ASSET MANAGEMENT SYSTEM FOR GAS TRANSMISSION

GRIDARI SUOMILAMMI, GASUM OY

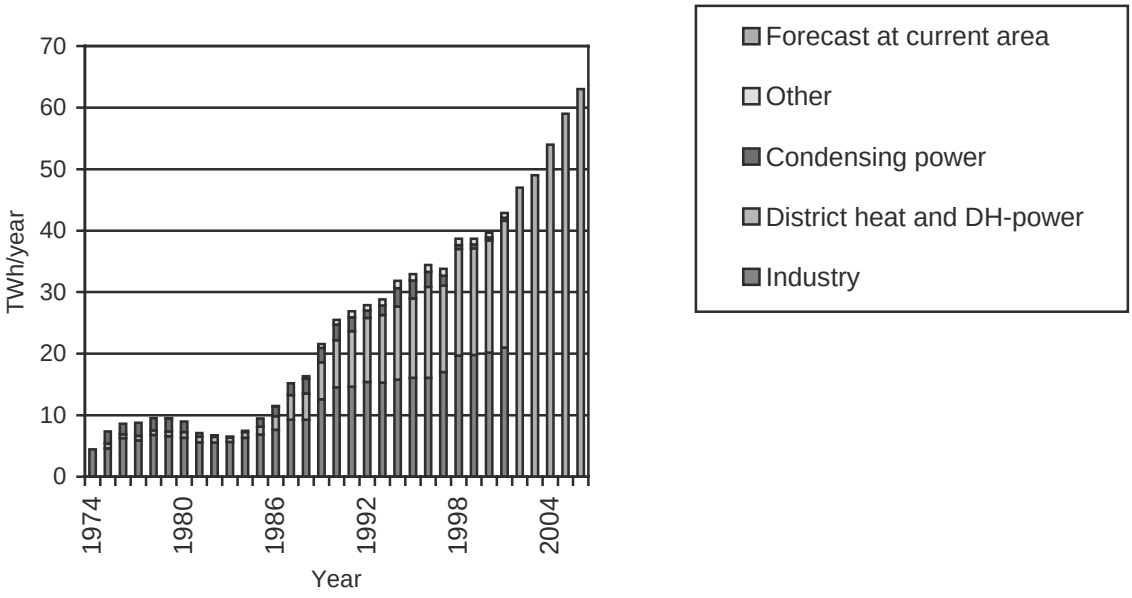
1 GENERAL

Gasum Oy is a company based in Finland and is responsible for importing natural gas, maintaining and extending the natural gas pipeline in Finland and for marketing and selling natural gas to wholesale customers such as industrial plants, energy companies and local distribution companies.

Gasum Group consists of Gasum Oy, the parent company, and its subsidiaries Helsinkikaasu Oy, Suomen Kaasuenergia Oy, Helsingin Kaupunkikaasu Oy and Gas Exchange Ltd (Kaasupörssi Oy). These subsidiaries are mainly related to the gas equipment sales and service, gas distribution network operations and construction, gas sales to customers like for small industrial plants and domestic use. Gas Exchange Ltd is for secondary gas trading.

Gasum Group turnover in year 2001 was 587 million €, operating profit was 45 million €. The share of the parent company of the group turnover was 99 %. Number of employees of Gasum Group in 2001 was 180, from which about 150 was in the parent company.

The history of Gasum starts from year 1971 when the contract to supply natural gas to Finland was undersigned by the governments of Soviet Union and Finland. Neste Oy, a Finnish oil, gas and chemical industry company, was nominated to be the company taking care of the gas transmission network construction, operation and maintenance as well as the sales and marketing of natural gas. The first cubic meter of natural gas was imported to Finland in 1974, when the gas network was some hundreds of kilometers long and ended at the Kymi river, near the town Kouvola in south eastern part of Finland. During the second energy crisis in early 1980s the gas consumption was declining due high gas price caused by linkages to oil price. Nevertheless, the management of the company decided to extent the gas network to Helsinki and Tampere region, two major cities in the southern part of Finland. The construction work was ready in 1985, and utilisation of gas started to increase steadily. Some additional branch lines were added to the gas transmission network later on and currently the gas transmission network covers about 1000 km of pipeline and around 200 gas delivery points. Currently gas represents 11,3% of primary energy consumption. Development of gas deliveries during the years is presented in picture 1.



