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Renewable Energy in Austria

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TU VIENNA

Biomass – Cash cow or poor dog

Austria

A Master Thesis submitted for the degree of

"Master of Science"

Supervised by

Mag. Nicole Bäck-Knapp, MSc

Andreas Mixa

0527551

Vienna, February 2008

Affidavit

I, **Andreas Mixa**, hereby declare

1. that I am the sole author of the present Master Thesis, “Biomass – Cash cow or poor dog", 45 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted this Master Thesis as an examination paper in any form in Austria or abroad.

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Abstract

In times when the amount of fossil fuels is decreasing it is necessary to focus on alternative energy sources. There are many different types of renewable energy sources – Austria has to find the best type. Biomass is together with wind power the most important alternative energy source. The purpose of this paper is to present biomass with its pros and cons and to point out the need for this energy source. The main question of this paper is:

Is it worth it to invest in the biomass market and the biomass products and bring them to market?

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1. Introduction

1.1. Motivation

Energy and climate protection are in public eye at this time. A lasting use of resources becomes more and more important due to global warming.

Still billions of people in the world do not have any kind of access to electric current. The global status of energy is affected by the increasing demand of fossil fuels and the dependence on oil. The price of oil has increased rapidly in a volatile way, e.g. during October 2007 the price of oil from supplier Brent increased to an average value of 82,14 USD per barrel, with the maximum value of 95,18 USD. Primary energy sources are getting more and more expensive which means that the power production costs increase as well. Furthermore, the energy sector stands for the largest part of the generation of greenhouse gases.

One of the main goals of the energy policies is to incentives the lasting use of resources with minimum environmental impact as well as the rapid increase of use and development of renewable energy. Especially the change of consumer behaviours needs to be supported.

Central points of an environmental policy are the increase of the lasting use of recourses for power production and promotion of biomass energy.

1.2. Biomass – cash cow or poor dog

A Viennese politician said once that the time of cheap oil will be over soon and those who are prepared will be the winners (quote: Christoph Chorherr town council Vienna source: biomass association Austria). He knew that Austria can seize the chance to be one of the winners if we react instantly.

More and more countries have the goals to decrease the dependency of fossil energy which means that these countries have to a large extent make use of energy produced from themselves. One good example for this need of independence is the conflict between Russia and Ukraine due to the energy problems which shows us the importance of security of supply. This conflict was about bringing down each other's import dependency of fossil energy. So called Action plans are to counteract these problems. These Action plans are made with special attentions to biomass.

The EU-law for priority of renewable energy sources aims at increasing the share in the market of renewable energy sources of min. 12,5% until the year 2010 and min. 20% until the year 2020.

The main barrier to use biomass has fallen due to the high price of oils at this time. Now it's up to the each country to harness the potentials of biomass especially in the agriculture and forestry. These Action plans shall jump-start the use of wood and plants. The woods play a decisive role in these plans.

To make sure that each country makes the best possible use of biomass each country has to recognize their potential and develop it. Due to the biomass action schedule of the EU new impulses for local bio energy will be released. This biomass schedule outlines the following actions to speed up the development:

- To end the Europe's dependency of oil
- To contain the emission of the greenhouse gases
- To stimulate the deployment of the European agrarian areas

2. Renewable forms of energy

2.1. Heating pumps

The principle of heating pumps is comparable with the function of a refrigerator. The heating pump abstracts heat from the very area and uses it for energy-saving heating. The heat is transported in a heat supporting medium. There are primarily three different types of heating pumps:

- air/water heating pump
- sole/water heating pump
- water/water heating pump

2.1.1. Pros and cons

Pros of heating pumps:

- safe, clean, efficient
- technology of the future
- low energy costs
- heating energy at no charge

Cons of heating pumps:

- risk of corrosion in parts of the heating pump
- additional need of electric energy
- limited availability of enough water

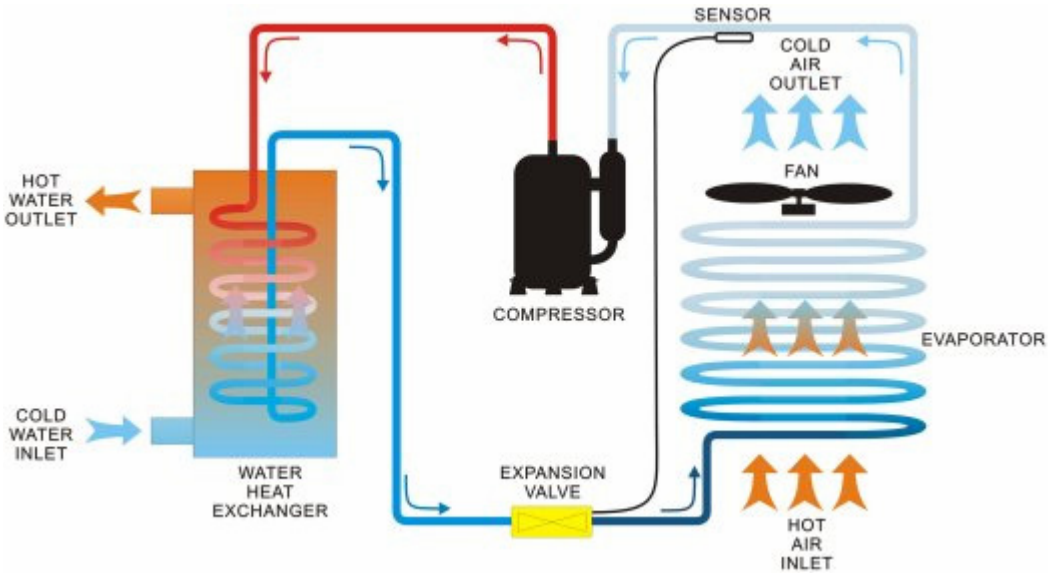


Figure 1: functional principle of heating pumps: www.jacksons-camping.co.at

2.2. Solar energy

There are two different types of technology in the field of solar energy: Photovoltaic and Solar thermal.

Photovoltaic:

The idea of Photovoltaic is to transform the sun's radiant energy into electric energy. The main part of a solar cell is a semi conductor, usually silicon cells (more than 90%). The produced direct current is used to load electric appliances, but it can also be stored in a battery. To use appliances that work with alternating current a converter has to be used.

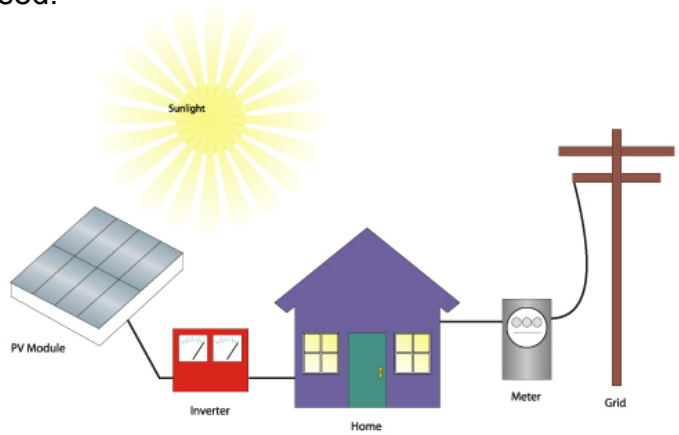


Figure 2: functional principle of photovoltaic from: www.acmgreen.com

Solar thermal:

As the name suggests, the idea of solar thermal is to convert the solar energy into heat energy. This system is mostly used to heat up water. The warm water can be use for the shower as well as heating installations.

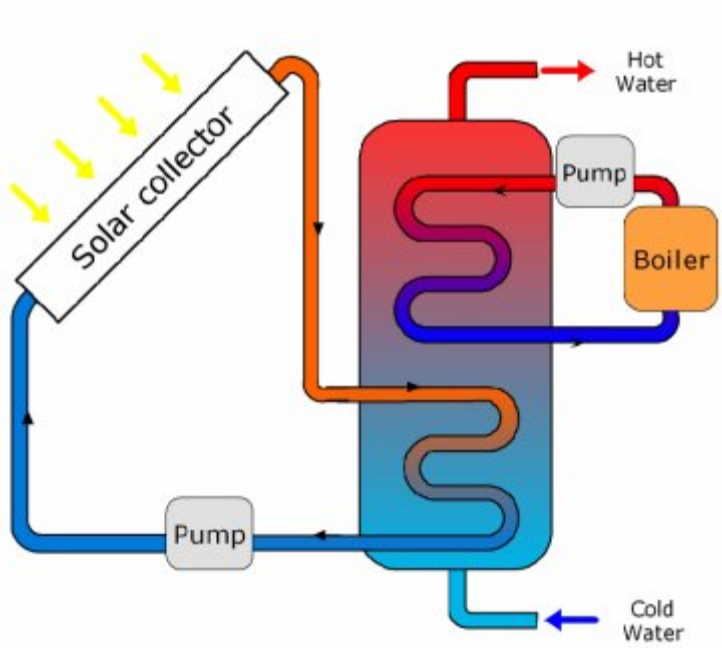


Figure 3: functional principle of solar thermal from: www.res-ltd.com

2.2.1. Pros and cons

Pros of solar energy:

- no emergence of emissions an gases
- no loss of energy due to the transport of this energy
- quite fail-safe

Cons of solar energy:

- the solar cell production costs are very high
- solar cells are made of dangerous chemicals and polluting materials
- disposal is expensive and polluting as well
- the amount of energy depends on the weather

2.3. Wooden-Chips

Wooden-chips are left-over bits of timber or left over wood that result from forest management. They just need a quarter of time and effort for the production compared to the pellets. Therefore Wooden-chips will result with an excellent eco balance sheet.

