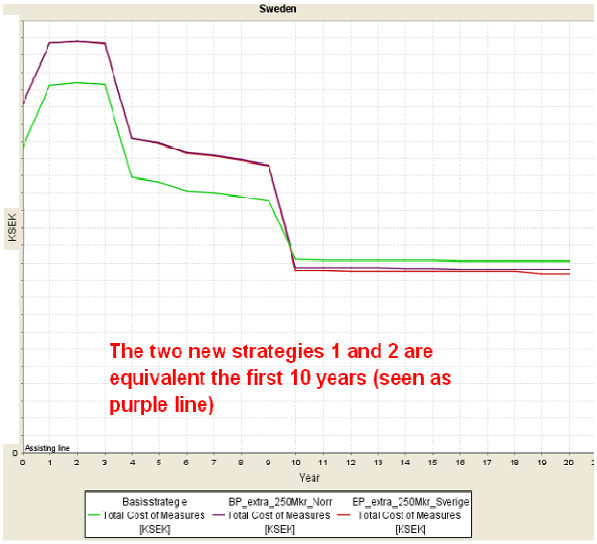

Figure 6

Figure 7

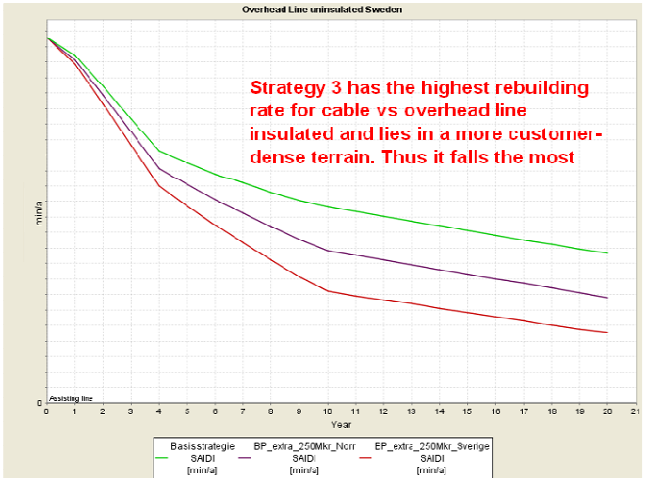

Figure 8

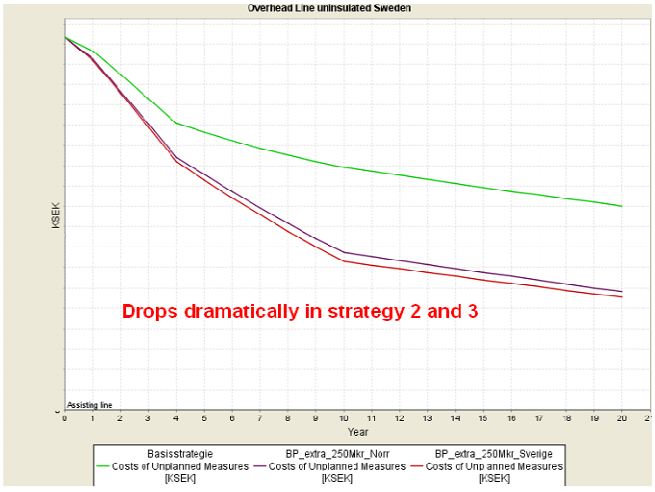

Figure 9

CONCLUSIONS

Control over network conditions and cost

Ability to simulate how different investments in maintenance and / or new investments affect the asset group/networks state (SAIDI / ESA) and the cost picture for a longer period of time.

Improved communications

ASP provides a clear picture in the organization of the consequences the different budget options provide short and long term.

Common language

Common communication tools for engineering department, maintenance department, finance department, asset owners and others.

Obvious basis for decision

Provides decision support with clear and common rules, for prioritization of the budgetary resources between different regions / areas of the organization.