

# **Summary of Master's Thesis**

on the subject of

**Water Revitalization by Example of Grander Living**

**Water Technology:**

**An Empirical Survey of Industrial Users**

completed at the

**Institute for Innovation and Environmental Management**

**of the Karl Franzens University of Graz (Austria)**

by

**Katrin Zunkovič**

**(katrin.zunkovic@gmx.net)**

**Jakoministrasse 7/13**

**8010 Graz**

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# 1. Introduction

Water is the basis of all life on Earth and the most important natural resource for humans. Economic considerations aside, this is why man constantly strives to ensure the best water quality possible. Physical and energetic water treatment systems promise to improve the quality of water, but though, according to manufacturers, these devices improve water quality, they are not water purification devices like, for example, filtration or reverse osmosis devices. Physical water treatment systems expose the water to a magnetic or electric field, whereas energetic water treatment systems transfer “positive information” to the water, thus changing the structure of water. In specialist terms, we distinguish between systems for water revitalization, water reformation and water energization which produce activated, energized, physically treated or “living” water. In this age of quantum physics, homeopathy and bioresonance it is very well possible that the revitalization of water with revitalization devices may have certain effects.

Grander® Living Water, produced with Grander® Living Water Technology, is clearly the best known revitalized water currently on the market. Grander Living Water Technology was chosen as the subject for the present thesis because far more data, information and documentation is available on Grander Living Water Technology as a method for water revitalization than on any other water treatment system. Grander Living Water Technology is currently used in private homes, industry, hotels and catering, swimming pools, agriculture and many other areas.

The present thesis focuses on and empirically assesses the application of Grander Living Water in industry. To this purpose, 32 industrial companies that use Grander Living Water Technology in a variety of industrial sectors were surveyed and the information collected was evaluated. The purpose of this survey was to assess if the application of Grander Living Water Technology in the industrial sector has positive or negative effects and consequences for the companies involved. The industrial sector, and not, for example, private homes, was chosen for this empirical survey because industrial users usually focus on economic aspects and critically and objectively check and document the costs and benefits to see if their economic expectations have been realized through Grander Living Water Technology or not. The present empirical survey on the application of Grander Living Water Technology in the industrial sector attempts to answer the following questions about the effectiveness and cost-effectiveness of and customer satisfaction with Grander Living Water Technology:

1. Does the application of Grander Living Water Technology in the industrial sector have positive effects or not?

2. Does the application of Grander Living Water Technology in the industrial sector generate economic advantages and benefits or not?

3. Are the companies that use Grander Living Water Technology satisfied with Grander Living Water Technology or not?

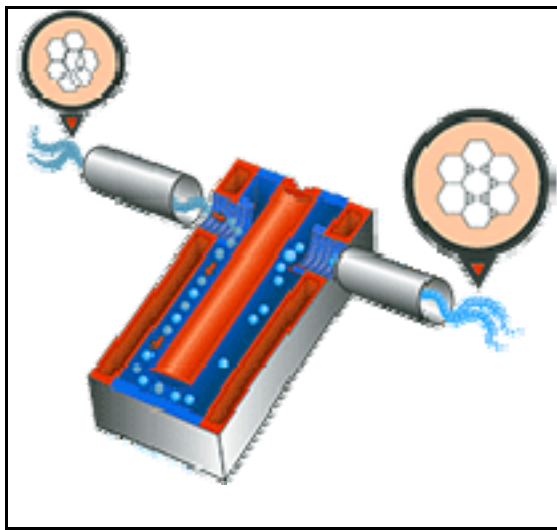
In times of fine dust, climatic change, water pollution, etc. it is also of interest to investigate the impact of the effects of Grander Living Water Technology reported by the industrial companies surveyed on certain environmental issues such as sustainability, environmental protection and water management. Therefore, this thesis also attempts to address the following question:

4. Can the application of Grander Living Water Technology in the industrial sector contribute to sustainable water management and/or to environmental protection and sustainability or not?

## **2. Basic Principles and Concepts of Grander Living Water Technology**

Due to environmental influences and flowing through pressure pipes, water loses its energy and vitality. Water revitalization according to Grander restores water's "natural defenses" and its resistance to external influences. The Grander Water Revitalization process is a technology of information transfer. To this end, "natural information" is transmitted to the water. However, nothing is added to the water, nor is anything removed from it. Grander Living Water Technology is a biotechnological method and operates without electricity or the addition of foreign substances. The water is revitalized either by devices filled with Grander Information Water which are immersed directly into the water (immersion devices) or by devices which are built into the water supply (flow-through devices). Devices for installation in the water supply are generally installed in the water main. Once inside the device, the

water is subjected to high-frequency oscillations (approx. 100,000 hertz) with the aid of magnets. In the process, the “lumpy” molecular formations in the water are being untangled. In a second step, the passing water is spun in a vortex and energized according to the principles of Victor Schauberger. In a third step, the water passes through chambers filled with Grander Information Water. There is no direct contact or exchange of information water and the water flowing through. As the water passes through the device, the oscillations of the information water are transmitted to the tap water, leading to a resonance reaction. Due to prior magnetization and spinning, the water is particularly receptive to these oscillations. This process is illustrated in Figure 1.



**Figure 1: Basic Design of a Living Water Unit<sup>1</sup>**

### **3. Procedures Used in Conducting the Survey**

Grander Living Water Technology is used all over the world. As it would have been impossible to globally survey industrial companies on their use of Grander Living Water Technology, due to restrictions in time and resources and due to language barriers etc., I decided to limit my survey to German-speaking countries (Germany, Austria, and Switzerland). To this end, 38 industrial companies were questioned about their use of Grander Living Water Technology. Of a total of 38 companies, 33 completed the questionnaire and supplied information on their use of Grander Living Water Technology. The survey period ran from October 30, 2006 to January 11, 2007.

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<sup>1</sup> Source: <http://www.grander.com/de/grandereffekt/index.php>, October 11, 2006

## **4. Results of the Total Evaluation of the Application of Grander Living Water Technology in the Industrial Sector**

### ***4.1. General Data on Industrial Companies Surveyed***

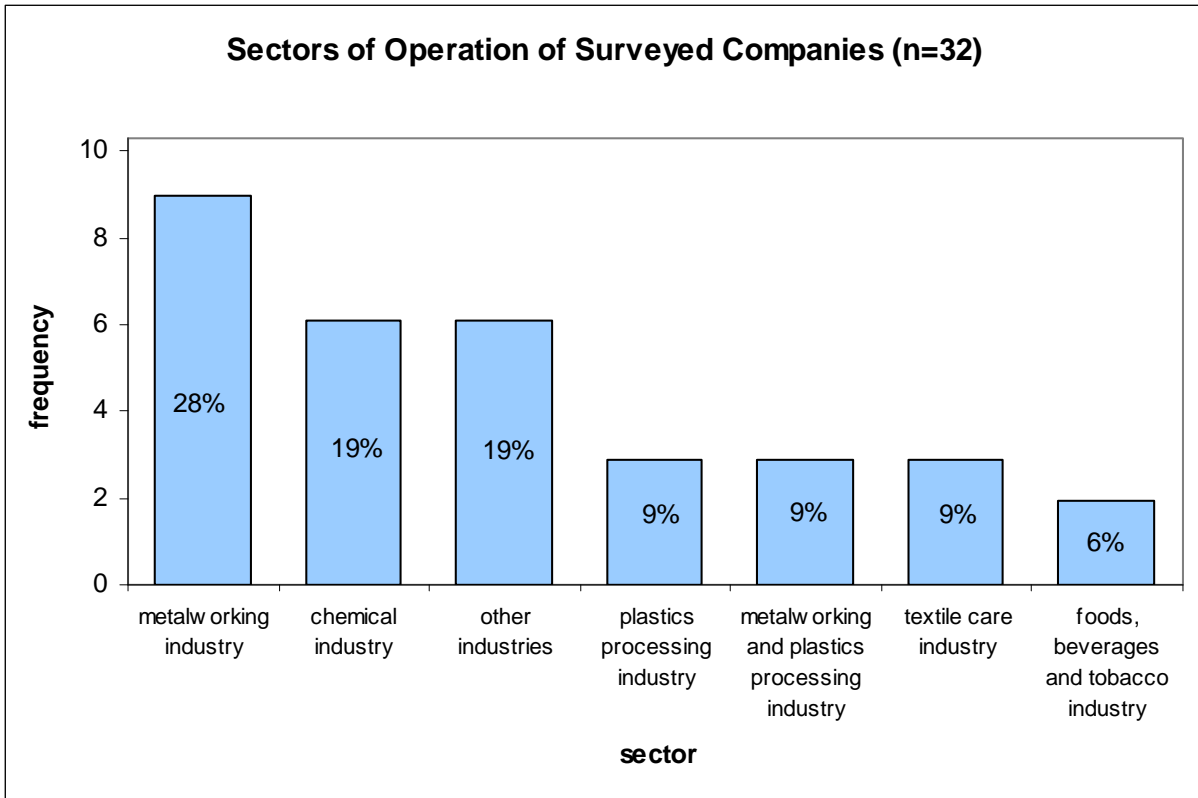
This chapter is primarily intended to provide a brief overview of the industrial companies surveyed to better evaluate the representative samples. In addition, the chapter includes information on the sectors of operation, number of employees and annual turnovers of the participating companies.