2.3.1. Pros and cons

Pros of Wooden-chips

- easily produced
- low cost
- need no pre crushing

Cons of Wooden-chips:

- Wooden-chips-heating systems are only efficient in bigger amounts of heat requirement
- creation of cords

2.4. Biomass

Biomass means all organic material in a biogenous, non fossil and includes also living and growing materials and their refuses from living as well as dead lump.
All organic material is called biomass. Biomass can be produced from vegetable and animal residual materials such as organic waste or straw as well as renewable material such as canola or sugar beets. The final goods can be biogas or biodiesel and so on.

Biomass can be classified in three different types.

- Solid components

wood is the most important material in this type. This is also the most popular type of biomass. Wood makes 70% of the Austrian energy consumption for renewable energy sources.

- Liquid components

liquid components are mostly oils, which are in Austria usually made of canola and sun flowers. Bio diesel can be made of this.

- Gaseous components

biogas can be produced in many different kinds of ways. The most popular ones are gas from purification plants and landfill gas.
As a matter of principle following conclusion apply to all types of biomass:

Sun + CO2 = biomass

biomass = energy + CO2

2.4.1. Pros and cons

Pros of biomass:

- No long routes of transport for local biogas-plant operators
- Small dependence on foreign countries
- appropriate use of resources

Cons of biomass:

- increase of material costs
- ethnic conflicts with Third world countries, as a consequence of above
- harmful substances are released due to the burning of solid components

3. Biomass

3.1. Potential of biomass

Fossil fuels are still dominating the Austrian market of energy at this point. Water power is the most important energy source in the field of renewable energy sources. Water power is not always mentioned as renewable source in a lot of statistics such as the energy report of the Austrian ministry of economic affairs and employment released in the year 2003.

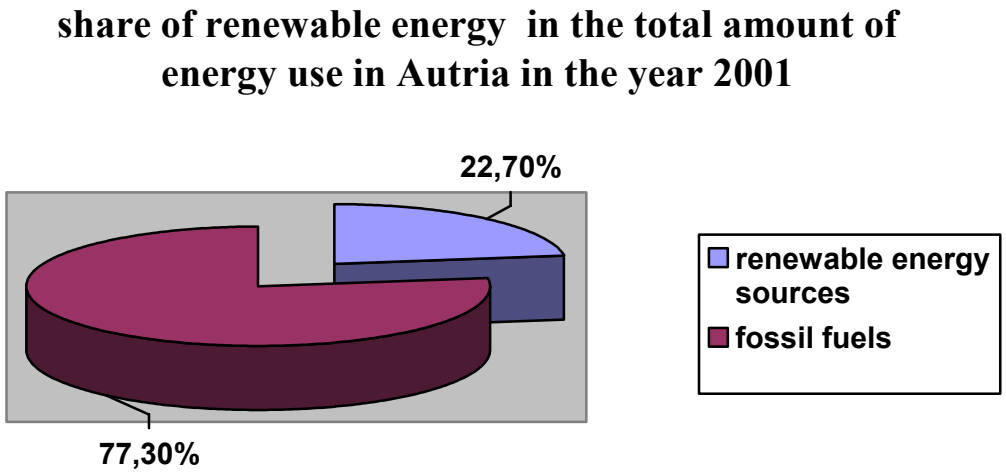


Figure 4: energy report 2003, ordered by the ministry of economic affairs and employment

Comparing the year 2001 and 2004 concerning the proportional part of renewable energy stagnation is established. As mentioned before the amount of alternative energy sources in the year 2004 is also 22%. To my regret no statistics for the next years has been issued up to now, but a proportional increase of renewable sources is assessed.

About 23 % of the total amount of energy use in Austria is covered by renewable energy sources. More than 50 % of the use of renewable energy is obtained by biomass.

Biomass is deployable in different fields.

The three most important fields are:

- Biomass for heat production
- Biomass for current production
- Biomass fuels

3.2. Biomass for heating

As stated, 70% of renewable energy is extracted from wood. Biomass is divided into following categories:

- Fuel wood is divided into split logs and oven logs. For home use spit logs is produced in different lengths (25, 33 and 55 cm). There is a general quality standard for split logs in Austria including the humidity ratio of maximum 20% and a minimum storage time of 2 years. Common beech, oak tree, hornbeam, ash tree, maple and birch tree is used for hard fuel wood. Fire wood, spruce wood and pine wood is used for smooth fuel wood.
- Wood chips made from left-over bits of timber and left over wood that result from forest management in sizes from 1mm to 10 cm which is standardized as well. These wood chips are good for personal use as well as biomass heat plant which can heat several buildings. This is one of the cheapest types of fuel.
- Pellets are standardized, cylindrical rolls made of dried left over wood such as saw mill waste or strands without any chemical additions. Pellets have enormous energy content – 2 kilo pellets contain approximately the same energy as 1 litre of fuel oil or 1 cubic meter natural gas.

Biomass for heat creation:

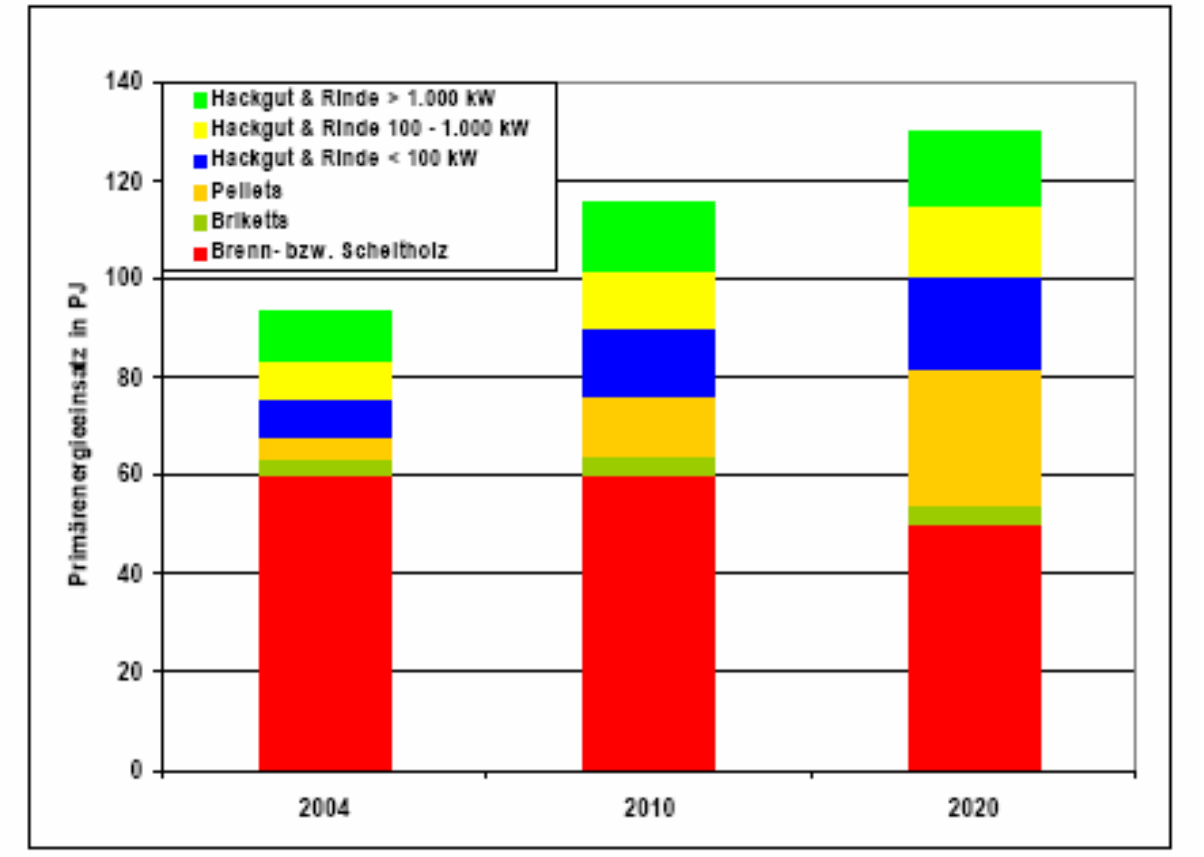


Figure 5: Austrian Energy Agency, Stand Mai 2006

Over 80 Petajoule of heat energy was produced by biomass in the year 2004 (Figure 5). The chart also gives a prognosis for the years 2010 and 2020, e.g. nearly 60 % of households heat with wood. Pellets and wooden chips from left-over bits of timber have only been used in small amounts in the year 2004. New manufacturing methods as well as economic prices will change this. The prognosis for the years 2010 and 2020 show a large increase of these types of heating and a small decrease for fuel wood.

Figure 6 shows the increase of pellet consumption in Austria. There's a continuous increase since the year 2005.

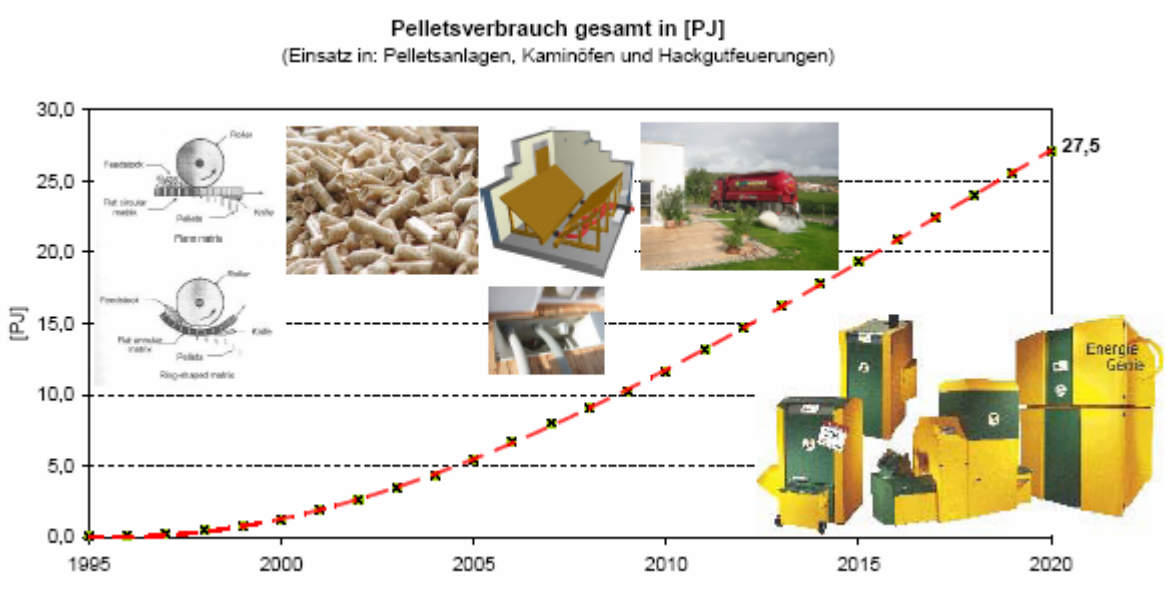


Figure 6: Austrian Energy Agency, Stand Mai 2006

3.3. Biomass for electricity

"The development of green electricity is an essential part of climate protection and provides new jobs. The one, who reduces promotions of climate protection, promotes the import of nuclear power."

