Professional MBA
Entrepreneurship & Innovation

VoiGuat OG

Transforming organic waste into high-quality organic products

(Business plan and Marketing strategy)

supervised by

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Affidavit

I, **ANDREAS GRUBER-WALTL**, hereby declare

1. that I am the sole author of the present Master's Thesis, "VoiGuat OG - Transforming organic waste into high-quality organic products", 71 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's Thesis as an examination paper in any form in Austria or abroad.

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ABSTRACT

This thesis describes the startup journey of a novel process development, where high valuable consumer goods are produced out of organic waste. It shows a possible profitable approach of a process implementation within the food processing industry. In addition, several supplementary by-products and co-benefits will extend the existing value-added chain for the producer with a minimum of additional input of resources and money needed.

The first part of the thesis elaborates on the development of the worldwide growing amount of organic waste and different avoidance strategies found in literature. The initial promoted take-make-disposal system is nowadays exchanged by several different approaches. Various waste circulating systems were developed since the early 90's and were partly implemented into several national and international waste management systems. All of these strategies have the reuse or the upscaling of ingredients from waste in common.

Within the second part, the business plan for this startup idea is laid out. Building on the described circulation waste management systems, where organic waste is transformed into high valuable organic products, the company VoiGuat OG was found in 2012. A process development for the vinery industry was the base for the first successful implementation of this concept. From the beginning on, the whole process concept has been proven and continuously improved with different partners. The sales experience from the first operation years was a helpful market feedback for a modified sales concept, described in this thesis. Finally, a promising business model based two major business directions is presented.

For the first field of operation, the whole process concept will be transferred into small flexible units which can be easily adopted, combined and equipped for different sizes and raw material. With this approach the whole concept can easily be multiplied and will be a pillar for the future operation. These processing units will be sold or leased to a broad range of different producers. Around these process implementations, a sales concept based on B2B partnerships is described as the second business direction.

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Part A

1 Food Waste – an introduction

Based on a growing global population, the worldwide waste amount in general, but also sourced from the food-production and food-processing industry is increasing. Especially in the industrialized countries the amount of produced and end consumer related **food waste (FW)** is expanding and turning into a problem. According to the Food and Agriculture Organization, roughly one-third of the edible parts of food produced for human consumption gets lost or wasted globally. This amount accounts about 1.3 billion tons per year [FAO, 2011; Galanakis, 2012]. In further detail a study, published by the EU in 2010 showed that 89 million tons of FW (or 179 kg per capita) within the European Countries is expelled from the food manufacturing industry every year [European Commission, 2010]. According to this study 42% of FW was produced by the households and 39% originated from the food manufacturing industry. Beside these two sectors, FW also comes from agricultural harvesting, food distribution and the food sector in general. In a different study the household produced waste in the UK accounted for 35%, whereas the other 13 million tons of FW, produced every year, are coming from the producers, the processor, institutions, retailers and others involved [Kosseva, 2011].

If we look into more recent figures, then we see the evidence of the prior mentioned trend of worldwide increasing FW. For instance within the EU, FW is expected to rise to about 126 Mt by 2020 if additional prevention policy or activities are not undertaken [European Commission, 2010]. Worldwide this trend is unbroken even if on the local base some of the harvested or processed goods are staying on the same level. Considering the given figures above and looking into the development of the worldwide commodity usage (see **Figure 1**).

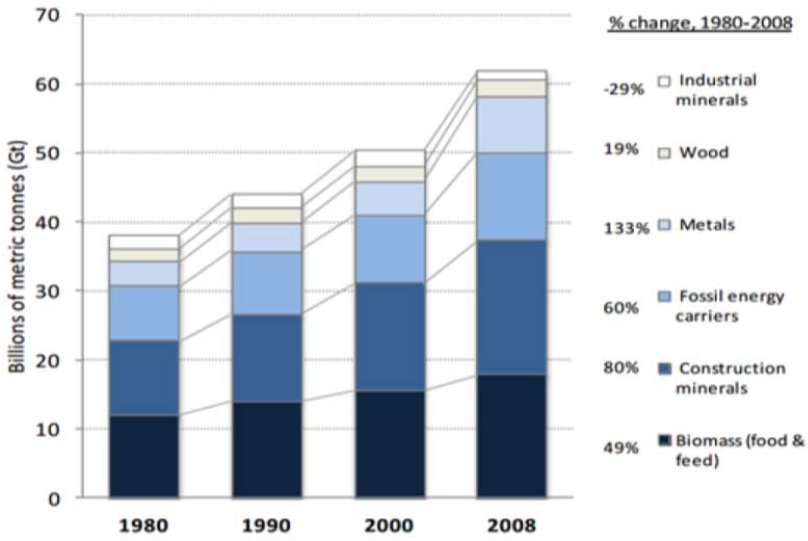


Figure 1: Overview of material extraction over time (Club of Rome, 2016)

The mass balances for waste formation, found in literature, are contradictory in some cases. **Table 1** shows an extract of different food supply chain waste, based on the geographic location.

Table 1: Food supply chain waste with respect to geographical location (contradictory data are marked)

Food Supply Chain Waste Examples	% of waste (by-products) from total input stream	volume available [ton/year]	region	year of data	reference
apple pomace	details see chapter 4.1	4.200.000	worldwide		Ravindran, 2016
apple pomace		20.900.000	worldwide	2008	Dhillon, 2013
apple pomace		140	Canada	2008	Dhillon, 2013
apple pomace		100.000	Germany	1997	Laufenberg, 2003
grape pomace	20-30% at wine production	15.000.000	worldwide		Pfaltzgraff, 2013
grape pomace		9.000.000	worldwide	2001	Schieber, 2001
grape pomace		700	France		Ravindran, 2016
grape pomace		300.000	USA - California only	1994	Laufenberg, 2003
grape pomace		1.800.000	Germany	1997	Laufenberg, 2003
grape pomace		80.000	Austria	2001	Graf, 2002
grape pomace		40.000	Austria	2014	www.österreichwein.at
olive pomace	40-70 % at vegetable oil production	2.881.500	worldwide		Ravindran, 2016
olive pomace		36.000	Jordan	1999	Laufenberg, 2003
olive pomace		250.000	Spain	1997	Laufenberg, 2003
tomato pomace		4.000.000	Europe		Ravindran, 2016
tomato pomace		14.000	Portugal	1994	Laufenberg, 2003
tomato pomace		53.800	Spain		Pfaltzgraff, 2013
orange peel		700	USA		Ravindran, 2016
orange peel		3.300.000	USA - Florida	1994	Laufenberg, 2003
waste vegetable oil		100.000	UK		Ravindran, 2016
potato peel	80 % at potato starch production	140	worldwide		Ravindran, 2016
sugarcane bagasse		1	Brazil		Ravindran, 2016
sugar beet maische	86 % at sugar production from sugar beet	14.000.000	Europe	2005	Mackwitz, 2011
pineapple peel		400.000	Australia	1995	Laufenberg, 2003
cereal waste		45.000	Europe		Ravindran, 2016

Disposal and waste reduction was long considered as the proper answer to the increasing negative environmental aspect of this issue. Even though the common waste management strategies and measures are not keeping up with the fast expanding FW amount (see **Figure 1**).

Nowadays FW is expected to be a valuable source of different components and in addition, is used as an energy resource. The valorization of FW and the related technologies are an increasing scientific issue since the late 90's.

In principle, food industry waste has a high cellulose and lignin content. Nowadays state of the arte technologies like enzymatic breakdown processes or fermentative microorganism suggest the production of energy carriers like methane or ethanol out of these two base materials. These and

other emerging technologies promote the uprising concept of bio-refineries, where all kind of biomass-derived material can be converted into different types of biofuels and chemicals through various conversion processes (**Figure 2**).