Picture 1. Natural Gas consumption in Finland

In 1994 Neste Oy natural gas and related assets were transferred to a founded company, Gasum Oy, which was owned by Neste Oy (75%) and OAO Gazprom (25%). As a consequence of the merger between Imatran Voima Oy, a Finnish electricity company, and Neste Oy to form Fortum Oy, major part of Gasum was sold in 1999 in order to fulfil the EU requirements concerning the monopolistic position in energy markets. The year 2002 is Gasum's ninth year of business. The ownership structure since summer 1999 has been:

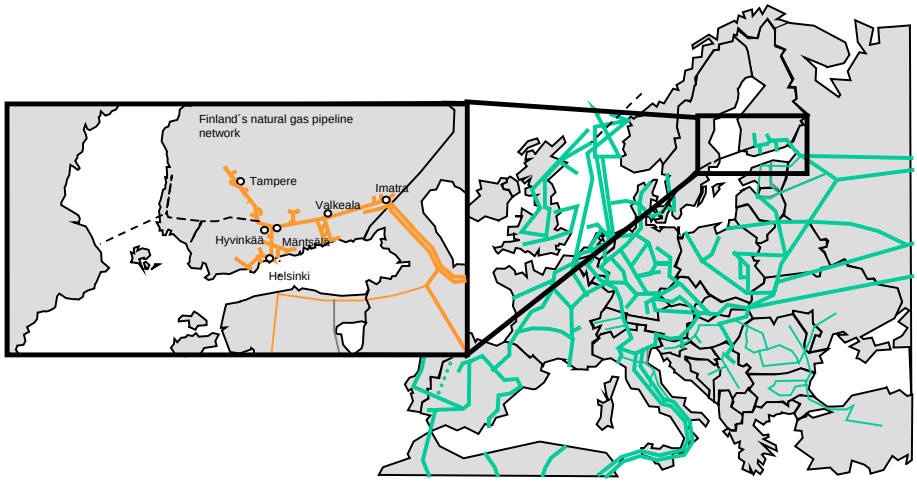
Fortum Oil and Gas Oy	25%
OAO Gazprom	25%
Finnish state	24%
Ruhrgas Energie Beteiligungs Aktiengesellschaft	20%
M-real Corporation	2%
Stora Enso Oyj	2%
UPM-Kymmene Corporation	2%

During the course of the years Gasum Oy has acquired its subsidiaries listed earlier, mainly to perform gas distribution and gas related services sales. Suomen Kaasuenergia Oy is the gas sales and distribution company for natural gas in the distribution network, and has around 35000 customers, main part of those are individual households in Helsinki. Helsinkikaasu Oy is a company who is responsible mainly for construction, maintenance and sales of gas related equipment. Helsingin Kaupunkikaasu Oy is like a holding company for the gas distribution network located in Helsinki, previously using city gas and partly originating from 19th century but converted to natural gas in 1991. Last subsidiary, Gas Exchange Ltd (Kaasupörssi Oy), was founded in 2001. The Gas Exchange Ltd is a market place on an Internet solution, where the customers can give sell and purchase offers and get all essential trading information. According to the Finnish Natural Gas Markets Act (in force since 1st August 2000), natural gas end users and distribution companies that use or sale more than 5 million cubic meters of natural gas per year have been eligible to trade on a secondary gas market as from 1st March 2001. This opening of the natural gas markets was basically the reason for founding the subsidiary to be first in the gas exchange business and utilise the gained expertise from strong and widely used information technology applications in Gasum Group.

2 PIPELINE NETWORK

Gasum's transmission pipeline is approximately 1000 km and has about 200 delivery points where the gas is filtered and heated, pressure regulated and flow measured. The transmission pressure is maintained by three compressor stations located in Imatra, Valkeala and Mäntsälä.