Green electricity is 100% energy produced of wind, sun, biomass and water plants, eco friendly and without nuclear-power.

All three types of biomass, solid components, liquid components and gaseous components, can be used to generate electricity. Figure 7 shows impressively that a great amount of electricity is generated with biomass.

Biomass for electricity:

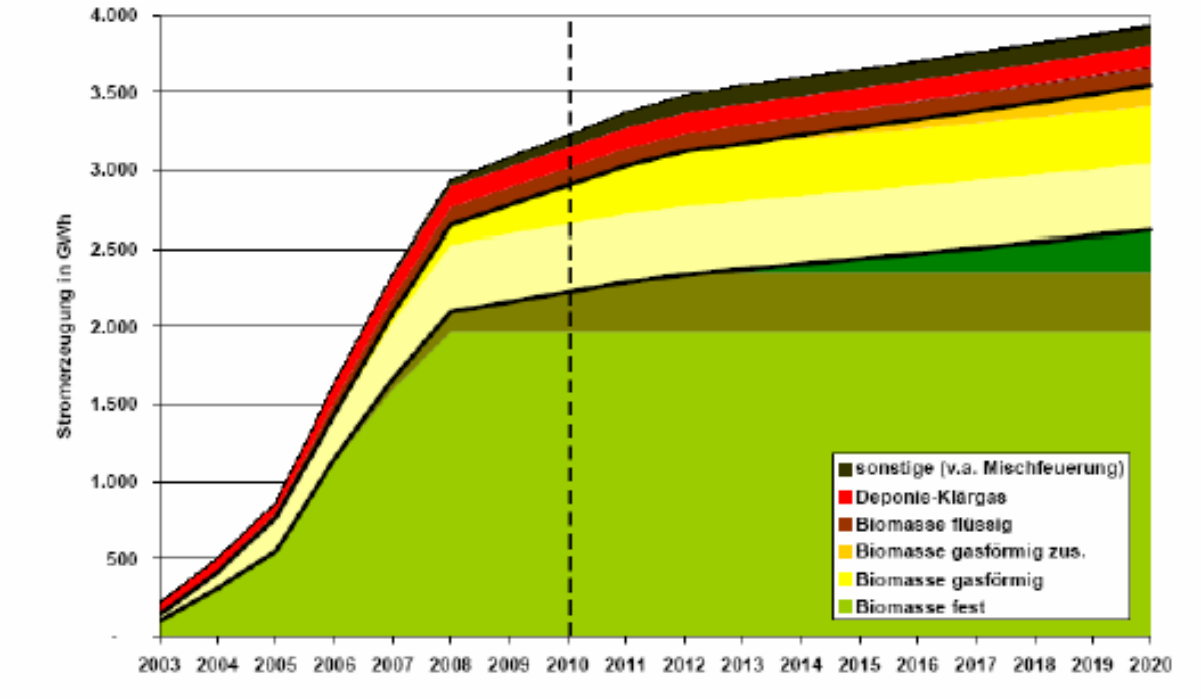


Figure 7: Austrian Energy Agency, Stand Mai 2006

3.4. Bio fuels

„Biomass fuels are liquid or gaseous fuels made from biomass and are intended for feeding combustion engines."

The amount of biomass fuels in diesel fuels was 4,3 % in the year 2007. An increase up to 5,75 % is planned until 1. October 2008.

The most important biomass fuels are:

- Biogas

Vegetable material forms gas due to decomposition in a hermetically sealed room. So called anaerobic bacteria decompose the material. The main composition of biogas is Methan (40 – 75 %).

- Bioethanol

Bioethanol is produced mainly from biomass. The starch inside the biomass is fermented into Ethanol.

- Biodiesel

Biodiesel is a vegetable fuel. This fuel is extracted from vegetable oils or animal fats.

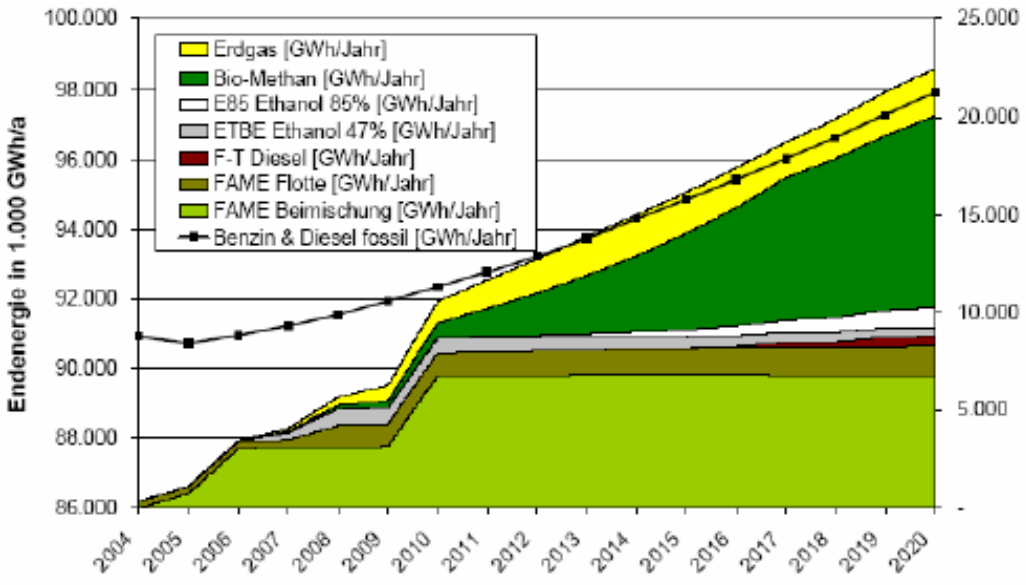


Figure 8: Austrian Energy Agency, Stand Mai 2006

Above chart shows the prospective development in the biomass fuel sector.

4. Marketing concept All In One

4.1. Status Quo at Austria's energy market

The energy market is about to change. An increase of energy consumption causes an increase of prices as well as imports. Furthermore, the amount of resources is decreasing. The below chart shows that crude oil is the fastest decreasing resource. Our aim has to be to work against this progression. How? By using renewable energy sources instead.

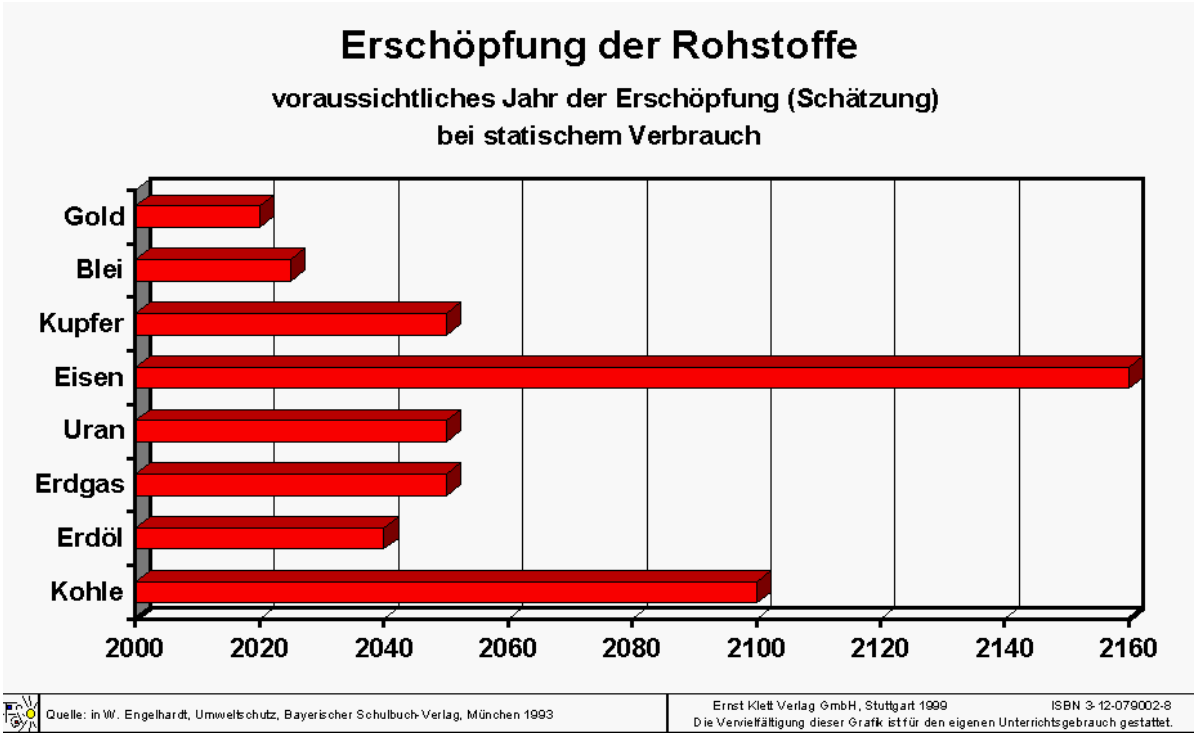


Figure 9: Engelhardt, Umweltschutz, Bayerischer Schulbuchverlag

The climate change is strongly related to the need of energy sources. The whole world is now trying to stop the climate change and save the environment. A good way to really do this is to replace fossil fuels by renewable energy sources.