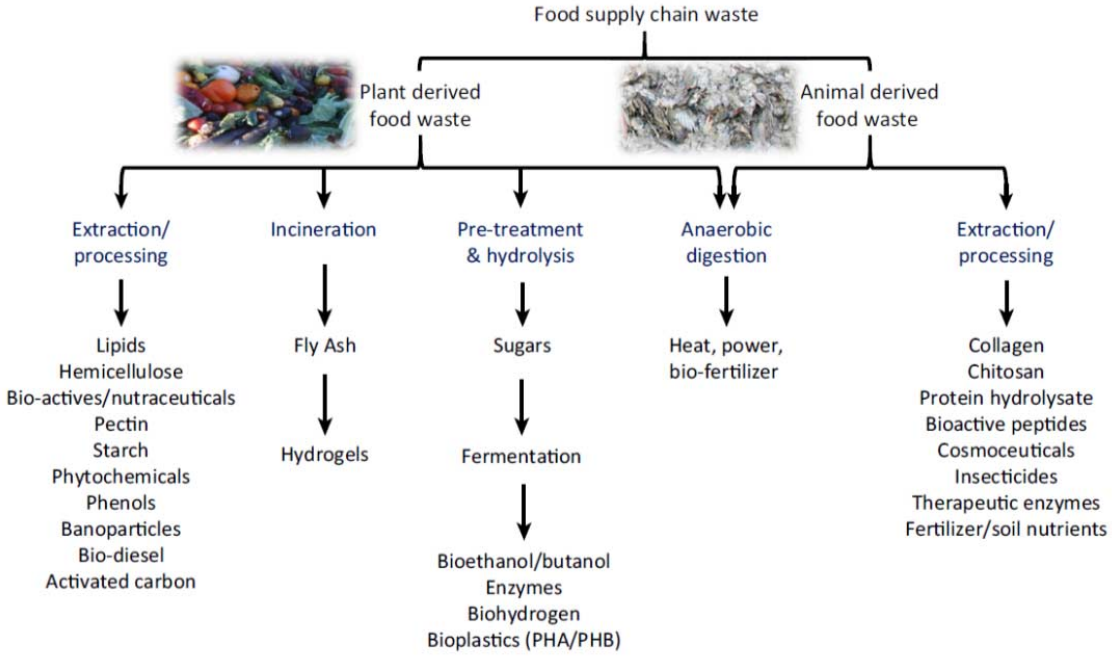


Figure 2: Possible commercial products and processes that can be derived from food chain waste [Ravindran, 2016]

Initially scientists focused mainly on the recovery of functional compounds derived from agricultural and food processing by-products. Nowadays with new technologies on hand, the focus is turned towards the recovery of active compounds with high added-values which can be reused in other products or production systems, trough e.g. bio-refineries (see **Figure 3**).

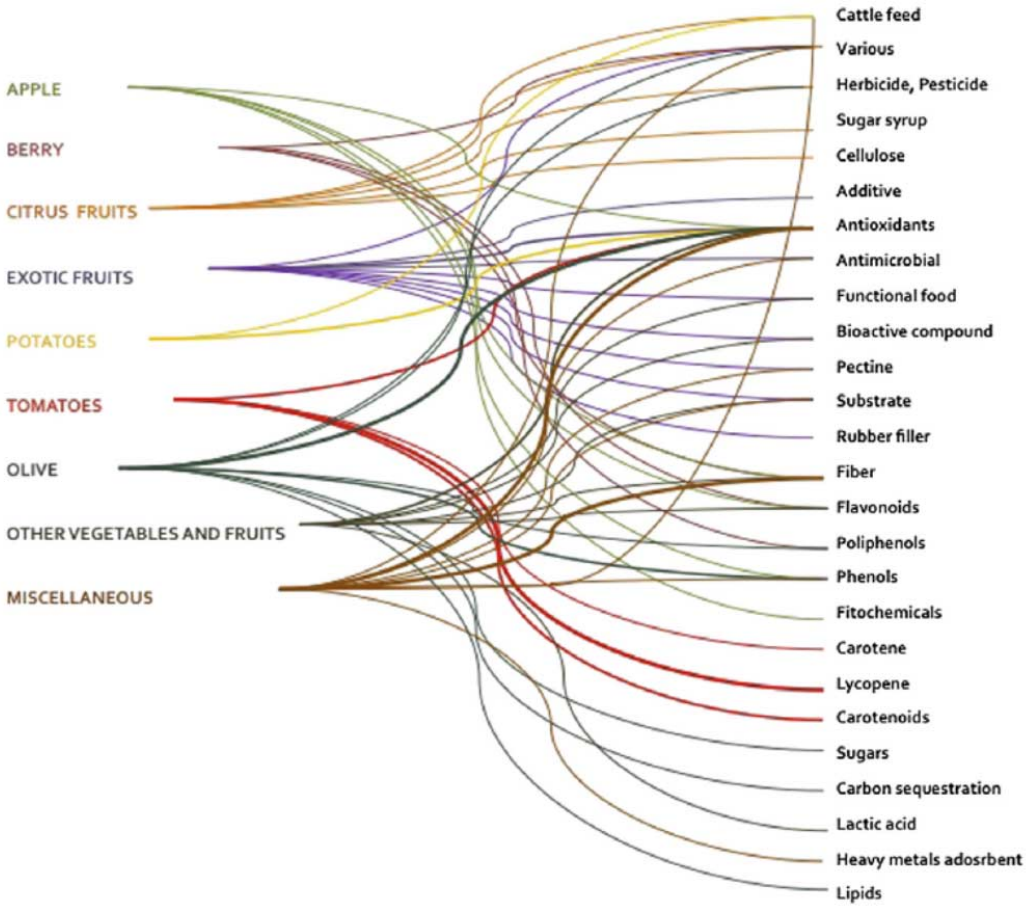


Figure 3: Summary of valuable compounds derivable from fruits and vegetables [Mirabella, 2014]

This combined point of view is the basis for industrial symbioses concepts, where waste from one sector is used as an input for another sector. Several concepts, like the **upgrading concept** derived from the **blue economy** vision or the **cradle-to-cradle** concept are based on these considerations. Further considerations also implement the overall economic and environmental perspective into the food processing industry. For instance the **holistic concept of food production** underlines the dependency of product quality, production efficiency and environmental protection at an optimized, integrated food processing industry.

It is obvious that these concepts have a local or regional dimension. Especially when a cluster with individual, integrated processing tasks is designed in order to reduce interfaces and transportation tasks. As a result, negative quality impacts are avoided or at least reduced. In contrast to these approaches, the recycling concept has a global dimension.

2 Waste Management – "Take-make-disposal" systems

Current waste management systems follow an integrated approach, where stakeholders, an appropriate technology and the political framework are combined. This approach is based on a hierarchical system where the 3R for Reduce, Reuse and Recycle is on top of the pyramid (see **Figure 4**).