All Gasum's compressor stations are unmanned and they are remotely monitored and controlled with DCS-system from Valkeala dispatching centre. Compressor units and stations were built in several stages, latest ones in 1997.



Picture 2. Gasum’s pipeline network

3 NEED FOR ASSET MANAGEMENT SYSTEM

Like for many other gas transmission companies in Europe, a remarkably affecting change in the business environment has been the EU natural gas directive implementation into the national legislation. This was done as the Finnish Natural Gas Markets Act (in force since 1 August 2000) in Finland.

The changes caused by the Finnish Natural Gas Markets Act were setting gas business in a completely new picture. The gas sales and gas transmission had to be separated in bookkeeping from 2001 onwards and the business had to be split in two pieces: gas sales and gas transmission. After the split, the gas transmission business is a regulated business, where profits can be at reasonable level compared to the assets and profits have to be based on real costs. In addition to real operating and maintenance costs, a development responsibility of the network causes future enlargement investments and the profits now should cover the these costs as well. All this is formed into a separate and public gas transmission tariff as the basis of the gas transmission business. The Energy Market Authority monitors this tariff and financial as well as technical performance of the company. Gas sales business remains in principle free and unregulated market. This is only partly true, because the Finnish Competition Authority is monitoring the pricing of gas to prevent the use of monopolistic position in gas sales. Subsidising of costs between the sales and transmission is prohibited.

To determine the real asset value of current property and future enlargement investments for gas transmission tariff calculation, an asset management system was developed in Gasum. The system was further enlarged to cover not only the real asset value of existing property and future investment but also to report the annual money flow for the investments and maintenance related tasks. A comparison of real asset value of existing property to the bookkeeping value was added as well.

The data from the system will be used to provide financial reporting, with the ability to consider different scenarios, and allow informed, auditable decisions to be made relating to investment and maintenance. Specifically, the system will allow Gasum to

- predict money flow;
- study the economic impact of investment proposals;
- calculate the present usage value;
- determine transportation tariffs;
- estimate future book value and future depreciation rate.

4 INPUT DATA

4.1 EXISTING PROPERTY

The existing property included in the asset management system are pipelines, valve stations, compressor stations and RM-stations etc. for which the reports will be available for all groups separately or combined as well as for individual parts. Each part or item of the gas transmission system is coded in a card, where the basic data of that part or item is given. The basic information covers the normal identification data and historical costs of the initial investments, past annual depreciation, the maintenance, major overhaul and replacement costs, the rebuild cost and annual building cost index. The rebuild cost is updated every five years and between updates, the rebuild cost is corrected to the date of the analysis according to the given annual building cost index.

In order to determine the net present value of maintenance related costs of existing property, each part or item is amended with a lifetime estimate and maintenance, major overhaul and replacement investment costs (= maintenance related costs) and timing estimates. These maintenance related costs are considered as an increase in asset and hence items to be added to the balance sheet. A minimum value and maximum value of the expected total lifetime is given and as well as the minimum & maximum annual cost and timing of the maintenance related costs as a time series format.

An additional calculation sheet is added to the system to allow the maintenance related costs time series to be calculated by using the expected annual operating hours in minimum and maximum level.

Because always there is a certain amount of annual overhead costs and other maintenance related general costs that cannot be distributed to individual items, a special card is added under the header of maintenance costs. This card will contain the history of these general costs and the future forecasts of minimum and maximum levels and timing of expected costs as a lump sum for whole pipeline system. An automatic correction of these costs is inserted to be used as an inflation level correction of the general cost level. These costs are considered as fixed operating costs and therefore are not affecting the company's balance sheet directly.

4.2 FUTURE PROPERTY

For the future investments, a scenario card system is created. This card system for different scenarios is basically a copy of existing property card system; there is a separate card created for each individual part or item of the future investments. The scenarios can be created in two levels – upper level selection for different alternative network extension levels and a sublevel of those having three different alternative investment money flows (minimum, base and maximum scenario). For each future network part or item card, the expected money flow (for investment and for maintenance) and timing is given in every of these three scenarios together with the basic identification data.