That's why it is necessary to "start up" – there's a need to develop new energy sources. At the same time the prices for crude oil and natural gas is increasing renewable energy sources are aided. The variety of innovative energy sources is wide, one source is of particular interest: heat and energy produced from biomass fuel. This would be an alternative solution to fuel oil and natural gas. The time the

prices of these well tried energy sources is still increasing, the pellets prices are stabile or even decreasing.

Each country will need its own time to change from fossil fuels into alternative energy sources. As it is natural the countries with a big natural amount of crude oil or natural gas will take more time than the countries which have to import the energy from foreign countries. For Austria an ambition should be to be a frontrunner in the field of alternative energy sources. Austria has to seize this chance to become one of the largest exporters of alternative energy. Aim is to keep the supremacy and even increase it. E.g. products like the All-in-one-pellets-solar-combi needs to be marketed better.

4.1.1. Most popular types of energy

Five different energy sources dominate the market of energy in Austria. Figure 9 shows the top energy sources in Austria. Natural gas is in the first place closely followed by wood and fuel oil. District heating and “direct electricity” is also worth mentioning. Currently, less than 10.000 households use renewable energy sources like pellets.

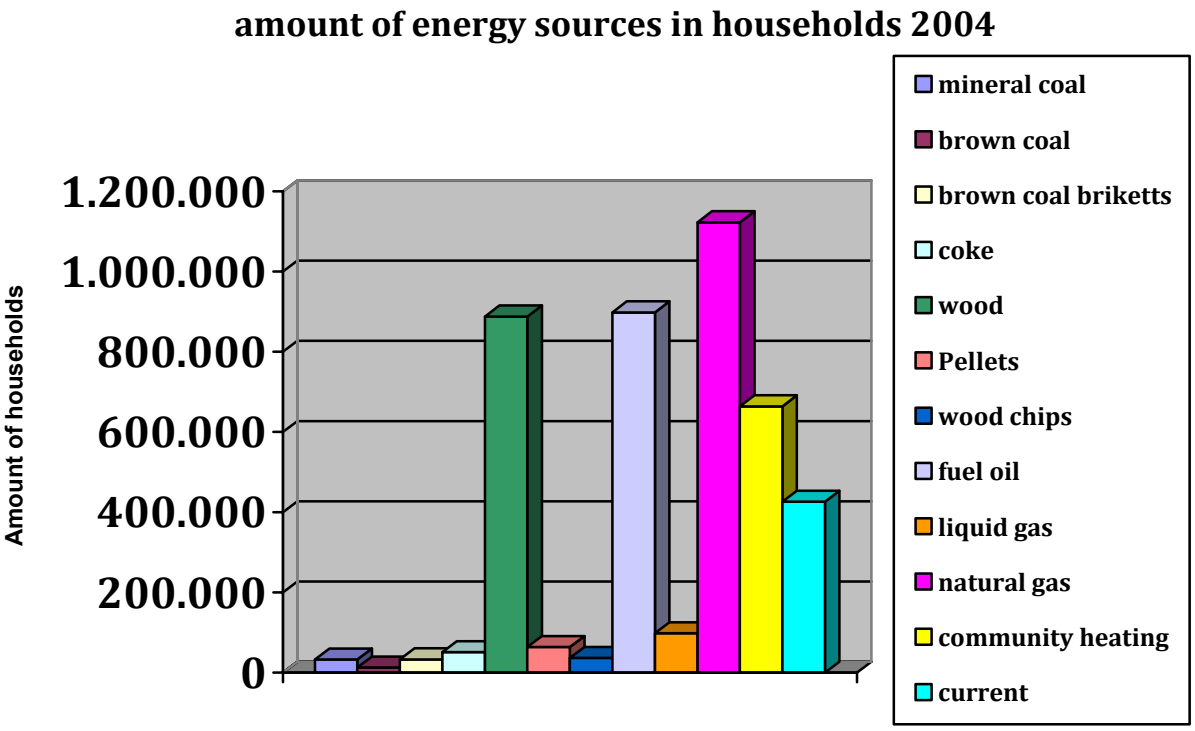


Figure 10: STATISTIK AUSTRIA, amount of energy sources in households 2004

The top five energy sources used in all households today are:

- Bio gas

Natural gas is gas extracted from natural recourses such as biogas. These gases usually result from a fermentation process.

- Heat fuels

Heat fuels are liquid fuels made from flammable parts of crude oil. There are two different kinds of heat fuels: heat fuel and heat fuel with a low amount of sulphur.

- Wood

Wood produces heat during combustion

- District heating

Community heating is the transport if thermal energy. This energy is transported through thermally insulated pipe systems, mostly misplaced in the ground from suppliers like the Austrian company “Fernwärme Wien”.

- Electricity

Electric current is the movement of charge carriers such as negative electrons or positive ions inside a vacuum or a material.

4.1.2. Share of the energy market

The energy consumption, whether it is energy from renewable sources or fossil fuels, is increasing since centuries. Energy will become a more and more precious commodity due to the fact that fossil fuel reserve is decreasing. Nevertheless these expensive sources are the most popular ones in Austria at this time.

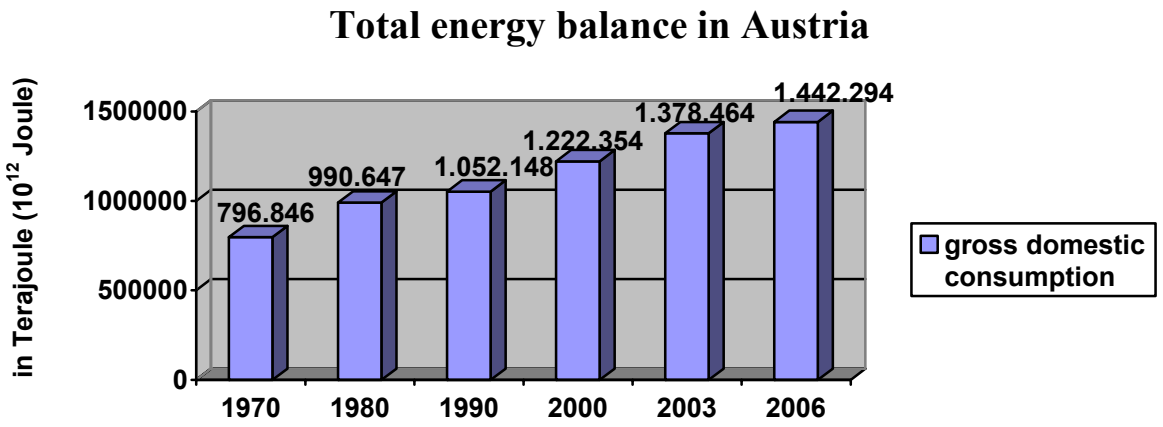


Figure 11: STATISTIK AUSTRIA, Total energy balance in Austria

As seen in Figure 11 the amount of energy consumption is increasing year by year. If you compare the year 1980 with the year 1990 the consumption had an increase of 6% in 10 years. Further compared the year 2000 with the year 2003 the increase has accelerated to 13% in only 3 years. With reducing fossil fuel reserves it seems necessary to make use of alternative energy to satisfy the large and increasing energy consumption.