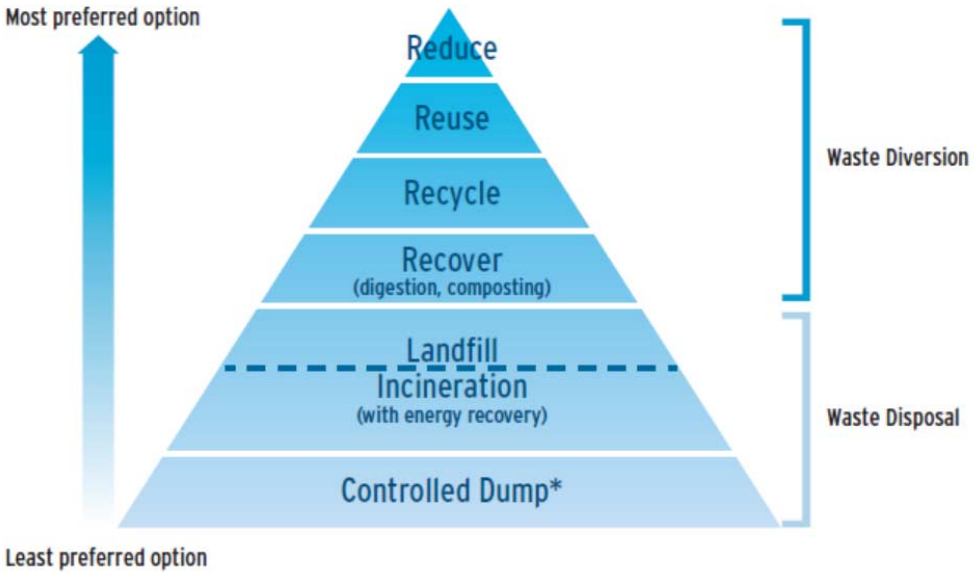


Figure 4: Waste Hierarchy [World Bank, 2012].

Although waste management is a local system, the growing global vagaries of secondary materials markets turned the whole system into a global system. As an example, is the price paid per ton of waste paper in New York City based on the current purchase price in China.

2.1 "Dump it" – Usage without treatment

Conventional waste management systems are linear systems and are focused no saving resources and decreasing the negative impact on human beings and to the environment. Waste is primarily treated as an environmental hazard and not as a source of valuable material and products. Especially in the agricultural system nutrients are predominantly not recovered. By sticking to this linear approach, water and fertilizer are used in a wasteful way. So account agricultural activities within the EU for almost a quarter of Europe's water withdrawals [Ellen Mac Arthur Foundation, 2015]. 25% of this amount is lost in conveyance. Soil degradation is another growing concern by sticking to this linear approach. Even if waste management systems improve this situation, they mainly make it less bad.

In the past, agro-industrial waste was often utilized as feed or as fertilizer. These end-of-the-pipe solutions cause additional problems. Laufenberg [Laufenberg, 1996] described that protein concentrate made of potato fruit water could only be feed to cattle due to the high potassium content. Also the olive cake is not recommended for feeding because of its low digestibility. Seasonal and compositional variations are additional issue which might be a challenge by utilizing agro-industrial waste as a fertilizer. Finally, environmental but also economical pressure turned the focus towards extracting valuable ingredients out of waste.

Nowadays recycling and reuse is considered within the latest waste management rules like the current Framework Directive of the EU [see Directive 2008/98/EC]. Here the prevention of waste generation is prioritized. This is followed by processing for reuse and recycling, with disposal as the least favored stage of waste management. Food waste was considered a special case in this Directive, focusing on three key points: the separate collection of biowaste, treatment of biowaste to ensure maximum environmental protection (composting and digitate), and the development of techniques to produce environmentally safe materials from biowaste.

2.2 Clean Production strategy

As a next step, waste processing was seen under the dogma of reducing waste in order to reduce costs. But also a process and resource optimization of the food processing industry was seen as one of the determining factors.

Under these main driving forces the transport effort reduction, the reduction of product losses and rejection were in the focus of the industry but also within the past legislation efforts.

In terms of industrial waste management technics, three different classifications are found in literature: source reduction, waste recovery or treatment by detoxifying and neutralizing or destroying the undesirable compounds [Laufenberg, 2003]. Although all of these waste management strategies are promising within the environmental and economical context, they cannot coop with the worldwide increasing pressure from the continuing environmental contamination. In addition space and odor limitations have to be considered.

3 New Strategies

3.1 Upgrading concept (blue economy)

The upgrading concept focuses in adding value to the byproducts and residues. One of the important factors for the upgrading process is the development of a procedure using technical standard equipment to reach this goal. With this concept, based on existing processes and structures, competitive processes and products in terms of price, quality, innovation and environmental protection are designed. The upgrading concept was first described by Gunter Pauli [Pauli, 2010]. One of its core messages is based on nature, where residuals from one process are a resource for another process. In principle it describes a cascading process. It is seen as an enhancement of the green economy and there for the term blue economy was developed.

3.2 Holistic concept of food production

With the holistic approach also the environmental protection plays a key role within the whole food production process (see **Figure 5**). Three different goals are connected and balanced through this concept. Here, the product quality, the production efficiency and the Environmental protection are matched and seen as ultimate principles within this concept.

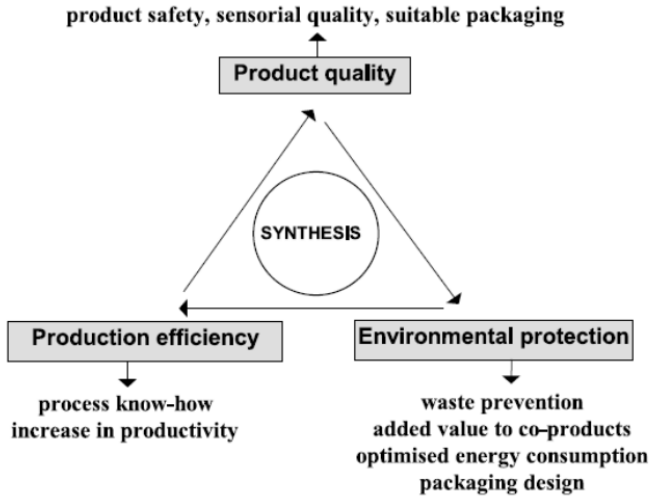


Figure 5: The holistic concept of food production [Laufenberg, 2003]

This synthesis is centered around the product, by considering the whole value chain from “cradle to grave”. In contrast to any clean production strategy this approach sees the environmental protection as an integrated part of the whole production process.

3.3 Circular Economy

Reuse before recycling has been an objective of the 2008 EU Waste Directive. Clean production systems, which are circular and use fewer materials and less water and energy, are considering this dogma shift. Nowadays circulating economies in general are seen as the leading principle for

eco-innovation. Its main goal is to keep products, components, and materials at their highest utility and value within the economy. In literature any circulation economy is defined by three principles: Recycling, Reduction and Reuse.

According to Prof. Stahel, one of the early thought leaders of the circular economy concept, is convinced that in terms of profitability and resource efficiency, recycling is the least sustainable of all the circular economy principles. He states that a circular economy is predominantly a regional activity, which finally substitutes manpower for energy. He also thinks that the key to enable the reuse of goods and components is the standardization of components, interfaces and materials, and the non-destructive collection of used goods [Interview, Article in Nature, 2013-2014]. In principle, a circulating economy would turn goods that are at the end of their service life into resources for others, closing loops in industrial ecosystems and minimize waste. The main objective is to maximize value at each point in a products life. Regarding a study of several European nations, a shift to a circular economy would reduce each nations greenhouse gas emissions by up to 70% and grow its workforce by about 4% [Club of Rome, 2015].

These principle conclusions are defined by two depending circles. With the first circle, the quantity of waste is prevented by utilization. Goods should be reused or repaired. But also reconditioning and the technological or fashion upgrade of goods happens within this loop. The second, the recycling circle reduces waste by reusing material as resources (see **Figure 6**).