5 ANALYSIS

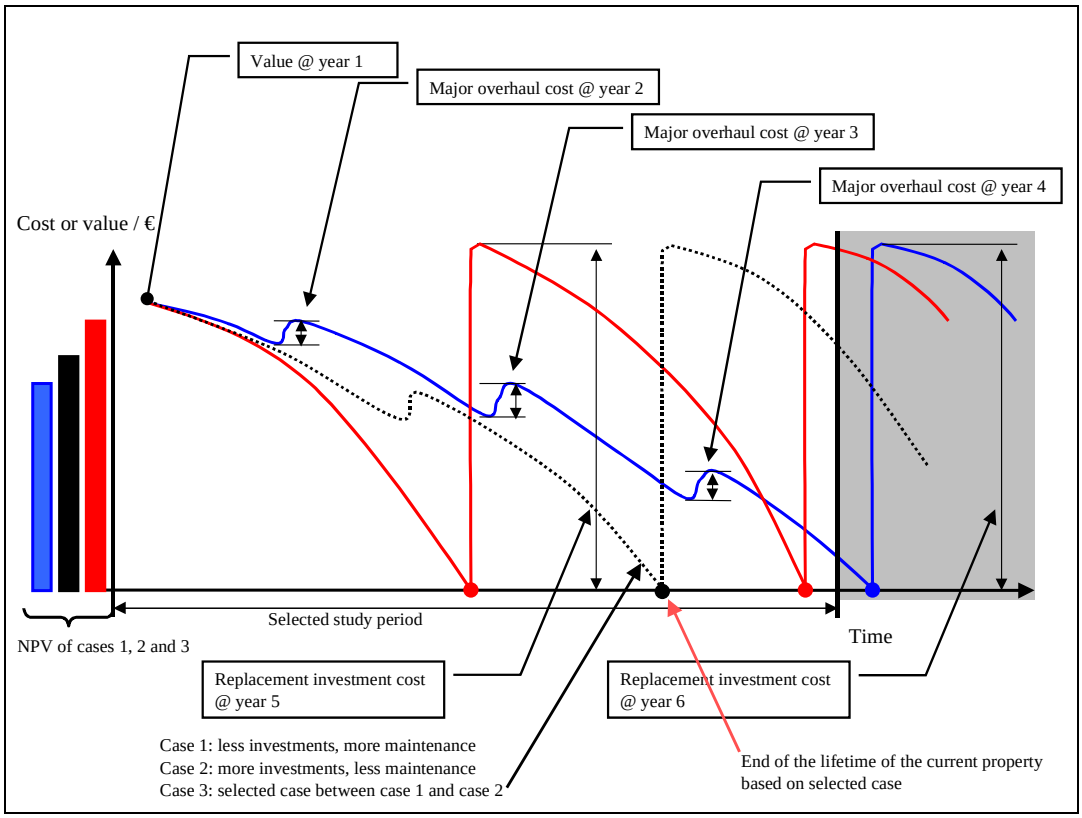
Based on the fed input data an analysis in three steps is be performed by using the system. The study period of the analysis can be set in the system parameters and as a pre-selected value, 50 years is used.

First part of the analysis is to calculate net present value (NPV) of the future money flow needed for maintaining existing assets and investing to and maintaining the future enlargement investments.

The lifetime and maintenance related costs for existing assets will be calculated based on two different maintenance philosophies: a maintenance philosophy, giving a longer lifetime (case 1 in picture 3) and a replacement philosophy (case 2 in picture 3). In the analysis the operator may freely select between the above mentioned philosophies. For some items the philosophy may be the same for both cases. When the desired philosophy has been chosen between cases 1 and 2 (i.e. case 3 in picture 3), the system shall calculate the net present value (NPV) of the future maintenance related costs for selected study period. This adjustment between case 1 and case 2 is possible for all network parts/items individually or all groups together (using the same maintenance philosophy for all).