#### **4.1.1. Sectors**

All of the 32 companies surveyed provided information on the sector in which they operate (compare Figure 2). Approx. 28 percent of the industrial companies using Grander Living Water Technology belong to the metalworking industry. Thus, metalworking companies represent the largest percentage of survey respondents. Approximately 19 percent of the industrial companies surveyed operate in the chemical industry. Approximately 9 percent respectively stated that they operated in the plastics processing industry, in the metalworking and plastics processing industry or in textile care. Another 6 percent of the companies surveyed belong to the food, beverages and tobacco industry. An additional 19 percent stated that they operated in other sectors of the industry not explicitly listed in the questionnaire.

The following were each cited once:

- electrical industry
- manufacture of body care products
- dental medicine
- circuit board manufacture
- textile industry
- services

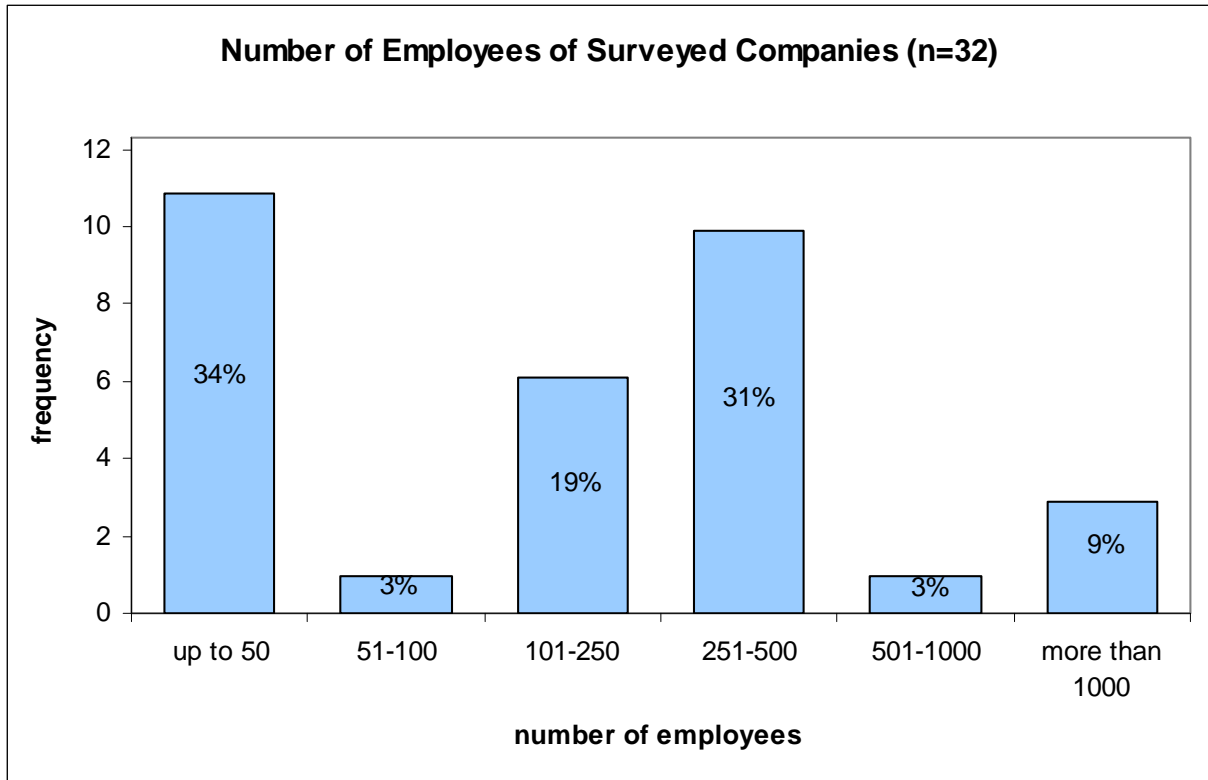


**Figure 2: Sectors of Operation of Surveyed Companies**

From the above figure, it is evident that the sectors in which Grander Living Water Technology is applied are vastly different. Thus, we can conclude that Grander Living Water Technology is and can be used in a wide variety of industrial sectors. In this survey, the application of Grander Living Water Technology in the metalworking industry was cited most frequently.

#### **4.1.2. Number of Employees**

34 percent of the companies surveyed stated that they had fewer than 50 employees. Another 31 percent have in between 251 and 500 employees and 19 percent stated that they had in between 101 and 250 employees. Thus, 88 percent of the companies surveyed have in between 1 and 500 employees. Only 12 percent of the companies surveyed have more than 500 employees. Figure 3 illustrates the number of employees of the participating companies.

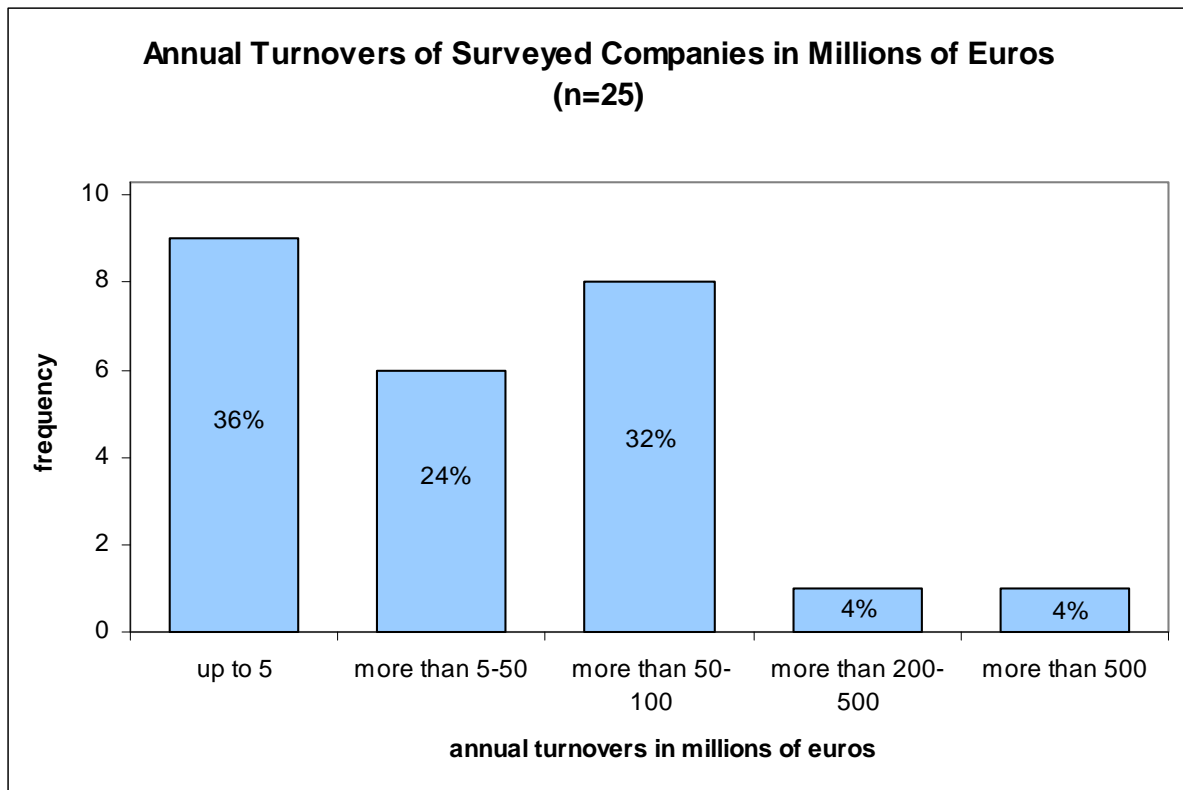


**Figure 3: Number of Employees of Surveyed Companies**

Information on the number of employees, as provided by participating companies, shows that small, medium and large companies participated in the survey. From Figure 3 it becomes apparent that Grandeur Living Water Technology is and can be used in small, medium and large companies.

#### **4.1.3. Annual Turnover**

25 of the 32 participating companies provided information on their annual turnover. 36 percent of the companies that answered this question reported an annual turnover of up to 5 million euros. 24 percent of the companies have an annual turnover of in between 5 and 50 million euros, and another 32 percent boasted of having an annual turnover of 50 to 100 million euros. Only 8 percent of the surveyed companies have an annual turnover of more than 200 million euros. Figure 4 depicts the annual turnovers of the surveyed companies.



