PREFACE

This master's thesis was produced during the spring of 2012 at Lund University – Faculty of Engineering (LTH), Department of Production Management within the Industrial Engineering and Management program.

A great number of people have contributed in different ways to make this thesis possible. We would therefore start by saying thank you to all people at the Company X office who have supported us with daily practical and administrative assistance throughout this thesis project and welcomed us here.

We especially like to thank our supervisors Tommy Ångbäck (Company X), Johan Decuyper (Company X), Ingela Elofsson (LTH), and Carl-Johan Asplund (LTH). Without your support, guidance, and feedback, this thesis would not have been possible.

We furthermore like to sincerely thank John Goswell and all employees at Company X Canada for all their invaluable time, help, and hospitality during our stay in Canada.

Finally, we like to thank all people, both inside Company X and externally, who helped us by answering our questions and providing us with valuable information and tips along the way.

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Lund, June 2012

ABSTRACT

Title:	Understanding Customer Needs in Canada – Importance of Marketing Research Excellence in a Market Oriented Organization
Authors:	Gustav Björklund, Joel Fredstorp
Supervisors:	Tommy Ångbäck, *Business Unit Manager, Refrigeration* at Company X AB, Johan DeCuyper, *Business Unit Manager, Comfort Heating and Cooling* at Company X, Ingela Elofsson and Carl–Johan Asplund, *Department of Production Management* at Lund University, Faculty of Engineering.
Problem Definition:	Company X Equipment division is a mature organization that has experienced a desire to broaden the knowledge about the market potentials of the Canadian markets. There is also an ambition within the organization to improve the sales in Canada by exploring previously unknown market opportunities. The needs for increased knowledge are experienced both at the Canadian sales office and at the Lund headquarters. To be able to make the right strategic and marketing decisions, Company X Equipment division needs in-depth knowledge about the end-users' current needs together with information regarding trends for the Equipment division's application areas. The experienced need for increased knowledge implicates an improvement potential within the process of generating marketing information. Company X has furthermore expressed desire to improve within that area. Generating marketing information is a cornerstone in a market-oriented

organization according to Mohr et al (2010) and by improving the marketing information system (MIS); there is a possibility for Company X to increase its degree of market orientation accordingly.

Purpose:

The main purpose of this master thesis is to conduct a market research and map the market potential for some of the Canadian application areas within Company X Industrial Equipment division. Furthermore, the thesis also describes and explains the current and future development of the end-user needs within the markets.

The secondary purpose of the thesis is to analyze Company X ‘s MIS (marketing information system) and give Company X a recommendation of improvements in order to achieve a higher degree of market orientation and thus reduce the risk of future knowledge gaps.

Methodology:

The research was conducted through a combination of a descriptive and an explanatory case study in order to achieve an in-depth knowledge of the underlying potential of the Canadian market and the processes of gathering market information within Company X and Company X Canada. The research was mainly qualitative and the information origins from several in-depth interviews together with written second-hand information from literature, articles and e-sources. In order to quantify the market potentials, quantitative second-hand data was used and combined with qualitative and quantitative first-hand empirics from interviewees. The interviews were held at Company X in

Sweden and in Canada as well as externally with different stakeholders in Canada.

Conclusions: The total potential and the size of a market are determined by how it is defined. Consequently, in some of the application areas studied, the Canadian market potential estimated differs from the one currently assumed by Company X. All the markets currently have low growth rates and a high amount of existing users. Thus, the bulk of the value is in the replacement markets, where Company X is observed to currently be less present and where the knowledge is lower accordingly.

There are currently some gaps in Company X's way of gathering external marketing information about the Canadian markets. Those gaps create a weakness in the MIS that connects the Canadian markets to the decision-making processes within the organization. Improved MIS have potential to improve the current market knowledge and in the long run – increase Company X's degree of market orientation and thus improve both the strategic and the marketing decision qualities.

Key words Market Research, Market Orientation, Marketing Information System, Market Potential

SAMMANFATTNING

Titel:	Understanding Customer Needs in Canada – Importance of Marketing Research Excellence in a Market Oriented Organization
Författare:	Gustav Björklund, Joel Fredstorp
Handledare:	Tommy Ångbäck, *Business Unit Manager, Refrigeration* på Företag X AB, Johan DeCuyper, *Business Unit Manager, Comfort Heating and Cooling* på Företag X, Ingela Elofsson och Carl–Johan Asplund, *Institutionen för Produktionsekonomi* och Logistik, vid Lunds Tekniska Högskola,
Problem definition:	För att kunna fatta högkvalitativa strategiska marknadsföringsbeslut krävs en god kunskap om marknaden. Divisionen för Företag X Equipment vill förbättra den interna kunskapen om den kanadensiska marknaden samt dess slutanvändares nuvarande och framtida behov. Genom en ökad förståelse för marknaden är förhoppningen att Företag X ska kunna öka försäljningen på de kanadensiska marknaderna genom att utnyttja tidigare icke kända affärsmöjligheter. En orsak till den kommunicerade önskan om ökad förståelse för de kanadensiska marknaderna skulle kunna vara an svaghet i de processer som finns för insamlandet av marknadsinformation. Genom att förbättra sitt Marknadsinformationssystem (MIS) kan Företag X öka sin befintliga marknadskunskap och på längre sikt nå en högre nivå av

marknadsorientering, något som är allt viktigare för dagens företag.

Syfte:

Examensarbetets första delsyfte är att genomföra en marknadsundersökning på de kanadensiska marknaderna för fyra av Företag Xs applikationsområden och därigenom uppskatta hur stor marknadspotentialen är. Examensarbetet syftar även till att beskriva och tydliggöra den nuvarande och framtida utvecklingen av slutkonsumenternas behov i Kanada.

Examensarbetets andra delsyfte är att analysera de processer som i dagsläget finns för att samla in, dela och använda marknadsinformation. Utifrån analysen ska förbättringsåtgärder för Företag Xs MIS tas fram med syftet att öka graden av marknadsorientering inom Företag X.

Metod:

Examensarbetet har genomförts som en kombination av en deskriptiv- och en förklarande-fallstudie. Angreppssättet möjliggör en djupgående förståelse för den underliggande potentialen på de kanadensiska marknaderna. De undersökningsmetoder som har använts har mestadels varit av kvalitativ karaktär i form ut av ostrukturerade djupgående intervjuer. För den empiriska delen av examensarbetet har dock sekundär data från oberoende organisationer använts. De intervjuerna som har genomförts har skett på Företag X i Lund och Kanada, samt externt med olika aktörer inom de olika marknaderna i Kanada.

Slutsatser:

En jämförelse mellan resultatet av de analyser som har gjorts med Företag Xs befintliga marknadsuppskattningar visar tydligt att

potentialen på en marknad beror på hur marknaden är definierad. Av denna anledning skiljer sig den uppskattade potentialen på några av de studerade marknaderna från Företag Xs egna beräkningar.

Vår analys av de kanadensiska marknaderna visar att det i dagsläget har en låg tillväxt och ett stort antal befintliga användare. Detta gör att det största marknadsvärdet återfinns inom renoveringsmarknaderna. Under arbetes gång har det observerats att Företag X i dagsläget har en lägre närvaro på renoveringsmarknaderna, vilket även gör att kunskapsnivån om dessa marknader är relativt låg.

Det finns i dagsläget förbättringspotential i Företag Xs hantering av extern marknadsinformation på de kanadensiska marknaderna. Detta gör att det även finns en förbättringspotential i Företag Xs marknadsinformationssystem. Genom att förbättra informationsinsamlingen av extern information har Företag X därför potential att förbättra kunskapen om de kanadensiska marknaderna samt öka nivån av marknadsorientering.

Nyckelord: Market Research, Market Orientation, Marketing Information System, Market Potential

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ABBREVATIONS

B2B	Business to Business
CAGR	Compound Annual Growth Rate
CHP	Combined Heat and Power
DE	District Energy
GWP	Global Warming Potential
HFC	Hydrofluorocarbons, old refrigerant with high GWP
HFO	Hydrofluoro-olefin-1234yf, new synthetic refrigerant with low GWP
MIS	Marketing Information System
MO	*Market Orientation*
OEM	Original Equipment Manufacturer

1 INTRODUCTION

This chapter describes the background of the thesis and defines the purpose in order to provide the reader with the scope of the research. The delimitations of the thesis are stated, an appropriate target group of the research is suggested and finally the disposition of the report is explained.

1.1 Background and Problem Definition

In a globalized world, where the competitive environment holds a constantly increasing amount of players offering more and more similar products, organizations that wish to maintain a leading position within their industries need to act from a desire to deliver maximum customer value. Consequently, many such companies choose a market oriented organizational structure. The purpose of that structure is to gain attention to the customers' needs among the people within the organization and thereby achieve a greater competitiveness.

Mature companies in general have a wide range of products, sold in many different geographical markets with varying business environments and challenges. This increases the internal organizational complexity and complicates the allocation of responsibilities. Thus, there is substantial need for clear processes and guidelines that support the market oriented organizational structure in such companies.

Company X Equipment division is a mature organization that has experienced a desire to broaden the knowledge about the market potentials of the Canadian markets. There is also an ambition within the organization to improve the sales in Canada by exploring previously unknown opportunities. The intuitive needs for increased knowledge are experienced both at the Canadian sales office and at the Lund headquarters. To be able to make the right strategic marketing decisions, Company X Equipment division needs more information about the end-users current needs together with information regarding trends for the Equipment division's application areas.

One reason for the experienced need for increased knowledge implicates an improvement potential within the process of generating marketing information. Company X has furthermore expressed desire to improve within that area. Generation marketing information is a cornerstone in a market-oriented organization according to Mohr et al (2010) and by improving the market information generation; there is a possibility for Company X to increase the degree of market orientation accordingly.

1.1.1 Purposes

Primary Purpose

The main purpose of this master thesis is to conduct a market research to map the market potential for some of the application areas within Company X Industrial Equipment division. Furthermore, the thesis describes and explains the current and future development of the end-user needs within the markets.

Secondary Purpose

This master thesis is analyzing Company X's MIS (marketing information system) and gives Company X a recommendation of improvements in order to achieve a higher degree of market orientation and thus reduce the risk of future knowledge gaps.

1.1.2 Target Group

This thesis is aimed towards senior students and professionals with engineering and/or business background as well as stakeholders within or with any connection to Company X Industrial Equipment Division and Company X Canada Inc.

1.1.3 Delimitations

Project Length

This thesis is based on 20 weeks of full-time work. Consequently, further research interests and implementation studies within the studied markets will only be suggested, as they will not be possible to conduct within the limited time frame.

Organizational Framing

The organizational framing for this master thesis report includes four market units within the Industrial Equipment segment: Comfort Heating, Comfort Cooling, Industrial Refrigeration and Commercial Refrigeration.

Application Areas

The application delimitations in this master thesis report are a result of discussion with market managers at Company X as well as representatives from Company X Canada. Applications that are believed to have a greater potential than currently known or areas with low initial knowledge have been chosen for each market unit in order to achieve a better result and due to time constraints. However, the fact that not all application areas are included must be taken into account when discussing general conclusions. Thus, this thesis should be seen as a framework for market research and a motivation for further research rather than a complete market potential mapping for the Industrial Equipment division in Canada.

For the heating and cooling unit this master thesis will be focusing on energy sources for larger applications, leaving out single household. That means focusing on district heating/cooling and common heating/cooling for apartment blocks and large building applications such as hotels, hospitals, office buildings, schools, sports centers and community dwellings etc. Thus, a suitable focus is hydronic systems with boilers with a capacity over 70 kW, which equals 2-3 family households and larger households together with buildings connected to district heating/cooling systems. (Johan De Cuyper, Market Unit Manager Heating Comfort/HVAC, Company X Head Office, 25 January 2012) (Company X, 2012a)

The market units and the application areas chosen for the study are stated below:

- Comfort Heating
  - District Heating
  - Local Heating

- Industrial Refrigeration
  - Cold storage refrigeration

- Commercial Refrigeration
    - Food retail refrigeration

Geographical Framing
The geographical focus area for this master thesis report is Canada.

1.2 Disposition of the Master's Thesis

Chapter 1 – Introduction

This chapter describes the background of the thesis. It furthermore defines the purposes in order to provide the target groups with the scope of the research. The delimitations of the thesis are stated, an appropriate target group of the research is suggested and finally the disposition of the report is explained.

Chapter 2 – Company Presentation

This chapter presents Company X, the Industrial Equipment Division, the Canadian sales office and the organizational structures therein. It also provides the reader with a presentation of the application areas studied.

Chapter 3 – Methodology

The methodology chapter describes the method used to conduct the market research. A discussion about methodology in general and the characteristics of this study will first be presented. Originating in the market research process, the choice of research strategy will thereafter be discussed. After follows a discussion of the choice of research method together with a reflection on the reliability and credibility of the study. For each phase in the methodology the choices for this master thesis will be presented.

Chapter 4 – Theoretical Framework

The theory chapter describes the theories and models, which are to be used during the analysis of the gathered data. The chapter starts with an explanation of the four phases of a market-orientated approach and how it can be used within a company. A focus on the first phase, *Intelligence Generation*, and what role a *Marketing Information System* has in this phase is then

presented. The last piece in the theoretical framework, the *PESTEL framework* and *Scenario Building*, and how it can be used within a Marketing Information System will thereafter be discussed. Lastly a discussion of the empirical approach of the theoretical framework will be presented.

Chapter 5 – Empirics

The empirical chapter presents the data that is to be used for analyzing and mapping of the four Canadian markets. The disposition of the chapter uses a bottom up approach of the theoretical framework starting with the current status together with underlying market forces and drivers. After follows the PESTEL findings from the qualitative interviews. The last part of the chapter is dedicated to the findings of Company X's Marketing Intelligence System and degree of Market Orientation.

Chapter 6 – Analysis and Discussion

In this chapter the assumptions and uncertainties of the valuation methods for each market will first be presented. For clarification purpose the calculations of the market valuation will thereafter be thoroughly described. After follows the actual outcome of the calculations. Lastly follows a discussion of the key factors affecting the future market derived from the PESTEL analysis performed in the empiric chapter.

Chapter 7 – Conclusions and Recommendations

In this chapter the conclusions and recommendation derived from the empiric and analytic chapters will be presented. The conclusions are divided into three areas: The implications of the definition of a market, Company X's internal marketing information system and how Company X can improve their marketing research processes in order to achieve full market orientation.

Chapter 8 – Reflections and Contributions

This chapter summarize the additional reflections and contributions that have arisen from the process of completing this master thesis. The possible implications due to our narrow scope and key insights from the analysis will be presented. A reflection on how different investment horizons can affect a

Market Information System and how a global leading market position may lead to a product focus are also discussed.

References

This chapter presents the information sources used while conducting the study of this thesis. The primary sources mainly consist of interviews within Company X and different experts and players within the markets studied. The secondary sources are various written sources describing theories and models. Also results from other studies are used as secondary sources whilst conducting the market mapping.

Appendices

This chapter contains information about the interviewees and an example of an interview guide that was used during the interviews. Included in the chapter are also general descriptions of the end-customer buying processes together with a detailed explanation about the market value calculations.

2 COMPANY PRESENTATION

This chapter presents Company X, the Industrial Equipment Division, the Canadian sales office and the organizational structures therein. The chapter also provides the reader with a presentation of the studied application areas.

2.1 Background

2.1.1 History of Company X

Company X was founded 1883 in Stockholm. The company's first products were separators used for separating milk into cream and skimmed milk. In 1888 Company X expanded their product portfolio by adding pumps for pumping the skimmed milk from the centrifugal separator. Company X's first product was introduced in 1938 and the production of it was placed in Lund, Sweden. In 1963, AB Separator changed its name to Company X AB after an acquisition of a numbers of industrial plate designs. (Company X, 2012b)

Company Y, a worldwide producer of food packaging solutions, acquired Company X in 1991. Liquid food processing activities were integrated with Company Y and Company X became and independent industrial group within the Company Y Group. (Company X, 2012b)

In 2000, an investment company acquired Company X with the intention of developing a global leadership within its key technologies; *technology A, separation and fluid handling*. The Company X share was re-introduced at the Stockholm Stock Exchange in 2002 and is today traded at the OMX Large Cap list. (Company X, 2012b)

2.1.2 History of Company X Canada

Company X entered the Canadian market around 1899 and currently has sales and service offices in Toronto (ON), Edmonton (AB), Calgary (AB), Brossard (QC), and Vancouver (BC); with Toronto being the Canadian headquarter. (Company X, 2012c)

2.2 Company X Today

2.2.1 Key Technologies

Company X's three key technologies, in which they hold a global market-leading position, are:

- Separation
- Technology A
- Fluid handling

The strongest position is within technology A, where Company X holds an approximate global market share of 30% (Company X, 2012d).

2.2.2 Organizational Structure - Global

Company X has after its reorganization in 2001 changed focus from a solely product orientation to a more market-oriented organization. The reorganization resulted in market-oriented divisions and segments with individual customer focus. Company X currently has three different customer segments: Process Technology, Equipment and Marine & Diesel. Each customer segment has sub-divisions, which focus on specific applications. The sub divisions are thereafter divided into market units responsible for more specific market areas. The market units are responsible for their product, sold at the sales offices around the world, and for setting up national guidelines and strategies for the different sales offices. (Company X, 2012e)

The operations within Company X consist of purchasing, logistics and manufacturing. The operations are not bound to any of the three market-oriented divisions and instead make up an own division that serves the Equipment, Process and Marine & Diesel divisions. (Company X, 2012e)

This master thesis is addressing the lack of information within the Equipment division, with focus on the sub division Industrial Equipment and the two market units *Comfort Heating & Cooling* and *Refrigeration*. Within the two market units the focus areas are Comfort Cooling, Comfort Heating, Industrial Refrigeration and Commercial Refrigeration.

A better understanding of the focus area of this master thesis is presented in the figures below where the focus of this master thesis is highlighted.

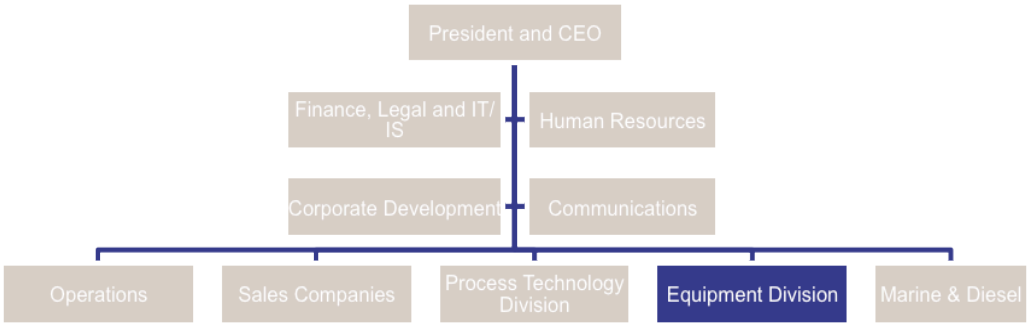

Figure 2.1: Company X's Corporate Structure - areas covered in this master thesis are highlighted in blue (Company X Intranet, 2012a)

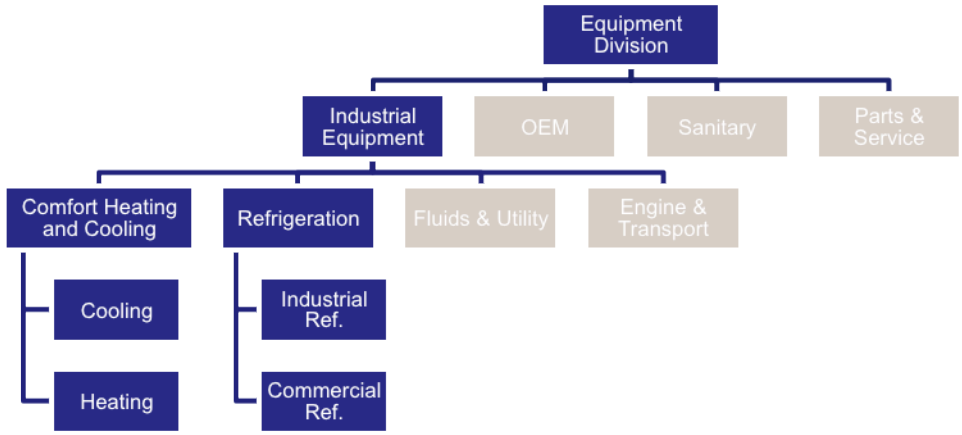

Figure 2.2: Company X's Corporate Structure cont'd- areas covered in this master thesis are highlighted in blue (Company X Intranet, 2012a)

2.2.3 Organizational Structure – Canada

The sales office in Canada, Company X Inc. is structured in a similar way as the parent company, with the same market-oriented division structure.

The sales organization consists of application engineers, contract administration and agents. Alongside with the day-to-day sales activities,

Company X Canada is responsible for collecting information about the national markets, the information is then distributed to Company X headquarter and used as input when setting up national guidelines and strategies. (Company X Intranet, 2012a)

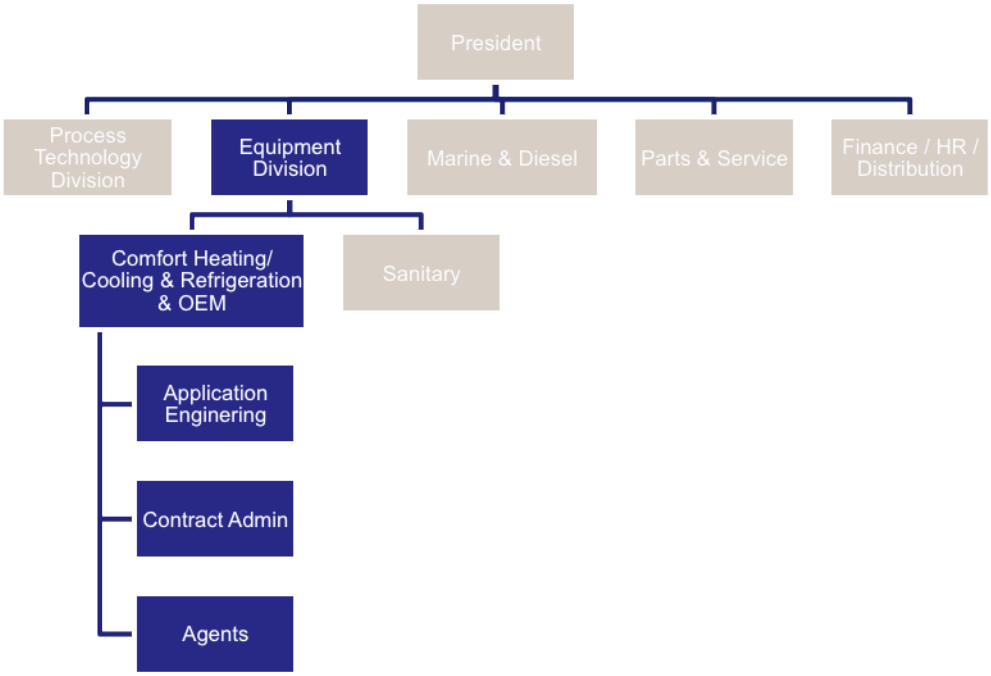

Figure 2.3: Company X Canada's Corporate Structure - areas covered in this master thesis are highlighted in blue (Company X Intranet, 2012a)

2.3 Equipment Division

The Equipment Division aims towards customers in need of specially adapted solutions and a vast majority of the sales occurs at division's sales companies. The Equipment Division serves customers from the market segments *Marine & Diesel, Industrial Equipment, Sanitary, OEM (Original Equipment Manufacturers), and Parts & Service. (*Company X, 2012f)

The market units Comfort Heating & Cooling and Refrigeration both serve the market segments Industrial Equipment and OEM. (Company X, 2012f)

2.4 Comfort Heating and Cooling

2.4.1 Application Description

The market units Comfort Heating and Comfort Cooling focus on creating comfortable indoor climate by distributing hot or cold water from an energy source to end users. Thus, comfort heating and cooling excludes lower temperatures, which in this master thesis will be sorted under the Commercial and Industrial Refrigeration market units. (Company X, 2012g)

District Energy

For district heating, the most common ways of generating heat are through a heat plant, a combined heat and power plant or through geothermal heating. A combined heat and power plant is a way of increasing the electricity generation efficiency, and thus decrease the environmental impact, of the power plant by distributing the excess heat of the cooling water into the district heating network. Geothermal heating uses hot water from the interior of the earth and distributes the heat into the district-heating network. Thus, it is a possibly totally fossil fuel free method of generating space heat. Furthermore is district energy offering possibilities of controlling emissions in a way that is not possible when generating energy in buildings individually, why district energy is considered an environmentally friendly alternative. (Company X, 2012h)

In district cooling applications, the cooling sources most widely used are cooling towers or the use of cold lake or seawater but also plants generating cold electrically are common. Cold water is then distributed in a similar way like district heating. (Company X, 2012g)

Local Heating

It has been found that the terminology for heating differs slightly between the Company X offices in Sweden and Canada. In order to avoid misconceptions the authors of the thesis have decided to make the following definition of local heating:

> *Local Heating is the way a single building heats living space and hot water using its own heating source*

Furthermore, by local heating with hydronic systems means local heating with water and/or steam as the heat carrier.