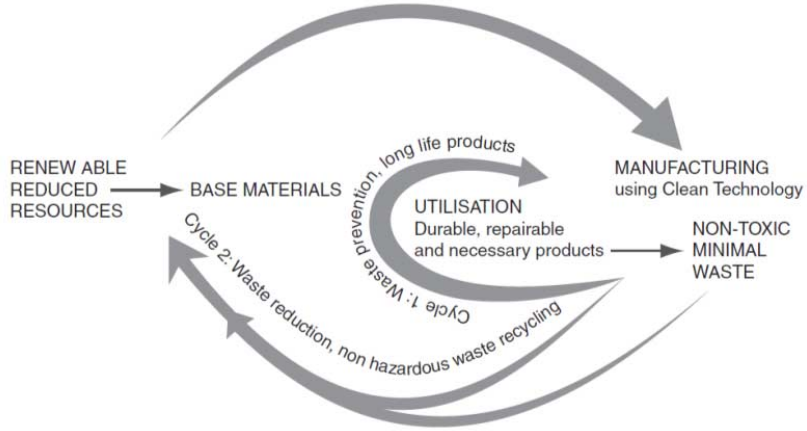


Figure 6: Circular structure of a sustainable economy [adopted from Stahel, 1982]

The **cradle-to-cradle concept** is focused in circulation molecules instead of goods and products. In principle, the circulation economy seeks on a lifetime extension of products; whereas the cradle-to-cradle concept follows a material based recycling of molecules. This concept distinguishes between a technical and a biological cycle, where the output of each process is reused as a nutrient or raw material for the next process (see **Figure 7**).

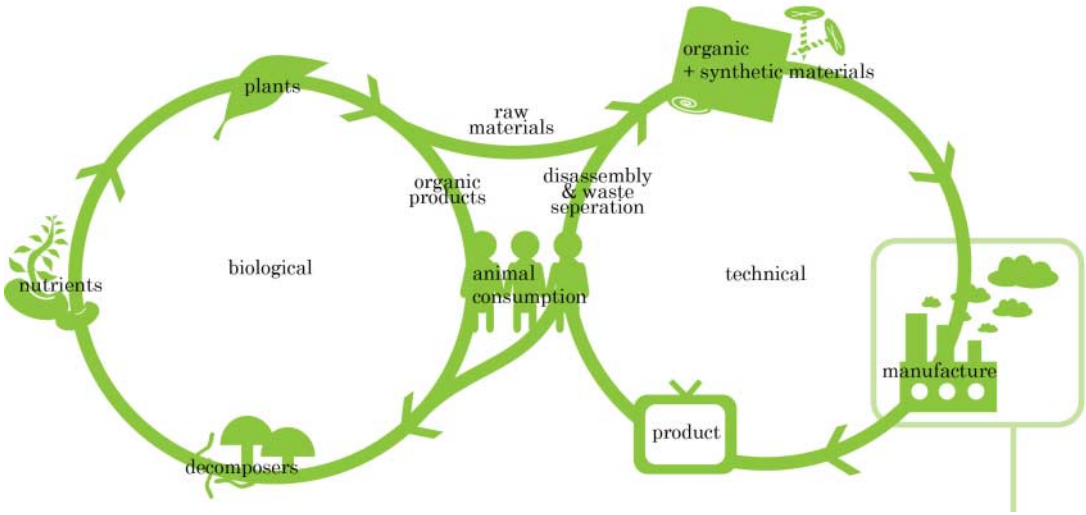


Figure 7: Cradle to Cradle concept [Braungart, 2013]

To make this concept happen, it is necessary to produce goods, which are useful for each of the circles. Therefore any of these products should be able to be dismantled easily into ingredients, which are harmless and useful for the biological and technical circle. In principle any product is not designed for the first usage as it is common in the current economy, it is designed for the whole life cycle. Cradle-to-cradle compatible products are designed under the dogma of eco-effective whereas nowadays we are focused on the eco-efficiency.

Under this perspective, also the manufacturing and production hast to be rethought. The dismantling of the goods and products into circulating by-products has to be in the focus at the beginning of any design process.

Within these two circles basically no waste is produced. Similar to a **cascading concept**, each material, which is not used anymore, is a resource for the next organism or product. Everything is a resource and ideally nothing is waste. Here, the circulating concept is combined with the mentioned cascading concept, derived from the blue economy concept, described by Gunter Pauli [Pauli, 2010].

4 Examples and their realization

4.1 Apple pomace

Apple pomace, the solid residues from the apple processing industry is a heterogeneous mixture, consisting of skin, peel, core, stem, seeds and soft tissue. It has high water content and is mainly composed of insoluble carbohydrates such as cellulose, hemicellulose and lignin [Kosseva, 2011]. The main interest of the food processing industry is the production of concentrated apple juice, jam and sweets (see **Figure 8**).

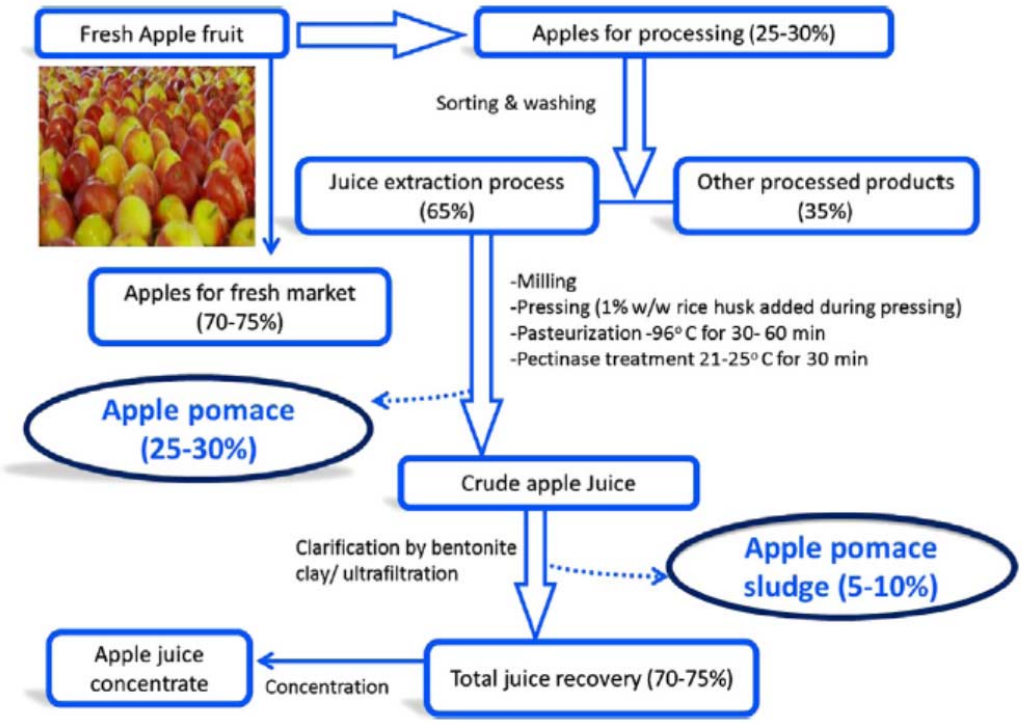


Figure 8: Overview of the process streams in the apple juice industry [Dhillon, 2013]

Mainly 20% of this left over is used for animal feed. The biggest portion usually goes to landfill, is incinerated or is sent to composting sites and therefore is a major environmental issue. Therefor the utilization of apple pomace has become a big scientific concern of the last decade, where direct extraction of bioactive compounds or the bioproduction of high added products such as enzymes, organic acids, biofuels, etc. were investigated. **Table 2** gives an overview of the possible ingredients found in apple pomace.