**Figure 4: Annual Turnovers of Surveyed Companies**

Similar to the number of employees, the above figure clearly shows that the economic performance of the participating companies varies significantly, and that large, small and medium companies participated in this survey.

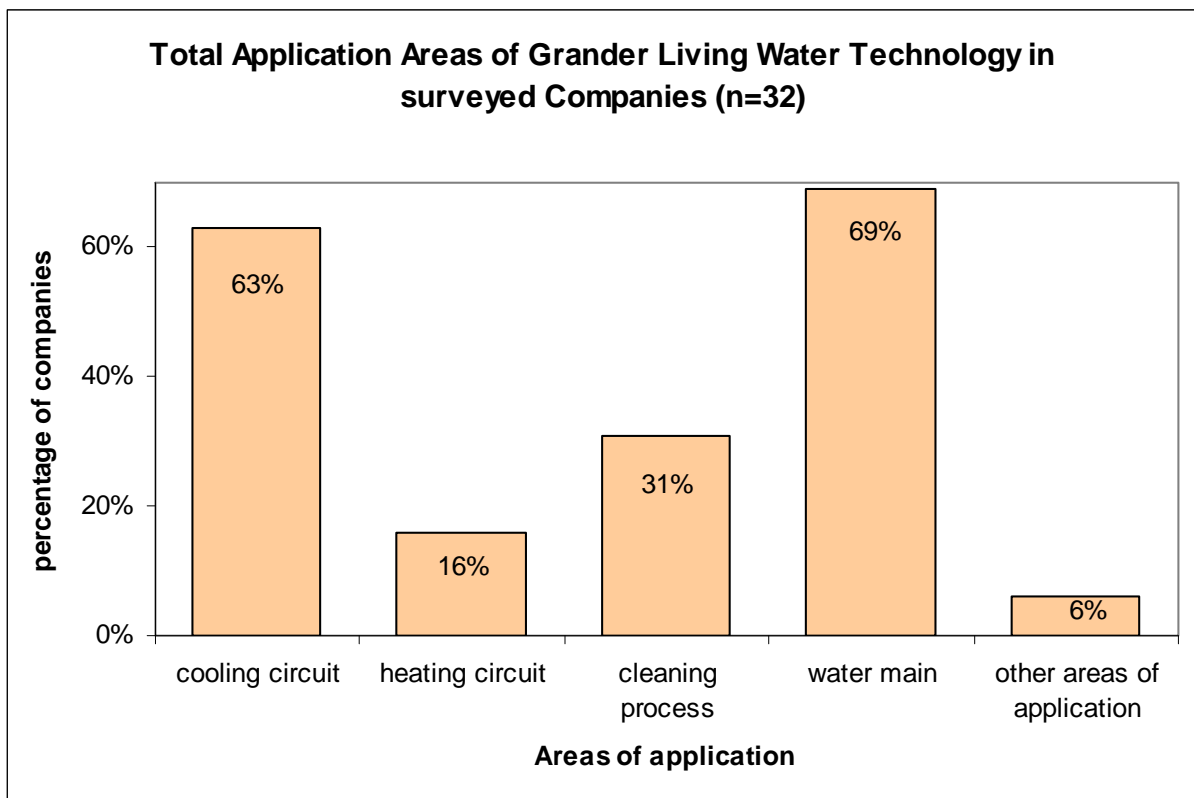
## ***4.2. Application Areas of Grander Living Water Technology in Surveyed Companies***

This section provides an overview of the different application areas of Grander Living Water Technology in the surveyed companies. The application areas of Grander Living Water Technology in the industrial sector differ significantly. The participating companies often use Grander Living Water Technology in several areas of application. That is why this chapters distinguishes between total application areas and main application area.

### **4.2.1. Total Application Areas**

Questions regarding the various areas of application of Grander Living Water Technology allowed for multiple answers. Most of the surveyed companies, namely approximately 69 percent, have Grander Living Water Technology installed in the water main. Cooling circuits represent the second largest application area. Approximately 63 percent of the

surveyed companies use Grander Living Water Technology in the cooling circuits. Cleaning processes are the third main application area. Approximately 31 percent of the surveyed companies use Grander Living Water Technology in cleaning processes. Only 5 companies stated that they had Grander Living Water Technology installed in the heating circuit, and another 2 named different areas of application altogether. On average, the participating industrial companies use Grander Living Water Technology in approximately 1.8 areas of application. Figure 5 shows the total application areas of Grander Living Water Technology in the participating companies.



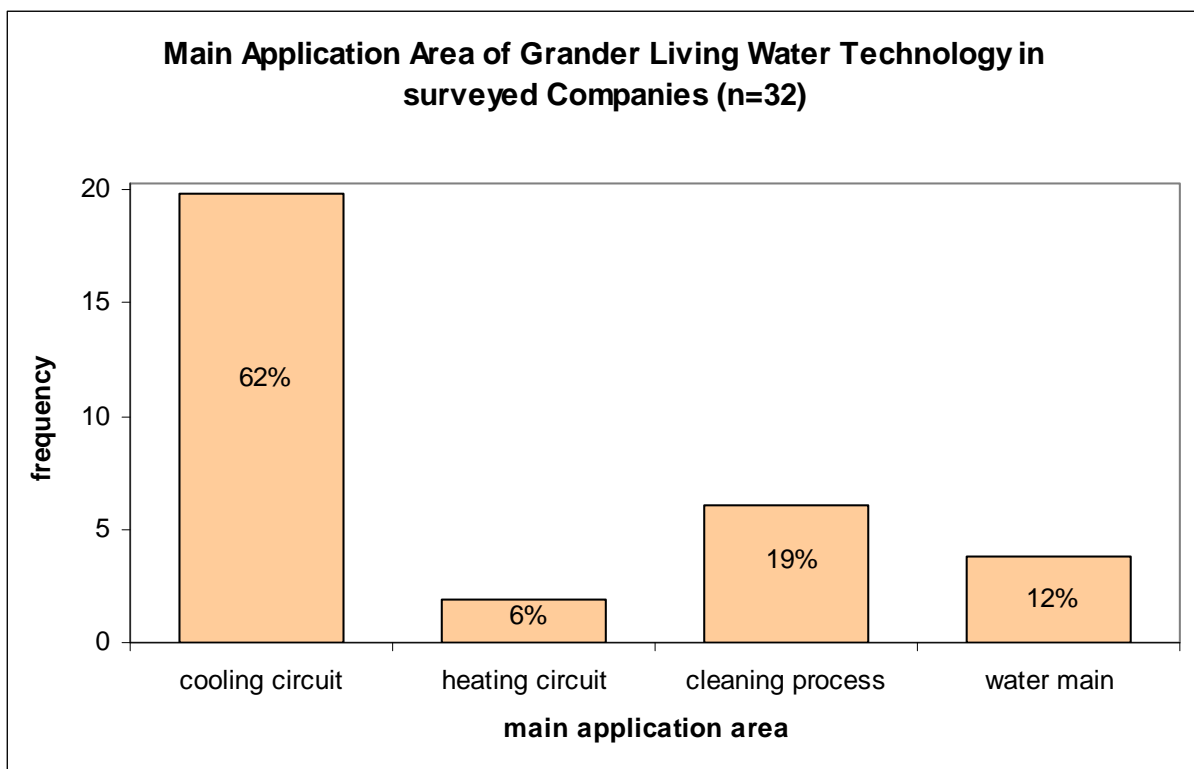
**Figure 5: Total Application Areas of Grander Living Water Technology in Surveyed Companies**

#### **4.2.2. Main Application Area**

Clearly it would have been too large and complex a task for the companies involved in the survey to provide information on all areas of application in which they use Grander Living Water Technology. That is why the companies surveyed were asked to provide detailed information on their main application area of Grander Living Water Technology, only.

If the companies used Grander Living Water Technology in several areas of application, they were asked to name the application area which they deemed most important. This question in

the questionnaire allowed for only one answer. All of the 32 participating companies provided information on their main application area of Grander Living Water Technology. 20 companies cited cooling circuits as the most important area of application for Grander Living Water Technology. This equates to more than 62 percent of the representative samples. Another 6 companies use Grander Living Water Technology primarily for certain cleaning processes. 4 companies have installed Grander Living Water Technology in the water main only, and another 2 companies cited heating circuits as the main area of application. If we compare figures 5 and 6, it becomes apparent that the companies regard cooling circuits as a far more important area of application than the water main.