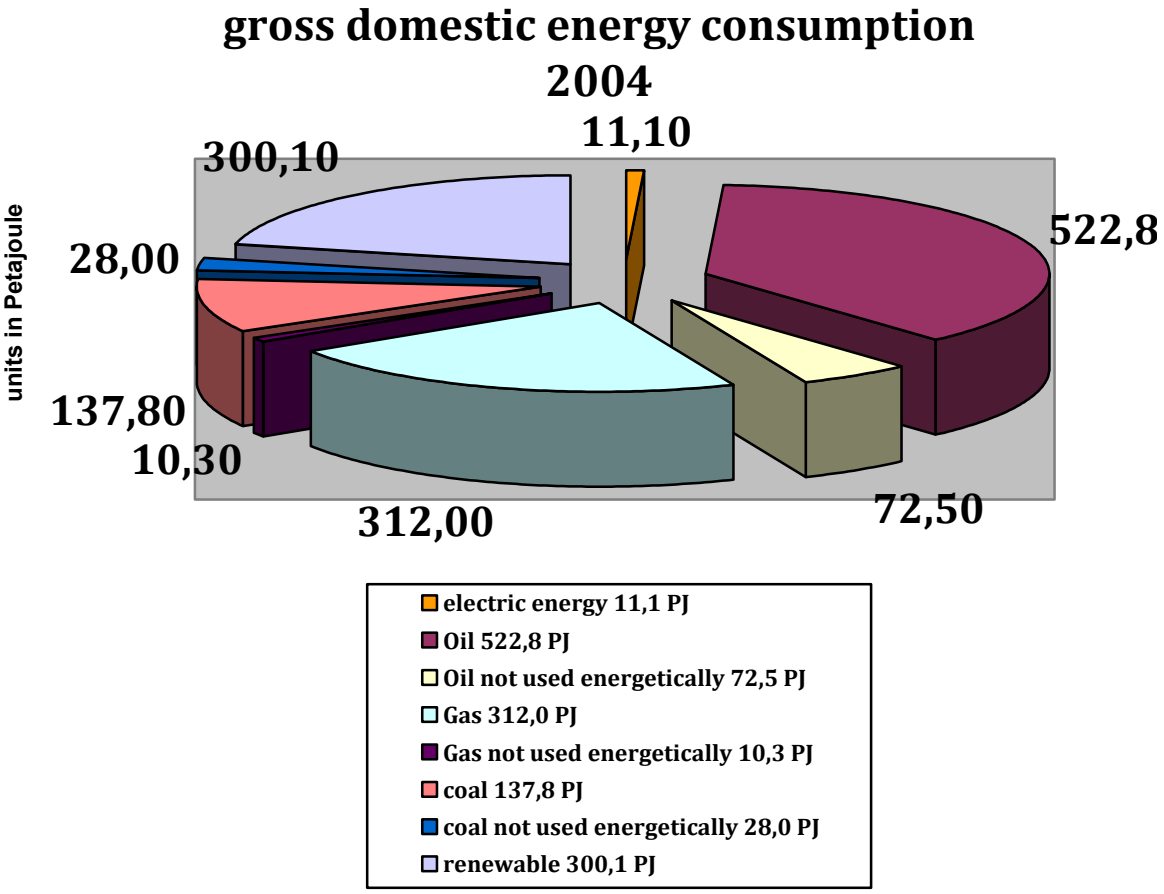


Figure 12: Austrian agency of energy, gross domestic energy consumption

The gross domestic energy consumption tells the amount of energy which is necessary to satisfy the needs of a country. Following operating figures are included in the calculation of the gross domestic energy consumption: the domestic production, all imports and exports as well as stock holdings. In the year 2004 the Austrian domestic energy consumption was approximately 1.394 Petajoule. At this time the domestic energy consumption is still dominated by fossil fuels. In the year 2004 oil was the most important type of fossil fuels on second place was gas and third place was coal. According to above chart 22 % of the domestic energy consumption was caused by renewable energy sources in the year 2004.

4.1.3. SWOT-analysis branch „renewable energy“

Internal Analysis	***Strengths***	***Opportunities***	External Analysis
	Most eco-friendly energy source Locally providing new jobs Unexhaustable (water, air) super abound less harm to the environment energy can be produced covering demand locally decrease of dependence on fossil fuels image of “BIO” is “politically correct” EU aids renewable energy sources	Fossil fuels become more and more expensive Amount of fossil fuels in the world is decreasing Fossil fuels cause a serious harm to the environment (nuclear power) Fossil fuels cause a serious harm to the climate Fossil fuels are exhausted faster than produced Managing the resources is necessary – long run resources have to be found	
	Weaknesses	***Threats***	
	Fossil fuels may still last for a reasonably long time some renewable sources are difficult to accumulate the costs of adjustments to use only renewable energy sources	Great variety of renewable sources Aid of renewable sources are going to cancelled Prices of resources are increasing	

Table 1: SWOT analysis branch “renewable energy”

Up-shot:

The amount of fossil fuels decreases and become more and more expensive. In times of the Kyoto-aims on which Austria is bound to renewable energy sources become more and more important. One of the main weaknesses is probably the fact that fossil fuels have a large amount of social prestige at this point. If Austria manages its resources successfully, there will be a good chance to extend its lead in the field of renewable energy sources.

4.1.4. SWOT-analysis market „biomass“

Internal Analysis	***Strengths***	***Opportunities***	External Analysis
	No uncontrollable risk due to the production (nuclear power) Potential of worldwide use storable no long routes of transport due to local production closed cycle of matter CO2 -neutral Decrease of addiction of foreign countries Securing and providing of jobs Wise use of waste wood Solid, liquid and gaseous versions potential	Better storage than wind and water energy Fossil fuels draw to a close and become more expensive Fossil fuels endanger the environment and people Fossil fuels cause serious damage to the environment and climate Fossil fuels are exhausted faster than produced Renewable energy sources Dependence on fossil fuels decrease	
	Weaknesses	***Threats***	
	The Energy density of biomass is smaller than the energy density of fossil fuels No constant service offering Efficiency is not always given	Growing energy plants while third world people are dying – delicate subject High aid for different kinds of renewable energy sources	

Table 2: SWOT analysis market “biomass”

Up-shot:

The main strength is probably the different use of biomass, like biodiesel, wood and wooden-chips waste material or straw – it doesn’t make any difference if it is solid, liquid or gaseous components. Furthermore biomass energy makes use of garbage as well. Not each type of energy source can guarantee the worldwide use of it – biomass can.

The main weakness of biomass is probably the authority of fossil fuels. If different types of renewable energy sources get more aids, the increase of biomass energy production may be hindered.

4.2. Market biomass

4.2.1. Market size biomass

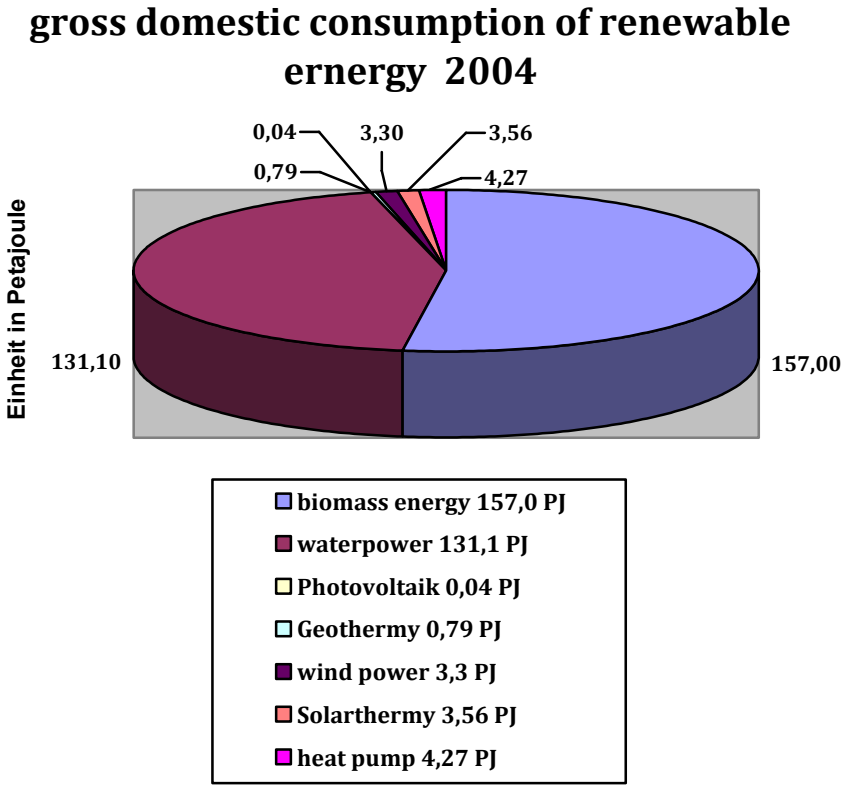


Figure 13: Austrian agency of energy, gross domestic consumption of renewable energy 2004

In the year 2004 as well as today, there are two dominant renewable energy sources in Austria. On the one hand the wind energy and on the other hand the biomass energy. The other types of energy sources (for example wind power, solar-thermal, heat pump or geothermic) are not really in use for now, event though there is a big amount of increase on the last years in the fields of wind and solar energy. Renewable energy sources can emerge with credit from the recent environment awareness and the climate change.

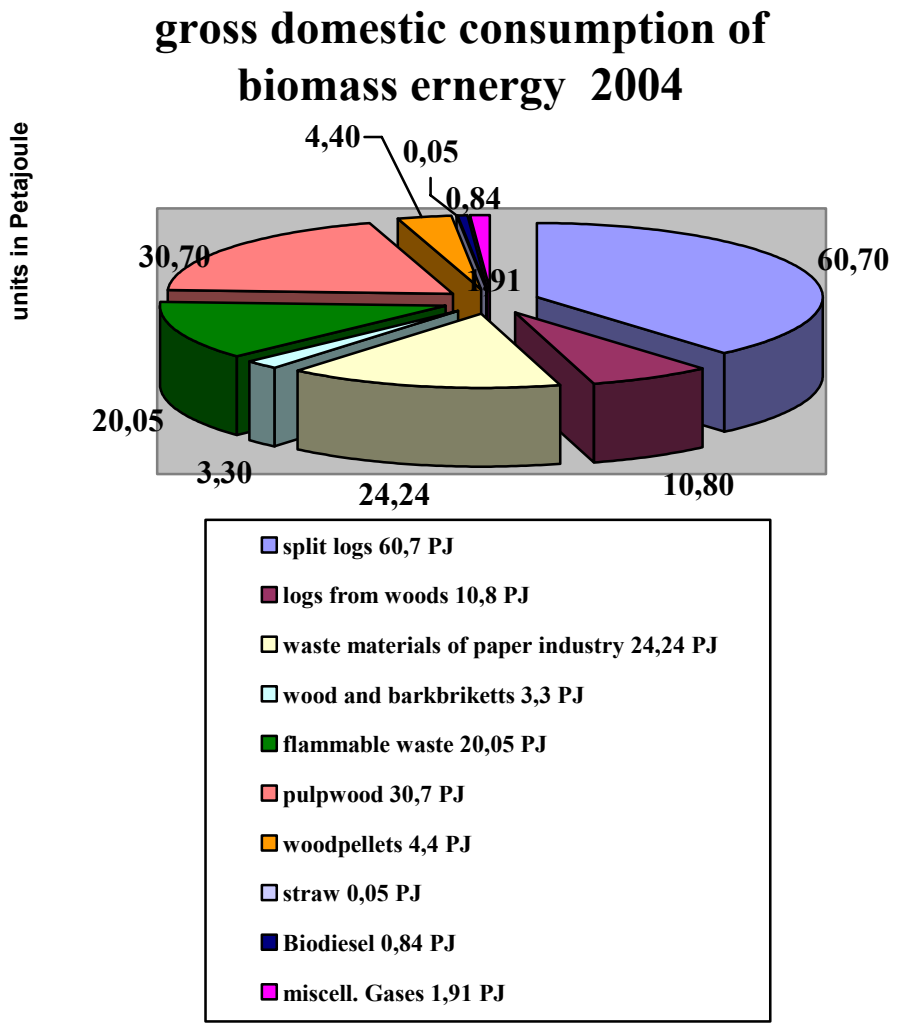
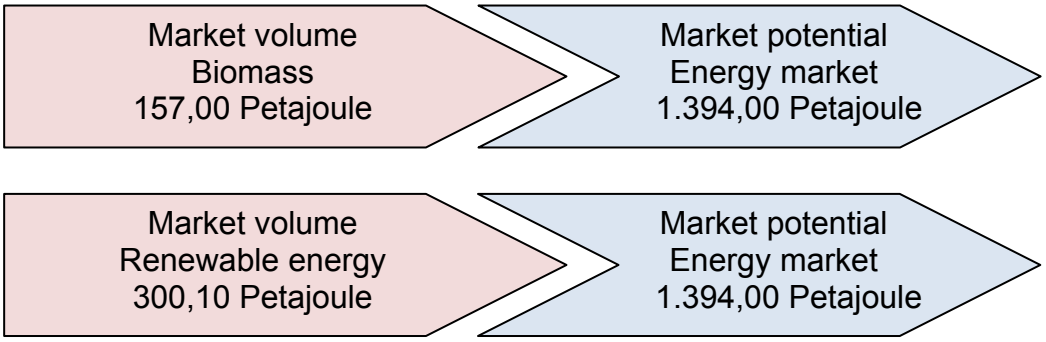