2.4.2 External Distribution of Heat and Cold

Company X's s operate in two systems for distribution of heat and cold within the scope of this thesis. These two systems are *district heating/cooling*, which serves multiple buildings, *and local heating,* which serves a single building with heat distributed from a boiler centrally located in the building. (Company X, 2012g)

For district heating, the heat or cold is generated in a central plant that supplies a certain region. This can be limited to a smaller area, such as a university campus, or to a larger regional network, heating a city. (Company X, 2012h) (Company X, 2012g)

A district heating/cooling system can be either direct or in-direct. In a direct district heating/cooling system the hot or cold water goes directly into the internal system of a building. In an in-direct district heating/cooling system each building separates the internal energy flow from the external flow system using a product A. (Company X, 2012h) (Company X, 2012g)

2.4.3 Internal Distribution of Heat and Cold

Space heating/cooling in this thesis refers to the use of the hot and cold water for changing the indoor temperature. The energy from the water is usually transferred to the air by radiators, heat circuits under the floor, ventilation or a combination of them. (Company X, 2012h)

Domestic hot water heating refers heating tap water with the use of the inbound water from the heating source or return water used for space heating. The use of return water as a heating source for domestic hot water is possible since it requires a lower temperature than space heating. (Company X, 2012h)

2.4.4 Building Types

In this thesis, buildings are referred to as commercial, institutional or residential. Examples of commercial and institutional buildings are: Hospitals, Offices, Green Houses, Schools and Universities (Company X, 2012h). The residential buildings that will be included in this master thesis are multi family households.

2.5 Refrigeration

2.5.1 Application Description

Food Retail Refrigeration

Food retail refrigeration refers to freezing and chilling store displays through a central system thus leaving out conventional fridges and freezers individually refrigerated. Product As are used in the systems to transfers the cool from where it is produced, in a separate room or building close to the store, to the displays.

Traditionally, store refrigeration systems use different types of synthetic refrigerants but in many parts of the world, CO_2 is becoming more and more popular as the environmentally hazardous HCFCs and HFCs are successfully phased out through different regulations.

Cold Storage Refrigeration

Cold storage refrigeration refers to freezing and chilling regional storage spaces and cold logistics centers.

3 METHODOLOGY

The methodology chapter describes the method used to conduct the market research. A discussion about methodology in general and the characteristics of this study will first be presented. Originating in the market research process, the choice of research strategy will thereafter be discussed. After follows a discussion of the choice of research method together with a reflection on the reliability and credibility of the study. For each phase in the methodology the choices for this master thesis will be presented.

3.1 Methodology Introduction and Type of Study

Methodology is the approach, or practical way, of how a master thesis should be executed. The methodology should provide a sufficient framework for the thesis in order to make it more efficient and precise. A methodology can be either fixed or non-fixed. A fixed methodology is to be followed without exceptions. A non-fixed methodology can be altered during the project if necessary. Whether the methodology is fixed or non-fixed depends on the approach of the master thesis. (Höst, Regnell and Runesson. 2011, p.32)

What kind of methodology to choose depends on the characteristic, goals and what kind of conclusions the master thesis should provide (Lekvall & Wahlbin, 2009, p. 209). According to Höst, Regnell and Runesson (2011, p. 29) there are four different types of approaches for a study, each approach is linked to a different conclusion.

- *Descriptive study* describes how something functions from a well-defined project specification. Used when the objective is to describe a market, structures, consumer behavior etc.

- *Exploratory study* is used when there is no or little knowledge of the target area in advance. Aims to provide an understanding of how something functions or executes and is often used as a pilot study in order to act as a guideline for future projects.

- *Explanatory study* finds explanations to how something functions and describes causations between different factors. Factors explaining connections are often given at the initial start-up and are also of great interest for further analysis. An explanatory study demands high standards of the quantitative part regarding statistical certainty.

- *Problem solving study* finds solutions to known problems.

Lekvall and Wahlbin (2009, p. 197) also mention a fifth approach, a *predicting study*. Such a study is to some degree an extension of an explanatory study as it predicts future outcome based on relationships between market factors.

The most common approach for a master thesis is to use a problem solving study, however a master thesis can include multiple approaches. (Höst, Regnell and Runesson. 2011, p.29)

Our Approach to the Problem

The underlying reason for the initialization of this master thesis was that Company X Equipment Division had experienced a lack of knowledge about the potential of the Canadian markets and a belief that they could improve their sales in Canada. The primary purpose for this master thesis was for us to construct a mapping of the current status and future potential for the Canadian markets by analyzing the current status, drivers for growth and trends. Later, the secondary purpose to analyze and suggest improvements to Company X's degree of market orientation was added. The combined purpose of this master thesis was to *describe* the current markets for Company X's products in Canada and Company X's degree of market orientation. The purpose was also to *explore* drivers for future growth in the Canadian markets and provided Company X with knowledge of how the markets are likely to develop in the future. The master thesis can thereby be said to be a combination of a *descriptive* and an *exploratory* study.

3.2 The Market Research Process

This master thesis' primary purpose was to describe and explore the Canadian markets and thus falls under the theory of market research that, according to Hague and Jackson, consist of 6 steps: defining objectives, planning how to collect the data, collecting the data, analyzing the collected data, reporting and finally making a market decision based on the gathered market information (1999, p. 19). For this specific market research project the step *Market Decision* in the market research process will be excluded and left to Company X.

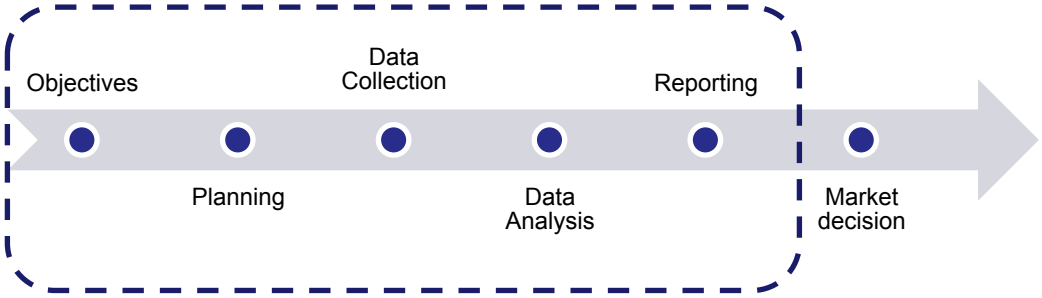

Figure 3.1: The Market Research Process and the 6 phases according to Hague and Jackson (1999, p.19). Bullets within the dashed line is the scope of the project

3.2.1 Objectives

The definition of the objectives is as seen in figure 3.1 the starting-point for any market research. Hague and Jackson (1999, p.18) describes that failure in defining the objectives often leads to sub optimum work result and waste of resources. Hague and Jackson (1999, p. 44) also mentions that the objectives for a market research should be short and precise and not to be confused with *detailed objectives* which includes a list of what information the market research need to collect in order to meet the objectives. In order to avoid misunderstandings, Hague and Jackson (1999, p. 44) explain that the client before start-up should approve the objectives of a market research report.

Our Approach to the Problem

A first step in the process of conducting the market research was to carefully determine the objectives for the project. The difficulties explained by Hague and Jackson (1999 p. 44) in defining the objectives was observed by the

authors of this master thesis. The process of determining the objectives for the market research was complicated by the situation with three supervisors at Company X who all had their own expectation of the project. However, after bringing the three different stakeholders together the objectives for the project was determined and all misunderstandings were eliminated.

Hague and Jackson (1999, p. 46) mention that the initial list of desired information for market research studies can get quite long and articulates the importance of evaluating what information that is essential to know and what is of less importance. This phenomenon occurred in this market research project and lead to an extensive project specification. However, together with the Company X supervisors, the initial list of market information was narrowed down to a practicable list consisting of 4 application/focus areas: District Energy, Local Hydronic Heating, Food Retail Refrigeration and Cold Storage Refrigeration.

3.2.2 Planning

Before the start of the empirical data gathering phase, Hague and Jackson emphasises the need of a *Planning Phase* (1999, p. 19). The planning process includes deciding how important variables, specific for the market research, will be obtained together with deciding how the objectives will be met.

Gathering the Market Information

The first step in the planning phase is to choose the right method for gathering market information. The four most relevant methods for gathering data are survey, case study, experimental and action research. (Höst, Regnell and Runesson. 2011, p.30)

- *Survey* is preferably used when the purpose for the study is to describe a phenomenon. A survey is therefore associated with either a descriptive or an explanatory approach. The method used for data collection is mostly executed by using a random selected sample of the population. A survey uses a fixed methodology and results in quantitative data. (Höst, Regnell and Runesson. 2011, p.31)

- *A case study* is according to Lekvall and Wahlbin (2009, p. 215) the preferred methodology to use when describing a single phenomenon

more deeply and thoroughly. The main objective in a case study is to obtain numerous descriptions from different interviewees. The approach results in different viewpoints and variations of the studied object and may result in new insights that are valuable for exploratory studies. The method is also characterized by the lack of interest in profound conclusion about underlying factors for a specific behavior, why the approach is not suitable for explanatory and predicting studies. However, the method is suitable for studies with a descriptive and exploratory approach. The method enables a non-fixed process and often results in qualitative information (Lekvall & Wahlbin, 2009, p. 216)

- An *experimental* method is a more methodical approach compared to a survey and a case study. The experimental method is considered to be a fixed approach where the goals are defined before the start of the project. The method also requires a hypothesis and pre-defined variables. (Höst, Regnell and Runesson. 2011, p.38)

- *Action research* is described by Höst, Regenell and Runesson (2011, p. 39) as a different version of, or an extension to, case studies. The method uses the same techniques as for case studies and surveys to map a current situation. In addition to the two methods an action research approach also provides a solution to the identified problem. The solution must be evaluated and possible errors must be stated, in order to be solved in future studies, and/or solved in the study. The process of identifying and solving problems is iterative, which means that the identified and solved problems must be re-evaluated. The iterative process of solving and re-evaluating is related to the Shewart-cycle described by Bergman and Klefsjö (cited in Höst, Regnell & Runesson, 2011, p. 39).

The methods presented above can be used simultaneously. This is called triangulation and for the most studies this result in a better understanding of the studied area. (Robson 2002, cited in Höst, Regnell and Runesson, 2011, p.31)

Our Approach to the Problem

Since this master thesis is a combination of a descriptive and an exploratory study, the preferred method to use was a case study. Important aspects when using a case study approach are to include numerous interviewees with different viewpoints of the market resulting in a broad understanding of the market. It is important to understand that the type of information that is collected in interview sessions will be of a qualitative nature. Therefore, in order to meet the objectives of the master thesis, the information collected from interviews was complemented with quantitative secondary information.

Hague and Jackson (1999, p.19) emphasises the fact that "*Market research is an applied science and its output should result in action".* Why the authors of this master thesis strived to make the output of this master thesis as comprehensive and easy to use in the decision making process at Company X.

Deciding the Target Population

Interviewees are normally decided through some kind of systematic election. The election methods can be divided into *probability methods* and *non-probability methods*. The later mentioned are more commonly used in qualitative research. (Lekwall & Wahlbin, 2001)

Quasi-statistical elections are non-statistical elections that strive to imitate probability methods of election, but the method cannot achieve the same statistical accuracy. An example of a quasi-statistical method is a *directional election*, where the interviewees in a firstly elected group are asked about new persons interesting for the research. *Assessment election* is used when the statistical independence is not of interest for the research and the goal instead is to highlight certain problems. In such case, the interviewees are elected by certain criteria that make them interesting for the study. (Lekwall & Wahlbin, 2001)

Our Approach to the Problem

This master thesis uses a case study approach and it was therefore important, at an early stage, to identify important and valuable interviewees. In order to acquire as many different viewpoints as possible it was decided that all players in the buying process should be included in the survey. A first step was therefore to map the buying process for the markets included in the master thesis.

Interviews were held with market managers at Company X in order to map the buying process and identify stakeholders. This led to exhaustive mapping of the buying process and the stakeholders for each segment could thereafter be identified.

Choosing what stakeholders to interview from the initial list was done using the *pareto principle* explained by Hague and Jackson (1999, p. 15):

> *…the pareto principle applies to most business markets; the top slice of a few very large players accounts for the large majority of the market and a small 'judgement' sample which includes such key respondents, will provide reliable data, whilst a random sample, which takes no account of industry structure, will produce only nonsense.*

Since the head office in Sweden had little knowledge of the Canadian markets additional interviewees were added as the project progressed and as a greater understanding of the Canadian markets was acquired. Consequently, the research conducted for this thesis used both an assessment election and a directional election of interviewees. Throughout the empirical study, directional election of interviewees has been used as a complement. By doing so, the amount of possible interviewees increased as it gave a valuable personal network. However, one may argue that the directional election affects the validity negatively but the increasing amount of available interviewees was believed to limit such negative effects.

Understanding Qualitative and Quantitative Research Methods

As discussed earlier, both qualitative and quantitative data was used in this master thesis. It is therefore of great importance to understand the differences and limitations of using either qualitative or quantitative information. Qualitative and quantitative studies differ mainly in two aspects: The first one is how the gathered data is expressed before it is analyzed – if it is recorded as numbers or expressed verbally, in pictures etc. Secondly, the analysis is different for a qualitative and a quantitative research. A quantitative research is based on methods for calculating statistical solutions while a qualitative analysis draws conclusions from verbal reasoning and mind maps. (Lekwall & Wahlbin, 2001, p 213)

Lekwall and Wahlbin (2001, p 214) mentions that the chosen method of analysis should be determined by what is appropriate according to the purpose of the analysis. Thus, many case-based analyses are qualitative since the initial analysis usually is qualitative.

Goodyear (cited in Lekwall & Wahlbin, 2001, p 214) exemplifies some characteristics of qualitative research methods.

- *Small selections*
  Often 20 or fewer. This varies, however, and the number of respondents can be a lot greater.

- *Relatively low-structured interviews*
  Often, the focus is to create an interaction with the interviewer and the interviewee and the content of a question is greatly affected by the answer to the previous question.

- *Greater impact from the researchers subjective points of view and values through the research process*
  This applies all the way from the problem definition through the interviews into the analysis and interpretation of the data. Such personal impact exists naturally in all research processes but is more characteristically occurring in qualitative ones.
- *Easier accessible research data*
  The user of the information can understand the data immediately without first being interpreted and modeled by experts.

Whether qualitative researches produce the same scientifically reliable result as quantitative is often discussed. According to Goodyear (cited in Lekwall & Wahlbin, 2001, p 215), one must therefore differ between reliability and validity of the research method. The reliability will likely to be lower in a qualitative analysis but the validity might be as high and often even better.

Our Approach to the Problem

For the study of the market potential in Canada the selection of possible respondents will be limited with a few people having a substantial knowledge of the specific area. Such factors proclaim the use of a qualitative study for

making the study. As mentioned earlier, for mapping the current situation additional quantitative secondary information will also be needed.

3.2.3 Data Collection

The third phase in the market research process described by Hague and Jackson (1999, p. 19) is the collection of market information. The main source of information in this master thesis was qualitative interviews. Methods of qualitative research are presented in the first section of this sub chapter. Methods for collecting secondary data will also be presented since it was used as complimentary source of information in the market research.

Qualitative Data Collection Methods

Observation

Observation is the traditional way of collecting information for market researchers while questioning is a relatively new phenomenon. Nowadays, however, observations are used whenever it is not considered preferable to interview people. Such situation may occur when interviewees' behaviour explains more about their opinion than their ability of explaining it. The results of observations are usually recorded in note form. (Hauge & Jackson, 1999, p 72)

Group Discussions

Group discussions are a popular and widely used technique for conducting qualitative research. In general, people open up more easily when discussing a subject in a group and a brainstorming effect is easily created when participants encourage each other. (Hauge & Jackson, 1999, p 73)

Group sizes in discussion forums usually differ. According to Cooper (cited in Hauge & Jackson, 1999, p 73), a typical size is 6-8 respondents in Europe and 10-12 in the US. A group should consist of people relevant for the study, which may be:

- People in a target group that are potential buyers/users of a product or service.
- People that are already customers/users.
- People with a particular profession or expertise within the area. This is usually relevant within business-to-business research.

During a group discussion, a researcher should act as a moderator, making sure that all participants become involved in the discussion and that the discussion does not loose its focus. (Hauge & Jackson, 1999, p 73)

Personal Interviews

Personal interviews are the preferred and most common way of collecting primary data. There are many advantages of conducting interviews in person and they mainly concern the personal contact with the interviewee that generates a depth and better explanations. (Hauge & Jackson, 1999, p 146)

However, there are disadvantages with personal interviews as well concerning the time, cost and organization required to set up and conduct the interviews. (Hauge & Jackson, 1999, p 146)

Telephone Interviews

The greatest advantage with telephone interviews is the flexibility and low cost of organizing them, especially when the study involves geographic distances that are hard to overcome otherwise. However, the difficulties in using visual assistance can make telephone interviews hard when the questions are of more complex nature. Furthermore the lack of personal contact makes analyzing the respondent's reactions hard and thus obstructs achieving the desired depth of the interview. (Hauge & Jackson, 1999, p 146, 147)

Depth Interviewing

For business-to-business research, as earlier mentioned, group discussion is an attractive tool. However, in such research the possible respondents are usually few and geographically scattered. Thus it might be impossible to gather them in groups, leaving in depth interviews as the only option. For the same reason, the sample of an industrial or business-to-business research is usually small. Hence, there is no point using very structured interviews for conducting the research since all fieldwork may be regarded as depth. (Hauge & Jackson, 1999, p 76)

Our Approach to the Problem

The main research method that was chosen for mapping the Canadian market potential was depth interviews because of the purpose of acquiring new first-hand knowledge. Also the big geographical area, limited number of

interviewees and interviewees limited schedules contributed to the choice of depth interviews.

Personal and telephone interviews were both used for the in depth interviews. A significant difference in the quality of information was detected between the two methods. Personal interviews provide far better data why the method was the preferred choice whenever possible. However, as mentioned before, the geographical spread and the great number of interviewees made telephone interviews necessary.

Questionnaire Design

For all interviews, stakeholder specific questionnaires were designed and used as guidance throughout the interviews. The questionnaire was designed a sequence of questions, used as a tool to record the data from the interviews.

The questionnaire should fulfil four purposes according to Hauge & Jackson (1999, p 115):

- *Gather accurate information from respondents*
- *Provide structure for the interviews*
- *Provide a form on which answers and facts can be written down*
- *Facilitate data processing*

There are three different types of questionnaires that should be used for three different interview situations. *Structured questionnaires* are used when a large amount of interviews are conducted and it is easy to anticipate the responses. *Semi-structured questionnaires* are often used in B2B market research when the different responses may vary substantially and there are fewer respondents. *Unstructured questionnaires* are used when the markets are narrow or technical and when depth interviews or group discussions are used. They should also be used when the researcher is unsure of the responses before the interview. Structured interviews use closed questions, while unstructured interviews use open ones. Semi-structured is usually a mix between open and closed questions. (Hauge & Jackson, 1999, p 115)

Furthermore, questions can be classified into *behavioural, attitudinal* or for *classification.* Hauge and Jackson (1999, p 116) provide a description of the different types of questions that is summarized in Table 1 below.

Table 3.1: Summary of the different classification of questions. (Hague & Jackson, 1999, p. 116)

Type of question	Information sought	Types of surveys
Behavioural	Facts about what the respondent does or owns and why different actions are performed.	Market sizing, market shares, product usage and awareness
Attitudinal	Peoples opinions about something	Brand and technology image surveys, brand mapping, customer satisfaction studies.
Classification	Information to group different respondents in order to determine how they differ from each other.	All types of studies.

Our Approach to the Problem

Since the interviews were of depth interview characteristics mainly unstructured questionnaires were used. The mapping of the Canadian market included both the current state and future development why the questions were a combination of the two types attitudinal and behavioural. The questionnaires also provided a structure for the post-interview analysis process that proved helpful since no recording devices were used during the interviews.

Secondary Data

Secondary research, or desk research, is the use of information that has already been published. Secondary research is considered to be highly valuable and in most cases also accurate. The amount of information that can be obtained through secondary research is surprisingly large and the method has a high ratio between amount of data obtained and time spent looking for the data. However, the benefits of secondary research quickly diminish meaning that a couple of days researching secondary data often are enough. (Hague & Jackson, 1999, p. 55)

Methods for acquiring secondary data, described in the book by Hague and Jackson, promotes libraries and the use of Internet as relevant information sources. (Hague & Jackson, 1999, p. 56)

A limitation of using secondary data is the fact that some information is not freely available or not available at all. Another limitation is the unpredictability of what will be generated when one first initiates a secondary data research. However, Hague and Jackson (1999, p. 55) explain that conducting a secondary research before a primary research always is preferable. Since the time spent collecting the more expensive primary data can be decreased by the information gathered through the more inexpensive secondary research.

Our Approach to the Problem

In this master thesis secondary data was used as a complement, and to validate, information acquired during interviews. The secondary data was mostly acquired using various reports and e-sources. Through the selection of secondary data, independent sources such as trade organizations have been strived for. In some occasions, data was acquired through written documents such as manuals and reports. The secondary data was also used as a quantitative input (statistical data) for the market sizing models and to validate and further develop the information acquired from interviews.

3.2.4 Data Analysis

According to Hauge and Jackson (1999, p 190), there is a lack of literature covering the subject of qualitative analysis. The interpreted reason is the individual researcher's impact on every qualitative study. It is highly unlikely that two different researchers will produce the same outputs, even when conducting the same study due to their personal interpretations.

Accuracy

The choice of research methodology and how the target population is decided, strongly affects the degree of accuracy according to Hauge and Jackson (1999, p. 48). Hague and Jackson (1999, p. 48) also explain meeting objectives not always equals a high accuracy. Meeting the objectives is all about finding the appropriate amount of accuracy for the specific objectives.

Our Approach to the Problem

Accuracy has not been a major concern during the process of mapping Company X's potential in Canada, because of the qualitative nature of the research. For the quantitative data mostly secondary data have been used. The accuracy of the secondary data was of high importance why the obtained secondary data was validated by interviewees.

Validity

Validity is the extent to which the results from the study reflect a true and objective picture of the reality. The theory of validity applies to both a phenomenon that is described qualitatively and a model that is describing something quantitatively.

For studies that are designed in a flexible way, it is appropriate to take the following areas into consideration (Höst et al, 2006, p 117-118):

- *Logbook*
  The foundation of a valid study is to archive decisions, thought processes and problems along the way. It is especially important to save documentation from a data collection or analysis so that it is possible to follow the path leading to a certain conclusion afterwards.

- *Feedback*
  To receive feedback from the data sources or from other experts is useful to secure a solid fact base.

- *Third-party inspection*
  Having an independent third-party inspecting the results along the way reduce the risk becoming 'home blind'.

- *Triangulation*
  Triangulation, by using different methods of data gathering gives a more accurate picture of the phenomenon studied.

- *Long-term studies*
  To conduct the research over an extensive time-period can be both positive and negative from a validity-point of view. It makes understanding the full complexity easier but simultaneously increase the risk of becoming a part of the phenomenon studied resulting in a difficulty to be objective.

Our Approach to the Problem

In order to increase the validity of the outcome of this master thesis, some of the above-mentioned methods to ensure the correctness of data have been used. During the field study phase of the master thesis, *feedback* from industry specialist and other *third party inspections* have been used for all acquired

data. The method of *triangulation* has also been used in order to ensure high quality data.

3.2.5 Reporting

The phase of *reporting* described in Hague and Jackson's market research process (1999, p. 18) is the last part of this master thesis.

Our Approach to the Problem

The reporting part of this master thesis includes both a written an oral presentation. The structure of this written report is presented in *Chapter 1.1.3 – Disposition.* The oral presentation consists of two separate presentations, one at Company X Lund and one at Lund University.

4 THEORETICAL FRAMEWORK

The theory chapter describes the theories and models, which are used during the analysis of the gathered data. The chapter starts with an explanation of the four phases of a market-orientated approach and how it can be used within a company. A focus on the first phase, Intelligence Generation, and what role a Marketing Information System has in this phase is then presented. The last piece in the theoretical framework, the PESTEL framework and Scenario Building, and how it can be used within a Marketing Information System will thereafter be discussed. Lastly a discussion of the empirical approach of the theoretical framework will be presented.

4.1 Introduction

The foundation of this master thesis was the fact that there was a need for a marketing research in Company X's Canadian market due to an experienced desire of increasing the knowledge. Such knowledge need implicates a possible weakness within the processes for generating market information within Company X. Marketing Information System is a tool for collecting and storing market information within an organization. Thus, the information generating activities at Company X was analyzed from the theory *Marketing Information System*. Furthermore, in order to connect the research to a strategic level context, generating market information is a cornerstone in the theory of *Market Orientation*. Since Company X's Industrial Equipment Division is a market-oriented division, the theory of market-orientation was added to the theoretical framework of this thesis.

Since the desired outcome of the marketing research was to gain knowledge about the macro environment and the underlying drivers that affect the studied markets, a PESTEL-analysis was considered being an appropriate framework to follow when conducting the market research.