Annual overhead costs and other maintenance related costs are given as an annual lump sum as a minimum and maximum to reflect the case 1 and case 2. This lump sum will be adjusted according to similar way; between two extremes to obtain the best estimate of future costs; and the net present value (NPV) of these costs will be calculated for the selected case 3. This annual lump sum will be handled separately in the end result of the analysis, because it is not directly related to the assets.

Future enlargement investments' NPV shall be calculated for the selected study period accordingly for each of the three given scenarios (minimum, base and maximum). These future enlargement investment scenarios shall include also the estimates of maintenance related costs. Before the analysis, an upper level scenario and one of the sub-scenarios has to be selected for analysis results.



Picture 3. First part of the analysis. NPV calculation of three maintenance philosophies.

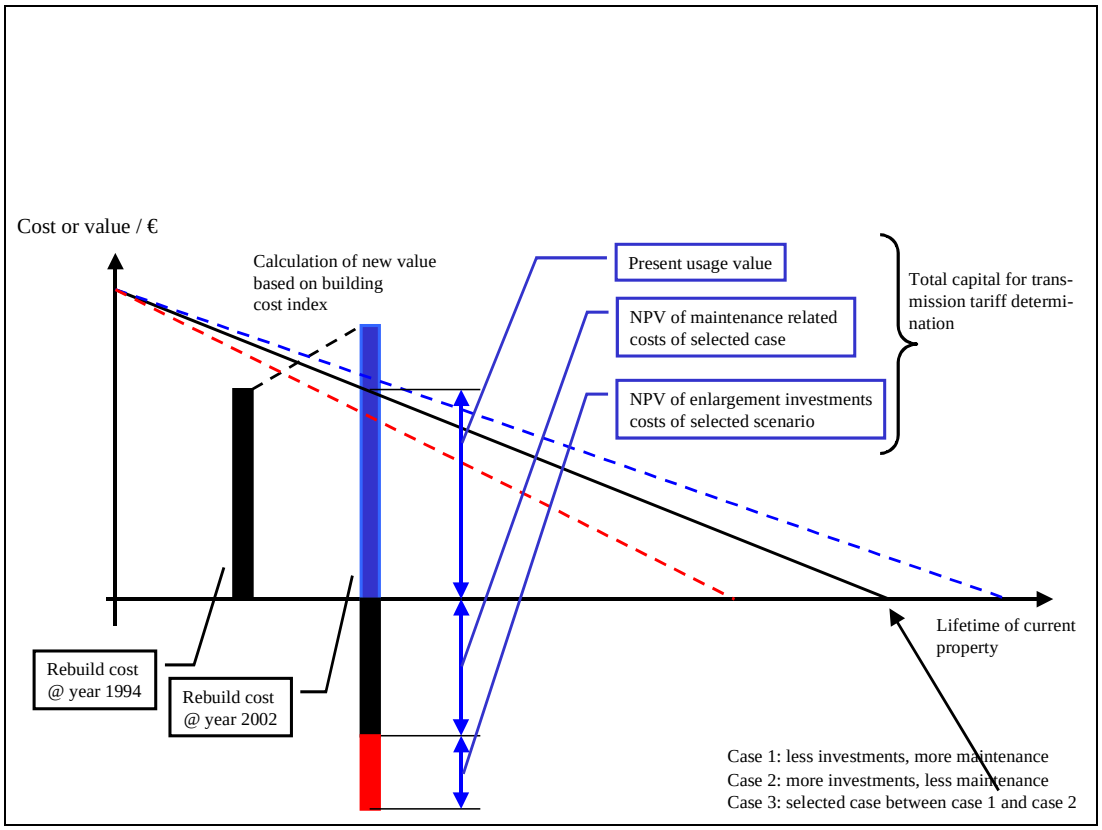
Second part of the analysis is to calculate the present usage value of existing assets together with needed future investments and annual maintenance related costs for the basis of transportation tariff determination.