Figure 14: Austrian agency of energy, gross domestic consumption of biomass energy 2004

As mentioned before biomass energy is the most important source of renewable energy. The above charts shows what biomass energy is split into. The main part of the energy has been extracted from wood such as pellets, wood briquettes and split logs. Biodiesel and biogas is not yet a preferred energy source in Austria. There are several reasons for that. On the one hand both energy sources are too expensive, on the other hand the change over has not really been started yet (for example filling stations with bio fuels) which may be due to the conservative thinking to renewable energy sources.

4.2.2. Market potential biomass

The current market volume of renewable energy sources has a long way to go to reach its potential. The below chart tells the values of the year 2004. The market potential of biomass is only approximately 11 %[1] of the total market potential. There is a pent-up demand in this field. More and more companies try to take this chance and change their politics regarding renewable energy sources.



4.2.3. Market trend renewable energy and biomass

Even though there isn't a statistic model which proves the increase of renewable energy sources there are two essential reasons for arguing:

- Kyoto-Protocol [2]

The objective of the Kyoto-Protocol is a global reduction of the greenhouse gas of 5,2 percent. The Kyoto-Protocol includes the six most important greenhouse gases such as Co2, CH4, N2O, H-FKWs, PFKWs and SF6.

[1] The market volume of biomass is 157,00 Petajoule – the market potential is 1.394,00 Petajoule – this meets a share of 11%, data is from Austrian agency or energy

[2] Source: http://www.klimaaktiv.at/article/archive/12097/

The following have to be achieved:

- Advancement of efficiency of energy
- Research, advancement, deployment and more use of new and renewable energy sources and ecological technologies
- Advancement lasting forest cultivation methods
- Advancement lasting agricultural cultivation methods
- Decrease of tax privileges or subsidies which are against the aims of the Kyoto-Protocol
- Limitation or reduction of emissions of the greenhouse gas in the field of traffic
- Limitation or reduction of emissions of marsh gas

Both Austria and the EU carry out a particular biomass-action schedule. This biomass-action schedule sets impulses in the local biomass energy market. Aim is the promotion of renewable energy sources in the biomass market: Austria tries to make the EU's grades in order to cash the money of the EU aids. One of the Austrian showcase projects is the city Güssing in Burgenland, which has the ambition to become energy self-sustaining since 1990. Today significant progress has taken place. (The Presse-research – magazine for technology and innovation of 20.02.2008)

The Kyoto-protocol and particularly the United Nations Climate Change Conference in Bali pointed out how much we pollute the environment by the enormous energy consumption our way of life require – the main energy source being fossil fuels. We have to revise our opinions not only because we are bound to the Kyoto-Protocol and this is only realizable with renewable energy sources.

The price of fossil fuels increases from year to year due to lack of supply. Below chart tells the continuous increase of the price from the year 2000 on. Experts are expecting an even more increase for the next years.

Figure 15: http://derstandard.at January 2008

4.3. Analysis company and competitive environment

4.3.1. Competitors

The All-in-one-system, developed by Xtm, will be discussed more in detail in the next section, is one of a kind in Austria. There is no strong direct competition on this specific market. Watching the market in a wider range any kind of heat- and energy provider is competition for Xtm.

There are two competitors with a strong market presence but with different products:

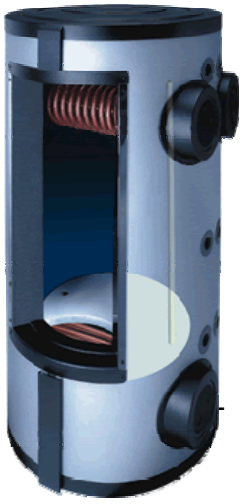
- Pellets^{plus} - company. Solarfocus [3]

The Pellets^{plus} System uses just like the all-in-one-system pallets as well as solar. The Pellets^{plus} System is also called “Four in one” which means that backup storage, water storage, solar components and pellet boiler are included in one product. The primary differences compared to the All-in-one-system are:

Combustor is not placed inside the storage – combustor is placed outside

Heat exchanger is not replaceable

No heat-layering-system of pellet-combustion



Multi-storage M-PD – company Capito [4]

The company captio takes place in Germany. The Multi-storage M-PD does use the All-in-One-System but leaves out the pellets. The pellets are replaced by oil or gas.

The primary differences compared to the All-in-one-system are:

- Pellets are replaced by oil or gas

[3] source: www.solarfocus.at

[4] source: www.capito-gmbh.de

4.4. Marketing mix (4 Ps.)

4.4.1. Product All-in-one-System

The All-in-one-system was designed and produced in the year 2004. It is established throughout Austria as the first solar-pellet-storage-boiler and probably the most revolutionary product produced from the company Xtm. The All-in-one-system combines two different types of renewable energy sources such as solar energy and heat extracted from wood pellets. This system is therefore a combination of backup storage, pellets boiler and warm water preparation all included in one product which makes it highly efficient and economical. What's really impressive is that the pellets combustion is only used if the solar module does not provide the product with enough energy.

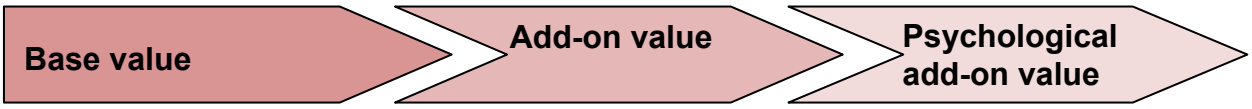
There are two different types of the all-in-one-system, which are only in the value of capacity different. There is the ON plus15 solar-pellets-storage boiler with a capacity from 0 – 14,9 kW, and the ON plus 25 solar-pellets-storage boiler with a capacity from 0 – 25 kW.

Product description of the ON plus15 solar-pellets storage boiler: Solar-Pellets-storage-boiler incl. 530 l backup-volume and 2 integrated heat exchangers for solar layering stowage. Module for fresh water, automatically fuel feeding and turbolator-cleaning incl. control module for 2 heater circuits, 3 m screw conveyor and smoke gas compressor.

Lightning boilers such as the All-in-one-system are hard to assign to a field of products. This system would be best placed into the field of specialty goods which is based on different kind of market needs. Specialty goods can be sold remotely satisfying special needs. Before this system is bought the buyer wants to know everything about the product. This description applies to the All-in-one-system well.

The buyer's final decision is based on price, aid and quality – in this case the decision is called rational decision.

An important part of a product is as well the product's benefit. This benefit is divided into 3 layers:



To allocate the All-in-one-system:

4.4.2. Price

As mentioned before the all-in-one-system is the only system in Austria which combines solar energy and pellets combustion. Therefore there is not an actual product to compare the prices with.

The prices for the all-in-one-system from the company Xtm are:

The ON plus15 solar-pellets-storage boiler in basic design (as defined in the product description) is EUR 12.500,--.

The ON plus25 solar-pellets-storage boiler in basic design (as defined in the product description) is EUR 13.700,--.

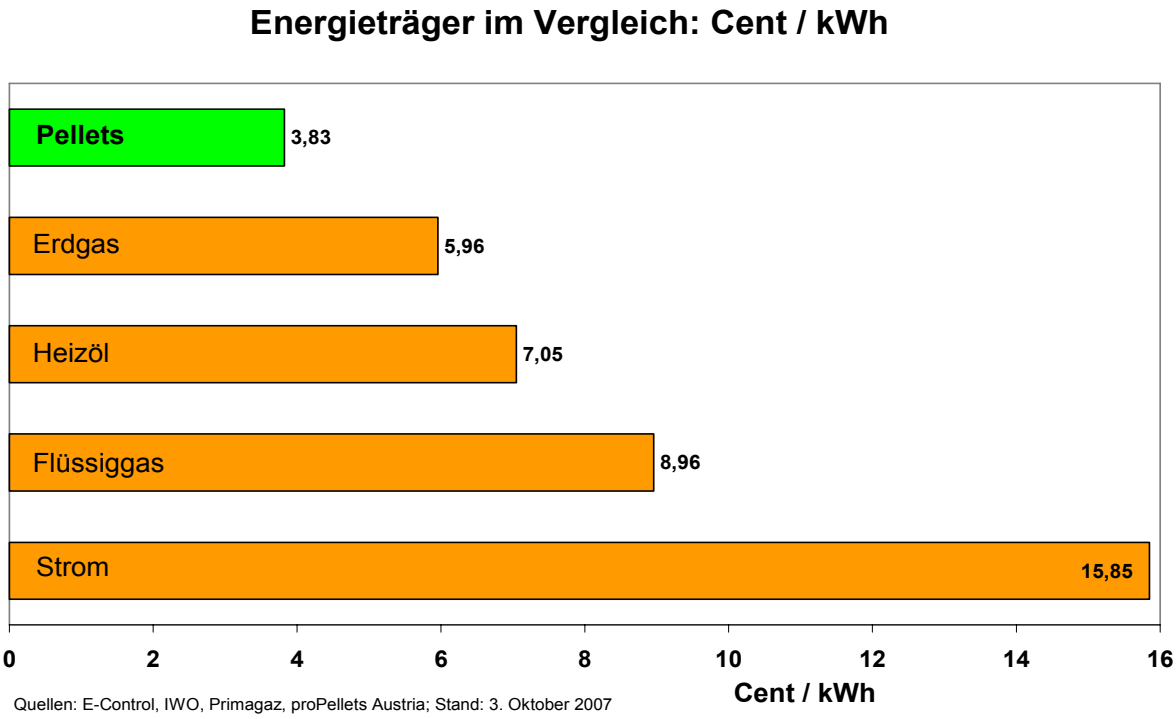


Figure 16: E-Control, IWO, Primagaz, proPellets Austria, October 2007

It is not feasible to compare the historic costs of different types of energy sources, but the running expenses are easy to compare. The above chart tells that pellets are the cheapest alternative compared to all other energy sources. Fuel oil is twice as expensive as pellets, currently even more than three times expensive than pellets.