4.2 Market Orientation

The degree of using market based information about customers, competitors, important stakeholders and trends in the decision making process can be

measured by the degree of market orientation. Mohr et al. (p 104) describe a market-oriented business as a company that uses market information to guide strategic decision-making. Thus, market orientation involves gathering, sharing and using information about the market the company operates in. Furthermore, market orientation means an organizational culture based upon a philosophy of putting the customers' needs first in the decision-making process. To achieve such culture, the firm needs an effective management of the knowledge that is inhibited in different parts of the organization. Also, all people, departments and divisions must collaboratively work towards the goal of delivering value to customers. (Mohr et al. 2010, p 104)

Four dimensions characterize a business that is market oriented. First of all, they *generate intelligence* of the market, which involves the present and future needs of the customers, the strategies and capabilities of their competitors, and knowledge of future emerging technologies that may impose opportunities or threats. A market oriented business also have an ability to *disseminate* the generated intelligence throughout the organization and to *integrate* the information in the organization, creating the knowledge to base decisions upon. Finally, market oriented businesses use a *coordinated action* across different departments and functions to create customer value based on the acquired knowledge. (Mohr et al. 2010, p 105)

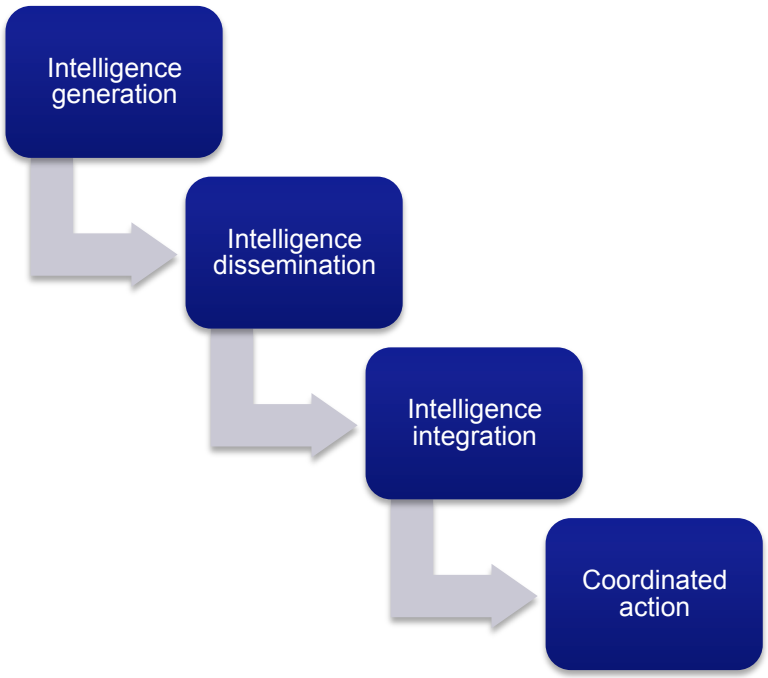

Figure 4.1: Four dimensions that characterize a market-oriented business. (Mohr et. al. 2010, p 105)

4.2.1 Intelligence Generation

Market intelligence is describes by Mohr et al. (2010, p. 105) as useful information about trends and stakeholder in the market. This includes:

1. Current and future customer needs
2. Competitors' capabilities
3. Emerging technologies both inside and outside the industry

The market intelligence can be acquired in various ways. Mohr et al (2010, p. 106) mentions customer hotlines, trade shows, customer visits, working with lead users, alliances, cooperation with universities as some examples of generating market intelligence.

4.2.2 Intelligence Dissemination

Any market intelligence is useless unless it can be shared effectively across the organization. Hence, a firm committed to market orientation use effective routines to disseminate market intelligence across the organization. People

within the organization must also be able to ask questions and extend or modify the information to generate new insights. (Mohr et al. 2010. p, 107)

4.2.3 Intelligence Integration

The third phase of the market orientation process is to integrate the generated intelligence to create knowledge assets (Mohr et al. 2010, p.111). Mohr et al. (2010. p, 112) describes two categories of information within a company: Explicit and Tacit knowledge. Explicit knowledge is the knowledge that is easily understandable and that can be stored in documents. Tacit knowledge is more complex, it refers to the combined understanding of how things work and consists of facts, stories, biases, insights and networks of stakeholder relations. This kind of knowledge cannot be transferred using documents but must be shared person to person. (Mohr et al. 2010, p. 112)

4.2.4 Coordinated Action

The last phase in the market orientation process is to use the intelligence in a coordinated decision process across divisions and function. A coordinated decision leads to less misunderstandings and lowers the risk of failure. Decisions that are being made inter-divisionally and inter-functionally are more precise since the decision will be based on a greater representation of information (Mohr et al. 2010. p, 112).

4.2.5 The Effect of Market Orientation

The effect of a market orientation philosophy in a company leads to increased product and service quality together with the development of new products. This leads in turn to superior sales growth and profitability compared to other companies in the industry. (Mohr et al. 2010, p 105)

A market-oriented approach also works as a fertilizer for the development of new innovations. Moreover, studies have shown that companies with intensive R&D activity stand to gain the most of being market oriented. (Mohr et al. 2010, p 105)

Mohr et al. (2010, p. 106) emphasis that the effect of a market orientation approach is ineffective unless the company continuously allocates resources to the intelligence generation phase.

4.2.6 Responsive or Proactive use of the Generated Intelligence

Mohr et al (2010) describe the importance of moving beyond the state of only responding to current market intelligence, referred to as having a responsive market orientation. This in order to reduce the risk of *marketing myopia,* which is a tendency to only concentrate on solving the existing customers' needs with the currently demanded technology.

> *Firms that focus too narrowly on their established customers (the tyranny of the served market) may be constrained in the strategies and technologies they choose to pursue. Such a focus obscures the possibility that customer needs may change over time and may be solved in radically different ways, allowing new, disruptive innovations to creep up like a stealth attack. (Mohr et al. 2010, p 107)*

The proactively market oriented firm, on the other hand, uses current market intelligence together with anticipatory intelligence, which focus on possible latent needs of the market and future needs that the customers are not aware of yet. Being able to address these future or latent needs gives the company a possibility to achieve a top-competitive position as the customers become aware of their needs. (Mohr et al, 2010, p 107)

Table 4.1: From responsive to proactive market orientation (Mohr et al, 2010, p 106)

	Responsive market orientation	Proactive market orientation
Information about:	• Current, expressed customer needs • Current competitive situation	• Latent and future customer needs • Future competitive threats

4.1 Marketing Information System - MIS

A tool for achieving the above-mentioned dimension of intelligence generation is the Marketing Information System. The theory, presented by Kotler (2011), concerns how to manage marketing information in order to gain valuable customer insights. It contains the people and the procedures for developing the

information the organization needs and that help the organization use the information to make decisions to create knowledge about the market.

> *The MIS begins and ends with the users – with assessing their information needs and then delivering information that meets those needs*. (Kotler, 2011, p 130)

4.1.1 Assessing Information Needs

A well-functioning MIS should create a balance between the information the users would like to have and the information they actually need. Generating too much information can have as negative impact as having too little information and in general, managers often express a need of all information they can think about rather than evaluating what they need it for. Another problem might be that the managers' are not aware of what kind of information they should have to make better decisions and the MIS should provide them with that knowledge. Also the costs of gathering, storing and delivering information are often high, why the routines for assessing the information needs must be well developed. It is also useful to remember that the value comes from using the information, not the information itself. (Kotler, 2011, p 131)

4.1.2 Developing Market Information

Market information can be derived from *internal data, marketing intelligence and marketing research*.

Internal Data

Internal data is information that can be obtained within the company's network from the customers' past purchases for example. Building internal data networks, where managers easily can find market information to work with for different purposes can constitute competitive advantages for a company. Often, the most valuable market information is already accessible within a company but is not used efficiently enough. (Kotler, 2011, p 132)

Information in an internal data network usually comes from many different sources. Marketing department as well as customer service, operations or accounting, are important sources to gather information from. (Kotler, 2011, p 132)

Internal data network is a cost efficient and easy way to access market information. However, since the information gathered from the different departments usually is presented in a way that fit their needs, it is not prepared for market decision-making purposes. Hence, when gathering the data into a database, it usually requires a slight rework. Adding the fact that much of the data gets out-dated quickly, keeping a database current is resource consuming. (Kotler, 2011, p 132)

Marketing Intelligence

Marketing intelligence is involves collecting publicly available information about consumers and competitors in the marketplace. It is a way to monitor competitors' and consumers' activities in order to understand the market. It may involve anything from gathering information from competitors' annual reports to browse trade shows or online forums. Even going through trash bins to get documents from competitors may be regarded as marketing intelligence. (Kotler, 2011, p 132)

Marketing Research

In addition to the information about general activity in the marketplace, provided by marketing intelligence, an organization needs formal studies that generate customer and market information. Marketing research can be used in many different situations and refers to a systematic design, collection, analysis and reporting of information needed for a specific marketing situation. Marketing research can for example be used to assess market potential or determine market share. (Kotler, 2011, p 134)

4.2 PESTEL Analysis and Scenario Building

4.2.1 Scenario Building

Scenarios are used to explore different plausible outcomes and the technique is a valuable tool to prevent decision makers from closing in for a single view when there are actually several possible scenarios. Thus the scenarios usually build on the factors that are essential for change, key drivers for change, found using a PESTEL analysis. It is important to understand that scenarios do not give a single specific forecast of how the environment will develop, but instead different plausible outcomes based on the variation in the key drivers for change. (Johnson et al, 2008 p 57)

Scenarios start from the current state of a market together with the outcome of the key drivers with the highest level of uncertainty. Sharing or debating different scenarios constructed around those drivers improves the organizational learning and makes managers aware of important influences in the business environment. Scenarios are especially suitable to use when there are a limited amount of key factors affecting the development of the business environment or the success of a strategy. (Johnson et al, 2008 p 57-58)

Managers should use the output from the scenario analysis to develop strategies suitable for each scenario and by monitoring the development in the business environment, chose the most appropriate strategy accordingly. (Johnson et al, 2008 p 57)

4.2.2 PESTEL Framework

In order to build scenarios there must exist input variables, key drivers for change. Identifying the most influential key drivers for change in a market can be done with a PESTEL framework using the information gathering techniques and described in section *4.2.3 Intelligence Generation*.

The PESTEL framework is a tool for analyzing the macro environment in which an organization operates by listing drivers for change. PESTEL lists different factors that influence the development and stands for political, economical, social, technological, environmental, and legal. Political factors are connected to the role of governments and their decisions; Economical factors refers to macro-economic features such as price levels, economic growth and business cycles; Social factors are influences from the culture or demographic features of the environment; Technological influences are technologies or innovations that affect the market; Environmental factors embrace green issues and Legal factors are legislations and restrictions. (Johnson et al, 2008 p 55)

After listing the drivers for change it is important to see the connection between different factors and to identify the key drivers for change for the specific market. Key drivers for change are the high impact factors that have a great probability to significantly affect the success or failure of a certain strategy choice. (Johnson et al. 2008. p. 56)

The key drivers found from a PESTEL analysis are used to build different scenarios on the key drivers in order to explore different ways in which the macro-environment may develop. (Johnson et al, 2008 p 55)

Johnson et al (2008. p, 59) explains that building scenarios are especially useful when only a limited number of key drivers of change influences the success of the company, when the outcome of a key driver is uncertain, when the outcomes of the scenarios greatly differ and when the company faces high up front investments that cannot be reversed. (Johnson et al. 2008. p. 59)

4.3 Empirical Use of the Theoretical Framework

The theoretical framework presented above will be used with a bottom up approach. This means that the empirical part in this master thesis first will analyse the PESTEL factors and scenarios. Thereafter evaluate Company X's *Marketing Research* as a part of the Marketing Information System. Lastly, the degree of market orientation, with focus on *Intelligence Generation*, will be discussed. For a more illustrative example of the empirical approach and how it relates to the theoretical framework please see figure 4.2.

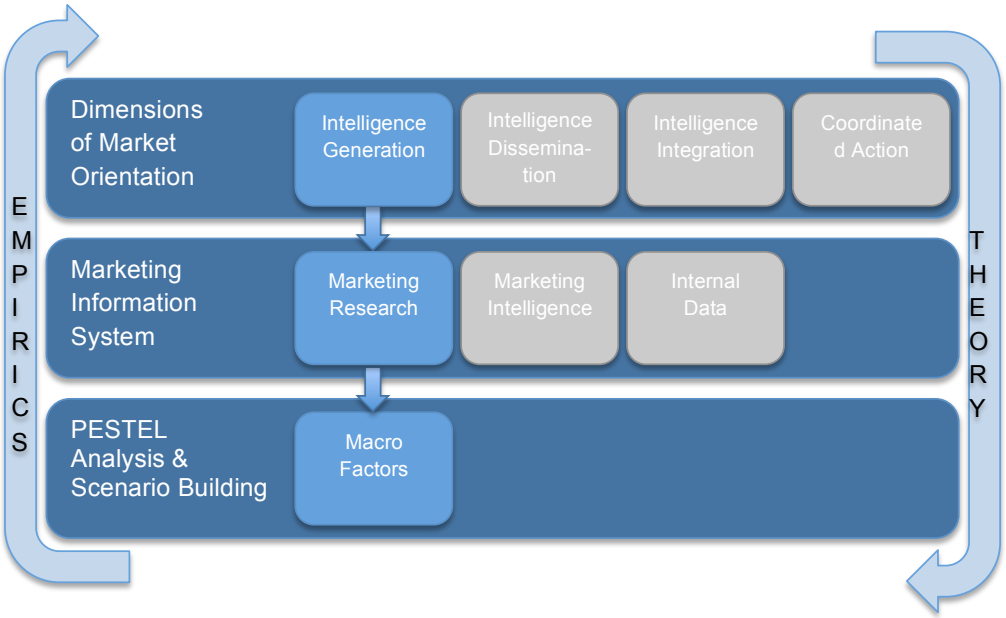

Figure 4.2: The theoretical and empirical framework

5 EMPIRICS

The empirical chapter presents the data that is to be used for analyzing and mapping of the four Canadian markets. The disposition of the chapter uses a bottom up approach of the theoretical framework starting with the current status. After follows the PESTEL findings from the qualitative interviews. The last part of the chapter is dedicated to the findings of Company X*'s Marketing Intelligence System and degree of Market Orientation.*

5.1 District Energy

5.1.1 Current Status

Existing Systems

Canadian District Energy Association conducted a mapping of existing district energy networks in 2009. Across the country, 118 district energy plants were identified; Ontario has the highest number of systems in operation, counting for 43% of the total amount. (CDEA, 2009, p 7)

Table 5.1: District energy systems across Canada (CDEA, 2009, p 7)

Location	Amount of DE systems
Ontario	51
Alberta	14
B.C.	11
Nunavut	9
North Western Territory	8
Quebec	7
Nova Scotia	5
Manitoba	4
Prince Edward Island	3
Yukon	3
Saskatchewan	2
New Brunswick	1
Total	**118**

In 2012, the number of district energy systems is 130 across Canada. (White, 2012)

Connected Building Area

CDEA (2009, p 8) estimated that there were 27 million square meters of floor space connected to district energy systems across Canada in 2009. That represents about 1.3% of all existing floor space. (CDEA, 2009, p 8)

The amount of floor space connected to district energy networks varies throughout the country. An estimation of the amount of floor space connected in different provinces was presented by CDEA (2009, p 7) in their report from 2009 and their findings are stated in Table 5.2 below.

Table 5.2: Known district heated floor space per region (CDEA, 2009, p 8)

Province	m^2 Connected to District Energy
Ontario	5,955,298
Alberta	2,311,608
B.C.	1,272,756
North Western Territory	6,500
Quebec	2,272,255
Nova Scotia	201,685
Manitoba	540,231
Saskatchewan	725,573
New Brunswick	371,612

Installed Capacity

The approximated total capacity installed for district energy in Canada for 2009 is 6050 MW (CDEA, 2009, p 8). The amount of district energy in Canada is believed to have grown during the last three years and the workload at FVB Energy, one of the largest players in the district energy industry, has been at a constantly high level during the recent years. Many existing district energy systems are growing and there is a constant establishment of new systems as well. (John Stephensen, Project Manager at FVB Energy, interview, 13 March 2012).

5.1.2 Features of the District Energy Market in Canada

Small District Energy Networks in General

In general, a new district energy network in Canada is constructed to serve one or a few larger buildings. A common method is to build a plant with room to install additional boilers later on, and the district energy network can thus be expanded as the demand arises from additional buildings located nearby. A consequence of this is a market with small direct district energy networks. (Elliot Digby, Application Engineer FVB Energy, interview, 13 March 2012)

Furthermore are substations very uncommon in Canadian buildings connected to district energy networks. (Elliot Digby, Application Engineer FVB Energy, E-mail, 3 May 2012)

Through the CDEA survey (2007 p 10), it was also noted that the use of district energy and electricity cogeneration is considerably more common among the newly built district energy plants compared to the old plants. Also, the average floor space served by the plants differs between the older plants and the newly established ones, with the new plants serving a smaller floor space on average (see Figure 5.1).

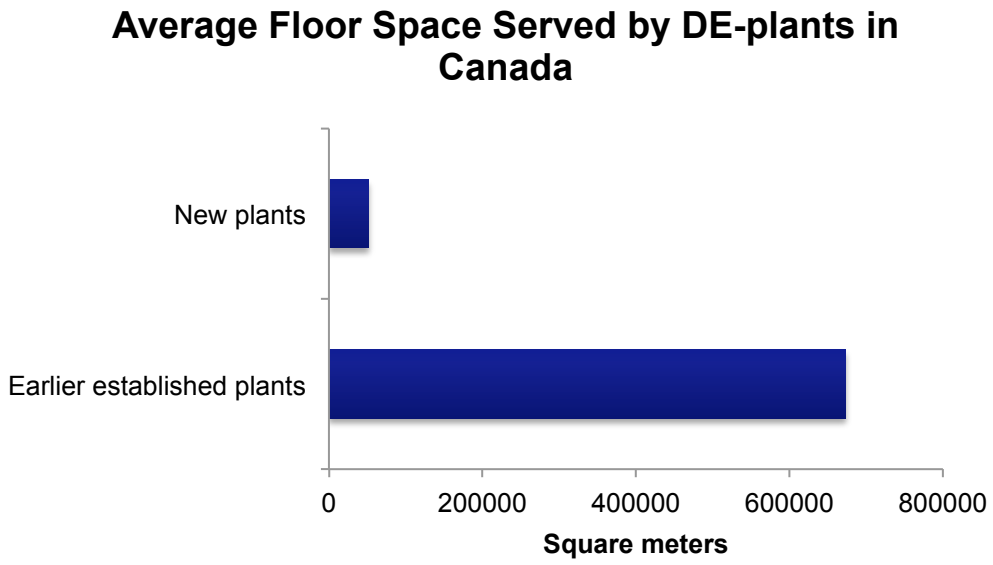

Figure 5.1: Average floor space served by each DE plant. (CDEA, 2007 p 10)

Heating Versus Cooling

The use of district cooling in Canada is mainly concentrated to the Province of Ontario, as it is the only geographic area where the climate requires a great amount of air condition during the summer. The other provinces where there is a substantial amount of district energy for heating purposes are located out west or in the Atlantic costal areas. Consequently, the total amount of district energy that is represented by cooling is estimated to be 10% or less. (John Stephensen, Project Manager FVB Energy, interview, 12 March 2012)

District Heating for Domestic Hot Water Purposes

The amount of product As used in buildings is heavily depending on whether the buildings use the district heating network for domestic hot water or not. Buildings that don't have showers and don't use greater amount of hot water use separate systems for domestic hot water (Elliot Digby, Application Engineer FVB Energy, interview, 13 March 2012).

Value of Product As in a District Energy Network

A typical building served by district heating uses 1 MW of heating. Since domestic hot water heating partially uses the hot return water for heating

purposes, the estimated effect required for heating a building is not affected by the use of domestic hot water heating. (Elliot Digby, Application Engineer FVB Energy, interview, 13 March 2012)

In terms of types of buildings served, the most common ones for both earlier and newly established plants are educational institutions. One can also note that among the newly established plants, residential and commercial buildings are more common than among the already established plants. (CDEA, 2007, p 11)

Frequency of Renovation for Product As in a District Energy Network

For the product As used in buildings connected to district energy networks, the lifetime differs between different application areas. Domestic hot water heating wears down the product A faster while space heating and cooling is less demanding. The estimated time between replacements of product As in the different applications are stated in Table 5.3 below. (Elliot Digby, Application Engineer FVB Energy, interview, 13 March 2012)

Table 5.3: Frequency of renovation for district energy product As (years) (Elliot Digby, Application Engineer FVB Energy, interview, 13 March 2012)

PRODUCT A application	Frequency of renovation (years)
Space heating PRODUCT A	15
Space Cooling PRODUCT A	15
Domestic hot water PRODUCT A	10

At the end of these life cycles, when product As for district energy use needs renovation, it is highly uncommon that the existing product As are renovated. They are more commonly replaced with new ones. (John Goswell, HVAC & Refrigeration Manager, Company X Canada, Interview, 29 March 2012)

Heating/Cooling Effect Requirements

The effect required for heating and cooling is similar but differs between different types of buildings. Residential buildings require less heating and cooling effect than hospitals and other institutional buildings. Hospitals are here stated separately since they are considered using district heating for domestic hot water purposes as well. (Elliot Digby, Application Engineer FVB Energy, interview, 13 March 2012)

Table 5.4: Table 5.4: Heating and cooling effect requirements for different building types (Elliot Digby, interview 2012-03-13)

Space type	Need for heating (W/sqm)
Residential	60
Hospital	100
Other institutional	100
Space type	**Need for cooling (W/sqm)**
Residential	60
Hospital	100
Other institutional	100

Fuel Types in District Energy Plants

The most common fuel type, used in the district heating plants in CDEA's survey from 2007, was natural gas. Looking at the newly established plants, the amount of plants using natural gas as primary fuel source was lower. The reason is that newer plants tend to use more than one fuel type while established plants in general only use one type of fuel. For the district cooling plants, electricity was the most common primary source of fuel. (CDEA, 2007, p. 14-15)

5.1.3 Macro Analysis

Political Driving Forces

No Supportive Environment

The political challenges for district energy in Canada mainly concerns a lack of strong political leadership and district energy project promoters. This issue is partially connected to the absence of proper education and the result is a lack of existing supportive regulatory and legislative environment for district energy. (CDEA, 2011, p 22)

Regulations and Incentives Vary Between Provinces

In Canada, each province is responsible for it's own energy policy as well as planning of regional growth and environmental policies. The provincial governments are also responsible for regulating the natural gas and electric systems. At a federal level, a part of the federal gasoline tax is placed in a Gas Tax Fund (GTF), from which municipalities receive funding to support

sustainable infrastructure. However, the GTF does not direct the funding in any certain way and consequently there are no specific incentives promoting technologies like district energy ahead of other options a municipality may invest in. (IDEA 2011a, p 35)

The way, in which the energy policies are designed today, the possibilities to influence the use of energy at a federal level are limited (Roland Kilpatrick, Industrial Technology Advisor NRC, interview, 8 March 2012). Mary Ellen Richardson holds similar opinions and states that any promotion of district energy has to be tailored towards a specific region's features. The policies used by each province are also highly affected by the natural resource base of each province. The type of resources the province holds and whether the province is a net importer or a net exporter of energy both affect the policies used. For example is a strive to build pipelines for natural gas export an important part of a province's own energy policy. (Mary Ellen Richardson, President CDEA, interview, 20 March 2012)

At a provincial level, there are currently big differences between the political incentives for the development of district energy systems across different provinces. In BC, there have been ongoing political regulations driving municipals towards being carbon neutral, which certainly has promoted the use of district energy, as it opens up for the use of biomass for heating purposes. BC is also the province where the use of district energy is increasing the most (Mary Ellen Richardson, President CDEA, interview, 20 March 2012). However, there is a concern that after a time of economic incentives and legislations promoting district energy in BC, the amount of governmental grants will be smaller going forward which could cause the growth to flatten out. In Vancouver though, the municipal political leadership towards district energy is very strong with legislations demanding all newly constructed buildings in certain areas to be district energy-ready. Thus, one can still expect the growth of district energy to be the greatest in Vancouver future wise. (John Stephensen, Project Manager FVB Energy, interview, 13 March 2012)

The provinces with high amount of hydraulic power generation: BC, Québec and Manitoba, have traditionally had a low focus on district energy systems, as they have had a surplus of low priced electricity produced in an environmental way. However, as being shown in the CDEA report, the focus in BC has

changed substantially after governmental-driven environmental imperatives. Similar trends can also be seen in Québec. (CDEA, 2011, p 26)

There is still an amount of uncertainty in the provinces of Quebec and Manitoba, which both have potential to adapt similar regulations as BC, since the regulations are not fully in place yet. (Mary Ellen Richardson, President of CDEA, interview, 20 March 2012)

Less Political Resistance in BC

CDEA (2011, p 26) finds slight differences in the challenges district energy stakeholders experience across different regions in Canada. Survey respondents of British Columbia experienced the least challenges in the expansion of district energy. Those respondents did not experience the same extent of challenges regarding political legislation. CDEA concludes that a reason might be BC having developed a climate change legislation, which has inspired developers of district energy systems. Furthermore, most of the energy delivery in BC is done by BC Hydro, who is overall responsible for delivering and implementing provincial policies for clean energy. Thus, gaining support from different local utilities is not a great challenge in BC as it is in the other provinces. For the same reason is connecting different growing customer bases not a major challenge in BC compared to the other provinces, as government support is more common. (CDEA, 2011, p 26)

Vancouver's District Energy Connectivity Guidelines – Information for Developers

In July 2011, the city of Vancouver released District Energy Connectivity Guidelines. The guidelines are aimed towards building developers and require buildings of greater size than 2000 m^2, that are built in certain high-priority parts of the city, to be designed district energy-ready. The areas of high priority are areas that are considered attractive to construct district energy systems in. The reason for promoting district energy infrastructure in the city is to make the supply of cheap zero-emission hydropower available for usage in other application requiring electricity, this in order to fulfill the goals of electricity production emissions in the BC Energy Plan. (Spurr, 2011, p 71)

Ontario's Long-Term Energy Plan

One of the existing political initiatives that have potential to positively impact the development of district energy is the Ontario Long-Term Energy Plan (Mary Ellen Richardson, President CDEA, interview, 20 March 2012). By the end of 2010, the government of Ontario released a 20-year plan - *Building Our Clean Future.* Among the actions stated in the plan is a commitment to double the output from combined heat and power plants (CHP) from what was estimated to be 2000 MW 2010. This should be achieved by promoting projects for local CHP generation by applying a specific program for CHP-projects below 20 MW. (IDEA, 2011b, p 58)

Ownership

A majority of the district energy systems currently existing are owned by municipals and sometimes in partnership with privately owned companies. Hence, the ultimate political decision of constructing a district energy system is in most cases taken at a municipal level. (Elliot Digby, Application Engineer at FVB Energy, interview, 13 March 2012)

When it comes to connecting non-governmental buildings to an existing district energy network, there is currently a weak interest from building residents and operators. This causes the building developers to look at only the most economically attractive methods of heating and cooling. For the developers to start demanding district energy, a belief that the buildings will be more attractive to sell is needed. (John Stephensen, Project Manager at FVB Energy, interview, 13 March 2012)

Obstructive Legislations and Lack of Standards for Non-conventional Fuel Sources

An important part of the district energy value proposition is the flexibility between different fuel sources and the ability to choose a fuel type that is most attractive at the moment. Currently, European standards like CE are not recognized in Canada, which causes limitations in using for example biomass boilers in district energy plants. Simultaneously, there are no standards available for the fuel quality in biomass or pellets, which creates difficulties and extra costs for an operator using that type of fuel. In Ontario, for example, there are legislations that require several measurements and safety restrictions when burning pellets since it is classified as burning waste material, which

raises the operating costs for such plants substantially. (Roland Kilpatrick, Industrial Technology Advisor NRC, interview, 8 March 2012)

Green Building Certification does not Recognize District Energy

There is currently nothing within the green building classifications that promotes district energy ahead of any other heating or cooling methods that are considered to be “green”. John Harris, Certified Energy Advisor at DSG Home Inspection (interview 22 March 2012), says that when certifying buildings, the energy advisors would not know how to handle calculations of district energy systems, as it is more complex. Mary Ellen Richardson and Bruce Andler (interview 20 March 2012), agree on this problem as they both consider the current building classification codes to be obstructive rather than supportive towards district energy. None of the interviewees believe that any changes in building codes that would favour district energy is likely to happen in the near future.