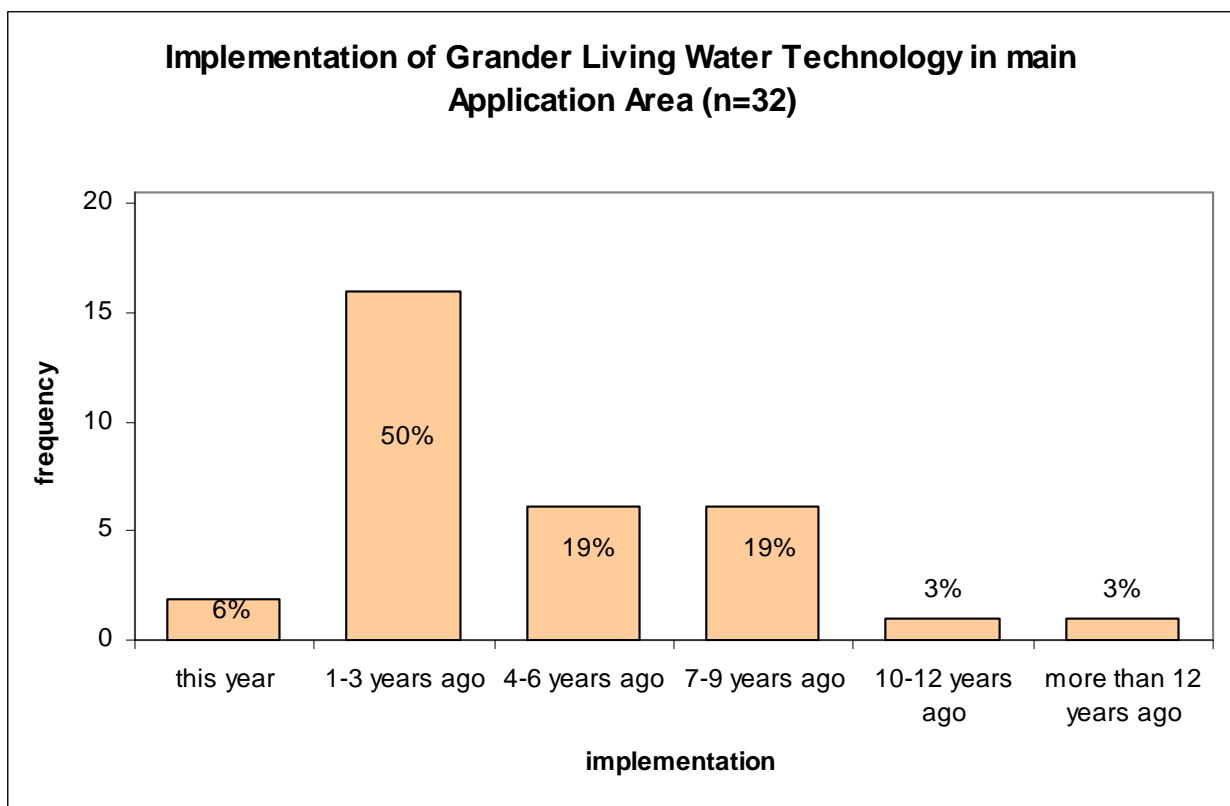
**Figure 6: Main Application Area of Grander Living Water Technology in Surveyed Companies**

Henceforth, all details provided by the industrial companies refer to the main application area of Grander Living Water Technology.

### ***4.3. Implementation of Grander Living Water Technology in the Main Application Area***

As the companies were questioned, among other things, about the efficiency of Grander Living Water Technology, the time of implementation of Grander Living Water Technology

was another decisive factor, in order to determine how long the surveyed companies had been using Grander Living Water Technology. Two companies stated that they had implemented Grander Living Water Technology only just this year – 2006. For various reasons, one of these two companies felt unable to comment on the efficiency of Grander Living Water Technology. Thus, most of the companies that provided information on the efficiency of Grander Living Water Technology have had at least one year of experience with Grander Living Water Technology. 50 percent of the surveyed companies have been using Grander Living Water Technology for 1 to 3 years. Another 44 percent have had more than four years of experience with Grander Living Water Technology (compare Figure 7).



**Figure 7: Implementation of Grander Living Water Technology in Main Application Area in Surveyed Companies**

#### ***4.4. Effect of Grander Living Water Technology***

Industrial companies generally want to achieve specific goals when they make new investments. The same goes for their investment in Grander Living Water Technology. That is why the participating companies were asked to briefly describe any problems they encountered and/or reasons that led them to install Grander Living Water Technology in the

main area of application (question 9 in questionnaire). Participants were asked to choose from the following problems and/or reasons:

- bacteriology or bacterial contamination
- corrosion
- limescale
- sludge deposits
- algae growth
- cleaning processes requiring improvement
- other problems

This question allowed for multiple answers. In addition, the companies were asked to provide information on the consequences associated with these problems. Again, multiple answers were possible. The term “consequences of problems” was chosen because e.g. high use of chemicals is not a primary problem but rather a consequence of another problem (e.g. corrosion or bacterial contamination).

Participants could choose between the following answers:

- high use of chemicals
- frequent need for maintenance and cleaning
- poor heat transfer
- too short residence time of fluids
- other consequences

The next question dealt with the effect of Grander Living Water Technology on the problems and the consequences of the problems (question 10). Participants could choose between the following answers:

- very good effect
- good effect
- no effect

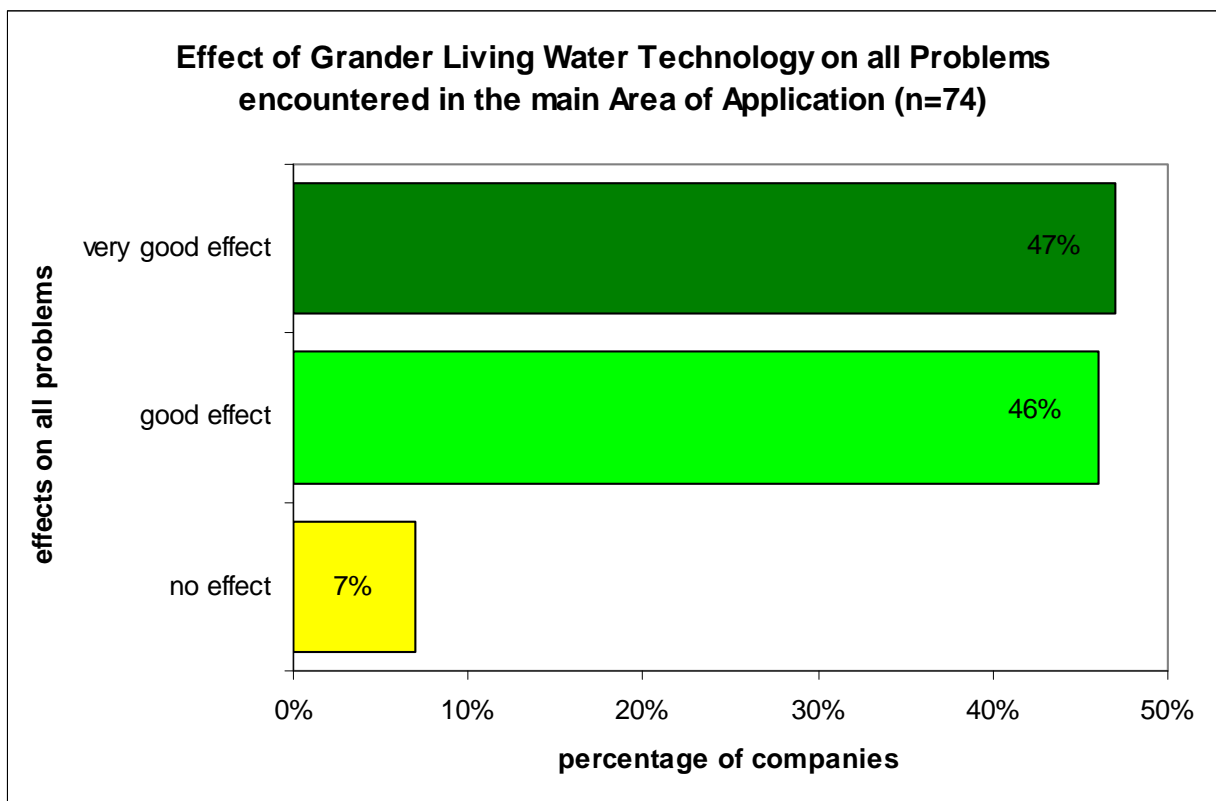
#### **4.4.1. Effect of Grander Living Water Technology on All Problems Encountered in the Main Application Area**

This chapter concentrates on the effect of Grander Living Water Technology on the following problems:

- bacteriology

- corrosion
- limescale
- sludge deposits
- algae growth
- cleaning processes requiring improvement
- other problems

The participating companies made a total of 74 statements relating to the problems that occurred in the main area of application before the installation of Grander Living Water Technology. 35 times (47 percent) Grander Living Water Technology was seen as having a very good effect on the respective problems and 34 times (46 percent) as having a good effect. 5 times (7 percent) it was said that Grander Living Water Technology had had no effect on the problems. Figure 8 graphically depicts the positive response from surveyed companies to Grander Living Water Technology.