The price formation is effected as a result of the 4 Cs.

- Costs

These costs include production, packing, advertising and administration. These costs are a decisive factor for the price formation.

- Customer

The price is also affected on the buying power of the target group. The purchase costs may not be any different compared to fossil fuels, but the current costs are lower. However, long term it is reasonable to assume that the cost of fossil fuels will increase dramatically.

- Competitors

As there is no actual competitor for this product the costs have to be compared with each product from different competitors separately. A different competitor may be other renewable energy sources.

- Circumstances

Included in this point is all regulatory framework, for example government subsidies.

The price value is consists of the purchase costs and the current costs. As mentioned before it is difficult to compare purchase costs from different production companies, therefore the current costs are compared. As seen in the chart below, the prices for the pellets started to decrease at the beginning of this year and stopped at an average of approximately EUR 3,80 while the prices of fuel oil increased at the beginning of this year and are still increasing.

4.4.3. Place

To place a product means offer the right product on the right spot in the right time to the right cost.

Xtm has a well organized sales network consisting of large national partners. Due to the fact that the all-in-one-system is a very complex and consultation-intensive product it is not reasonable to be listed in every possible distributor's sales list. In this case quality is more important than quantity. In the future it will be focused on high quality distributors. This aim has to be achieved to increase the sales in the long run.

4.4.4. Promotion

Promotion means to form and transmit information according to several communication objectives.

The general targets of promotion are:

- Sustaining and hedging the current sales volumes
- Defending against competitors
- Enlarging the market share

Up to now the way Xtm presents its products with brochures, case stories, product leaflets and on the homepage. The homepage is well featured with several areas for distributors, filled with exclusive information. Xtm also provides distributors with detailed product documentations which also show that quality is an important point regarding its distributors.

The types of consumer advertising Xtm uses are usual and typical ones for small and medium sized companies. To stand out in a crowd it may be necessary for Xtm to take different lines of advertising even though TV- and poster-campaigns may not make sense for this complex product.

4.5. Objective target for All In One

4.5.1. Long- term goals: -10 years

Probably the most important long term goal is one of the economic performance factors. A continuous increase of quality is a must in the next 10 years. Unfortunately there is no way to tell the production quality in percent, but the amount of repairs is significant for the amount of quality.

Another long term goal has to be expansion. Before 10 years trade relations to the EU-member states have to be developed – foreign distributors in at least 5 foreign countries.

4.5.2. Medium-term goals: 5 years

Before 5 years at least 20 distributors in Germany shall be developed.

Before 5 years the market potential shall be improved. – goal shall be to increase the market share of a level of 15 %, at least.

Before 5 years a special annual distribution-promotion shall be established for those who push the All-in-one-system.

4.5.3. Short-term aims: 1-3 years

Before 1 year a sales increase of approximately 5 % shall be achieved. The recommendation quote of dealers shall be increased from current 5 % up to 65 % before 2 years.

Before 3 years a customer loyalty program shall be implemented to commit the customers to the service network – 80 % of new customers shall make use of the maintenance services before 3 years.

4.6. Focus on promotion

4.6.1. Customer loyalty program

Long term customer loyalty is the most important factor for a company's success. But what exactly is long term customer loyalty?
Customer loyalty shows which part of the demand is covered based on one specific product category, one specific customer and one specific company or label. In short terms: Customer loyalty means loyalty to the company or label.

Customer loyalty is divided into 2 parts:

- Passive loyalty: due to disinterest of consuetude
- Active loyalty: due to active efforts, special supply of services – that's what is called deserved loyalty – That's our goal!

There are a lot of reasons for program pro long term customer loyalty, the most important points are:

- It is cheaper to keep an existing customer than recruiting a new one. If the customer is committed to the company for example due to maintenance the customer will remain happy.
- Loyal, happy customers are not that sensible to prices and accept a price increase easier than new customers. Especially in the branch all-in-one is placed the customer has to spend a lot of money and the price will be accepted if the quality and service is ok.
- Ensure target achievement – acquire customers and commit them to the company with maintenance services

The point in time to start communicating with the customer is very important. The communication shall not be interpreted as advertisement or harassment. It is difficult to find the right point of time, and the best thing the company can do is to adjust your communication with the buying process. Please find below example for All-in-one-systems.

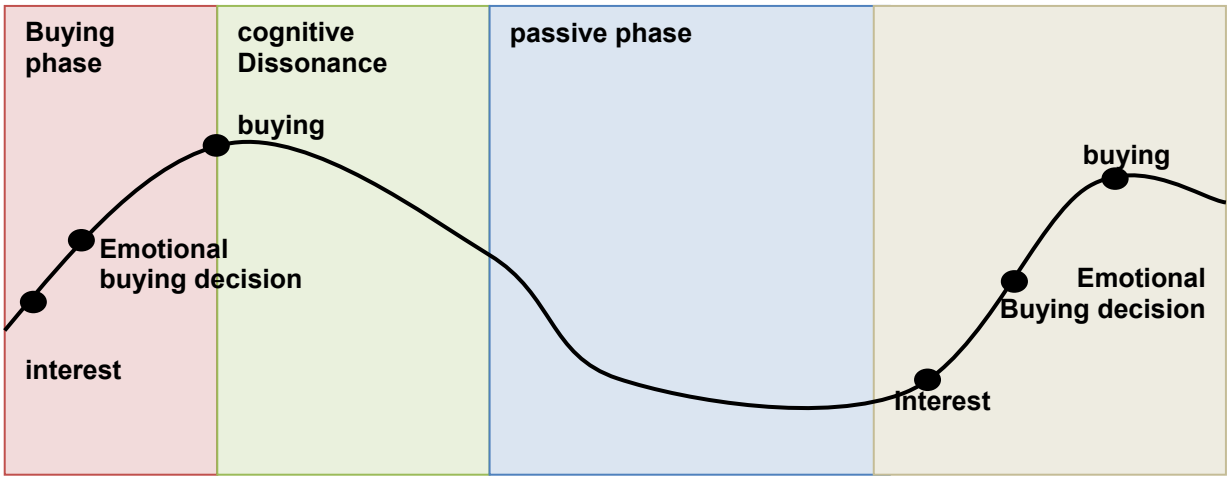


Figure 17: Rock+Partner: CRM – Customer Relationship Management

The buying phase is the customer's active phase. First interests arise for wood- or storage boilers. The emotional buying decision is made, but not always noticed. The customer tries to find rational reasons for the emotional decision, for example the costs for fossil fuels are increasing constantly or fossil fuels harm the environment. Now the decision between fossil fuels and alternative energy sources is going to be made. In this phase the customer is sensible to all kind of information if it's advertisement or paper reports. In the end the customer buys the All-in-one-product. At this point the customer is semi-professional in heating.

The next phase is the cognitive dissonance. Now it's the company's turn to confirm the buy with a welcome mail or a test report in which the product is the best listed. That's when the customer's decision is confirmed. This phase opens the opportunity to offer several services such as delivery services or maintenance services.

That followed the phase when the customer is using the product. In our case is a very long phase, because the All-in-one-product has a long service life. In this phase the customer is not interested in advertising. New interests will rise again for example if a child is leaving home and thinks about its own type of heat.

Below chart shows the companies behaviour in these phases.