Economical Driving Forces

Low Energy Prices

The natural gas markets in USA and Canada are one integrated North American market where prices are set commonly. Over the last 10 years, prices for natural gas have been decreasing (see Figure 5.2 below). (EnergyShop.com, 2012)

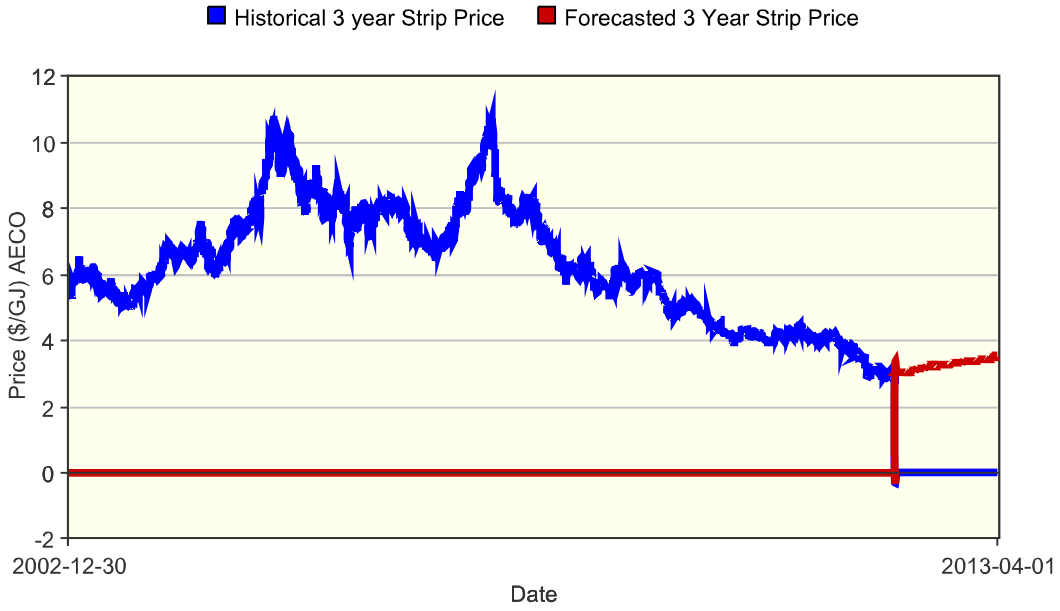

Figure 5.2: Historical natural gas prices and forecast. (EnergyShop.com, 2012)

Low energy prices and a lack of carbon emission pricing in Canada impact the financial attractiveness of district energy systems negatively. The high investment costs creates a time horizon to realize the economic returns that is too long to counterbalance the market penetration risk and thus the possibilities to attract capital. (CDEA, 2011, p 22)

The possibility of attracting willing investors is therefore depending on the availability of economic returns that are relatively attractive and risk-adjusted. This is considered being a key challenge for growing district energy going forward. (CDEA, 2011, p 22)

The low energy prices have throughout the empirical study been raised as one of the major barriers for a wide adoption of district energy in Canada. Domestic natural gas production and a well-developed natural gas distribution network are major reasons for the low prices. Thus, access to energy efficient heating and cooling does not have a high priority for the individual building operator or resident.

Among the experts interviewed, the opinion about the future development of energy prices differ. Oil prices can be expected to continue increase globally but for natural gas, the development is more uncertain. Implementation of a carbon tax or carbon credits would certainly increase the natural gas prices but the probability of such system being adopted within the near future is low. The production of fossil fuels is an important part of the Canadian economy. Large producers of conventional energy are heavy political lobbyists against development of new energy efficient technologies. (Mary Ellen Richardson, President of CDEA, interview, 20 March 2012)

John Stephensen articulates that a high energy consumption is very stimulating for the economy, creating vested interests for politicians. This certainly works counterproductive towards implementing carbon taxes or carbon credits. The fact that Canada recently left the Kyoto Protocol supports this theory as well. (John Stephensen, Project Manager at FVB Energy, interview, 13 March 2012)

Social Driving Forces

Lack of Knowledge

According to CDEA, lack of knowledge is one of the main barriers for district energy development in Canada. As long as decision and policy makers are unaware of the potential benefits of district energy, the technology will continue to be overlooked as a viable alternative. (CDEA, 2011, p 22)

According to Roland Kilpatrick (interview, 8 March 2012), a barrier for district energy is a common belief that it is more energy efficient to transport natural gas to each building and heat the buildings individually, compared to heating water centrally and transfer to the buildings. John Stephensen (interview, 13 March 2012) means that this is a common misconception about district energy that originates in a lack of technological knowledge. He says that this belief originates in an assumption about the efficiency in a district energy plant being the same as the one of a gas boiler in a single building. In reality, he says, the only way to possibly run a boiler optimally is in a district energy plant and the efficiency of a gas boiler in a building is actually only about 60 % according to FVB's studies while efficiencies of 90% can be achieved in a plant.

Roland Kilpatrick (interview, 8 March 2012) also highlights a lack of public knowledge in environmental issues as a current barrier for district energy development. Paying a premium for energy efficient solutions are not attractive as the connection between environmental health and energy efficiency is not publicly recognized. Natural Resources Canada conducted a survey among different stakeholders well educated in environmental issues and energy efficiency that showed an interest in paying a premium. He draws parallels between the educational level and the will to pay a premium for environmental health.

Also Mary Ellen Richardson and Bruce Andler (interviews, 20 March 2012) mention a lack of knowledge about district energy. They believe that the politicians have the same low knowledge about the possibilities of the technology as the public in Canada.

Overall, district energy is not seen as basic community infrastructure, why qualitative benefits and social development factors are not considered in the demands for investment returns. (CDEA, 2011, p 22)

Human Resource Challenges

Some experts mean that there is a lack of expertise human capital within the district energy industry. On a local level, the expertise gap leads to an inability to design, build and operate district energy systems that meet diverse needs for different Canadian communities. Current district energy operators confirm this challenge as they face difficulties in recruiting the right expertise. (CDEA, 2011, p 22)

John Stephensen at FVB Energy (interview, 12 March 2012) partially shares this concern. He means that the district energy industry would benefit from more companies with their expertise engaging in the market. More players engaging in district energy development would mean more options, increased knowledge and more public attention for the technology.

Wasteful Culture

Energy has always been cheap in Canada, which has created a wasteful culture and a low awareness of energy efficient solutions. (Roland Kilpatrick, Industrial Technology Advisor NRC, interview, 8 March 2012)

Increasing Urban Density

In Canada, the urban density is constantly increasing and can be expected to continue doing so. The infrastructure in the largest cities is ageing and can in many areas not be renovated to fit the increasing demands of the higher population density. This trend could create new opportunities for district energy according to Bruce Andler (interview, 20 March 2012). In Toronto for example, feasibility studies have shown that there are currently 30 possibilities for district energy networks (John Stephensen, Project Manager at FVB Energy, interview, 13 March 2012).

Technological Driving Forces

Areas Without Access to Natural Gas Holds Potential

In the northern habited parts of Canada and in certain areas along the Atlantic coast, the natural gas infrastructure is poor. These areas are mainly depending on other expensive fossil fuels for comfort heating today and the low supply of natural gas creates an opportunity for district energy. (John Stephensen, Project Manager at FVB Energy, interview, 13 March 2012)

Environmental Driving Forces

Uncertain Development of Fracking

Fracking is a highly questioned method from an environmental perspective to extract natural gas from the ground that is commonly used in the US today almost non-existent in Canada. There is a current debate about companies' interest in using the fracking technique in Ontario as well and a few wells are now in operation (Goodine, 2011). If the use of fracking should become widely accepted in Canada the supply of low priced natural gas in North America would increase and in the long run, indirectly lower the economic viability of district energy.

Sustainability Challenges

In the CDEA report (2011, p 22) 8 percent of the survey respondents experience sustainability challenges for district energy. Sustainability challenges refer to a difficulty of promoting district heating as a strategic tool for implementing a public environmental agenda and moving away from the dependence on fossil fuels. The fact that this aspect of district energy is often overlooked is considered as a challenge in the report. (CDEA, 2011, p 22)

Canada Leaving the Kyoto Protocol

In December 2011, Canada announced a withdrawal of the Kyoto Protocol on Climate Change. The given reason to that was that all the greatest emitters in the world did not partake in the protocol. (Austen, 2011)

5.2 Local Heating

5.2.1 Current Status – Local Heating Residential Market, Canada

Forced Air-Furnaces and Electric Baseboards the Preferred Choice

The current state and recent development of the residential housing market in Canada differ between provinces. Also the use of boilers for heating purposes differs widely. Scott Papp (Manager Contractors Division at Heating, Refrigeration and Air Conditioning Institute of Canada, interview, 2012-03-22) articulates that the use of boilers is more common in the east parts of Canada. This statement is confirmed by the report *Households and the Environment: Energy Use* published by Statistics Canada in 2007. The highest usage of boilers for heating purposes in the residential sector is in Prince Edward Island (51%) and Nova Scotia (24%) (Statistics Canada, 2007). Both provinces are located in the east and are, together with Newfoundland, Labrador and New Brunswick, referred to as the Atlantic Provinces. For a complete overview of the usage of boilers for heating per province in the Canadian residential sector, see Table 5.5 below.

Table 5.5: Usage of boilers in the Canadian Residential Sector for heating purpose per province in 2007 (Statistics Canada, 2007).
Note(s): Dwellings using heat pumps as main heating source not included. Number without (*) indicates a maximum error of 16.5%. Numbers market with (*) indicates that the estimation has an error between 16.6% and 33.3%.

Province	Usage of Boiler
Newfoundland and Labrador	n.a
Prince Edward Island	51%
Nova Scotia	24%
New Brunswick	9%*
Quebec	6%*
Ontario	7%
Manitoba	n.a
Saskatchewan	11%*
Alberta	7%*
British Columbia	9%
Canada average	**8%**

The usage of boilers in Canada only represents a small share of the total heating need in Canada. The two most widely used methods of heating residential buildings in Canada are forced air furnaces and electric baseboards, the usage for the two heating systems are presented in table 5.6 below.

Table 5.6: Usage of Furnace and Electric Baseboards in the Canadian Residential Sector for heating purpose per province in 2007 (Statistics Canada. 2007)
Note(s): Number without (*) indicates a maximum error of 16.5%. Numbers market with (*) indicates that the estimation has an error between 16.6% and 33.3%.

Province	Usage of Forced Air-Furnaces	Usage of Electric Baseboards
Newfoundland and Labrador	25%	47%
Prince Edward Island	30%	n.a
Nova Scotia	35%	22%
New Brunswick	23%	35%
Quebec	16%	61%
Ontario	76%	8%
Manitoba	73%	14%*
Saskatchewan	81%	n.a
Alberta	90%	n.a
British Columbia	56%	21%
Canada	**56%**	**24%**

As seen in table 5.5. and 5.6, the use of local hydronic heating systems (i.e heating with boilers) only represents a smaller part of the total heating need in Canada. However, HRAI (Heating, Refrigeration and Air Conditioning Institute of Canada) has seen an increase in the use of boilers in new built buildings (HRAI, Consumer Guide). Even though an increase may be upcoming, people within the industry consider a growth of 1-2 percentage units as a major achievement and consider the market to be mature (Ken Tomihiro, Program Manager, Canadian Institute of Plumbing and Heating (CIPH), Interview, 22 March, 2012).

Central Air Conditioning Incompatible with Hydronic Heating

The use of forced air-furnace is the preferred choice of heating whenever the household also needs a central air conditioning system, according to Ken Tomihiro (interview, 22 March 2012). This is due to the fact that a forced air-furnace system can be used both for distributing heat and cool why it also is the preferred system in the regions where air condition is needed. A local

hydronic system, on the other hand, requires a separate system in order to fulfill the air condition need.

The need for air-conditioning in Canada has an effect on the amount of local hydronic heating installations. Presented in the figure below is the amount of houses with central air-conditioning systems out of the total housing stock displayed per province. As shown in the figure, the use for air conditioning is greatest in the province of Ontario. This is validated by Ken Tomihiro (interview, 22 March 2012), who confirms that the GTA (Greater Toronto Area) has the greatest need for air conditioning in Canada and thus a low percentage of local hydronic heating systems.

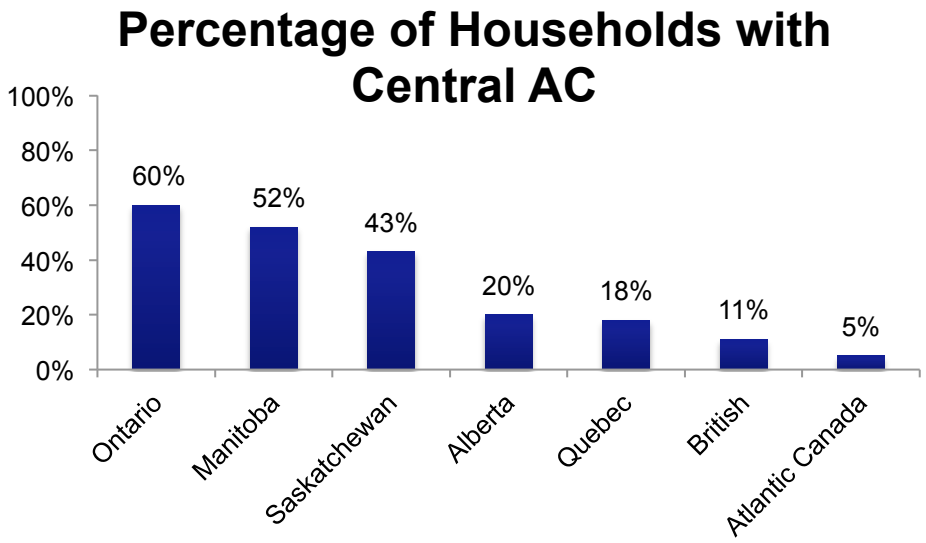

Figure 5.3: The percentage of total households per province using a central air conditioning system. (Statistics Canada, 2011)

Underlying Driver – the Canadian Housing Market

Important factors for determining the amount of new local heating systems, is the amount of provincial housing starts. When looking at the housing starts in the provinces, it can be concluded that it differs greatly between them. Historical data of new built homes by provinces is presented in the figures below.

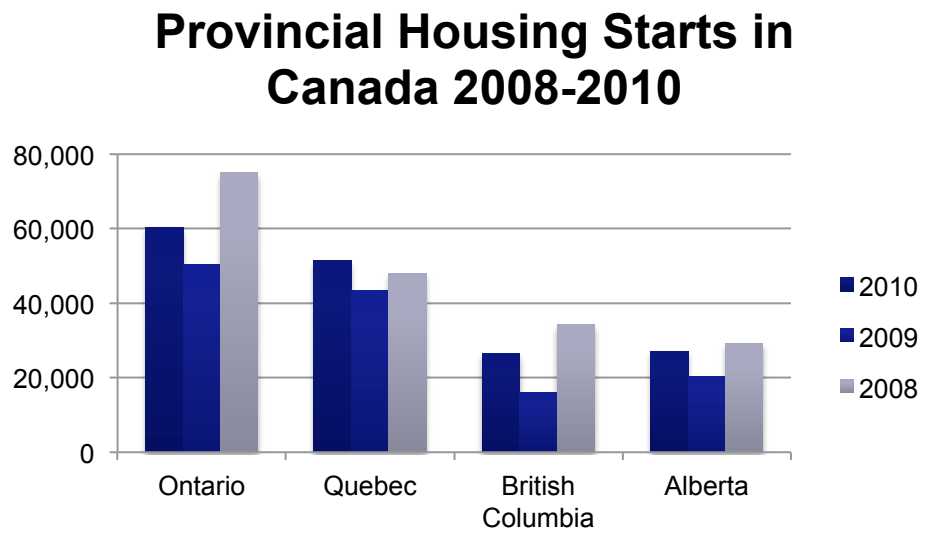

Figure 5.4: Number of housing start for 2008, 2009 and 2010 by province. (Canada Mortgage Housing Corporation. 2011, p. 161)

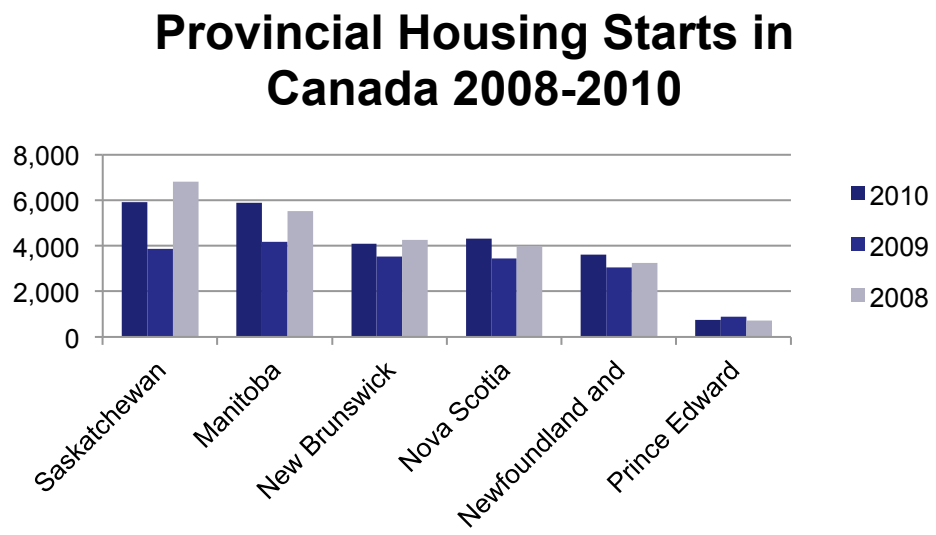

Figure 5.5: Number of housing start for 2008, 2009 and 2010 by province. (Canada Mortgage Housing Corporation. 2011, p. 161)

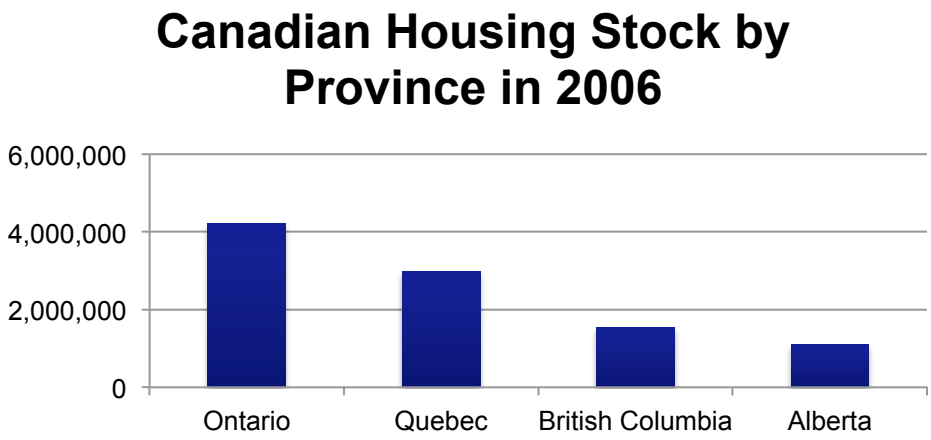

Figure 5.6: Canadian Housing Stock in 2006 by province, presented in descending order. (Canada Mortgage Housing Corporation. 2011, p. 172)

Another important factor for the market mapping of local residential heating systems is to estimate the market for renovation. It is therefore important to know the current provincial housing stock. Canadian Home Builder Association present figures for the Canadian housing stock divided by province in their report from 2011, the numbers are presented in the figure below.

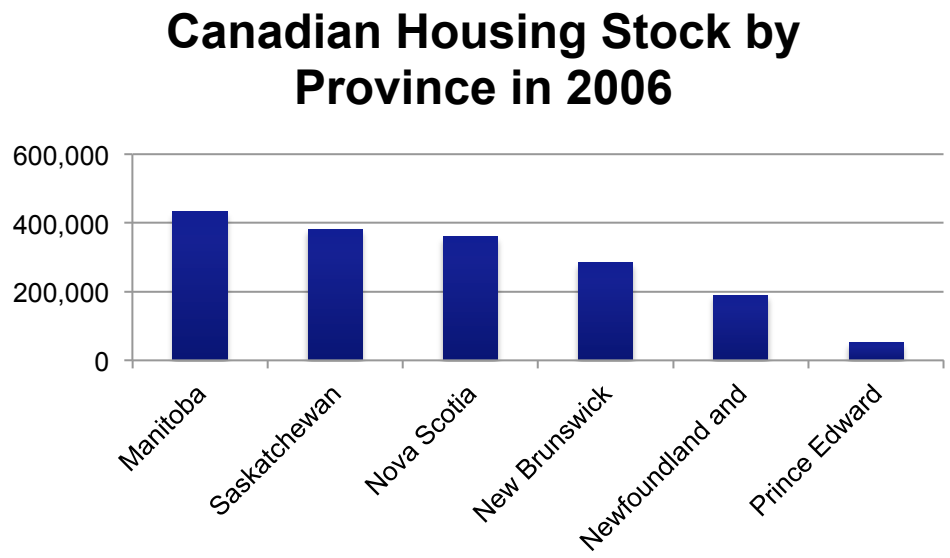

Figure 5.7: Canadian Housing Stock in 2006 by province, presented in descending order. (Canada Mortgage Housing Corporation. 2011, p. 172)

Housing Stock of Multifamily Households

The delimitations for the master thesis only include usage of boilers above 70 kWh, why single households can be excluded in the market research. In the table below are the fractions between new produced single households and multi family households presented for the years between 2001 and 2010. The amounts of single households have decreased as seen in figure 5.8. The trend for the Canadian housing market is to move towards multifamily houses and apartments. The measurement from year 2010 shows a fraction close to 50/50 between single and multifamily homes. (Canada Mortgage Housing Corporation. 2011, p. 160)

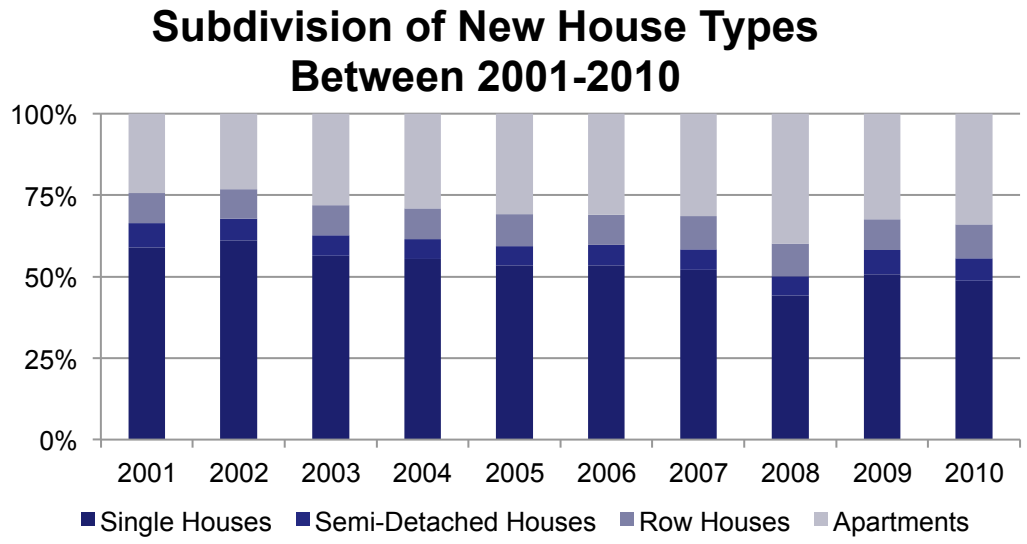

Figure 5.8: Fraction of new produced single houses, semi-detached houses, row houses and apartments in Canada between 2001 and 2010. (Canadian Housing Observer, 2011, p. 160)

In the Canadian Housing Observer from 2011 the increase in multiple family homes as seen from 2010 is also observed for 2011. The main reason to this is that multiple family homes have a lower price compared to the increasingly more expensive alternatives such as townhouses and apartments. (Canada Mortgage Housing Corporation. 2011, p. 62)

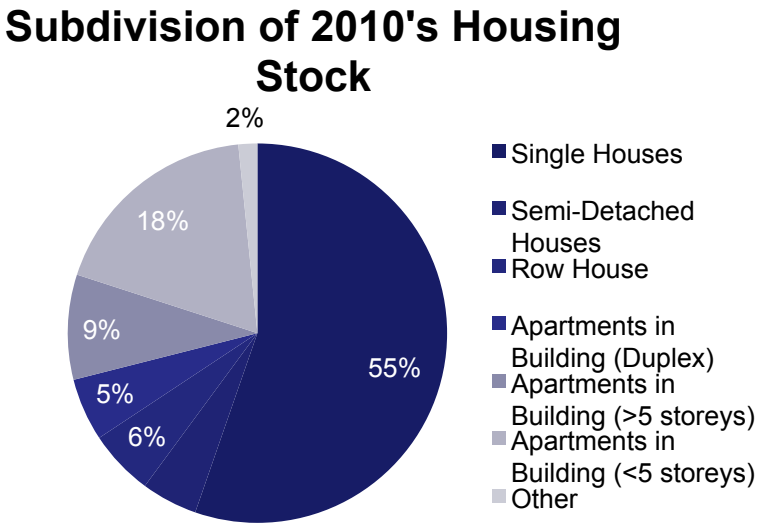

Figure 5.8: Subdivision of 2010's housing stock. (Canada Mortgage Housing Corporation. 2011, p. 164)

The current housing stock fraction divided by type is similar to the fraction for new produced houses presented above, however there are some differences. The current Canadian housing stock divided by type is presented in figure 5.9 below. (Canada Mortgage Housing Corporation. 2011, p. 164)

Other Variables

The product A values and frequency of renovation are considered to be the same as for the District Energy market. The average annual usage of energy per household in Canada is: 96 GJ for semi-detached and row houses and 63 GJ for apartments (Statistics Canada, 2012). The energy consumption for multifamily households has the following characteristics: Space Heating (60%), Hot Water Applications (20%) and Other (20%) (Aguilar C. et al. 2005).