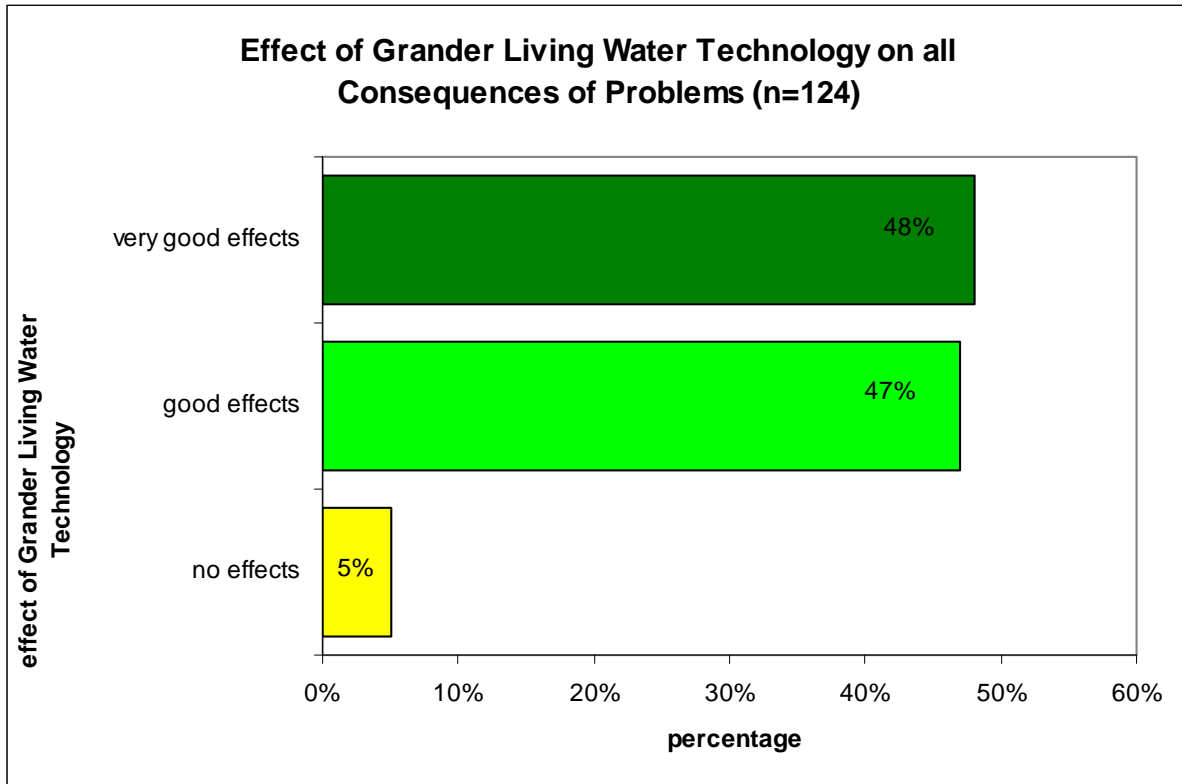
**Figure 8: Effect of Grander Living Water Technology on All Problems Encountered in the Main Application Area**

#### **4.4.2. Effect of Grander Living Water Technology on All Consequences of the Problems Encountered in the Main Application Area**

This chapter analyses the information provided by the participating companies on the effect of Grander Living Water Technology on the following consequences associated with the abovementioned problems:

- high use of chemicals
- frequent need for maintenance and cleaning
- poor heat transfer
- too short residence time of fluids
- other consequences

The participating companies made a total of 124 statements relating to this issue. 60 times (48 percent) Grander Living Water Technology was rated as having a very good effect on the consequences of the problems, 58 times (47 percent) as having a good effect. In six cases it was said that Grander Living Water Technology had had no effect on the consequences of the problems. The statements provided by the participating companies on the effect of Grander Living Water Technology on the consequences of the problems are shown in Figure 9.



**Figure 9: Effect of Grander Living Water Technology on All Consequences of the Problems Encountered in the Main Area of Application**

#### **4.4.3. Effect of Grander Living Water Technology on Main Problems**

Seeing as industrial companies usually pursue strictly commercial objectives and set targets for themselves designed to enhance company performance with their investments, the participating companies were asked not only about their problems but also about the reasons and/or the main problem that led them to install Grander Living Water Technology in the main area of application. This question was asked in order to obtain more detailed information regarding the companies' main problem and/or the primary reason for installing Grander Living Water Technology, and to find out if Grander Living Water Technology contributed to the achievement of this primary goal or not.

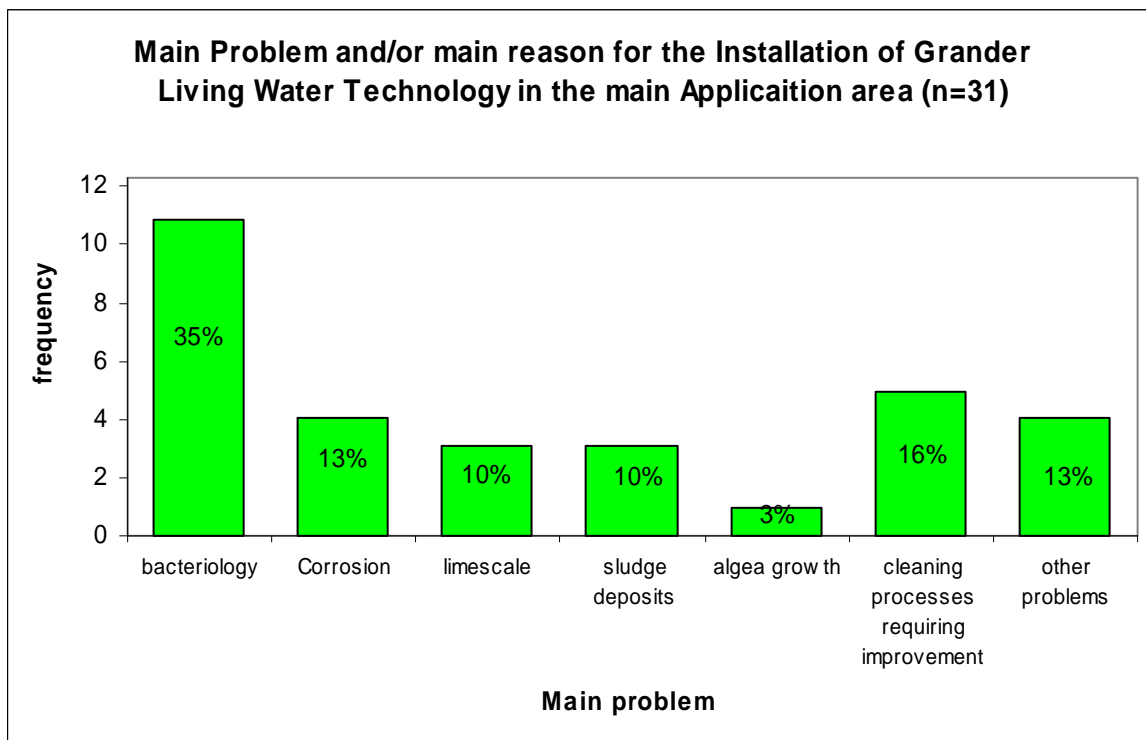
Information provided by the surveyed companies about the main problems and reasons is important because these are amongst the questions that must also be asked by the specialists at Grander Living Water Technology prior to installation in order to chose the right device or combination of devices specifically tailored to suit a company's needs.

#### 4.4.3.1. Main Problems

The one problem cited most frequently in the survey was bacteriological contamination in the main area of application. The second most cited problem were cleaning processes requiring improvement (e.g. application in industrial washing machines, washing water, etc.).

Corrosion was identified by 13 percent of the surveyed companies as the main problem in the main area of application. Another 13 percent cited other problems. Among these, three saw poor water quality as the main problem. These companies wanted to improve their water quality without encountering problems like, for example, bacterial contamination or corrosion. One company cited odor problems associated with wastewater treatment.