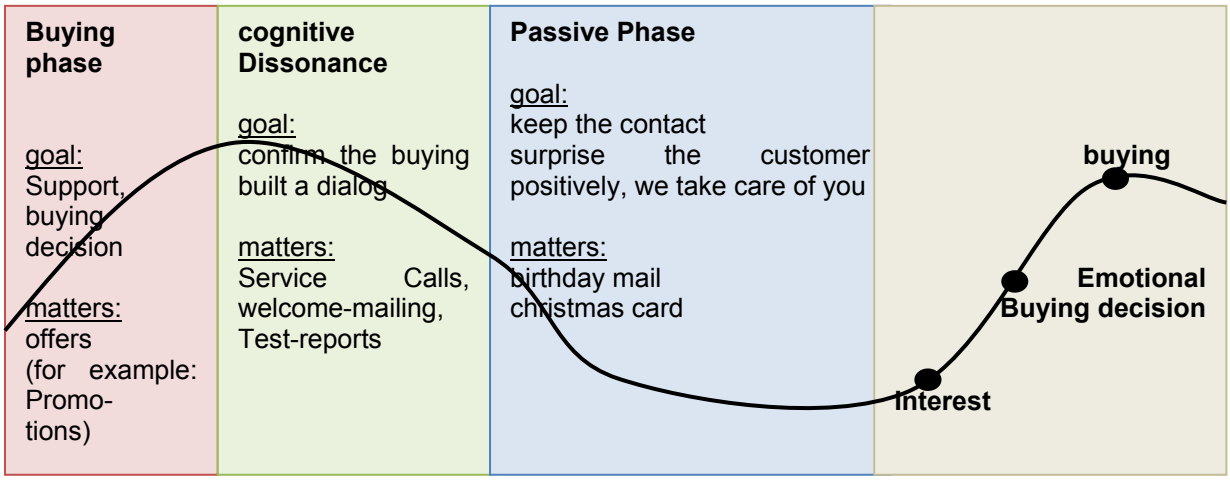
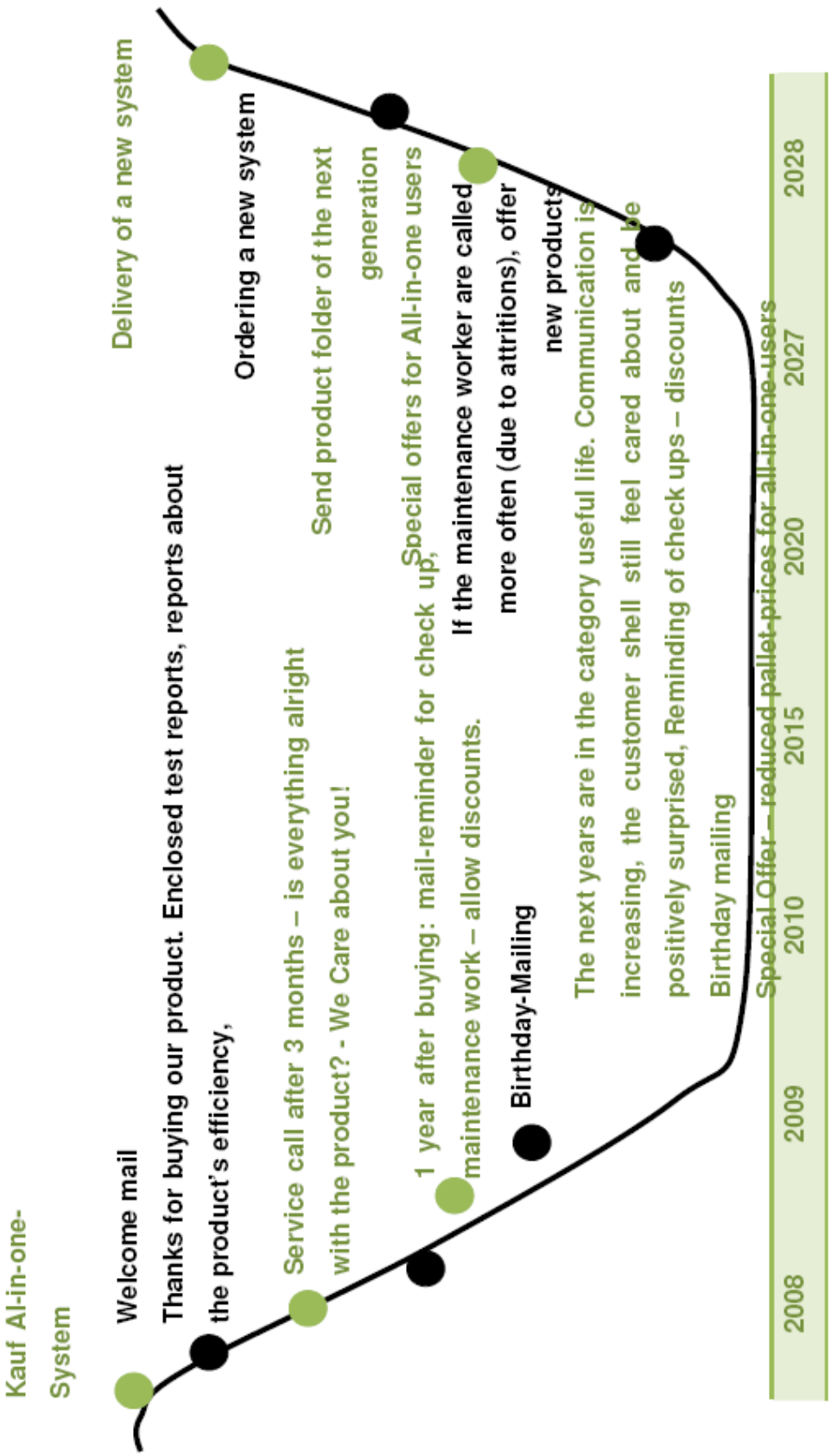


Figure 18: Rock+Partner: CRM – Customer Relationship Management

To make it more imaginable see example of a CRM-program for the company Xtm in the chart below.

Example for a CRM-program



The goal of each customer loyalty system is to find out as much information about the product as possible. The better you know the customer and its needs, the better you can respond to his needs.
In the case of Xtm information can be found in many ways, the import thing is to save them all into one data base.

- Mails including answer-sheets for appointments contracts with customer engineers (best the design of these shapes is when the customer only has to mark points with a cross)
- Customer engineers
- Service-hotline
- Distributors

4.7. Strategy to achieve the aims

Conclusion:

The All-in-one-system made inroads into the market in the year 2004. 150 systems have been sold in the last 2 years. For publication normal types of advertising are used. On the one hand the product is very complex which makes it difficult to give the buyer an understanding of it in a normal type of advertising, on the other hand that makes the great spirit of innovation possible to constantly launch new products. Therefore a goal should be to make the company represent a famous name in the field of renewable energy sources and not a specific product. I.e. a strong brand in the market.

There are 2 different types of target groups: On the one hand the end-consumer such as owners of “passive houses”, apartment houses or one-family houses and of course all eco-friendly people and on the other hand dealers, particularly those who focus on renewable energy sources.

Market opportunities:

All-in-one has the following two main market opportunities:

- Renewable energy sources are very popular at this time

Due to the climate change, the Kyoto-targets, government aids for alternative energy sources or the increased costs of fossil fuels or other, Mr. and Mrs. Austria is very interested in new energy sources. Xtm has identified this trend at an early stage and will profit by this.

- Increase of environmental awareness.

Whether it is the politics or the media everybody noticed in the last years the large extent of environmental pollution caused by unnecessary energy consumption. The trend goes toward saving the world actively.

Particular target group:

For Xtm this goal will be difficult to achieve due to the fact that they become more and more a manufacturer and leaves this goal to the dealers. Another goal would be to keep the existing clients, because:

Happy clients recommend the product and forgive mistakes.

4.7.1. Positioning from All In One

All-in-one is a one of a kind, innovative, high quality and most importantly environmentally friendly product which is positioned in the market in a confusing way. The product positioning and the market positioning have room for improvement.

- Product positioning

Several products are silhouetted due to their characteristics, functions or additional demands and thereby position themselves. That is definitely a characteristic of the all-in-one-product. Eventually this product is the only one which combines pellets and solar energy. The fact that the product is an outstanding eco-friendly alternative has to be pointed out. Mixing different types of energy sources – solar energy and pellets – is a unique idea.

- Market positioning.

These stage specific markets are found deliberately to position the product for example market niches. This type of positioning also applies to the all-in-one-product partly. The company Xtm chose a specific market niche – production of energy with biomass – and positioned its product environmentally friendly and ahead of the times. Often market niches become top-sellers which is anticipated for the field of alternative energy sources.

4.8. Performance review

The most important thing for any activity is the performance review. Each action which is performed has to be measured if it was a success of failure. The goal is to know which programs are to be continued in the next year and which programs are to be reconsidered and changed or even shut down for the next year.

Without performance review each program is half as useful when you cannot learn from it.

5. Conclusion

Biomass compared to fossil fuels has one enormous advantage: it is locally and basically unlimitedly available.

The main disadvantage is that there are so many types of biomass, that no one is able to present one particular product in accordance to biomass.

The potential of biomass in Austria will not be reached in a long time – a continuous increase is forecasted. On the one hand due to the fact that fossil fuels run short and on the other hand due to the continues increase of the fossil fuel prices.

The combination of different types of renewable energy sources like solar and pellets in one product like a boiler or a heater is a great opportunity. At this time the large purchase costs are in the way of these products. Even though these products achieve government aid they are starting to be profitable not until years, or even centuries. The running costs of these alternative energy sources are definitely lower than the fossil fuel ones but are not proportion able to the purchase costs.

There's now only one question left:

Does it make sense to invest in this market and these products and bring them to market? Still owing the answer, it's a definite YES! The environment has to be treated with care which makes alternative energy sources more and more important. Austria has to extend and increase its supremacy in the field of renewable energy sources. Austrian companies support the positive image with innovative products such as the All-in-one-system. This has been aided from our country as well as from the EU. The market and its products have to be advertised better in order to be successful. Without any marketing alternative energy sources will never replace fossil fuels in the market.

6. Company Xtm© © Energie, Technik, Management

Facts:

1987: Formation of the company Xtm

1983: Design of the first straw-pellet-plant

1987: Design of the first pellet-heating-plant

1990: Design and production of production- and chipping-plant

1993: Design of a prototype which lights tiled stoves automatically

1997: Design of a Pellet-boiler of the 2nd generation

1999: Design of a Pellet-boiler of the 3rd generation

2002: Design of tiled stove-system to head whole buildings

2004: Design and production of the first solar-pellet-boiler-storage ON plus 15/25

Place of business:

Xtm Energie Technik Management GmbH;
A-2170 Poysdorf, Baumfeldstraße 5;
Phone: +43 (0)699 / 154 13 650;
FAX: +43 (0)699 / 454 13 650

Xtm Energie Technik Management GmbH;
D-81675 München, Ismaninger Straße 17-19;
Phone: +49 (0)89 / 413 00 656;
FAX: +49 (0)89 / 470 72 283

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