5.2.2 Current Status – Local Heating Commercial/Institutional Market, Canada

The local hydronic heating market for commercial and institutional buildings is significantly larger than the market for residential buildings. Industry consensus is that approximately 50% of the Canadian commercial and institutional

buildings have hydronic heating systems (Brian M. Morgan, Sales Representative, HTP Boilers, Interview, 22 March 2012)

The Canadian Commercial and Institutional sector was estimated to be composed of almost 469,000 establishments in the report *CICES 2008* published by Natural Resources Canada (Natural Resources Canada, 2008). In the table below are the building types that where included in the *CICES 2008* report.

Table 5.7: Total number of Establishments and floor area in the Canadian Commercial and Institutional Sector 2008, (National Resources Canada, 2008, p. 3)

	Number of Establishments	Floor Area (m2)
Wholesale and Warehousing	45,694	92,866,888
Retail Trade	101,147	96,774,018
Information and Cultural	6,875	11,358,699
Financial, Real Estate and Other Professional Services	77,859	96,133,263
Public Administration	7,088	40,225,724
Education	21,498	119,302,877
Health Care	52,090	72,136,971
Accommodation Services	7,514	37,455,527
Food Services and Drinking Places	46,391	15,277,174
Religious Organizations	31,140	52,074,520
Other Services	71,822	71,582,365
Total	**469,118**	**705,188,026**

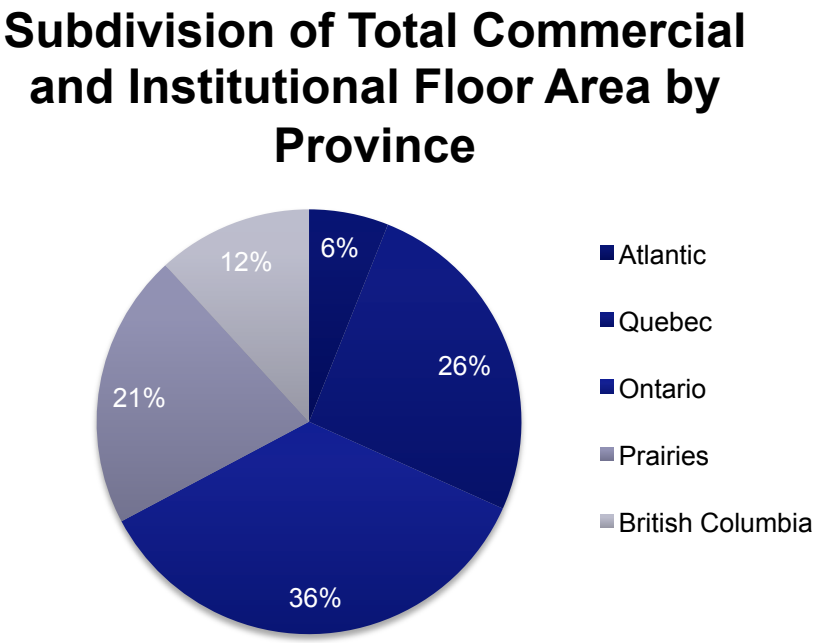

Figure 5.9: Subdivision of total commercial and institutional floor area by province in 2006. (National Resources Canada, 2008, p. 12)

In the report *CICES 2008* from National Resources Canada, the subdivision of total floor area by province can be found and the relevant data from the report is presented in the figure below.

Presented below are the figures of the provincial energy need provided by local boilers (e.g. local hydronic systems) out of total energy need. The figures were presented in the report *Commercial and Institutional Building Energy Use – Detailed Statistical Report – 2000* published in 2002 (National Resources Canada, 2002).

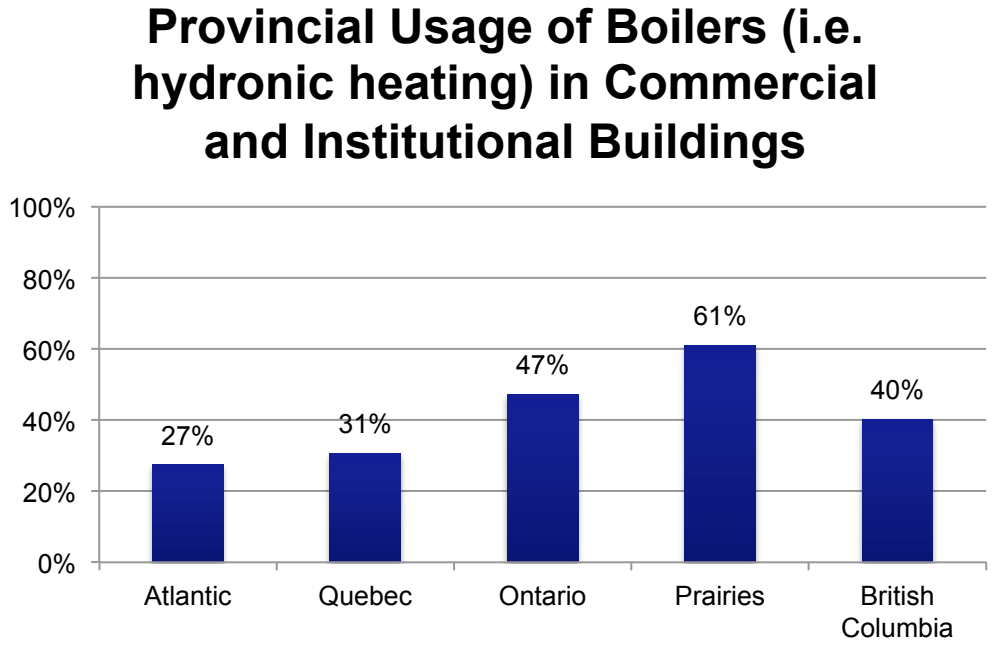

Figure 5.10: Subdivision of total commercial and institutional floor area by province in 2006. (National Resources Canada, 2008, p. 12)

Deon Pfisterer, Commercial Sales Representative at Weissman (interview, 22 March 2012), explains that the hydronic Commercial and Institutional market has been constant for a few years and most larger commercial building already use boilers why he believes that the market has reached a mature state. However, Deon Pfister believes that the hydronic residential market will continue growing.

Other Variables

The values for product A, frequency of renovation and need for heating are the same as for the District Energy market.

5.2.3 Macro Analysis

The PESTEL factors for the two markets Residential and Commercial local hydronic heating are similar in many aspects why they are presented together.

Political Driving Forces

Hydronic not Likely to Grow Without Political Support

Marc Gendron, Chair of HRAI Executive Committee, sees a potential in local hydronic heating systems in provinces where the electricity is more expensive. For example, in the Province of Quebec where the electricity is cheap, hydronic heating would not succeed without the help of incentive programs and with the right political support on a central, regional and local level (Marc Gedron, Chair of HRAI Executive Committee, Interview, 22 March 2012).

A change in building codes, in favour for more efficient energy solutions would lead to an increased market potential for hydronic heating. John Harris (Certified Energy Advisor, DSG Home Inspections, interview, 22 March 2012) cannot picture any changes in the Canadian building codes in the near future that will be in favour of technologies such as local hydronic heating.

Educate the Market - A Starting Point

Ken Tomihiro (Program Manager, Canadian Institute of Plumbing and Heating, Interview, 22 March 2012) explains that there is a lack of expertise in the heating industry. Ken Tomihiro believes that all stakeholders lack knowledge about the benefits of hydronic heating. The starting point for the industry is to start educating all stakeholders about the benefits of using a local hydronic system compared to traditional heating systems.

Economical Driving Forces

Low Energy Prices are a Major Barrier

Consensus among the interviewees is that low energy prices are a major barrier for the future development of local hydronic heating system. The provinces that have highest potential for future growth of local hydronic heating are the ones with the highest energy prices (Marc Gendron, Chair of HRAI Executive Committee, interview, 22 March 2012).

Marc Gendron says that low energy prices over a long period of time have led to a low demand for energy efficient solutions. This statement is acknowledge by Steve Thompson, Management Consultant at Taco and Board Member at ASHRAE, who says that Canadians are not interested in high efficient heating and that Canadians almost consider low energy prices a “human right”.

Social Driving Forces

Hydronic Heating is Seen as a Luxury System

A common believe in Canada is that hydronic heating is a luxury item in the residential market. This is because the installations of hydronic systems often include heating of floors, which is a luxury feature. This is one reason to why homebuilders often choose other alternatives for heating. (Scott Papp, Manager Contractors Division, HRAI, interview, 22 March 2012)

Another reason to why homebuilders choose other alternatives than hydronic heating is that they do not include lifetime cost when calculating cost of heating. Since hot air-furnaces have a cheaper installation cost, compared to hydronic heating systems, hot-air furnaces often become the preferred alternative in larger dwellings. (Ken Tomihiro, Program Manager, Canadian Institute of Plumbing and Heating, Interview, 22 March 2012)

Atlantic Provinces and Province of BC have Greater Potential

Ken Tomihiro, Program Manager at CIPH (Interview, 22 March), explains that there is a greater potential in British Columbia and the Atlantic provinces due to their “hydronic” mindset. This hydronic mindset together with their higher energy prices and greater environmental awareness (British Columbia) makes these regions highly interesting for further growth.

Cultural Biases

There are no preventions in building standards against hydronic heating. However, there are cultural biases against the technology. People rather pay their own gas bills than sharing a heating system, even if the total cost would be lower with a hydronic heating system. (John Harris, Certified Energy Advisor, DSG Home Inspections, Interview, 22 March 2012)

A Net Increase in Energy Efficiency Awareness

Over the past year (2010) the net increase in energy efficient improvements request in the residential sector has been over 30%. This indicates an increased interest in energy efficiency. (Pulse Main Report 2011, p. 15)

Technological Driving Forces

Compatible Technologies have a Major Influence

Ken Tomihiro (Program Manager, Canadian Institute of Plumbing and Heating, Interview, 22 March 2012) describes a reason to the small market share for hydronic heating in regions with the need of air conditioning. Since there is a compatibility problem with central air conditioning and hydronic heating systems and not with hot air furnace systems, the later is often the preferred alternative.

A compatibility opportunity for hydronic heating in Canada is the emergence of geothermal heating. Marc Gendron (Interview, 22 March 2012) says that all geothermal systems he has seen also have a hydronic heating system.

Environmental Driving Forces

European Standards not Recognized

Local hydronic heating is not acknowledged as an environmentally friendly heating system. One reason for this is that Canada does not recognize the European standards such as ISO and CE. (Ken Tomihiro, Program Manager, Canadian Institute of Plumbing and Heating, Interview, 22 March 2012)

Legal Driving Forces

Complex Building Codes for Hydronic Heating

Canadian building codes do recognize other heating solutions besides forced air furnaces. However, it is hard for inspectors and contractors to handle the calculations for all of them. (John Harris, Certified Energy Advisor, DSG Home Inspections, interview, 22 March 2012)

Incentive Programs

The Energy Guide Rating System used to be voluntary but is now mandatory, at least in the province of Ontario. The Energy Guide Rating System focuses on lowering the energy consumption in space heating, hot water applications and base load. (John Harris, Certified Energy Advisor, DSG Home Inspections, interview and seminar, 22 March 2012)

5.3 Food Retail Refrigeration

5.3.1 Current Status

The Market and Number of Store Outlets

The three largest supermarket operators hold 68 % of the total 84 billion dollar food retail sales and the five largest players have a combined market share of almost 83 % (OSEC, 2011). The major super and hyper market chains all have their own in-house refrigeration engineers why the usage of consulting services within food retail refrigeration is limited. (Phil Boudreau, interview 2012-03-28)

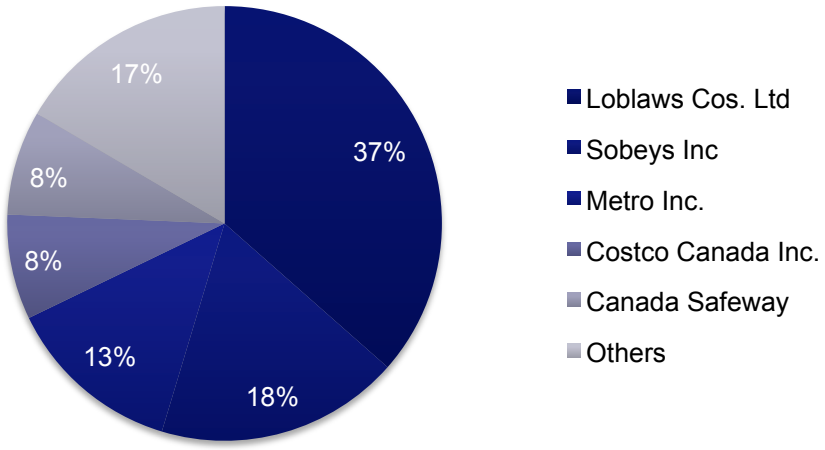

Figure 5.11: Market shares for the largest food retail companies in Canada. (OSEC, 2011).

Euromonitor International (2010, p 508) conducts research over the international retail trade market. Euromonitor also presents future predictions of the development for each market. The relevant data from their research is presented in table 5.7 and 5.8 below.

Table 5.8: Total number of Hyper Market outlets and selling space in thousands of m2. The data for 2010 to 2014 are estimations made by Euromonitor International. (Euromonitor 2010, p.508)

Hyper markets (>2500 m^2)	2009	2010E	2011E	2012E	2013E
Nbr of Outlets	315	324	334	342	350
Selling Space (000') m^2	3 405,8	3 511,5	3 634,5	3 732,1	3 822,8

Table 5.9: Total number of Super Market outlets and selling space in thousands of m2. The data for 2010 to 2014 are estimations made by Euromonitor International. (Euromonitor 2010, p.508)

Super markets (400-2500 m^2)	2009	2010E	2011E	2012E	2013E
Nbr of Outlets	2 641	2 653	2 661	2 665	2 667
Selling Space (000') m^2	6 552,0	6 585,8	6 607,1	6 616,4	6 622,1

Amount of Refrigeration in a Typical Store

The average amount of refrigeration in each of the above mentioned store sizes, is estimated in intervals. The reason for that is that there are variations in the amount of fridges and freezers in relation to the store size. In larger stores, referred to as Hyper Market, the excess store space is in general filled with other goods than groceries. Thus, the amount of refrigeration need for a food retail outlet does not grow infinitely with the average floor space. The average need of refrigeration in tons for an average super and hyper market is presented in table 5.10 below. (Phil Boudreau, Ontario Sales Manager at Bitzer Canada, interview, 28 March 2012)

Table 5.10: Amount of refrigeration in stores. Combined low and medium temperature. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012) The numbers are confirmed by Phil Boudreau (Ontario Sales Manager at Bitzer Canada, interview, 28 March 2012)

	Low amount of refrigeration (tons)	High amount of refrigeration (tons)
Hypermarkets (>2500 m^2)	200	400
Supermarkets (200-2500 m^2)	150	200

Value of Product As

The product A value for the Canadian market that needs to be installed in order to provide the required amount of refrigeration presented above is similar to the required amount of refrigeration in the European food retail markets (Tommy Ångbäck, Market Unit Manager Refrigeration, interview, 20 April 2012). Recent market estimation has been done for the food retail market in Poland, the values from that research are presented in table 5.11 below.

Table 5.11: The average value for product A in thousands of EUR for a typical new built and renovated store. (Patrik Ek, Market Manager Commercial Refrigeration, Interview, 1 February 2012)

(kEUR)	New Built Value	Renovation Value
Hypermarket (>2500 m^2)	55	40
Supermarket (200-2500 m^2)	15	10

Renovation of Product As

How often equipment in a refrigeration system needs to be replaced depends on if the part is a moving or non-moving part of the system. The renovation frequency is greater for moving parts, for non moving-parts such as product As, the need for renovation is not as frequent. The lifetime for a typical product A in refrigeration systems is estimated to be 9 years. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 Match 2012)

All of the major super and hyper market chains have yearly contracts with a contractor who is responsible for the daily refrigeration operations. All costs that may arise during the year are included in the yearly fee that the super/hyper market chains pay to the contractor. This creates incentives for the contractor to choose the cheapest replacement product available and creates a renovation market that is all about the cheapest price. (Bill Northam, Company X Commercial Refrigeration Sales Representative, interview, 9 March 2012)

5.3.2 Features of Store Refrigeration Market

Amount of CO_2 Refrigeration

Quebec is currently the province where CO_2 systems are most popular. The market share for CO_2 in Quebec is currently estimated to be 15 percent and is

expected to grow in the future. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Canada-wide, CO_2 as a refrigerant currently stands for about 1 percent of the market (Domenic Loconte, Sales Manager at Arkema, interview, 23 March 2012). Phil Boudreau (interview, 21 March 2012) confirms this by stating that there are currently about 30 stores using CO_2 refrigerated systems in Canada. Many of which are pilot stores constructed for the evaluation of CO_2 systems.

Sobey's, one of the largest super market chains, have 15 CO_2 refrigerated stores in Quebec and has a mandate to equip future stores with nothing but CO_2 systems. They are currently evaluating the performance of CO_2 in order to make more stores HFC-free. (Phil Boudreau, Ontario Sales Manager at Bitzer Canada, interview, 28 March 2012)

Canadian Store Refrigeration Systems is a US Market

The store refrigeration systems in Canada are increasingly sold and manufactured by US firms. The sales volume from Canadian players is small and is shrinking as they continue to move to the US. (Bill Northam, Company X Refrigeration Sales Representative, interview, 6 March 2012)

The exception is the currently small market for CO_2 systems that is held by a few local manufacturers in Quebec. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Segmentation Between Store Sizes

After a period of consolidation among the stores with a trend towards larger store outlets, one can now see a demand from the customers for smaller, local stores. People have lost interest in making small purchases in big superstores. Therefore the large players in the market have started to experiment with smaller, more specialized store outlets as a complement to the larger ones. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Euromonitor International (2010, p 509) acknowledges a slight store downsizing as a key trend. They still see a growth in the larger store segment but it is declining and the amount of smaller more specialized store outlets is growing.

5.3.3 Macro Analysis

What drive change in the market for food retail refrigeration are mainly changes in the technology used. Thus, the major focus this PESTEL analysis is change in the preferred refrigerant and its drivers.

Political Driving Forces

Incentives for CO_2 installations in Quebec

Political incentive programs have proven important for new technology as shown in Quebec where a political incentive program, to only use environmentally neutral refrigerants, has made the technology take a leap forward. (Phil Boudreau, Ontario Sales Manager at Bitzer Canada, interview, 28 March 2012)

> *If we had the same incentive program across Canada as in Quebec, we would see CO_2 grow really fast* – Phil Boudreau, Sales Manager at Bitzer Canada Inc

Uncertainty of HFC phase-out

Currently there is no political mandate of an HFC phase-out in Canada. However, Environment Canada is lobbying to include HFCs in the Montreal Protocol and there is a proposal to phase-down the use of HFCs to 2050. Using the word phase-down instead of phase-out might be a sign of uncertainty of the decision. (Phil Boudreau, Ontario Sales Manager at Bitzer Canada, interview, 28 March 2012)

Despite no actual decision, the industry expects some kind of legislative action towards HFCs, like the leakage tax system currently used in the US. An uncertainty of whether a similar system will be adopted in Canada creates a current interest in other alternatives and a certain desire to move away from HFC usage. According to James V Thomas, some sort of penalty fee is very likely to be developed in the near future. (James V Thomas, President of Refrigeration Services Inc, interview, 23 March 2012)

Possible Carbon Credit System

There is a possibility that Canada eventually will adopt a carbon credit trading system, similar to the one in Europe. If so, CO_2 systems would become more

attractive as using CO_2 as a refrigerant would give the operator carbon credits that could be sold. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Economical Driving Forces

Low Energy Prices

As mentioned before, the electricity prices in Canada are low. That affects the operational costs of a refrigeration system and makes the payback times for expensive but energy efficient systems long relative other systems. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Even with technologies like heat recovery that improves the efficiency of CO_2 systems, the pay-back times of three years that are used by the major supermarket chains are hard to achieve at current energy price levels. (Gus Rolotti, Technical Marketing Director at Arkema, interview, 23 March 2012)

Urban Areas Are Most Likely to Be the Focus for New Technology Investments

The major urban areas in Canada are growing and are most attractive to make new investments in for the supermarket chains. Any major investments in technologies like CO_2 are thus most likely to be placed there. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Social Driving Forces

Knowledge Barriers for New Technologies

The knowledge of non-conventional technologies like CO_2 is low in Canada. Most contractors or technicians would not know how to work with CO_2 equipment. A general opinion in the industry is that *it won't become popular as long as I'm still around in the business so there is no need for me to learn about it*. (Dominic Loconte, Sales Manager at Arkema, interview, 23 March 2012)

Phil Boudreau sees an increasing interest in CO_2 refrigerated systems at the university of Mississauga. He means that the interest is greater today compared to a couple of years ago. However, he simultaneously agrees on the fact that the current generation working in the refrigeration industry is reluctant towards new and more complex technologies. He believes that the market

needs to be educated in order to boost the learning curve. (Phil Boudreau, Ontario Sales Manager at Bitzer Canada, interview, 28 March 2012)

Phil Boudreau also says that if there was a greater knowledge of CO_2 in the market and under what circumstances the systems is more advantageous to use, the possibilities of the technology would increase. (Phil Boudreau, Ontario Sales Manager at Bitzer Canada, interview, 28 March 2012)

Technological Driving Forces

Development of HFOs

DuPont and Honeywell have developed a joint production facility of the new generation of synthetic refrigerants called HFOs in the US. According to Paul R. Sullivan (Technical Service Manager at Honeywell, interview, 23 March 2012) the company is awaiting any legal regulations in GWP for refrigerants, in order to blend their refrigerant to pass the limitations. Regardless of the limitations, this will be feasible since the HFO itself is practically non-ozone depleting. Furthermore will the HFOs be possible to use in straight retrofitting of systems using HFCs today.

The CO_2 system builder Lesage can see in their market that many operators are awaiting the development in the market of synthetic refrigerants before making any decisions of switching into systems of natural refrigerants. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

HFOs have a GWP of 6, which is about 1/300 of the lowest possible GWP that can be achieved with HFC refrigerants. Except being partially flammable, the HFOs have not shown any weaknesses compared to the synthetic refrigerants used today. (James V Thomas, President of Refrigerant Services Inc, seminar, 23 March 2012)

Honeywell are confident about synthetic refrigerant being the widely used standard in the future. They believe that CO_2 will gain some momentum with a possible phase-out of HFCs but the technology's inferiority regarding energy efficiency and the fact that people rather use technologies they are familiar with will make competing with systems using synthetic refrigerants like HFOs impossible. Since the energy prices are at a low level, once the subsidies are

gone, the market will move away from CO_2 again. (Jonathan Gart, Senior Marketing Manager at Honeywell, interview, 23 March 2012)

> *In the real world, people don't make their choices based on green thinking. In business, dollars is the only thing that counts* – Jonathan Gart, Senior Marketing Manager at Honeywell

At Kool-Air, a refrigeration system builder, requests that are driven by an environmental agenda have started to be more frequent. (Gilbert St-Charles, Technology Representative at Kool-Air, interview, 23 March 2012)

Companies like DuPont and Honeywell are extremely powerful. They are both influencers of political decisions and have an R&D capacity that makes developing refrigerants that match any regulations possible. Thus, CO_2 is very unlikely to become a market standard. (Don Bowman, Director of Refrigeration at WWG Totalline, interview, 23 March 2012)

Bill Northam, on the other hand, means that technicians and developers are less loyal to the large refrigerant manufacturers today and their powerful position in the market are weaker than before. He thereby means that the choice of system is more likely to be based on what is best for the operator. (Bill Northam, Company X Commercial Refrigeration Sales Representative, interview, 9 March 2012)

Both Phil Boudreau (interview, 28 March 2012) and Gus Rolotti (interview, 23 March 2012) see interesting possibilities of secondary loop systems combining CO_2 and HFO refrigerants.