Table 2: Summary of selected ingredients of apple pomace [Dhillon, 2013]

ingredient	process	remark
Organic acids – citric acid	Solid-state Fermentation by microorganism (apple pomace acts as ideal substrate)	No pretreatment necessary
Organic acid – lactic acid	Sequential hydrolysis and solid-state Fermentation by microorganism	pretreatment in order to increase the yield necessary
Enzymes (cellulose, pectin and others)	Solid-state fermentation	Superior gelling properties slightly brown hue caused by encymatic browning
Natural Antioxidants	In development (e.g. nutraceutical product development)	The content of antioxidants verify largely
Aroma compounds	Microbial biosynthesis or bioconversion by submerged fermentation	Yield very low due to early stage of development / cost intense due to early stage of development

Apple pomace and the produced sludge are in general rich in carbohydrates and other useful nutrients, having high moisture content and containing a high biodegradable organic load.

4.1.1 Organic Acids

Citric acid is considered as one of the important platform chemicals with numerous applications. It has been used in biomedicine industry, in the culturing of a wider variety pf human cell lines, but also in the nanotechnology for bioremediation of heavy metals from soil and metal ore mines and for making water based wood preservations. The reduction in prices, high energy and raw material costs have turned the once lucrative Citric acid market into an unprofitable one. Therefore alternative, inexpensive raw material sources like pomace are of interest.

Lactic acid has a wide range of applications in the food (as acidulant, flavor and preservative), pharmaceutical, leather and textile industry and is used as a chemical feedstock. The world market for lactic acid is growing every year, and its current production is about 150 million lb per year. The worldwide market growth is expected to be between 10% and 15% per year [Kosseva, 2011]. Also here the high cost of raw material and nutrients is the major driving force in order to search for alternative sources for this multifunctional and versatile organic acid.

4.1.2 Enzymes

The bioproduction of enzymes is very expensive and raw material translates into a 40-60% of the production costs [Dhillon, 2013]. A wide verity of different enzymes can be produced from apple pomace by fermentation. The extracted enzymes have a wide range of applications in the food and textile processing, degumming of plant rough fibers and others.

For instance **cellulases enzymes**, which are currently the third largest industrial enzyme worldwide with the prediction of being the most important enzyme in the near future. It is used in various applications like bioethanol production, cotton processing, paper recycling, juice extraction and animal feed additive. The high costs of cellulase enzymes are the major barrier in various biotechnological processes. According to an estimate, cellulases procured from commercial sources contribute 23 to 43% to the total cost of cellulosic ethanol production [Dhillon, 2013]. The cost economics of cellulases and other industrial enzymes can be brought down by multifaceted strategies, such as by using low cost agro-industrial wastes as substrates, cost effective fermentation techniques in special and optimized and clean production processes in general.

Based on their ability to form gels, pectin is an indispensable ingredient in the pharmaceutical, cosmetic and food industry. Under the over group of pectinases which catalyze the hydrolysis of pectins, the production of several enzymes from apple pomace were studied. Pectinases in general are the structural polysaccharides present in the plant cells and are responsible for maintaining the plant tissues integrity.

4.1.3 Natural antioxidants

Apple pomace is an excellent source of bioactive antioxidants, having various polyphenols available, which have many potential applications in food, pharmaceutical and cosmetic industry by virtue of their antioxidant and antimicrobial activities. Depending upon different varieties and various parts of apples, the polyphenolic compound contents vary largely, which makes the recovery of such compounds difficult. This issue and the complex appearance in conjugated forms have not favored a clear processing strategy yet. Several research groups are currently working on this issue intensely.

4.1.4 Aroma compounds

Natural flavors are chemical substances with aroma properties that are produced from feedstock of plant or animal origin by means of physical, enzymatic, or microbiological processing. Flavors are important components of food industry and comprise over a quarter of the world market for food additives. Most of the flavoring compounds are produced via chemical synthesis or by extraction from natural materials. The recovery of essential oils and flavors out of natural resources are difficult therefore alternative processes like microbial biosynthesis or bioconversion are investigated.

4.1.5 Biofuels

Various studies have demonstrated apple pomace as a source for bioethanol. Also here solid-stage fermentation was used as the primary production technology with a maximum yield of over 16%. Alcohol fermentation from apple pomace proved to be an efficient method to reduce the waste disposal with the concomitant production of ethanol [Kosseva, 2011].

In general apple industry wastes represent rich substrates for culturing of different microorganisms for processing to various high value products like biofuel. For instance in the US alone, out of the total apple pomace waste generation (0.4 million tons on dry weight basis), 0.08 million of bioethanol can be produced [Dhillon, 2013].

4.1.6 Animal / livestock feed

AP is presently used in low value applications, such as to feed ruminants or simply added to soil as a fertilizer. Several problems occur with the usage of apple pomace due to the negative effect of several ingredients. So is the low digestibility due to high lignin / cellulose ratio and the high free sugar content. Also the protein vitamin and mineral content is comparable low.

4.2 Grape pomace

Grapes are one of the largest fruit crop with more than 67 million tons produced annually. [Fontana, 2013] About 80% of the total crop is used in wine making, and pomace represents approximately 20% of the weight of grapes processed. From these data it can be calculated that grape pomace amounts to almost 11 million tons per year. Other sources calculate that the pomace which consists of skins, seeds, and stalks counts for 13% by weight of the processed grape [Kosseva, 2011]. Taking this figure into account, than we still would have an worldwide annual pomace appearance of 7 million tons.

The composition of grape pomace varies considerably, depending on grape variety and technology of wine making. High water content and residual organic constituents make this pomace in general very prone to microbiological deterioration. In the past a great range of products such as ethanol, tartrates, citric acid, grape seed oil, hydrocolloids, and dietary fiber were recovered on a small scale.

There are many studies that justify positive health effects, basically associated with the known antioxidative properties of grape pomace. The most relevant activities attributed to bioactive phytochemicals from grape pomace by-products are antioxidant, antimicrobial, anti-inflammatory, and anticancer.

The sustainable exploitation of grape (see **Figure 9**) will be a useful strategy for wineries with the aim of reducing environmental contamination and as an alternative to reduce the carbon footprint in the whole production process. In this sense, simplified processes (with few extraction and purification steps) will be the choice with the aim of an easier scale-up as well as achieving a

cheaper production. The recycling of the wine making by-products constitutes an opportunity for providing valuable materials to pharmaceutical, cosmetic, nutraceutical, and food industries, resulting in reduced costs and environmental impact.

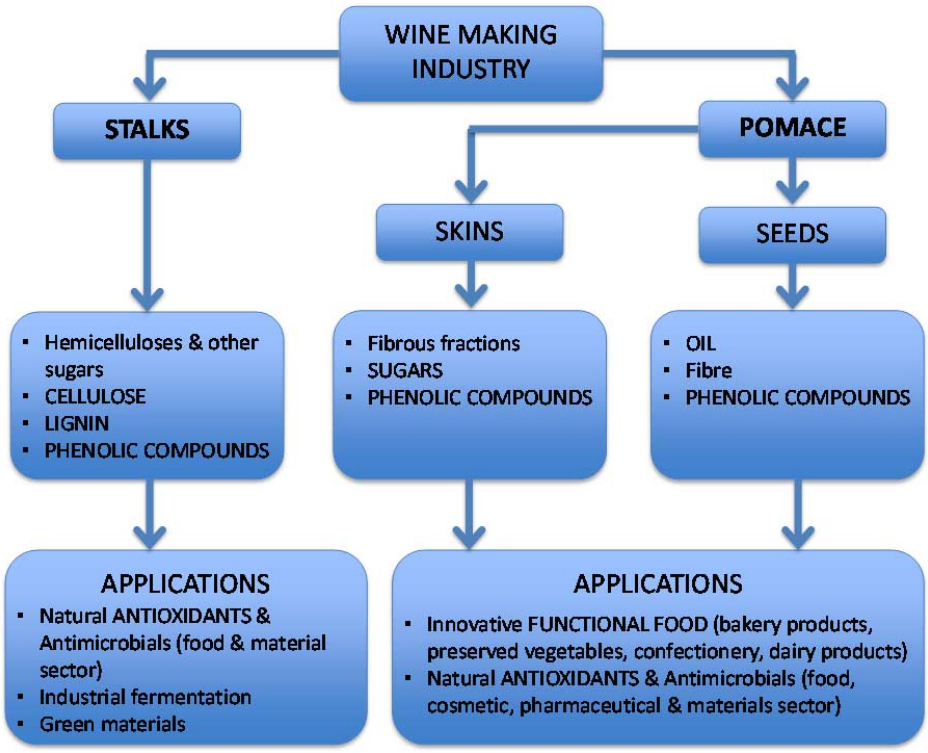


Figure 9: Overview of various by-products from the wine making industry, derived from [Valorivitis, 2014]