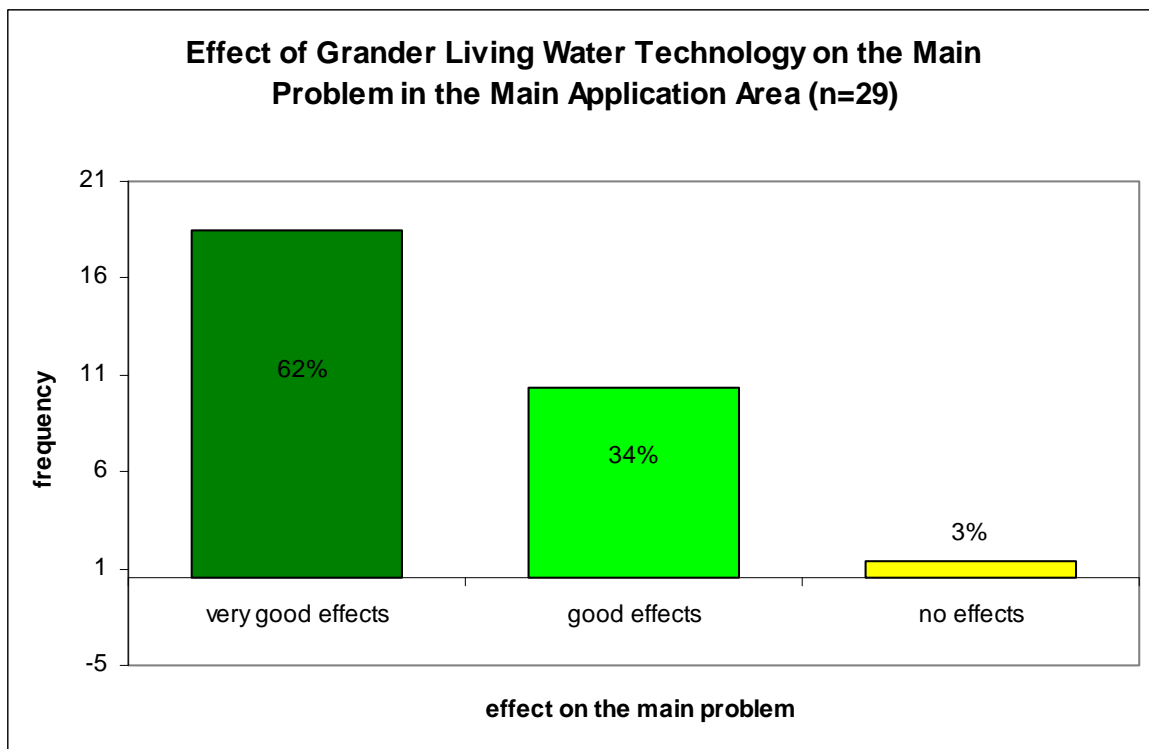
10 percent of the companies cited sludge deposits as their main problem and another 10 percent reported limescale as their main reason for installing Grander Living Water Technology. Only one company cited algae growth as their main problem. Figure 10 illustrates the main problems.



**Figure 10: Main Problem and/or Main Reason for the Installation of Grander Living Water Technology**

#### 4.4.3.2. Effect on Main Problems

Participating companies were asked to evaluate the effect of Grander Living Water Technology on the most commonly encountered problems. 62 percent of the surveyed companies described the effect of Grander Living Water Technology on the main problem as “very good.” Another 34 percent said that the effect of Grander Living Water Technology on the most common problems encountered was “good.” Only one of the participating companies said that they had observed no effect of Grander Living Water Technology on the main problem.

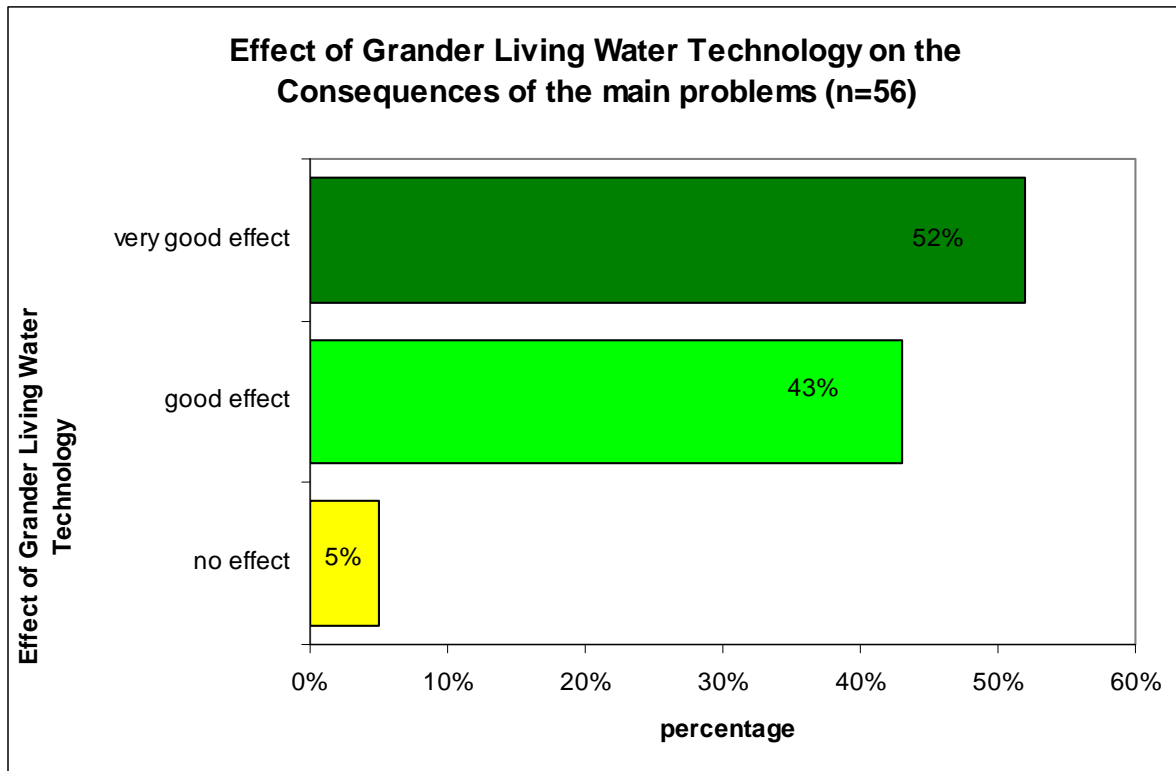


**Figure 11: Effect of Grander Living Water Technology on Main Problem in Main Application Area**

#### 4.4.3.3. Effect of Grander Living Water Technology on Consequences of Main Problems

Here, it is also apparent that Grander Living Water Technology has a significantly positive effect on the consequences of the main problem. 52 percent of the surveyed companies described the effect of Grander Living Water Technology on the consequences of the main problem as “very good.” 43 percent of the surveyed companies said that the effect was

“good.” 5 percent of the participating companies had observed no effect on the consequences of the most frequently encountered problems.



**Figure 12: Effect of Grander Living Water Technology on Consequences of Main Problems**

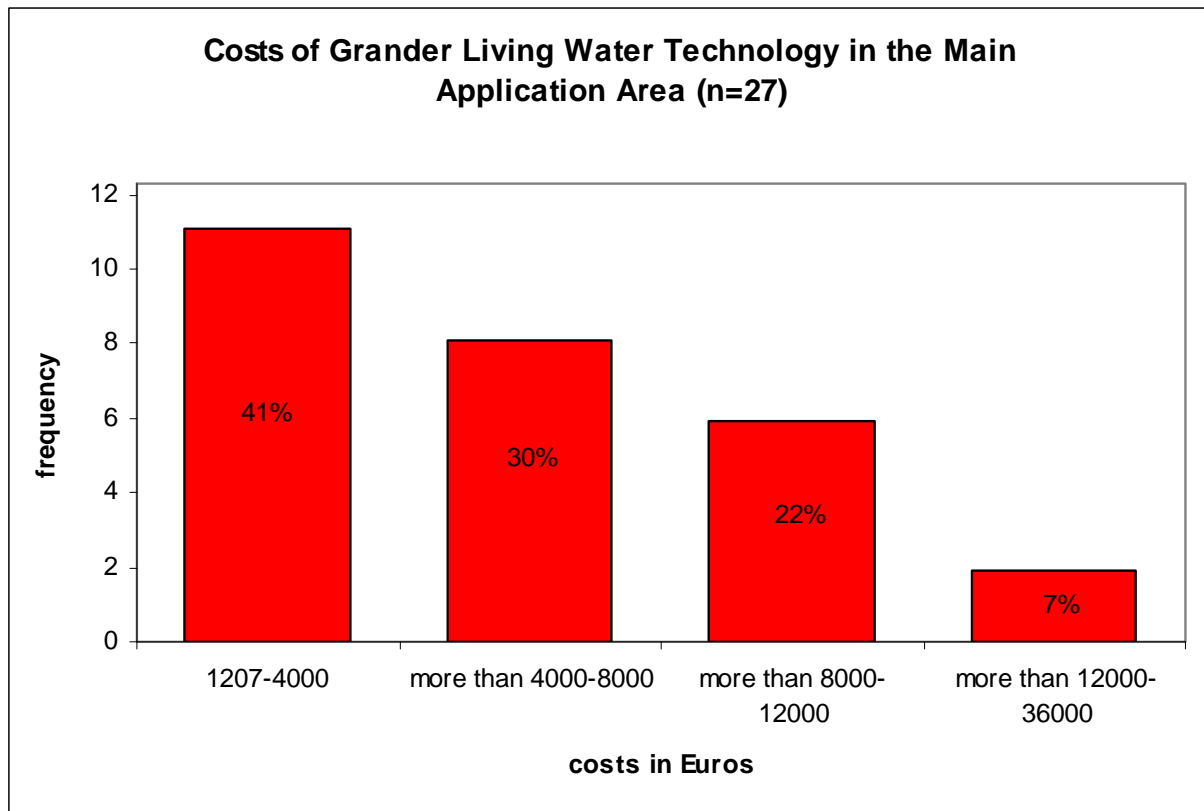
#### ***4.5. Cost-Benefit Considerations for Grander Living Water Technology***

In addition to the effect of Grander Living Water Technology, the participating companies were also asked to provide information on the costs and benefits of Grander Living Water Technology in the main area of application in order to examine the economic aspects of investment in such technology.