Unproven Performance of CO_2

Throughout the empirical study, interviewees express a concern about CO_2 systems being inferior to conventional systems. The concern involves both a higher energy consumption and inflexibility when using CO_2 in medium and low temperature systems together.

> *Right now, CO_2 refrigeration is in a time of flux. It can go either way* – Greg Swierzc, Technical Service Manager at Emerson Climate Technologies

Looking at the interest in the market, Greg Swierzc (interview, 23 March 2012) means that CO_2 has potential to achieve a market penetration of 20-25% within the next 5-10 years if the technology performs well and is recognized for it. Domenic Loconte (interview, 23 March 2012), on the other hand cannot see CO_2 capture more than a 5 % market share within the next 5 years.

Phil Boudreau (interview, 28 March 2012) sees a problem with CO_2 often being oversold as a technology. He says that it definitely has attractive features but the fact that it is often claimed to be more efficient compared to other alternatives, when it is not proven to be, creates a resistance towards the technology.

Environmental Driving Forces

Market Awaiting GWP Regulations

Global warming potential (GWP) is gaining a lot of interest in the Canadian market for refrigeration. However, the regulations and taxes are not in place to force the market to take any actions. (James V Thomas, President of Refrigerant Services Inc, seminar, 23 March 2012)

Furthermore is GWP currently only about leakage from system operations. There is no focus on the global warming potential from a high-energy consumption during the lifetime of a system. (Greg Swierzc, Technical Service Manager at Emerson Climate Technologies, interview, 23 March 2012)

Varying Environmental Awareness

The environmental awareness in Canada has traditionally been low but some attention to environmental issues and energy efficiency has started to occur in the recent years. In Quebec, people are more environmentally savvy and more open to new technologies with such features. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Legal Driving Forces

HCFCs Should be Totally Phased Out by 2030

HCFCs as a refrigerant is currently under phase-out and the usage will be totally stopped by 2030. (James V Thomas, President of Refrigerant Services Inc, seminar, 23 March 2012)

5.4 Cold Storage Refrigeration

5.4.1 Current Status

Amount of Cold Storage Space in Canada

In Canada, the existing amount of cold storage space is 30 million m^2, divided over about 2000 facilities. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

Market Growth

There are tricky legislations in Canada, preventing imports of refrigeration systems to the Canadian cold storage market. Thus, the population growth (shown in table 5.12) is a good estimation for the growth in the amount of cold storage space. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

Table 5.12: Total population for Quebec, outside of Quebec and Canada Total and their CAGR 07-11. (Statistics Canada 2012b)

Population (millions)	2007	2008	2009	2010	2011
Quebec	7,7	7,8	7,8	7,9	8,0
Outside Quebec	25,2	25,6	26,0	26,2	26,5
Total population	32,9	33,3	33,7	34,1	34,5

Amount of Systems With Ammonia as a Refrigerant

The amount of ammonia-refrigerated systems differs between Quebec and other provinces (see table 5.13). (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

Table 5.13: Table 5.13: Amount of NH3 refrigeration systems in Quebec and outside of Quebec. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

NH3 refrigeration, amount of total systems	
In Quebec	50%
Outside Quebec	95%

Ammonia in secondary loops is more common for systems that are being built today than among already existing systems (see table 5.14). (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

Table 5.14: Amount of NH3 refrigeration in secondary loops. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

NH3 Refrigeration in secondary loops	
Existing installations	5%
New construction	50%

Product A Values in Cold Storages

The values of product As are different depending on the type of system used. For all systems, the value for air-heat exchanges is included and for the systems with secondary loops, the value for liquid product As is added as well (see table 5.15 for product A values). (Tommy Ångbäck, Market Unit Manager Refrigeration, Company X Head Office, 20 January 2012)

Table 5.15: Estimated product A values for cold storage spaces. (Tommy Ångbäck, Market Unit Manager Refrigeration, Company X Head Office, 11 May 2012)

	Product A value EUR/kW
Air product A	142
Liquid product A	27

5.4.2 Macro Analysis

Political Driving Forces

Uncertainty of HFC phase-out

The industry is awaiting any political decisions affecting the future of HFCs. This is especially important in Quebec where the current usage of synthetic refrigerants is high. (Gus Rolotti, Technical Marketing Director at Arkema, interview, 23 March 2012)

Legislative Resistance Towards Ammonia in Quebec

There are strict legislations against NH_3 in Quebec due to its flammability and toxicity. Thus, the most common refrigerants in Quebecois cold storages are

HCFCs and HFCs. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

When searching for alternatives to HFCs, NH_3 is not a given option for the operators and some companies currently experiments with CO_2 refrigeration in cold storages. (Xavier Marle, Director of Operations at Lesage Inc, interview, 28 March 2012)

Economical Driving Forces

Low Energy Prices

The electricity prices in some of the areas with high population density are low. This gives low operational costs and results in relatively long payback times for high-performing energy efficient systems. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

Table 5.16: Current electricity prices. The rates vary between within the stated interval depending on various conditions. (National Energy Board, 2012)

	Low cents/kwh	High cents/kwh
Ontario	6,2	10,8
Quebec	5,4	7,5
BC	6,7	9,6
Alberta	8,5	8,5
Saskatchewan	10,6	11,7
Manitoba	6,6	6,6
Northwest Territories	16,4	47,4
Yukon	12,1	30,8
PEI	9,2	12,05
Newfoundland & Labrador	10,4	10,4
Nova Scotia	12,6	12,6
New Brunswick	9,9	9,9
Nunavut	52,4	102,5

Over the last 10 years, there has been a slight overall increase in Canadian electricity prices. Ontario, Alberta and the Atlantic regions have seen a higher price increase than other provinces. (National Energy Board, 2011)

Social Driving Forces

Consolidation of Storage Space

There are currently several large players that are consolidating their cold storages in order to capitalize on economies of scale. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

Safety Important When Choosing Refrigerant

Safety is a major concern for companies when choosing refrigerants. At Walmart for example, they are concerned about NH_3 leakages in cold storages will have a negative effect the brand image. This concern is often put ahead of the desire to make green choices. (Dave Malinauskas, Director of Engineering at CIMCO, interview, 14 March 2012)

> Just say the word; ammonia, and people become frightened!
> – Xavier Marle, Director of Operations at Lesage Inc

Knowledge Important for Choice of Refrigerant Configuration

What configuration an operator's technicians are familiar with plays an important role when renovating or constructing a new refrigeration system. There is a strong reluctance towards leaving the technology that is currently being used. (Gilbert St-Charles, Technology Representative, Kool-Air, interview, 23 March 2012)

Technological Driving Forces

Increasing Interest for NH_3 in Secondary Loops

At CIMCO, they see an increased interest in secondary refrigeration loops with NH_3 as a refrigerant. Traditionally, 5% of the NH_3 systems are secondary loops but after an increasing trend, 50% of the requests are now for secondary loops.

Future for Synthetic Refrigerants

Dave Malinauskas (interview, 14 March 2012) believes that synthetic refrigerants have a bright future. Right now, the energy prices are too low but if they were to increase, the synthetic refrigerants would become attractive again.

Future Potential of HFOs

The development of the new generation synthetic refrigerants can potentially affect the continuous use of synthetic refrigerants in the future. (James V Thomas, President of Refrigerant Services Inc, seminar, 23 March 2012)

5.5 Marketing Information System

A Marketing Information System consists of the use and distribution of internal data, the non-systematic gathering of market intelligence and the systematic gathering of market data that results in reports, market mappings and future potential analyses.

Presented below is the complete empiric data that have been observed both at Company X Canada and Company X Head Office divided into the three parts of a market information system.

5.5.1 Internal Data

There is a lot of valuable internal data within Company X and an internal database has recently been developed. The available internal data has a high product focus with information regarding products and their attributes. All divisions and segments within Company X have the possibility to share information through the database. Since the sales offices are the one with the most knowledge about the national markets and have a lot of customer interactions they also have a great responsibility in gathering the market information. It has been observed that there are no clear processes for gathering, storing and updating the internal data.

5.5.2 Marketing Intelligence

Marketing intelligence is a company's non-systematic gathering of market information. Since the marketing intelligence process by nature is sporadic it is difficult to observe and do a complete mapping of the process. However, it has been observed that Company X Canada performs various activities in order to gain market information. The observed activities include attending trade shows, having close customer interactions, membership in trade associations and meeting with consultants.

Similar marketing intelligence activities as seen at Company X Canada have also been observed at Company X Head Office.

5.5.3 Marketing Research

Marketing research is the systematic gathering of market information resulting in reports together with future market potential and trend analyses. For the PHE segment a systematic process for mapping the global market share has been observed. However, the market share analysis on a national level is an ad hoc process individually performed by each sales office.

The global market share analyse is performed by the Company X head office and include information from third party reports, competitors' annual reports and Company X own sales figures. The routinely marketing research activities within the PHE segment also include competitor analyses. The information that is gathered by the sales offices is from current customers. Marketing research activities of non-existing customers or in "new" markets has not been observed.

5.6 Market Orientation

Historically, Company X has been a product-oriented company, meaning that the organizational structure and its operations were aligned around its products. In 2002, however, the company conducted a major reorganization resulting in market-oriented divisions, with the purpose of achieving a distinct customer focus within its operations. (Company X, 2012i)

Despite the efforts of becoming market oriented to a greater extent, the operations in some of Company X's markets still use a relatively product-oriented approach of its market activities (Johan De Cuyper, Market Unit Manager Heating Comfort/HVAC, Company X Head Office, 25 January 2012). As a result of that focus, the knowledge about underlying end-user preferences and the features of the market is sometimes limited. Canada is an example of such market where the knowledge of the end-user market is limited.

Signs of a product-oriented approach to marketing can also be seen in the global market share analyses mentioned above. The data purchased externally states global sales figures of product A types broken down to fit the different

products offered by Company X. Since the company is organized in market-oriented divisions that share the same products, the reports do not include information about the divisions' respective markets and performance.

5.6.1 Intelligence Generation

The degree of market orientation is, as mentioned in the theory chapter, depending on how well the four dimensions of market orientation work and how well the dimensions interact with each other. Since the marketing information system is a part of the intelligence generation dimension, the quality of it affects the degree of marketing orientation. Thus, an implication of the observed weaknesses in the current applied MIS is that the market orientation has potential to increase.

6 ANALYSIS AND DISCUSSION

In this chapter the assumptions and uncertainties of the valuation methods for each market will first be presented. After is the outcome of the calculations presented. Lastly follows a discussion of the key factors affecting the future market derived from the PESTEL analysis performed in the empiric chapter.

6.1 District Energy

6.1.1 Assumptions and Uncertainties

The market for product As in district energy applications is considered to consist of equipment used in buildings that are connected when a system is newly constructed and equipment installed in already connected buildings when replacing the existing ones.

Only product As within the buildings are considered as the market. This because the empirical findings suggest that the systems that are built are small and the plants are consequently connected directly to the networks and the amount of product As outside the buildings are very limited.

Different values of the product A equipment are used depending on whether a building uses district heating for domestic hot water purposes or not. For the buildings using domestic hot water, the value of such product A is added on top of the space heating product A value. Buildings that are considered to use district heating for domestic hot water purposes are residential buildings and hospitals.

The data about existing district energy systems that the market sizing calculations are based upon was gathered by CDEA a few years ago. This might affect the accuracy of the market size calculations as today's usage levels of district energy had to be calculated using an estimated growth factor. The data that have been used is the most recent mapping of the existing district energy market. However, CDEA is currently executing a project for mapping the current status of district energy across Canada that might be released during 2012 and once that is done, the models can easily be updated with the latest data.

6.1.2 Market Value Calculations

See appendix D

6.1.3 Estimated Market Value

It has been observed that the bulk of the market value for the Canadian district energy market is within renovating existing systems due to a slow growth in the construction of new systems.

It has been noted that the Canadian sales office does not share our view of the size of the replacement market. Thus, it is encouraged by the authors to conduct a more detailed analyze of the replacement market for district energy in order to determine its true value.

The estimated market values for product As in the Canadian district energy market are presented in the table below.

Table 6.1: Estimated market value for product As in Canadian district energy applications.

(kEUR)	2012	2013	2014
Heating			
Existing sq m	24 740 030	24 888 470	25 037 801
Yearly increase in sq m	147 555	148 440	149 331
Value of newly produced	128	129	129
Value of replacements	1 142	1 149	1 156
Total Value	**1 270**	**1 278**	**1 285**
Cooling			
Existing sq m	2 907 605	2 980 295	3 054 802
Yearly increase in sq m	70 917	72 690	74 507
Value of newly produced	143	146	150
Value of replacements	273	280	287
Total Value	**415**	**426**	**436**
Canada Total Value	**1 685**	**1 703**	**1 722**

6.1.4 Company X Canada's estimated market share

Company X presents their sales figures divided by sub division, and not by application market, why market share estimation for the Canadian district energy market not has been done.

6.1.5 Key Factors from Macro Analysis

Municipal Energy Planning - A Key Factor

A key factor for the district energy development is political incentives. What also can be noted is that the current system, where each province is responsible for its own energy policy, obstructs the possibilities of constructing general incentives that promotes district energy across Canada.

As many of the district energy systems currently constructed origins from community energy plans made at municipal level, such plans are believed to be a key factor for district energy development. A community plan for energy consumption and greenhouse gas emissions from a community as a unit is definitely something that triggers the attractiveness and viability of district energy.

BC as a province has been successful in the development of district energy after implementing the 2007 BC Energy Plan. Without stating any direct incentives towards district energy, it has required energy planning at a municipal level in order to deploy the available resources where they are needed most. Vancouver's District Energy Connectivity Guidelines is an example of how the BC Energy Plan is pushing the community to replace electrical heating with district energy in order to use the available electricity resources for purposes actually requiring electricity.

Lack of Knowledge an Important Barrier to Overcome

The lack of knowledge about district energy that has been defined through the empirical study is a major challenge that has to be overcome. Even with supportive energy plans, the value proposition of district energy has to be fully understood if it should become a widely accepted method when implementing a public green agenda. The knowledge has to be spread among potential building operators using district energy as well as among political decision makers. Unless the knowledge about district energy is spread, any political

decisions that are made are less likely to be aligned through different political levels in a way that promotes district energy.

Building Certification Codes Have Potential to Both Boost and Obstruct the Development

Made at a provincial or federal level, building codes will have to involve many different options and solutions to choose from in order to fit the various needs of different communities. That is the case today in Ontario, where the certifiers believe that the number of options are more than they can be familiar with handling. Hence, they become reluctant to recommending solutions that they do not know how to handle calculations of. Furthermore will the frequency of revising and changing the building certification codes be substantially lower at provincial or federal level, which creates a risk that they do not follow the technological development and become obstructive towards new technologies rather than supportive.

Building certification codes tailored to the needs of a certain municipality or community are more likely to be supportive towards district energy as they can be aligned with the goals of a community's energy plan. This can be seen in Vancouver where the building certifications demand certain areas to be district energy compatible.

Vested Political Interests

There are clear incentives for politicians towards high-energy consumption in Canada. As one of the largest natural gas producers in the world, maintaining a high consumption of gas worldwide is indeed stimulating for the Canadian economy. How much these vested interests actually affect initiatives towards energy efficiency is difficult to measure. However, what is clear is that Canada recently left the Kyoto Protocol, meaning that they will certainly not lead the international development of carbon dioxide emission reductions going forward.

Uncertain Future Without the Kyoto Protocol

A carbon tax or a trading system with carbon credits at a federal level would have potential to drive decisions on lower political levels towards a system of prioritizing emission sources that are necessary. Such decisions could be seen in BC, where demanding the newly constructed electricity production to be

carbon-neutral required Vancouver to look at district energy in order to use electricity elsewhere.

However, by leaving the Kyoto Protocol, the Canadian government has made a statement that can be interpreted to be in a totally opposite direction from reducing carbon-dioxide emissions. It is not likely to affect any of the already existing provincial energy plans but it clearly weakens the political leadership towards a green agenda. Even though the ultimate decisions of building district energy systems are made at a municipal level, a strong political leadership at a federal level founds a political leadership towards district energy.

Gas Prices Will Continue to Affect Economic Viability of District Energy

Natural gas fired heating is considered to be the greatest substitute to district energy. When studying the natural gas prices that have been declining over the last decade, the probability of a major future increase is low. Thus, the payback times of district energy investments are likely to stay relatively long since the difference in operational costs will remain low. This is interpreted as being obstructive towards private investments in district energy plants, and areas with well-developed natural gas infrastructure will continue to heavily depend on political initiatives in order to grow the use of district energy.

Increasing Prices of Oil and Electricity Drive Some Potential in Areas Without Gas

In contrast with natural gas, the prices of oil and electricity in Canada are likely to continue to increase, following international trends. Thus, the heating costs will continue increasing in the Atlantic and northern regions without natural gas infrastructure. In the long run, it forces such regions to look at alternatives, which certainly may create some opportunities for district energy. However, the mentioned regions' lower urban density tells against a widespread use of large district energy systems. Also the fact that a vast majority of the existing district energy systems exist in other provinces make these opportunities small compared to the total market.

6.1.6 Future Market

High But Uncertain Growth Potential

There is undoubtedly a potential for higher growth in district energy. The fact that several of the provinces with the highest population density are making

moves towards implementing energy plans that have potential of promoting more strict municipal energy planning is a sign of a future growth potential. The single most important key to realizing this growth, however, is believed to be a strong political leadership in each community. Furthermore, the foundation of such leadership is the knowledge about district energy as an efficient tool of achieving the goals in a provincial energy plan. Until that knowledge is acquired, district energy will probably continue to be overlooked as an alternative, regardless of the incentives implemented at a provincial or federal level.

Until high growth in district energy, replacement will continue to dominate

Unless the growth in district energy increases to levels that are substantially higher than the current estimation, replacement will continue to constitute the greater part of the market. The replacement market size is also more certain, as it does not depend on decisions of new district energy system constructions. Furthermore, as the total amount of district energy increases, the replacement market will grow linearly with it. It is thereby important to note that the renovation market will continue to be of highest importance, regardless of the development of new construction. Hence, the authors once again state that being present in this market should be of high importance for AL, being an equipment manufacturer with intentions of having a dominant position in the market for district energy applications.

Many Factors That Need to Align In Order to Realize Growth Potential in the Near Future

To sum up, the majority of the market value is found in the replacement market. We also see that the right political environment is crucial for district energy to gain momentum in Canada. It also means that political decisions and incentive programs at several different levels need to be aligned in a way that is advantageous for district energy. Furthermore, these political decisions need support from an overall increased knowledge level of district energy. Finally, an increase in especially natural gas prices would be desired in order to fully exploit the value proposition of district energy. Considering the way in which the defined key factors affect each other and the uncertainty of them individually, we do not believe in a major growth increase for district energy in the short run. As earlier mentioned though, a commitment of developing a

large district energy network in only one community have a large impact on the market size.

6.2 Local Heating

6.2.1 Assumptions and Uncertainties

The market for Company X in local heating is with the defined delimitations restricted to hydronic systems. The Canadian market in local heating with hydronic systems consists of two types of buildings: Multi-family residential and commercial/institutional. The two building types have different characteristics and differ in average size, average energy consumption and need of hot tap water system. Therefore the current market and future potential for local hydronic heating in Canada has been divided into two different markets: the residential market and the commercial market.

The use of product As for floor space heating differs and the most widely used technology is to have a direct system, with no need for product As. The analysis in this master thesis will therefore only consider product As for hot tap water systems and not for floor space heating.

One of the major differences between residential buildings and commercial buildings is that the latter does not have the same need for hot tap water. Residential buildings use 20 % of the total energy need for heating water in hot tap water systems. Hospitals and accommodation service buildings are the only building types within commercial buildings using hot water systems. Together they represent 16% of the total commercial floor space in Canada.

It has been found that few, if any, retrofits involve the change from one heating system to another (i.e changing from forced air system to a hydronic system). Thus, when calculating the future market for hydronic systems in Canada, new dwellings/commercial buildings with hydronic systems and renovation of dwellings/commercial buildings already using a hydronic system will be included.

Looking at historical growth rates for the total residential housing stock the CAGR from 2001 to 2012 has been 1.7 %. This growth rate has been used when estimating the future market size for local heating in the residential

market. The commercial/institutional market is assumed correlate with the housing market why the same growth rate has been used when calculating the future market size for local heating in the commercial/institutional market.

The product A value per energy unit used for estimating the potential for Company X in the Local Heating market is the same as in the calculations for the District Energy market. The value for product A, when estimating the value of the District Energy market, was dimensioned for an average building connected to a DE network, which is significantly larger than an average residential building using hydronic local heating. This means that in the calculations for estimating the market size of local heating, a linear value per energy derived from the value of 7.8 kEUR for 1 MW installed heating has been used. Employees at Company X Lund office have confirmed that the above-mentioned approach for calculating the product A value is reasonable. However, the approach gives a lower value for a product A than the actual value why the outcome of the calculations can be considered to be conservative.

New data of the total usage of hydronic systems in Commercial and Institutional buildings have proven to be difficult to get hold off. The latest report from Statistics Canada was published in 2002, however a new report is to be published in 2012 Q3. The data from that report have been requested without any success. Another uncertainty in the calculations is the values of the total commercial and institutional building stock, which are from 2008. To get the total stock for 2012 the values from 2008 have been extrapolated using a growth factor of 1.7%. The outcome of the calculations must therefore be considered with caution.

6.2.2 Market Value Calculations

See Appendix D

6.2.3 Estimated Market Value

With our definition of the local hydronic heating market, which consists of both new construction and replacement, it can be concluded that the replacement markets are responsible for 80 percent of the total market value. The 80/20 separation between the replacement markets and the new construction

markets are mainly because of the slow market growth together with a historically high usage of local hydronic heating systems.

In the table below is the estimated total value for product As in the residential local hydronic heating market presented.

Table 6.2: Residential Local Hydronic Heating Market

(kEUR)	2012	2013	2014	2015
New Built				
Semi-Detached	29	30	30	31
Row House	34	35	35	36
Apartments	80	81	83	84
Total New Built	**143**	**145**	**148**	**151**
Renovation				
Semi-Detached	127	129	131	134
Row House	125	127	129	131
Apartments	488	496	504	513
Total Renovation	**740**	**752**	**765**	**777**
Canada TOTAL	**883**	**897**	**913**	**928**

The estimated total market value for product As in the commercial and institutional local hydronic heating market is presented in the table below.

Table 6.3: Commercial and Institutional Local Hydronic Heating Market

(kEUR)	2012	2013	2014	2015
New Built				
Atlantic	8	8	8	9
Quebec	39	39	40	41
Ontario	83	84	85	87
Prairies	63	64	65	66
British Columbia	23	24	24	25
Total New Built	**216**	**219**	**223**	**227**
Renovation				
Atlantic	33	33	34	34
Quebec	154	157	159	162
Ontario	329	335	341	346
Prairies	251	255	259	264
British Columbia	93	95	97	98
Total Renovation	**860**	**875**	**889**	**905**
Total Market	**1,076**	**1,094**	**1,112**	**1,131**

6.2.4 Company X Canada's estimated market share

Company X presents their sales figures divided by sub division, and not by application market, why market share estimation for the Canadian hydronic heating market not has been done.

6.2.5 Key Factors From Macro Analysis

Implications Due to the Lack of Political Incentive Programs and Trade Organizations

During the empiric-gathering phase of the master thesis no local hydronic heating incentive programs was found. A political incentive program can help technologies achieve a greater market presence. Since there are no ongoing political programs in Canada or any campaigns for such plans in the near future, it is important that local hydronic heating is promoted as a reliable and

economically beneficial alternative. There is therefore a need for educating the market and improving the knowledge of the technology.

The knowledge level of the technology for local hydronic heating is quite low among all stakeholder groups. It has been observed that even the installers of heating systems find that local hydronic heating is a complex system and that they rather prefer other alternatives. A reason to low knowledge level within the market can be due to the shortage of, or difficulty to find, trade organizations for local hydronic heating. The lack of easily found trade organizations affects the average knowledge level of the technology and since the knowledge level is one of the key barrier for greater future growth in Canada, it is regarded as a major concern for the development of the market.

In order for the market of local hydronic heating to increase its annual growth, it is believed that educating the market is of great importance. How to best achieve a better general understanding of the technology and what areas and stakeholder groups that will give the best yield per education effort have not been investigated in this master thesis. To further investigate these areas is of great interest and is encouraged by the authors.

For Company X it is important to be aware of the above-mentioned *key factors for change* and any development they may have in the Canadian market. A change in the educational effort and incentive programs is likely to effect the new built market for local hydronic heating in a positive way. By observing these two factors Company X will have enough time for preparing for a future increase in the market for new built local hydronic heating systems.

It is important to understand that many of the municipal incentive programs derive from decisions made on a provincial level. Thus, focusing on the province where the above-mentioned key factors for change is most likely to occur and where they will have the greatest impact is recommended. From our empirical findings, it can be concluded that the provinces with the highest likelihood of an increased future growth for the new built market are the Atlantic Provinces together with the province of British Columbia.