The chemical composition of grape pomace is rather complex: alcohols, acids, aldehydes, esters, pectins, polyphenols, mineral substances, sugars are the most represented classes of compounds [Kosseva, 2011].

Table 3 gives an overview of the major constituents out of the wine making residuals.

Table 3: Summary of Major Constituents from the wine making residuals [Winterthaler, 2015]

Side Stream	**% of Grapes**	**Major Constituents**	
Grape pomace	~15 % dry 25-45 % wet	Pigments/Phenolics	~ 9 kg/t (red grapes)
		Sugars	150 kg/t
		Tartrate	50-75 kg/t
Grape seeds	3-6 %	Grape seedoil	12-17 %
		Phenolics (Procyanidins)	4-6 %
Yeastlees	3-8 %	Pigments	12 kg/t (red lees)
		Tartrate	100-150 kg/t
		Ethanol	wine
		β-1,3-Glucans	6-12 % dry weight
Grape stalks	3-7 %	Stilbenes	
Vine prunings	2-5t/ha/year	Stilbenes	

Grape pomaces are characterized by high contents of **phenolics** due to an incomplete extraction during the winemaking process. These phenolics are secondary plant metabolites with potential beneficial effects on human health because of their antioxidant activity and antimicrobial, antiviral, and anti-inflammatory properties [Fontana A. R., 2013].

Anthocyanins, catechins, flavonol glycosides, phenolic acids and alcohols and stilbenes are here the principal phenolic constituents. Anthocyanins have been considered the most valuable components, and methods for their extraction have been reported [Schieber, 2001].

Actually, the industrial recovery of grape pomace is performed by its partial use for tartaric **acid extraction** or **ethanol production**, and the final solid residue is sometimes cast off as fertilizer, although the high levels of phenolics constitute a problem because they inhibit seed germination. As well, grape pomace has been utilized as an **additive in animal feeding**, but the presence of polymeric polyphenols (lignin) reduces digestibility because they inhibit cellulolytic and proteolytic enzymes as well as the growth of rumen bacteria. Additionally, the high content of dietary fiber, especially glycans, cellulose, and pectins, emphasizes the possible nutritive value of pomace with a wide range of applications as food ingredients. Therefore, most attention has been paid to the recovery of bioactive phenolics from grape byproducts from the winemaking industry.

As a consequence, grape pomace is considered a valuable **source of phytochemicals** that may be recovered as functional compounds for the pharmaceutical, cosmetic, and food industries as well as used as biopesticides. In this way, the recovery of phenolics from grape byproducts from the winemaking industry has attracted increasing attention in the past years, and industries are finding a high value and sustainable alternative to their residues [Fontana A. R., 2013].

5 Lookout

A shift on various disciplines is necessary in order to turn the current practice into a sustainable approach. Currently social stimulations on a wide basis are missing. Nowadays quality is still associated with newness rather than caring. In other words, long-term using is undesirable which is not resourceful. Here a change in the economic logic is necessary in order to replace production with sufficiency. Therefore as driving force also the political stimulation has to pave the way towards this direction. For instance, discussions about the taxation of resource destroying products rather than workforce show a possible approach. Also the GDP driven economy evaluation, which is based on measuring a flow over a period of time is not considering circular approaches, where physical stocks are preserved. As a result of the current situation, the lack of political pressure does also not stimulate a shift of the academic focus towards this direction.

A possible sustainable solution for the increasing economic and environmental problems, based on the current linear driven 'take, make & dispose' economy can be a circular based economy. A study of selected European nations found that a shift to a circular economy would reduce each nation's greenhouse gas emission by up to 70% and grow its workforce by 4% [Club of Rome, 2016]. Targeting the year 2030 it found that the economy in each country would become 25% more energy efficient.

Another European wide study concluded that a circular food system would be regenerative, resilient, non-wasteful and healthy [Ellen Mac Arthur Foundation, 2015]. Even the food costs could be more than 30% lower than today. On top of efficiency and waste reduction improvements, the food system would close the nutrient loops, preserve natural capital and create a market for rehabilitating degraded land and resource stocks. Within this study two scenarios are compared. The first scenario reflects the current linear based economy, where the increase in efficiency, based on resource efficient agricultural practices and waste reduction in the supply chain are taken into account. The second scenario is focused on a circular approach, which closes the nutrient loops and preserves natural capital. Finally the whole food value chain would be more efficient (see **Figure 10**).

According the Ellen Mac Arthur Foundation study, the current development scenario could lower the costs of primary resource input by 10%. In addition the produced FW would be lowered by 45% by 2050. As a clear disadvantage, the issues of degraded lands and increasing health problems are not addressed within this scenario. Closed and local loops would probably remain niche practices. With the circular scenario, beside environmental and economic benefits the overall social benefits are unique. As an example the usage of synthetic fertilizers could be reduced by 80% by 2050. This would significantly reduce eutrophication and other negative environmental effects by closing the loop.

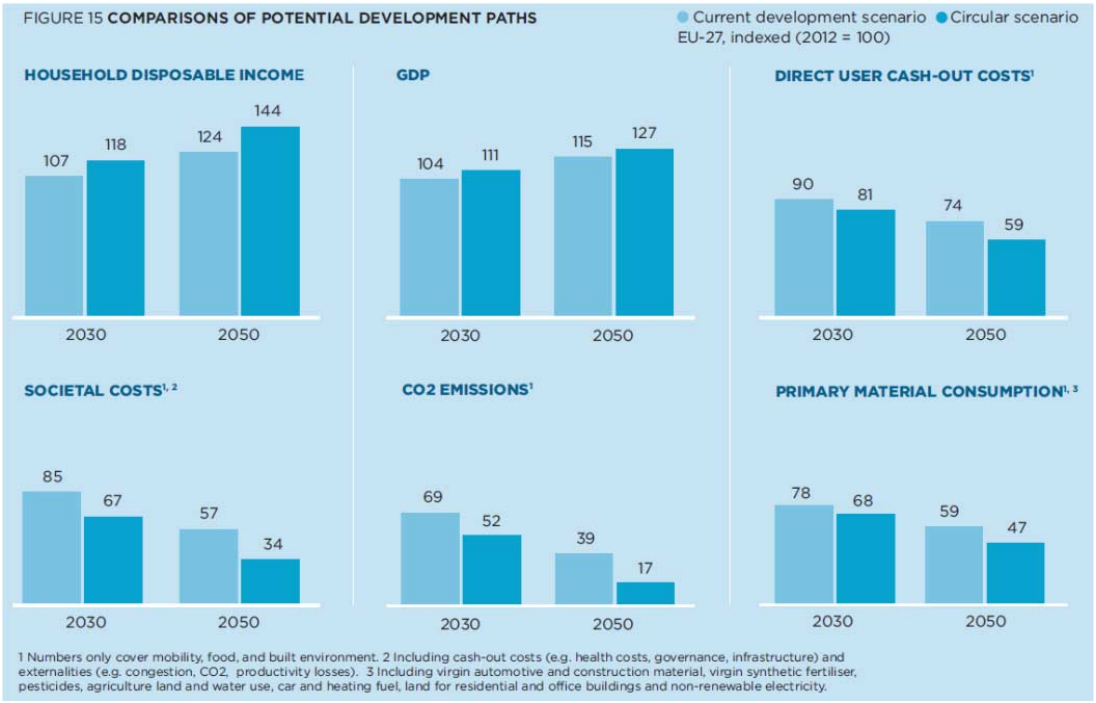


Figure 10: Comparison of different development paths [Ellen Mac Arthur Foundation, 2015]