##### **4.5.1. Costs of Grander Living Water Technology**

The participating companies were asked to provide information on their costs incurred by Grander Living Water Technology. “Costs of Grander Living Water Technology” refers to all investment, installation and other costs. 5 companies provided no information on the costs. The average costs of Grander Living Water Technology were calculated at 7,000 euros. Median costs were 5,300 euros.

Figure 13 shows the costs incurred by each company for the purchase and installation of Grander Living Water Technology in the main application area. 41 percent of the surveyed companies said that their costs ranged from 1,207 euros to 4,000 euros. Another 30 percent paid in between 4,000 and 8,000 euros for Grander Living Water Technology. 29 percent of the participating companies spent more than 8,000 euros on Grander Living Water Technology.



**Figure 13: Costs of Grander Living Water Technology in the Main Application Area**

#### **4.5.2. Benefits of Grander Living Water Technology**

Participating companies were asked to provide information on the economic benefits and/or annual savings (in the latest reported year). Two companies reported no savings from the implementation of Grander Living Water Technology.

It should be noted, however, that these two companies have Grander Living Water Technology installed in the water main only and had no major problems to begin with.

Three companies were unable to distinctly say whether or not there had been savings generated by the installation of Grander Living Water Technology. 27 of the companies surveyed (or 84 percent of representative samples respectively) stated that cost savings had

been achieved through the application of Grander Living Water Technology. Of those, 24 companies provided more detailed information on the type of cost savings resulting from the installation of Grander Living Water Technology.

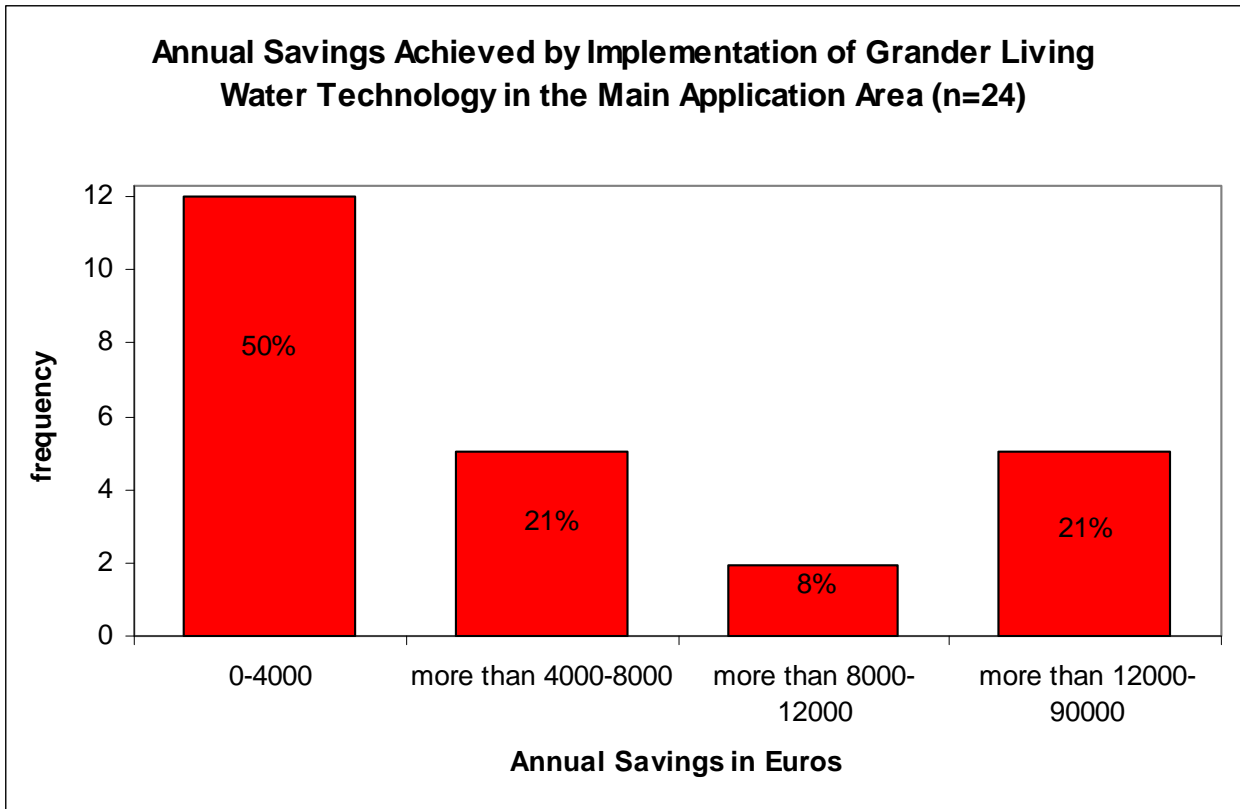
Mean savings were approximately 10,200 euros. Median annual savings, however, were 4,200 euros. The significant difference between the mean and median values is due to the significant difference in the amounts saved reported by the individual companies.

21 companies provided detailed information on the type of savings. It should be noted that 2 of those 21 companies reported no cost savings at all. Table 1 below shows the mean and median savings. In addition, a distinction was made between annual savings in chemical costs and other annual savings (e.g. savings in maintenance and cleaning costs, less frequent water changes, reduced disposal costs, etc.).

	<b>Annual Savings in Chemical Costs in Euros (n=21)</b>	<b>Other Annuals Savings in Euros</b>	<b>Total Annual Savings in Euros (n=24)</b>
<b>Mean</b>	5,534	6,410	10,201
<b>Median</b>	1,500	1,400	4,200

**Table 1: Mean and Median Savings Generated by Grander Living Water Technology**

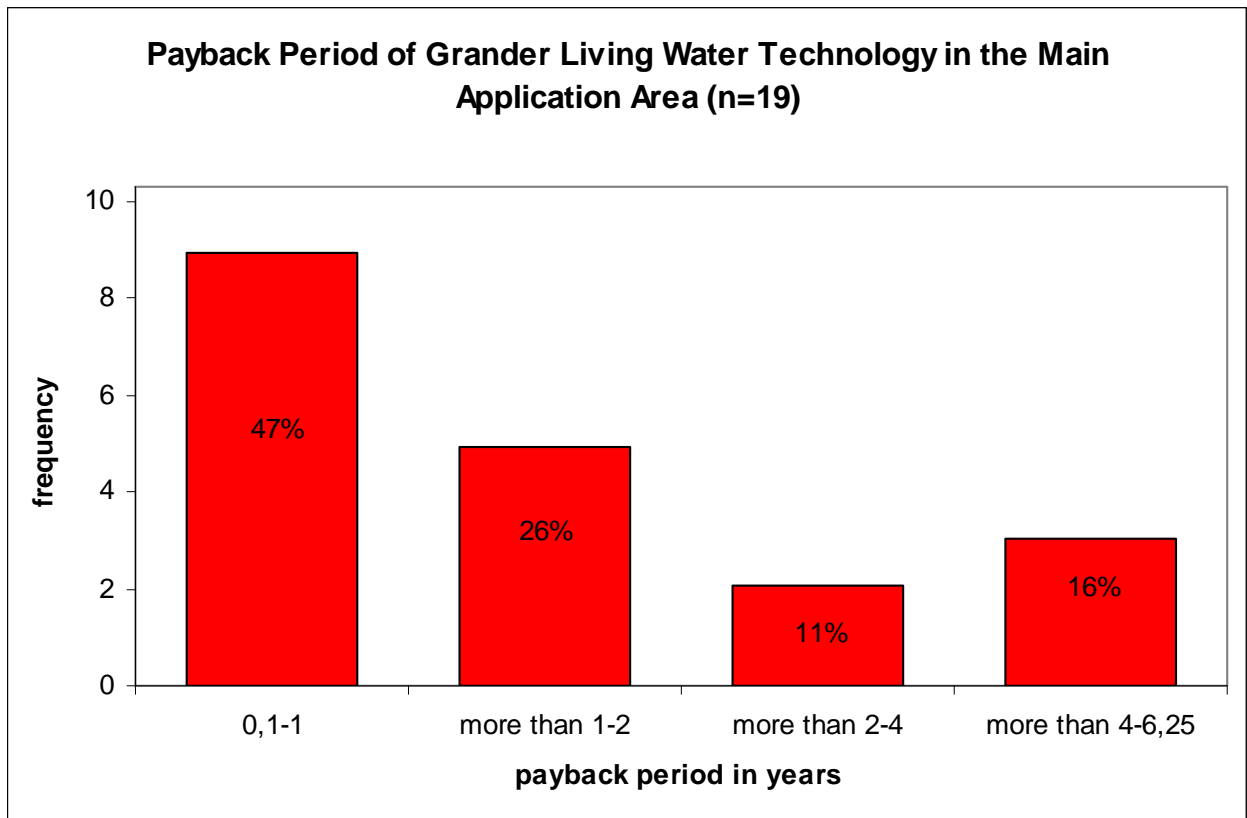
From the table it can be seen that annual savings in chemical costs and other annual savings are about the same. Figure 14 below illustrates the savings (in euros) achieved by implementing Grander Living Water Technology. 50 percent of the companies using Grander Living Water Technology report savings of up to 4,000 euros per year. The other 50 percent saved in between 4,000 and 90,000 euros.