Low Environmental and Energy Efficiency Awareness

Another barrier for increased growth for local hydronic heating is the low environmental and energy efficiency awareness. Since one of the selling

arguments for local hydronic heating is its energy efficiency and thus also low environmental impact, a low environmental awareness reduces the likelihood for future increased usage of the technology in Canada.

During the interviews, no indications of any improvement in the environmental awareness areas have been found. Consensus is that the Canadian people still have a great individualistic mindset, why heating with an individual heating source is the preferred choice regardless of its environmental impact.

One of the reasons for the low interest in energy efficiency solutions in Canada is the cheap energy across almost all Canadian provinces. Low energy prices do not only increase the relative pay back time for energy efficient heating solutions, such as hydronic heating, but also eliminates the topic on the political agenda. Since Canada have had low energy prices over a long period of time the need for, and development of, energy efficient heating solutions have not been of great interest. A key factor that should be observed and that may increase the future demand for energy efficient solutions is therefore the energy prices across Canada. An increase in energy prices can, with the right political incentive programs, have a positive impact for the future usage of local hydronic heating systems.

Another reason for the low attractiveness of energy efficient heating solutions is the way buildings are being built in Canada. Today the constructor of a building has no incentives to install a heating system with low lifetime cost why cheaper heating systems are preferred over local hydronic heating. Again, observing the political agenda and detect any changes that may alter the incentives for constructors is believed to be of importance for AL.

Observed Positive Growth Indicators

A positive trend for local hydronic heating systems in Canada is that the increased fraction of new built multifamily households. Since the usage of hydronic heating system increases with the floor space in a building, the amount of new hydronic heating systems is believed to grow. The increase in multifamily households is still relatively small but there is an indication of increased urbanization. In order to capitalize on the urbanization it is important to educate the market about the benefits of a hydronic system compared to other, more widely used, heating solutions.

In the secondary data, it has also been noted that the amount of renovation done for energy efficiency improvement is increasing. This is of course a positive trend towards a more environmentally mindset in Canada. However, the actual effect on local hydronic heating is uncertain, as is the short-term effect on the heating-system-decision made by Canadians.

6.2.6 Future Market

A Large Replacement Market and Slow Growth

Throughout the process of mapping the Canadian potential it has been clear that the market potential depends on how the market is defined. We have seen in our analysis that a major bulk of the market value is to be found in the replacement markets. One of the reasons for this is that the markets have reached a mature state. This equals a slow growth together with a relatively large amount of current users.

The combined conclusion for the local hydronic heating market is that the annual growth observed today is not likely to change in the near future. In order for local hydronic heating to expand beyond today's growth numerous factors must change. The most critical factor for the future development of local hydronic heating is the political decision-making process. A political decision has the potential to increase the general knowledge level by the initiation of academic researches, information campaigns and an introduction of an energy efficiency agenda. However, from our analysis it is believed to be unlikely for a political decision, in favour of local hydronic heating, to be made in the near future.

Major Growth Increase Unlikely

Another observed factor that strengthens the view that the local hydronic market will remain constant in the near future is the incompatibility with other technologies. A major barrier is the need for two separate systems when using central air conditioning and local hydronic heating. Since the usage of central air conditioning varies across Canada so do the potential for local hydronic heating, nevertheless, the incompatibility problem is a barrier for future growth.

The overall view is that the new built market for local hydronic heating wont change significantly from today's levels. Consequently, a strategy for expanding Company X's business in the local hydronic market is to aim at the

replacement market, which today is estimated to represent 80 % of the total value of product As sold. During the empiric data-gathering phase, it has come to the authors' attention that most of the product As for replacement purposes are being bought at wholesalers by individual contractors. Evaluating the wholesaler distribution channel can thus be a first step in the process of understanding the renovation market. Also, it must be acknowledged that the Canadian Company X office has been aware of the need of evaluating the different distribution channels where wholesalers has been a top priority. Unfortunately the time frame for this master thesis has made it impossible to include an evaluation of the different distribution channels why further research in this area is both encouraged and seen as relevant.

Lastly, it is important to know that the replacement market potential differs between the provinces. Since retrofits rarely involve the change from one heating system to another, the actual number of households and commercial buildings using hydronic systems today is a good indicator of where the greatest potential for replacement is to be found.

6.3 Food Retail Refrigeration

6.3.1 Assumptions and Uncertainties

The driver of the market size for food retail refrigeration systems in Canada is considered to be the amount of new built and existing stores. Thus, the two underlying main drivers are newly produced stores and existing stores that need renovation.

When calculating the new built market the estimation made by Euromonitor for the future amount of stores has been used. The estimation made by Euromonitor equals an annual growth between 2012 and 2014 of 2.2% for hyper markets and 0.05% for super markets.

The input data that have been used for the market value calculations are considered to be of high quality. The underlying market data from Euromonitor and the product A values acquired from Company X Head Office are both considered valid. Confirmation of the product A values has not been received from the Canadian office. However, employees at Company X Lund have confirmed the values.

6.3.2 Market Value Calculations

See Appendix D

6.3.3 Estimated Market Value

The total market value for product As each year is given by summing the values for newly constructed stores and renovated stores.

Table 6.4: Estimated product A values of newly constructed stores

Value per store type (kEUR)	2012	2013	2014
Hyper markets	440	440	385
Super markets	60	30	15

Table 6.5: Estimated product A values of renovated stores

Value per store type (kEUR)	2012	2013	2014
Hyper markets	1,520	1,556	1,587
Super markets	2,961	2,963	2,964

Table 6.6: Estimated total market value for product As

Value per store type (kEUR)	2012	2013	2014
Hyper markets	1,960	1,996	1,972
Super markets	3,021	2,993	2,979
Total Market Value	**4,981**	**4,989**	**4,951**

6.3.4 Company X Canada's Estimated Market Share

Company X presents their sales figures divided by sub division, and not by application market, why market share estimation for Refrigeration in the Canadian Food Retail market not has been done.

6.3.5 Key Factors From Macro Analysis

Refrigeration Market at a Technological Tipping Point

The Canadian store refrigeration market is undoubtedly at a technological tipping point. Interviewees from different parts of the value chain and independent experts believe that the industry is getting ready to start moving away from HCFs that are the widely used refrigerant substances today.

What refrigerant that will replace HCF as the most common refrigerant is believed to be more uncertain. There seems to be a strong belief in CO_2 among the interviewees that are working with CO_2 and the opposite among the ones with no interest in CO_2 systems.

As seen earlier, the interviewees who believe in CO_2 as a refrigerant believe in a usage as high as 25% within 5-10 years. However, if a strong growth in CO_2 usage should occur, it is reasonable to believe that the technology must firstly prove itself being efficient, well performing and economically viable compared to the alternatives. A strong development and attractive pricing of the synthetic refrigerant substance HFO, which is one of the possibly strong alternatives, may quickly become obstructive to any such development.

Political Incentives and Regulations Could Tip the Market In Any Direction

As seen in Quebec, political incentives have the power to tip the development in the market towards a certain refrigeration technology. There is a belief in the market that there will be legislations on the use of HFCs as well as organizations currently working on such legislations. However, whether the upcoming refrigerant technology will be CO_2 or any synthetic refrigerant blend will likely be affected by the way in which any regulations or incentives are designed. If, for example, legislations that limit the GWP of a refrigerant are implemented, the development can go in any way. If there instead were an incentive program for natural refrigerants or taxations on HFC leakage implemented, the use of CO_2 would quickly increase.

From the empirical study, an implementation of penalty fees or taxes for HCF leakage is the most likely form of regulations. Also, such legislations are reality in many parts of the world; it is likely that it will eventually happen in Canada as well. However, when and if that will happen is uncertain and consequently also how the refrigeration market will be affected going forward. This is considered to be a key factor that would drive a change towards new refrigerants, even though it would not promote any certain substitute technology.

Electricity Price Increase Might Improve Technological Development

Through the empirical study, low electricity prices giving low operational costs are mentioned as a barrier for operators to take on greater investments for modern, efficient systems. Electricity prices have been increasing lately in

some of the large provinces and it is likely that the Canadian electricity prices will continue increasing, even if they increase slowly. If so, the value proposition for more technologically sophisticated refrigeration systems will improve, which has potential of driving the development forward.

Knowledge Barriers Likely to Decrease Quickly

As the interest for technologies like CO_2 increase, the lack of knowledge about the technology is likely to decrease. Being able to offer the most suitable refrigeration solutions for clients will probably be the most important factor for being successful within the industry, why the knowledge barrier is not considered being a strong barrier for the development of these technologies.

Regulations that drive a shift away from HCFs as refrigerants may also create a market pull for other technologies that itself will push the learning curve forward.

Environmental Awareness Likely to Increase From Low Levels

With the increasing industry attention for GWP and the operators' desire to adopt green profiles, the knowledge about environmental footprints is likely to increase going forward. Thus, the overall environmental awareness connected to refrigeration is likely to increase. The development regarding environmentally friendly refrigerants, though, is unlikely to be strongly affected by such awareness unless the economic viability and performance is recognized accordingly.

6.3.6 Future Market

The Tipping Point

The future market for food retail refrigeration is at a tipping point. The next few year will show what direction the refrigerants will take, either natural or HFO's. This development is of great interest for Company X and something that should be monitored closely.

There are some indications that the province of Quebec will go towards the use of natural refrigerant. The province of Quebec is also the largest market for building new CO2 system. Thus, it is recommended that Company X, if wanting to compete in the Canadian CO2 refrigeration business, to be present in the Quebec area.

American or Canadian market

It has been observed that food retail refrigeration manufacturing and selling for the most part mainly is a US market and not a Canadian market. The majority of refrigeration systems for food retail are manufactured in US and thereafter sold to Canadian buyers. This is important for both the US and Canadian Company X offices to notice because any equipment sold in one country may be used in cross-border applications. Thus, a North American approach to marketing research for store refrigeration is preferable.

Reverse Store Consolidation Create More Opportunities

The fact that there is currently a trend towards more and smaller stores might increase the market potential slightly as more new store refrigeration systems might be constructed. The effect of this trend is considered to be small, but something that Company X should be aware of.

In-house Store Specialists Might Complicate the Market Structure

The fact that a few companies completely dominate the grocery store market, together with the fact that they have their own in-house refrigeration specialists, complicate the market structure. This makes the consumer bargaining power high and the available distribution channels to target these companies are likely to be few. Especially since the empirical findings show signs that there is reluctance in the market to choose equipment that is not familiar. Important for Company X is to see in what direction the larger companies will take in the choice of natural refrigerant or HFO's. An interesting observation is that Sobeys have a mandate to only build CO_2 systems in their food retail stores in the province of Quebec. This is seen as a positive indicator for the future development of CO_2 usage.

An opportunity with the current market structure is that the education of CO_2 systems can be done by fairly low investments.

6.4 Cold Storage Refrigeration

6.4.1 Assumptions and Uncertainties

The market for product As in Canadian cold storage spaces is considered to consist of an increase in storage space due to a growing underlying market and existing cold storages that are renovated.

The market size estimations are based upon the amount of existing cold storages in Canada. The values for the different types of product As are derived from Company X and may therefore differ slightly from the market average. Company X's product As are considered to be in the higher price range and the market size estimation may also end up in the higher range accordingly. This, however, is somewhat compensated by using a conservative frequency of renovation.

6.4.2 Market Value Calculations

See Appendix D

6.4.3 Estimated Market Value

The total market for product As in Canada is estimated by adding the new construction and replacement market values both in Quebec and outside of Quebec.

Table 6.7: Total market value estimation for product As in cold storage spaces.

Total product A Market Value (kEUR)	2012	2013	2014	2015
Outside Quebec				
New production				
Air product A	3 539	3 583	3 627	3 671
Liquid product A	321	325	329	333
Replacement				
Air product A	19 464	19 703	19 945	20 189
Liquid product A	176	179	181	183
Total	**23 501**	**23 789**	**24 081**	**24 376**
Quebec				

New production				
Air product A	810	818	825	833
Liquid product A	39	39	39	40
Replacement				
Air product A	5 842	5 896	5 951	6 007
Liquid product A	28	28	28	29
Total	**6 719**	**6 781**	**6 845**	**6 908**
Total Air product A	29 655	30 000	30 348	30 701
Total Liquid NH3 product A	564	570	577	584
Total market value	**30 219**	**30 570**	**30 925**	**31 285**

6.4.4 Company X Canada's Estimated Market Share

Company X presents their sales figures divided by sub division, and not by application market, why market share estimation for Refrigeration in cold storages not has been done.

6.4.5 Key Factors From Macro Analysis

No Switch in Refrigerant Technology Likely

In cold storages, ammonia is a well-accepted refrigerant across Canada and a switch to any other refrigerant is regarded unlikely within a near future. Through the empirical study, a reluctance of switching refrigerant technology among technicians has been observed as well. If restrictions on HCF leakage are applied, the probability of switching from ammonia decreases even more.

The uncertainty of this development is in Quebec, where there currently the use of ammonia currently is restricted as well. On top of the legal restrictions, the empirical findings also show a strong cultural bias against using NH_3 in Quebec that is likely to prevent the use of the refrigerant, even if the legal restrictions would weaken. That might be the reason why the empirical findings show some experimentation with CO_2 in cold storage-applications in Quebec. However, if HFO becomes a viable alternative, its potential as the preferred refrigerant in Quebec is likely to be high.

Possibly Increasing Interest in Energy Efficiency

If electricity prices continue to increase, the interest in more complex, energy efficient refrigeration systems is likely to grow. Such development may boost the market potential as high performance equipment is more expensive.

Trend Towards Secondary Refrigeration Loops Boosts Market Potential

The trend of operators choosing NH_3 in secondary loops, seen in the empirical data, has potential of increasing the market potential slightly as the total product A values in such systems are greater.

Cold Storage Refrigeration Is Likely to Remain a Canadian Market

The empirical findings show regulations, preventing foreign actors entering the Canadian market for refrigerated storage spaces. No signs of any changes in the regulations can be concluded why the market is likely to remain Canadian, which limits the growth to the population growth going forward.

Consolidation of Cold Storages Might Affect the Market in the Near Future

The trend of consolidating cold storages might increase the investments in new constructions in the short run. Although, that would require existing cold storage spaces being discontinued and the renovation market would decrease slightly. Consequently, the total market size would be only be affected moderately by the consolidation trend.

6.4.6 Future Market

Mature Market With Few Surprises

To sum up the PESTEL analysis, the market for refrigeration systems in cold storages is considered to be a mature market with low probability of any major changes. Since cold storage is a Canadian market, the growth will likely remain equal to the population growth going forward and the changes in technology and cold storage sizes are likely to have a limited effect in the long run.

The Bulk of the Market Is In Replacement

Like some of the other studied markets, the growth rate and consequently also the amount of newly constructed storage spaces are low. Thus, a majority of the sold product A volume is for replacement purposes when renovating existing systems. This master thesis has not investigated the profitability of the

replacement market nor how it functions or how to best reach it. Thus, it is encouraged to further investigate the replacement market for refrigeration in cold storage in future research.

6.5 Marketing Information System

6.5.1 Internal Data

With the implementation of a new internal database, where existing information can easily be shared throughout the organization, Company X's ability to capture and use information available within the organization is considered to increase. However, the impression is that the routines and processes for using the system are not yet fully in place.

6.5.2 Marketing Intelligence

Through the empirical study, it can be concluded there exist marketing intelligence activities in both Company X Canada and in the Company X headquarter. No clear processes of storing and using the generated intelligence have been observed, which implicates a weakness in this part of the marketing information system.

As earlier mentioned, marketing intelligence is by nature an activity that is unstructured, why it is also hard to draw conclusions about the quality of such activities when studying them during a short period of time. However, it is believed that any marketing intelligence activities have potential to generate highly valuable information why the routines and processes of capturing and storing any findings from marketing intelligence activities are very important. An organization with those routines in place is likely to be able to capture valuable information, disseminate the information through the organization and create an environment of continuous learning among the people engaging in marketing intelligence activities. Thus, it is of importance for Company X to improve processes for handling any information generated this way to create an efficient marketing information system.

6.5.3 Marketing Research

Throughout the process of mapping Company X's Canadian markets it has come to our understanding that both the sale and head office wish to improve their market research routines. It is clear that with the resources given today,

Company X Canada has no resources dedicated for conducting market researches outside of the current customer stock, which might prevent them from seeing and capturing new opportunities.

Our observation, during the work at Company X sales and head offices, is that there is a lack of routines for conducting market researches and market mappings. Our experience is that there are no guidelines of how to conduct and measure a specific market or how to best gather the market information. At the same time we have seen that there is an ongoing project aiming to improve Company X's market research process. The system builds upon information that is available within the company such as request for quotes and the quote database. However, the need for data gathering of the *non-visible markets*, studied in this master thesis, is still not addressed in this new system.

If the non-visible markets are not included in Company X's market research processes it is our belief that important business opportunities may be lost. Also, the lack of research of the non-visible markets creates the need of buying expensive third party reports that not always are precise. Looking at the MIS theory the system that Company X currently works with lacks some aspect of in the *market intelligence* process, which is the gathering of information about customer need's and competitors. Even though some aspects of the market intelligence factor have been observed it still needs more attention. The process in the MIS theory that needs the most attention is *marketing research*, which is the structured way of using the gathered information to estimate market size, market potential and market share.

Developing the marketing research process will create common guidelines for how Company X should measure and map their markets. This means that the actual performance for each market can be measured in a better and more rightful way. Since Company X is a global actor, a common way of measuring the markets is seen as a tool for continuous improvements and increased profits by the help of benchmarking different regions and markets.

6.5.4 Implications of the Way Company X Works With MIS Today

Company X does not routinely acquire any marketing research from third parties, the information the decisions can be said to origin from an opinion at the Canadian sales office, which does not engage routinely in marketing

research. Consequently, the information originates in Company X's current customer base and the market that can be reached through the current sales channels, thus leaving substantial parts of the market unknown. This is known both by the Canadian sales office and the head quarter in Sweden and the reason for this is that there are no specific resources available for working with MIS in Canada.

Our observation of the current market research methodology in Canada is that it provides a greater uncertainty in markets where Company X has smaller market shares, since the information sources in such markets constitute a smaller part of the actual market. Thus, the current way of working creates an imprecise view of markets where Company X has potential to grow.

6.6 Market Orientation

6.6.1 Observed Improvement Potential In the Intelligence Generation Phase

As noted above, there are gaps in the way Company X gathers information and how they use it, which creates a weakness in the dimension of *intelligence generation* in the market orientation theory. Consequently Company X's current marketing information system is interpreted to be somewhat contradicting towards the theory of a fully market-oriented company.

Since the quality of market orientation is dependent on high performance in all phases, it is recommended that Company X start with improving their MIS system. A better MIS system will help Company X to achieve higher quality in the intelligence generation phase, which will help them to become more market oriented. A better market orientation will, if used correctly, lead to better decision-making and the ability to see and exploit opportunities and avoid pitfalls that arises in the different markets.

7 CONCLUSIONS AND RECOMMENDATIONS

In this chapter the conclusions and recommendation derived from the empiric and analytic chapters will be presented. The conclusions are divided into three areas: The implications of the definition of a market, AL's internal marketing information system and how Company X *can improve their marketing research processes in order to achieve full market orientation.*

The empiric data gathered in this master thesis have not only helped us map the market size and future potential for the four markets; it has also been helpful in the process of understanding how different market definitions can lead to different actions and outcomes. During our research we have also seen indications of how Company X's Marketing Intelligence System works and limitations of the current process have been observed. These insights, together with the theory of market orientation, leads to our recommendation of how Company X can improve its marketing information system and thus achieve a higher degree of market orientation.

7.1 Implications of Market Definition

The potential and size of a market is determined by how a market is defined. Our definition of the Canadian markets includes both new built systems, referred to as the *new installation market*, and the replacement of product As when renovating old systems, referred to as the *replacement market*. Our analysis shows that the sizes of the two market components are dependent on numerous factors. However, the main drivers are: the annual growth of new users and the size of the existing user base. These two factors can partially be described by the market's position in the life cycle.

A way of analyzing the relative size of the new installation and replacement markets is therefore to evaluate where the market is positioned in the technology life cycle. The majority of the analyzed Canadian markets show indications of being mature markets, or behaves like mature markets, with a low annual growth and a relatively high amount of current users.

For the markets that have reached a mature state, our empirical findings show that the replacement markets have a higher monetary value compared to the

new installation markets. It is therefore our suggestion to evaluate how AL can capitalize on the replacement part in such markets. Our empirical findings show that Local Hydronic Heating and Refrigeration in Cold Storages are mature markets why our recommendation is that the replacement part of these two markets is further analyzed and evaluated.

Another market where the replacement part has a higher monetary value is the market for district energy. The market for district energy is a rather special case since the technology has been more widely used historically. This creates a large amount of current users compared to the amount of new built systems. In our opinion, district energy has not reached a mature state since it still has a high growth potential if the right market environment occurs. However, it currently behaves like a mature market since the growth is small, why the replacement part has a higher monetary value for the time being.

The fourth market, food retail refrigeration, differs somewhat from the other studied markets since it currently experiences a time of flux. The market for food retail refrigeration is at a tipping point between two competing technologies. This makes the new built market interesting, since completely new systems are likely to replace old ones. Hence, our recommendation for the food retail refrigeration market is to be responsive to technology changes and closely monitor the development of new refrigerants.

It has also been observed that the definition of a market affect the choices and marketing efforts being made on the specific market. Our market research suggests evaluating the potential of the replacement markets, since we believe those markets hold previously not explored potential. There might be a risk of overlooking opportunities in a market if certain parts are not included when defining the market. Such view can potentially give a false security of having a major market share when the actual case is different, which prevents engagement to capture those unknown shares.

A concern about not being present through wholesale channels that target the replacement market is something that was articulated by the Canadian sales office. Our recommendation in the particular case, concerning the wholesalers, is that targeting this sale channel is likely to result in greater sales and a higher market share since it is a way of reaching the replacement market.

Despite the potential of the replacement markets, it is strongly believed that these markets will be very difficult for Company X Canada to reach with the existing resources. We believe that the new installation markets, as opposed to the replacement markets, require a close customer contact and long-term engagement that occupies the sales staff, preventing them from engaging with sales channels for the replacement markets with other desired value propositions. Hence, there is a concern that the organization Company X Canada has today is suboptimal to engage in the replacement markets. In order to draw conclusions whether that is the case or not, a deeper analysis of the market channel strategy is needed.

7.2 Acknowledge the Importance of Marketing Research

Through the study of the Canadian market, we have concluded numerous threats, generated by having a too narrow market focus that only focuses on the existing customers' needs. A wider focus leads to a better understanding of the trends and future end user needs, which would allow Company X to become more proactively market oriented and competitive according to Mohr et al (2010).

Company X Canada is currently working with trade organizations, customers, consultants etc. and has thereby seen many of the trends that this analysis has concluded. However, we suggest that Company X Canada routinely engage in marketing research work with structured analysis of the actual end-user need and the development of the identified PESTEL factors on a national level. Especially the geographical areas that are difficult to overview from the sales office, due to long distances, are important to monitor in a structured way.

We believe that Company X would have potential gains through a better-defined process for gathering market information. Through such process, different responsibilities would be clearer and the origin of the information that the decisions are based upon would be clearly known, which would increase the decision quality. Also, by deciding on global guidelines for how to acquire market information, different regions could easily be compared which would improve the overall marketing performance. It is our impression that the decision making process today heavily relies on market information from the

Canadian sales office, even though there is no function there with explicit responsibility of gathering external market information.

7.3 Being Market Oriented – A Continuous Process

With an improved marketing research processes, the next challenge is disseminating the information generated by the marketing information system through the organization, thus making it available for anyone within the organization who needs such information for improved decision-making. Consequently, an improvement of the marketing information system alone is unlikely to provide long-term performance improvements in the Canadian market for Company X.

In order to achieve the desired level of market orientation, Company X needs to consider the dimensions of market orientation in their daily routines. This thesis is focusing on the generation of intelligence alone, which is only one of the four dimensions. We suggest that being market-oriented should be seen as a continuous process where the generation of intelligence through an efficient marketing information system is fully integrated in a cycle of processes, rather than several individual steps. We also suggest adding an evaluation process after each cycle. Increasing the degree of market orientation is, due to Company X's complex organizational structure, not a one-time fix. Having a cycle process, where improvements and alterations can be made on the way, is believed to be the best approach if Company X wants to become more market oriented.

By applying a cycle approach, Company X would be able to increase its degree of market orientation substantially and thus make coordinated quality decisions based upon creation of customer value.

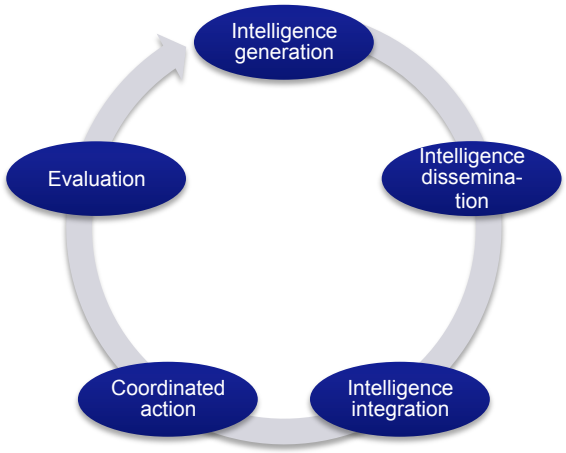

Figure 7.1: The continuous process of market orientation

8 REFLECTIONS

This chapter summarize the additional reflections and conclusions that have been drawn during the process of completing this master thesis. The possible implications due to our narrow scope and key insights from the analysis will be presented. A reflection on how different investment horizons can affect a Market Information System and how a global leading market position may lead to a product focus are also discussed.