The present usage value shall be determined by calculating the current rebuild cost by adjusting the given (in picture 4 year 1994) rebuild costs to current year (in picture 4 year 2002) with given building cost index change.

From the first analysis, the lifetime of the selected case 3 and the original construction year will determine the remaining part of the current year's rebuild cost for tariff determination. Marked as present usage value in picture 4. This will be calculated for all the network parts/items separately and summed up as different aggregates.

On the top of the present usage value, the NPV of selected maintenance related costs and the NPV of selected enlargement investment scenario shall be added. Total value is the capital value for the tariff determination.

It is also possible to do sensitive analysis by selecting different maintenance philosophies for different parts/items and select between different enlargement investment scenarios in order to demonstrate the impact to the asset value for tariff determination and the future money flow.



Picture 4. Second part of the analysis. Calculating the present usage value of existing property and adding the NPV of investments and maintenance related costs to it. Result is the total capital for transmission tariff determination.

Third part of the analysis is to estimate the future book value and depreciation rate. From the current book value, the future depreciation rate will be calculated based on given depreciation plan. To the current book value, the maintenance related costs shall be added (considered as major overhaul costs and thus added into the balance sheet) according to selected maintenance philosophy and enlargement investment scenario. The depreciation rates from these future assets shall be calculated according to given depreciation plan and added to the earlier depreciation rates. The result will be the past and future book value and depreciation rate.

6 REPORTS

Main reports of the asset management system are analysis reports, maintenance and investment cost reports and different asset value and depreciation rate reports. All reports are in numerical and graphical format.

Reports will include:

Analysis report, indicating 1) NPV of maintenance related costs for maintaining existing property, 2) NPV of future enlargement investments and maintenance related costs for maintaining it; 3) current usage value of existing property 4) comparison value of current usage value when using a fixed lifetime estimate and 5) NPV of annual overhead costs and other maintenance related costs. The subtotal of items 1, 2 and 3 will form the capital, which is the basis for transmission tariff determination. In picture 5, a sample of analysis report is given.

ANALYSIS REPORT

Parameters of the calculation

Date of calculation	17.01.2003 12:53:51
WACC	1,12 %
Study period	2003-2020
Selected scenario	Scenario / Minimum

First part of analysis (NPV)

Maintenance related costs of existing property		
Maintenance related costs Case-MIN	13 396 897,80 €	
Maintenance related costs Case-MAX	38 462 779,20 €	
Maintenance related costs Case-3	13 369 112,66 €	13 369 112,66 €
Investments and maintenance related costs of future property		
Scenario-related investments	1 680 639,81 €	1 680 639,81 €
Scenario-related maintenance costs	23 894,95 €	23 894,95 €

Second part of the analysis (present usage value)

Present usage value of existing property	48 257 852,78 €	48 257 852,78 €
Present usage value with fixed lifetime	39 657 859,00 €	
Total capital for transmission tariff determination		63 331 500,20 €
Annual overhead and maintenance related costs		51 422 277,47 €
Annual maintenance cost Case-MIN	55 155 612,82 €	
Annual maintenance cost Case-MAX	49 822 276,61 €	
Annual maintenance cost Case-3	51 422 277,47 €	

Picture 5. Analysis report

Annual maintenance cost money flow report, showing how much of different kind of maintenance related costs are needed annually in the future. Also the comparison between realised and forecasted maintenance related costs is reported.

Enlargement investments annual money flow report for different scenarios item by item.

Accounting reports are including the reports for annual past and future depreciation amounts, book value comparison to the current usage value and other book keeping and financing related reports.

7 STATUS

Gasum is building the system during winter 2002/2003. The basic data already exist and will be fed into this system during spring 2003. First test runs with the asset management system is expected to be made by April - May 2003.

One of the main objectives was to construct an easy system with a user friendly interface for information update and analysis purposes. One of the targets is also to have all the data in one controlled place. These objectives and targets have been the guiding force during the construction of the system.

The system has been coded by a Finnish software supplier and the system is constructed on the Microsoft® SQL Server database and using Microsoft® Excel for the reporting purposes.