**Figure 14: Annual Savings Achieved by Implementation of Grander Living Water Technology in the Main Application Area**

### 4.5.3. Payback Period

The payback period was calculated by dividing total project costs by annual savings. Data on this issue was provided by 19 of the participating companies. 47 percent of the surveyed companies reported a payback period of less than one year. 84 percent of the companies that disclosed information on costs and benefits realized a payback period of less than 4 years. 16 percent of the surveyed companies reported a payback period of 4 to 6.25 years. The mean payback period was calculated to be 1.8 years, with a median payback period of 1.3 years.



**Figure 15: Payback Period of Grander Living Water Technology in the Main Application Area**

#### ***4.6. Customer Satisfaction with Grander Living Water Technology in the Main Application Area***

This chapter explores data provided by the participating companies on their satisfaction with Grander Living Water Technology in the main application area.

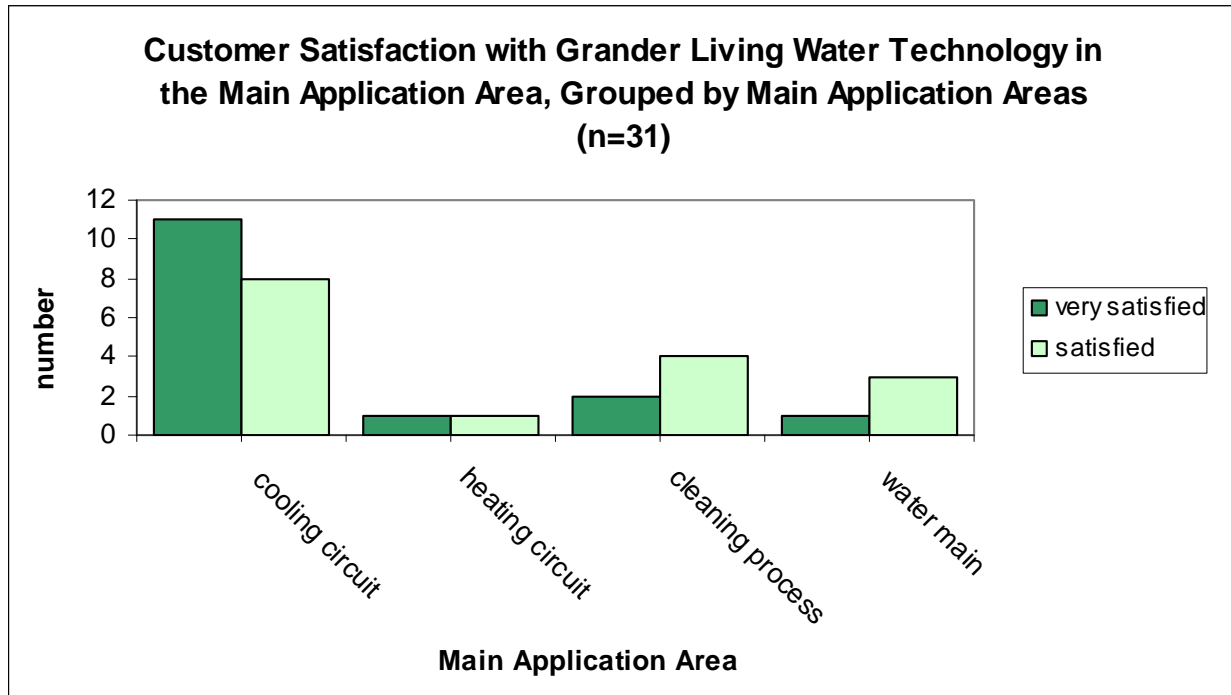
Possible answers included the following:

- very satisfied
- satisfied
- not satisfied

31 of the 32 surveyed companies felt able to provide information on their satisfaction with Grander Living Water Technology in the main application area. None of the respondent companies were “dissatisfied” or “not satisfied” with Grander Living Water Technology in the main application area. Approximately half of the respondent companies said that they

were “very satisfied” with Grander Living Water Technology. The other half replied that they were “satisfied” with Grander Living Water Technology.

Figure 16 below illustrates customer satisfaction with Grander Living Water Technology in the main application area, grouped by main application areas.



**Figure 16: Customer Satisfaction with Grander Living Water Technology, Grouped by Their Respective Application Areas**

## 5. Conclusion

The present thesis deals with water revitalization in general and Grander Living Water Technology in particular. It aims to provide answers to some fundamental questions regarding the application of Grander Living Water Technology in the industrial sector:

1. Does the application of Grander Living Water Technology in the industrial sector have positive effects or not?

Information presented by the surveyed companies clearly showed that Grander Living Water Technology had a positive effect on bacteriology, corrosion, limescale, sludge deposits, algae growth, cleaning processes requiring improvement and other problems that occurred before the installation of Grander Living Water Technology. Thus, based on the information

provided by participants, we may conclude that the application of Grander Living Water Technology in the industrial sector has a generally positive effect.

2. Does the application of Grander Living Water Technology in the industrial sector generate economic advantages and benefits or not?

This was another question posed to the participating companies. The survey data collected indicated that some cost savings can be achieved through installation of Grander Living Water Technology provided that certain problems exist and/or provided that there is potential for improvement in the respective area of application. The mean payback period of Grander Living Water Technology was calculated to be 1.8 years, with a median payback period of 1.3 years. Thus, we may conclude that the application of Grander Living Water Technology in the industrial sector generates economic advantages and benefits.

3. Are the companies that use Grander Living Water Technology satisfied with Grander Living Water Technology or not?

A company's satisfaction with their investment reflects the efficiency of and possible costs savings achieved through Grander Living Water Technology. 48 percent of the surveyed companies said that they were "very satisfied" with Grander Living Water Technology and 52 percent said that they were "satisfied."

4. Can the application of Grander Living Water Technology in the industrial sector contribute to sustainable water management and/or to environmental protection and sustainability or not?

Experience with Grander Living Water Technology, as reported by the surveyed companies, clearly shows that Grander Living Water Technology makes an obvious contribution to the protection of the environment and water resources. E.g. Most of the companies were able to significantly reduce or completely eliminate their use of chemicals in the main area of application. The term "chemicals" here includes biocides, inhibitors, cleaning agents and detergents, stabilizers, etc. As a result, water pollution and/or contamination can be reduced, thus reducing the time and costs spent on wastewater purification and/or the volume of water

to be treated. Therefore, Grander Living Water Technology can contribute to protecting water quality and conserving water resources.

In addition, several companies reported that the residence time of fluids (water and cooling lubricants) can be increased by application of Grander Living Water Technology, allowing for less frequent water changes and significant water savings. Thus, a reduction in water usage is achieved through an optimization of cleaning processes with the help of Grander Living Water Technology. As a result, it is possible to protect and improve water quality and conserve water resources through the application of Grander Living Water Technology in the industrial sector. Improved heat transfer, reduced maintenance and cleaning requirements etc. reported by some of the companies surveyed would lead us to safely assume that the application of Grander Living Water Technology results in a reduction of energy consumption.

From an environmental economics point of view, one of the major advantages of Grander Living Water Technology is that it operates without electricity or the addition of foreign substances and requires no service or maintenance. Thus, Grander Living Water Technology contributes significantly to the conservation of natural resources, apart from the production of the Living Water units themselves. Another great advantage of Grander Living Water Technology is that it is an integrated technology that initiates improvement measures already during manufacture. Thus, Grander Living Water Technology contributes to sustainable water management and/or to environmental protection and sustainability.

In conclusion, and based on the evidence provided by the surveyed companies, we can say that the application of Grander Living Water Technology has resulted in a number of tangible benefits for the industrial sector from an environmental economics point of view.