8.1 General Reflections

The focus area of this master thesis has been the Canadian market, which regarding total sales, is a small market for Company X. Also, our focus within the Canadian market has only been on the Industrial Equipment division. This makes our view of Company X as a global company quite narrow. Furthermore, only four application areas within the Industrial Equipment division have been analyzed. Thus, the outcome of this master thesis only gives a narrow view of how Company X operates and what problem Company X may have globally. The problems that have been identified in this master thesis may not exist in other markets. The observed problems may not even exist within other divisions in the Canadian market. Consequently, the authors encourage further research in other application areas and other markets in order to determine the scale of the identified problems.

Despite our narrow view, it is our belief that some of the identified problems are likely to be found in other application markets and divisions in Canada. It has been observed that the studied Canadian markets are 10-15 year behind Europe in its development of environmental awareness. This “trend” is likely to affect end-user’s decisions and behaviour on other markets where Company X Canada operates. We have also seen that most of the studied Canadian application markets are mature markets, with slow growth and a large amount of current users.

During our meetings with employees at Company X it has become clear that there is a need and a desire to improve the marketing information system. We believe that the development of such system will take long time due to the complexity in Company X’s organizational structure. It has also become clear

that a Marketing Information System is no exact science and that it does not need to be linked to a specific country. The fact is that several factors, in favour of a regional MIS system, have been observed during the study of the Canadian markets. The similarities between the macro factors in the US markets and the Canadian market and the fact that the US market in some cases directly sell its product to the Canadian markets, strengthens this belief.

When improving the MIS it is important that the manager and decision group of the MIS development process is aware of the complexity in the organizational structure and the implications it may have on the development of the MIS. The process is believed to be both time consuming and complex. Furthermore, keeping the MIS up-to-date and efficient will be a demanding task and it is important to know that it is a continuous learning process and not just a one-time-project.

Whether Company X successfully can implement a MIS system within the current organization and current incentive programs is an interesting question. Our belief is that successfully improving Company X's MIS system, where the sales offices have a large responsibility for gathering information about future development, will be difficult. Our observation is that the incentives at the Canadian sales office are somewhat contradicting to long-term investment activities, such as market researches and future end-user need analyses. How to best solve this problem is of course left to Company X to solve, but it is recommended that this problematic be further investigated.

We also believe that being a market-oriented company is not only a result of organizational structures and processes therein. The culture within the organization and the individuals' view might affect the degree of market orientation substantially. In a very technologically driven company like Company X, where a great amount of the people have strict engineering backgrounds, we believe that changing the view from *making the products right* (product orientation) to *making the right products* (market orientation) is a slow process that may continue over generations of employees and managers. Regardless of these challenges, we believe that having well-developed processes and organizational structures that support a high degree of market orientation is a necessary foundation that cannot be overlooked.

Lastly the question how Company X‘s world leading position has affected the way it operates today is something that has been discussed during the process of completing this master thesis. Our belief is that having a leading position within a product category is likely to create a product-centered focus. The confidence of having the technologically leading products is a risk of market myopia. Market myopia makes companies reluctant to look at competitors and future customer need and thus creates a risk of being hurt by the introduction of new, disruptive technologies. Since Company X definitely is a global leader, this can be one of many reasons why they have an underdeveloped MIS. If global success makes companies blind for certain improvements is an interesting question and something that is encouraged to further investigate.

8.2 Future Research within Company X

Many areas for future research have been identified during the process of completing this master thesis. The two most interesting and urgent areas are presented below.

We encourage further research of the replacement parts for the four studied markets. The attractiveness of these markets for Company X should be further examined. A first step might for example be analyzing the competitive situation within the markets through Michael Porter’s Five Forces framework. Also identifying key success factors within the markets and determining the market mix needed to reach the markets successfully is seen as a highly interesting, if the Five Forces analysis indicates an attractive market.

The authors also encourage further research of the Marketing Information System within Company X as it is of great importance for a market-oriented company. Since the product development division was excluded in this research, to include it in future studies is seen as relevant.

8.3 Academic Contribution

The report’s contribution to the academy constitutes of a theoretical and practical part. The theoretical framework (presented in figure 4.2) illustrates how a company’s degree of market orientation can be measured. The applied

framework shows how different theories and models can be used simultaneously and thus provides the acedemy with a better understanding of the concepts: Market Orientation, Marketing Information System and the PESTEL framework. Also, students can apply the theoretical framework when evaluating a company's degree of market orientation: by measuring how a company performs in the three parts of the MIS, it's quality in the Marketing Generations phase can be decided and thereby, to some extent, also it's degree of Market Orientation. The methodology chapter together with the empirical and analytical chapters is the report's practical contribution to the academy. The chapters provide a detailed method of how a market research can be executed. By closely follow the approach used in this reports, students have a good foundation when conducting marketing researches on their own.

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10 APPENDICES

10.1 Appendix A - Interviewees

January

- Tommy Ångbäck, Market Unit Manager Refrigeration, Company X Head Office, 20 January 2012
- Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012
- Johan De Cuyper, Market Unit Manager Heating Comfort/HVAC, Company X Head Office, 25 January 2012
- Pontus Bulow, Market Manager Industrial Refrigeration, Company X Head Office, 30 January 2012
- Patrik Ek, Market Manager Commercial Refrigeration, Company X Head Office, 31 January 2012

February

- Joakim Söderlund, Global Business Controller, Company X Head Office, 1 February 2012
- Magnus Edin, Market Manager Heating Comfort/HVAC, Company X Head Office, 6 February 2012
- John Goswell, HVAC & Refrigeration Manager, Company X Canada, 7 February 2012
- Tommy Norén, Corporate Development, Company X Head Office, 20 February 2012
- Rolf Christiansen, Product Portfolio Manager, Company X Head Office, 20 February 2012

March

- Steve Wilson, HVAC & Technical Sales, Company X Canada, 5 March 2012
- Bill Northam, Refrigeration Sales Representative for Company X, 6 March 2012
- Roland Kilpatrick, Industrial Technology Advisor, NRC, 8 March 2012
- Megan Smith, Manger of the Biomass Innovation Center, Nipissing University, 8 March 2012
- Elliot Digby, Mechanical Engineer, FVB, 13 March 2012
- John Stephenson, Project Manager, FVB, 13 March 2012
- Dave Malinauskas, Director of Engineering, CIMCO, 14 March 2012
- Ellen Richardson, President and CEO, CDEA, 21 March 2012
- Bruce Ander, CEO & Chairman, Markham District Energy & CDEA, 21 March 2012
- Scott Papp, Manger Contractors Division, HRAI, 22 March 2012
- Marc Gendron, Chairman Executive Committee, HRAI, 22 March 2012
- Ken Tomihiro, Program Manager, Canadian Institute of Plumbing and Heating, 22 March 2012
- John Harris, Certified Energy Advisor, DSG Home Inspections, 22 March 2012
- Deon Pfisterer, Commercial Sales, Wiessman, 22 March 2012
- Brian M. Morgan, Sales Representative, HTP, 22 March 2012

- Steve Thompson, Management Consultant & Board Member, Taco & ASRAHE, 22 March 2012
- Grant Miles, Senior Officer Building Division, NRC, 22 March 2012
- Gus Rolotti, Technical Marketing Director, Arkema, 23 March 2012
- Domenic Loconte, Sales Manager, Arkema, 23 March 2012
- Greg Swiercz, Enigneering/ Technical Service Manager, Emerson Climate Technologies, 23 March 2012
- Gilbert St-Charles, Technology Representative, Kool-Air, 23 March 2012
- Don Bowman, Director Department of Refrigeration, WWG Totaline, 23 March 2012
- Jonathan Gart, Senior Marketing Manager, Honeywell, 23 March 2012
- Paul R. Sullivan, Techical Service, Honeywell, 23 March 2012
- James V Thomas, President, Refrigerant Services Inc, 23 March 2012
- Xavier Marle, Director of Operations, Lesage Inc, 26 March 2012
- Syed Alam, Senior Engineer, HH Angus and Associates Limited Consulting Engineers, 26 March 2012
- Phil Boudreau, Ontario Sales Manager, Bitzer Canada Inc, 28 March 2012
- Pierre Malavoy, Application Engineer Equipment Division, Company X Canada, 28 March 2012

- Morrigan McGregor, Project Manager, Corix, 28 March 2012

May

- Mats Carselid, Marketing Engineer Industrial Equipment, Company X Head Office, 4 May 2012

- Maria Sennevall, Business Intelligence Analyst, Company X Headquarters, 5 May 2012

10.2 Appendix B - Interview Guide

For all interviews an interview guide with unstructured questions was used, thus the interview often took unexpected directions depending on the interviewee's expertise and interests. It was therefore important as an interviewer to have a broad understanding of the different markets. A different interview guide was constructed and tailored for each interviewee with questions linked to the interviewee's area of expertise. Below is an example of an interview guide tailored to fit the interview with Elliot Digby, Mechanical Engineer, at FVB.

FVB queries for meeting 13/3 2012 @10.00

Introduction pitch

We are two students studying Industrial Engineering and Management in Lund, Sweden. We are currently working on our Master's Thesis. The thesis is sponsored by Company X and a part of the project is to map the potential for District Energy in Canada. The mapping will be done by interviewing different players in the Canadian DE market.

FVB in general

1. The role of FVB in the Canadian DE market
    a. What does the typical process of building a DE system look like and what is FVB's role in it?

District energy networks in Canada

2. What is the average building size connected to DE (District Energy) systems across Canada?

3. What is the degree of utilization for existing DE systems in general, i.e. are most systems fully used nowadays or can more buildings be connected without building new plants?

4. How much of DE in Canada is Cooling? Heating?

5. Do you know how much DE that has been built since 2009? The total floor space that was connected to DE across Canada was 27 million m^2 in 2009, what would your estimation be for 2012? The total energy

produced by D.E plants was 6 GW in 2009, what would your estimation be for 2012?

6. How do you believe that the use of DE will develop going forward?
    a. In 5 years?
    b. In 10 years?

7. What factors do you believe will have the greatest impact on the development of DE?

    Can the answers be linked to some of the PESTEL factors:

    - Political factors
      Legislations, regulations, "Green" initiatives

    - Economical
      Energy prices, ownership issues, subsidies

    - Social factors
      Knowledge, public opinion

    - Technological factors

    - Environmental

    - Legal

8. How do the factors you just mentioned differ between different provinces? And have the factors you just mentioned proven to increase the usage of DE in the past?

9. Are there any ongoing incentive programs for DE in Canada? How has historical incentive programs affected the usage of DE in Canada?

Product As in a DE network

10. What is the average value for product As in a DE plant per produced energy unit?
    a. For heating
    b. For cooling

11. What is the average value for product As in a DE system (transportation from plant to heated space) per produced energy unit or per m^2 of space heated by the system.
    a. For heating
    b. For cooling

12. How does the average building size affect the product A value in a DE system? What else can affect the product A value?

13. How often does product A equipment have to be replaced in a DE network?

10.3 Appendix C - Customer buying processes

District Energy and Local Heating

Large Contractors and System Builders

Large contractors and system builders are engaging in the heating, air-conditioning and ventilation disciplines (HVAC). They are the buyers of the system but not the end users. For these customers, Company X is usually just one among many suppliers. The product A components usually represent a small part of the total system cost. (Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012)

For the mechanical contractors and system builders, trust, relationship and price are important factors that affect the buying decision. Mechanical contractors and system builders that do not possess competences within the HVAC disciplines sometimes use HVAC consultants for specification advice. (Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012)

Smaller Contractors, Local OEM and Installers

This group of player in the buying process has the same function as the larger contractors. However, they engage in smaller projects creating a need for an authorized distributor. (Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012)

Authorized Distributor

The authorized distributor supplies products for minor projects as well as spare parts for replacement purposes. (Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012)

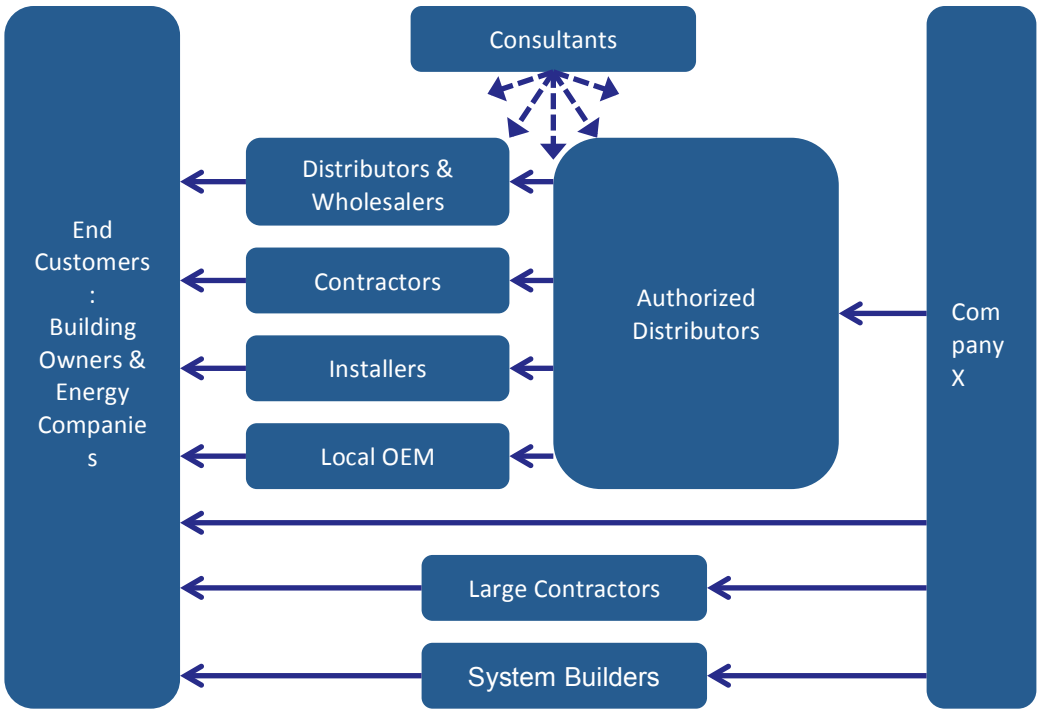
Property developers and Operators

Property developers are usually the buyers and in some case also the end-users of the product A components. For these customers, the type of product As to be used is usually specified by the HVAC consultants or mechanical contractors. However, a common specification leaves room for a choice between different manufacturers. Hence, the price has a substantial impact on these customers' buying decision. (Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012)

When the operators are not the property developers, their preferences mainly concern reliability and performance of the equipment and thus may possibly differ from the property developers' preferences that in this case are price driven. (Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012)

HVAC Consultants

HVAC consultants support contractors, property developers and operators with advisory services within the HVAC discipline. They are usually involved in the specification process and thus have a great influence on the buying decision. (Stefan Linde, Cooling Market Manager, Company X Head Office, 24 January 2012)



Refrigeration

The buying processes for the refrigeration segment is similar to the buying process for comfort heating and cooling. Presented below are an example of how the value chain is typically organized and functions for the commercial refrigeration segment. There are certainly variations and depending on the features of each project, different players may or may not be involved.

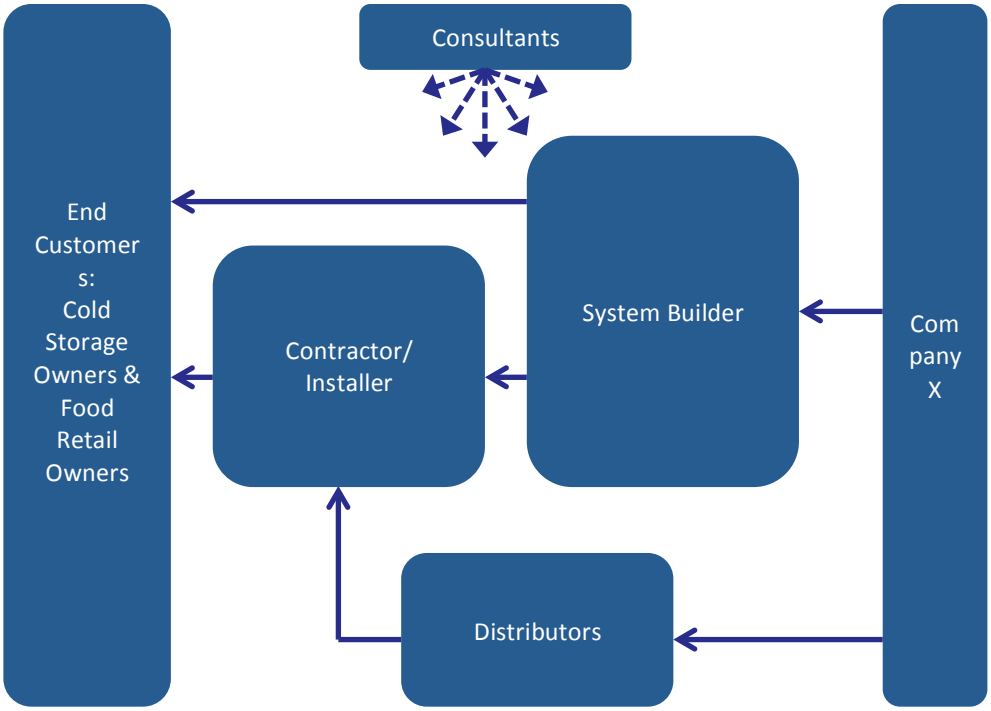
1. The end-user decides on building a food retail facility.

2. The end-user contacts a consultant, who investigates the end-user's needs and produces a specification of the facility. When specifying the product As, the consultant usually collaborates with a manufacturer, who provides the consultant with a suggestion of what equipment to use. In specification the consultant states the equipment suggested by the manufacturer but always leave an opportunity to use other equivalent equipment. An example of such specification can be: *32 x Model X from Manufacturer Y or equivalent.*

3. After receiving specifications and blueprints from the consultant, the end user requests quotations from different contractors and decides on one or several contractors to execute the project.

4. During the project, the contractors often question the equipment specified by the consultant in order to minimize costs. Before approving such change, the end-user usually seeks advice from the consultant, who either approves using another manufacturer's equipment or takes no responsibility of the facility's performance with equipment other than specified. The contractor then buys the refrigeration system, with the right specifications, from a system builder who is the one responsible for building the refrigeration system.

The above-described buying process is for the construction of new refrigeration systems. When renovating the refrigeration systems the distributors, who keep the products in stock, sells the product A direct to the contractor or installer.



The buying process for refrigeration in cold storages is similar to the process for commercial refrigeration systems. The difference between the two buying processes is that components for cold storage applications have an increased complexity and a need for ad hoc solutions. Both Company X and the consultants have therefore a larger role in the cold storage buying process. (Dave Malinauskas, Director of Engineering, CIMCO, 14 March 2012)

10.4 Appendix D - Market Value Calculations

District Energy

The amount of new constructed district energy systems each year is estimated by using the amount of systems constructed between 2009 and 2012 and the average floor space served by systems recently constructed.

$$Yearly\ increase\ in\ fl.space = Avg.amount\ of\ systems\ built/yr \times avg\ fl.space\ served$$

This approach gives a conservative growth of district energy that is assumed to be constant over time. In reality, the existing amount of district energy in Canada is very low and a decision of building only one larger system would have a great effect on the new construction market size.

When modelling this growth, only new district energy systems are considered. The actual growth is probably slightly higher as many already existing systems are growing as well. Hence, the growth is estimated in a very conservative way.

For both district heating and district cooling, the renovation market is calculated by subtracting the estimated amount of systems that are built within the last 10 years and then consider the frequency of renovation for the different product A applications.

$$fl.space\ renovated = (Amount\ of\ existing\ fl.space - fl.space\ built\ within\ 10\ yrs) \times \frac{1}{frequency\ of\ renovation}$$

From the changes in total floor space heated or cooled, the market value is estimated by multiplying with heating effect requirements for the different building types and product A value/effect.

$$total\ market\ value = fl.space\ built\ or\ renovated \times effect\ requirement/sqm \times HEX\ value/effect$$

Local Heating

The calculations of the product A market among, new built residential buildings, were done by determining the yearly increase of multifamily households for each province. The usage of hydronic heating systems for the new households was assumed to be equal to the current usage of hydronic systems. Consensus in the market is that hydronic heating has reached its maturity stage and the usage of boilers is likely to remain constant in the near future. This statement validates the assumption above.

$$Total\ Nbr\ of\ New\ M.F.Households\ with\ Hydronic\ Heating\ per\ Province\ and\ Year = Provincial\ Nbr\ of\ New\ Multi\ Family\ Households * Provincial\ usage\ of\ Hydronic\ Heating\ Systems$$

Since the *value of product As per W* proved to be the easiest value to calculate, the number of new built households needed to be translated into actual installed energy capacity:

$$Yearly\ Installed\ Capacity\ in\ New\ M.F.Residential\ Hydronic\ Heating\ Systems\ by\ Province\ in\ W = Total\ Nbr\ of\ New\ M.F.Households\ with\ Hydronic\ Heating\ per\ Province\ and\ Year * Average\ floor\ space\ area\ per\ M.F.Household * The\ installed\ capcity\ need\ per\ sqm\ for\ Heating\ in\ W$$

The total product A value for new built multi family households could thereafter be calculated using the *value of product As per W* times the *total yearly installed capacity* and usage of hot tap water systems:

$$Total\ Value\ of\ HEX\ Heating\ Market\ for\ New\ Built\ Residential\ M.F.\ Houses =$$

$$\sum_{i}(Yearly\ Installed\ Capacity\ for\ Hydronic\ Heating\ in\ M.F\ Houselholds\ in\ Province\ i) * Value\ of\ HEX\ per\ W * Usage\ of\ hot\ tap\ water\ systems$$

When estimating the renovation market for product A the total amount of multifamily households was divided by the average lifetime of product A in a hydronic system. In order to simplify the calculation, the households that have been built in the last 15 years have not been subtracted from the total Canadian housing stock.

$$Nbr\ of\ M.F.Households\ with\ Hydronic\ Heating\ Systems\ in\ Need\ of\ Renovation\ per\ Province = \frac{Total\ Provincial\ Housing\ Stock * Usage\ of\ Hydronic\ Heating\ Systems}{Frequency\ of\ Renovation}$$

The total number of households in need of product A replacement was thereafter multiplied by the average energy consumption:

$$Yearly\ Provincial\ Renovation\ Need\ in\ Old\ M.F\ Residential\ Hydronic\ Heating\ Systems\ in\ W = Nbr\ of\ M.F\ Households\ with\ Hydronic\ Heating\ Systems\ in\ Need\ of\ Renovation\ per\ Province * Average\ floor\ space\ area\ per\ Household * The\ installed\ capcity\ need\ per\ sqm\ for\ Heating$$

The value of the replacement product A market for Company X was there after calculated using the value of product A per W and usage of hot tap water systems:

$$Total\ Value\ of\ Residential\ Renovation\ HEX\ Market\ for\ M.F.\ Houses =$$

$$\sum_i (Yearly\ Renovated\ Capacity\ for\ Space\ Heating\ in\ M.F\ households$$

$$in\ Province\ i) * Value\ of\ HEX\ per\ W * Usage\ of\ hot\ tap\ water\ systems$$

Food Retail Refrigeration

The estimated market value for product As given by the new stores that are constructed each year is calculated by using the value of product As for a refrigeration system in each store type. To get the new built market value the product A value was multiplied by the number of newly constructed stores annually for each store type.

$$Total\ Annual\ Value\ of\ HEX\ in\ new\ built\ commercial\ refrigeration\ systems$$

$$=$$

$$HEX\ Value\ by\ store\ type * Annual\ number\ of\ new\ stores\ by\ type$$

In this estimation, the same product A value is used regardless of which refrigerant that is used. That gives a conservative approach to estimating the market, since an increasing use of CO_2 systems would require more advanced equipment and thus a greater product A value.

The market value for product As given by renovation of existing stores is estimated by using the existing amount of stores and the estimated frequency of renovation. The total annual market value for product A in renovated food retail refrigeration systems was calculated by multiplying the number of renovated stores by the estimated product A value per store type.

$$Total\ Annaul\ Value\ of\ HEX\ in\ renovated\ commercial\ refrigeration\ systems$$

$$=$$

$$HEX\ Value\ for\ renovation\ by\ store\ type *$$

$$Annual\ number\ of\ stores\ in\ need\ of\ renovation\ by\ type$$

Cold Storage

New construction market

The existing cooler and freezer area is calculated by using the current existing number and the estimated growth, which is the population growth in Canada. The annual change is multiplied with the estimated effect/m^2.

$$Amount\ of\ newly\ constructed\ refrigeration = Change\ in\ total\ m^2 of\ ref \times cooling\ effect/m^2$$

Finally the market value for product As in newly constructed systems is calculated by multiplying the amount of newly constructed refrigeration with the estimated product A value.

$$Market\ value\ of\ new\ construction = Amount\ of\ newly\ constructed\ refrigeration \times HEX\ value/ton$$

Replacement market

From the estimated frequency of renovation, the amount of total cold storage space that is renovated each year is calculated from the existing amount of cold storage space.

$$Amount\ of\ renovated\ refrigeration = Existing\ cold\ storage\ space \times \frac{1}{renovation\ frequency} \times cooling\ effect/m^2$$

The market value of product As replaced when renovating cold storage spaces is calculated by multiplying the amount of renovated refrigeration with the estimated product A value.

$$Market\ value\ of\ replacement = Amount\ of\ renovated\ refrigeration \times HEX\ value/kW$$

For the replacement market, the same product A value is used as in new construction because it is assumed that condensers and evaporators are replaced with new ones instead of being renovated.