As a conclusion a shift to a circular economy would offer independence, innovation, employment and growth. In order to successfully implement this paradigm shift a consequence behavior change, underpinned by political reforms is the base for a sustainable development. The politics have to move away from promoting the labor productivity towards accelerating the conservation of resources.

Part B

1 Executive Summary

VoiGuat OG follows two different directions within this business plan:

- Sell Process implementations in order to produce high quality organic product out of organic waste, which would extent the value chain for the producers;
- Sell the products to B2B partners and operate as a missing link for the produced intermediate and by-products;

After proofing our process idea on different demonstration facilities within the vinery processing industry we feel comfortable to expand this approach towards different sources. With our first process implementations, where we produced top grape seed oil out of pomace, in an unbeatable time period without influencing the current way of wine production. In the future we plan for these process implementations to design small, container based, flexible units which are applicable for different raw material sources (grape see, fruits). With this approach we can offer a scalable business. Any of these compact units will be sold or leased out.

In addition, we will operate as a cooperation partner between the producers (vineyards, juice producers, …) and customers for the new introduced by-products (bio gasification, fertilizing and animal feed distributer). By coordination several product streams from different producers we expect an attractive price base for each shareholder.

The second business direction is based on our sales experience from the first years of operation. We found that the effort for establishing a whole B2C segment from scratch is too time and resource consuming for the startup company. Now we focus on B2B partnerships. We experienced that the best dealers for the end products are the producers themselves. Here the distribution channels are already in place and the producers see the benefit by extending their overall value chain without a major input. In addition, we will further develop the established B2B distribution channels like online deli shops, deli chains, premium dealers for gift bags etc.

We also cooperate with selected premium customers within the high value food industry. This helps us to get a first feedback and promote our offered processes and end products. Also attending markets, shows and public tests are helpful to promote the end and by-product.

2 Description of Business

2.1 Description of the Venture

The VoiGuat OG exists since 2012 and sat down with the goal to generate high valuable products out of **food waste**, rich in healthy plant ingredients. Our goal is to develop innovative processes, integrated into existing production chains.

Out of this context we have two fields, which we are focused on. On the one hand we have a clear focus on process development in the described context. On the other hand we are also dealing with product development (see **Figure 11**).

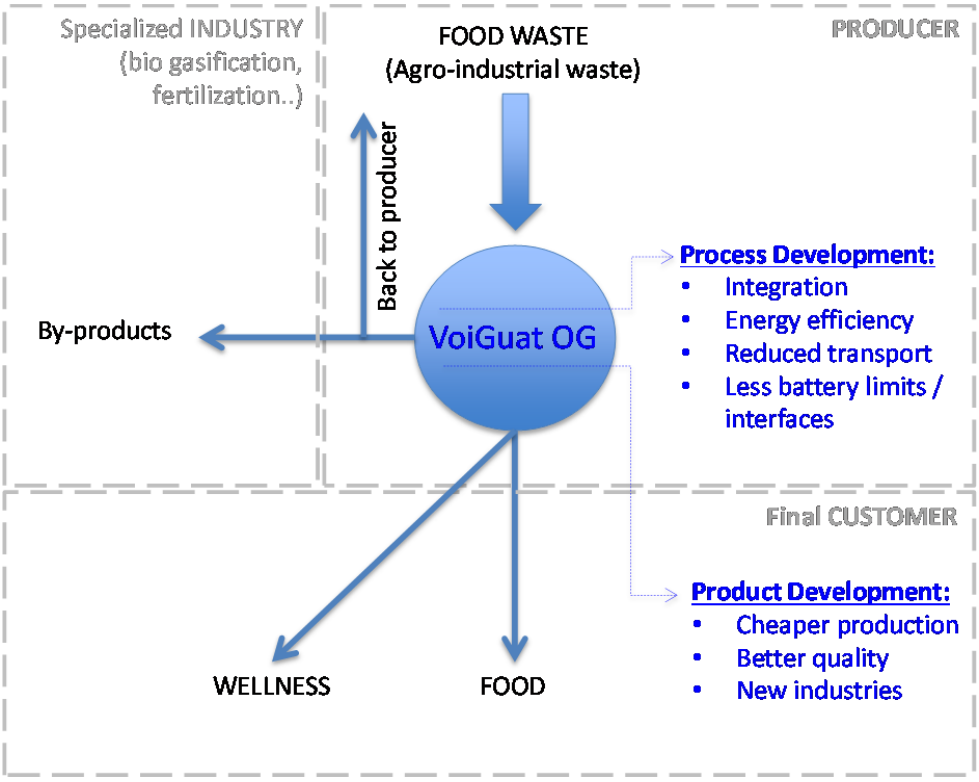


Figure 11: Principle operation field of VoiGuat OG

The VoiGuat OG acts under the following free trades:

- Oil pressing (business No.: 610/14141)
- Trade (business No.: 501/730368).

The VoiGuat OG is led by 3 partners (see enclosed personal records):

- Mr. Wilfried Andexer acts here as managing director and is responsible for marketing and sales;
- Mr. Michael Kramer is responsible for process and product development and
- Mr. Andreas Gruber-Waltl is in charge of machinery.

As shareholders, we combine experience in Chemical and Mechanical Engineering. In addition one of the shareholders has 10 years of managing experience for a small business unit in the IT sector. This professional background, gives us the opportunity to engineer, design, construct and optimize all the necessary machines by ourselves.

For the time being, the focus of the process and product development lies on local high-quality products. The first industry, which we decided to focus on, was the wine making industry. We recognized a potential in upgrading the leftovers of the first processing steps of the overall value chain of the wine making process. In our region, usually the pomace finds no further usage. In most cases it is used as a fertilizer brought out back on the fields of the vineyards. Although grape seed oil is known as a very healthy vegetable oil with various applications, processing the seeds out of the pomace is rather an exception than standard.

From the present plant size an annual turnover of 30.000, - EUR can be gained. Within our midterm planning we expect a turnover of 250.000, - EUR. With the planned extension of the product range we aim a long-term annual turnover of 700.000, - up to 1.000.000, - EUR.

The enterprise main office is located in the southern Styria (Pössnitzberg 133, 8463 Leutschach), directly within a well-known wine area. Based on the topographic and economic analogy this area is also known as the Austrian Tuscany. At this location the majority of the product processing takes place, currently all process steps are either directly located at the contracted vineyard or at the manufacturing plant (see also chapter 2.2, Products and Services). In addition the trade unit is located in Salzburg (Gebrigsjägerplatz 3, 5020 Salzburg).

2.2 Products and Services

In principle, our process concepts follow the idea of a cascading concept, which was first described by Gunter Pauli under the term of blue economy or upsizing [Pauli, 2010]. As mentioned in the first part (see part A, chapter 3.3 – Circular Economy), he describes a concept, away from linear processes towards recycling processes, where useless residues from one process are used for value creation in other processes. This can be realized by setting up a cluster of companies. In overall these clusters show an increased productivity of the overall transformation of capital, work load and raw material by the creation of additional products and services. He also defined “Integrated biological systems” where emissions and residuals are understood as miss leaded resources. “Learning from the nature” is one of his basic principles, where nutrition, material and

energy are reused and residuals from one process are used as raw material for the following process.

Worldwide a huge amount of different unused biological resources are available (see part A). This is the type of raw material we target. Our goal is to **develop and offer processes** which, are **integrated into the conventional production process** in order to contribute to reduced operation costs (energy input, reuse of excess heat) and an reduced environmental impact linked to the disposal of these by-products within the production areas. Therefore we analyze the current production process and the existing residuals in detail. The goal is an integrated process with a multiple reuse of different end- and by-products.

With this approach we follow the concept of a **holistic food production** (see part A, chapter 3.3 – Circular Economy). In addition, our production of high value end- and by-products fit perfect into this concept by integrating the product quality, production efficiency and environmental protection around the final product. Established refinery processes usually go a different way. They are highly specialized production facilities, which are focused on a high production rate. Transport and process steps before and after the refinery process are not in their focus. Therefore, unnecessary interfaces and waiting time are lowering the efficiency and quality of the final products.

Figure 12 shows the three main pillars of this concept based on the production of VoiGuat OG. The result is a product which has a better quality and is produced with less environmental impact than known so far.

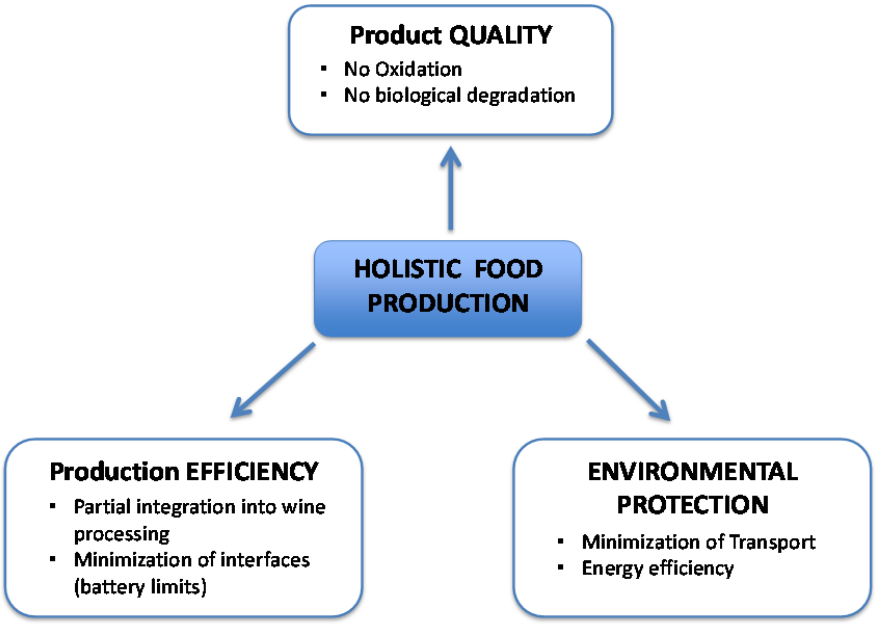


Figure 12: The holistic concept of food production adapted from [Laufenberg et al, 2003]

Following the described concept, we have the goal of an **increased value creation over the whole production process**.

As a first candidate we chose **grape pomace**, where we developed an innovative treatment process for harvesting and conserving the grape seeds in an unbeatable time. We integrated the first treatment step directly into the wine pressing process and eliminated any disturbing interface and transport tasks. With this process design we erased any quality degradation by oxidation or other biological degradation processes. Comparing with existing process chains we could minimize the process time by the factor 4 to 5 (see **Figure 13**).

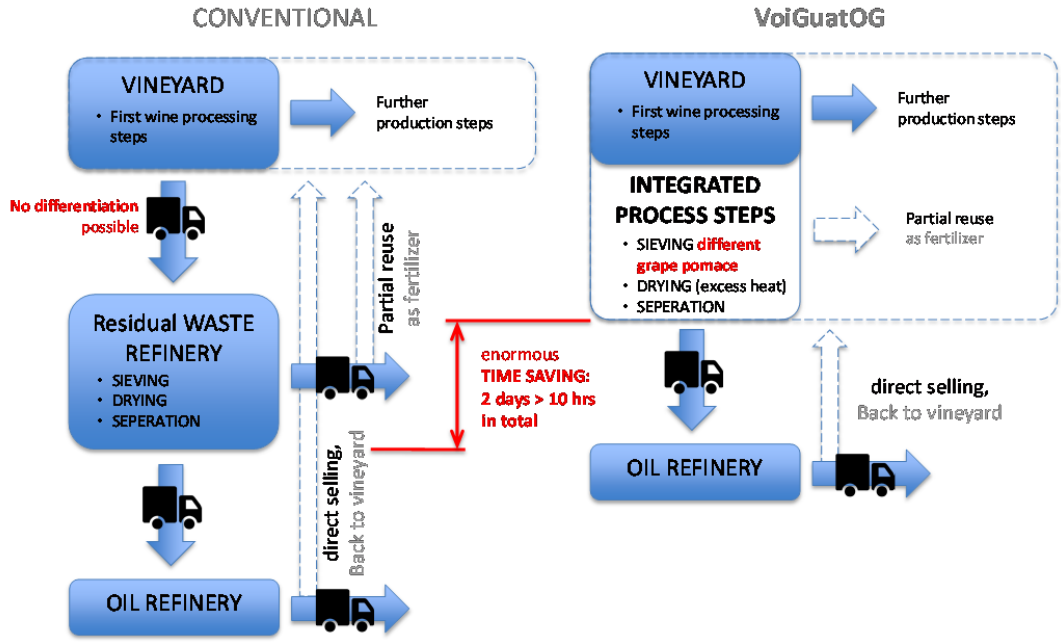


Figure 13: Conventional vs. VoiGuat OG process chain

By a partial and contemporary integration into the existing grape-pressing process and the immediate treatment afterwards we are able to produce an outstanding quality. We could confirm this by several awards within the first year of production [2013 – 2 x Gold medal at intern. Carinthian Oil Testing; 2014 – 1 x 1st price Wieselburger Oil King Testival] (see **Figure 14**).

Figure 14: Awarded producers at the Intern. Carinthian Oil Testing; VoiGuat OG in last row;

As one of the benefits of our innovative approach we are also able to produce different types of grape seed oil without any further treatment, depending on the processed grapes. This is unique compared to the established processing methods.

In addition, also different applications of the produced byproducts are possible. As an example, the processed pomace is ready to use for bio gasification where the core material in the unprocessed pomace is usually a criteria of exclusion. Also further applications in different industries like the cosmetic and food industry are possible.

With the first unit we could **prove the concept** in detail. The process was integrated by 100% into the wine making process of two different clients. Throughout the whole harvesting season we had no negative interruption for this very intense and critical task. Any interruption and delay in the wine pressing process could jeopardize the whole wine production for a season.

In the future our goal is to focus on **small and flexible units**, which makes it easy to adapt and multiply this concept for any raw material supplier. In principle we will stick to the same concept by integrating innovative process steps as close as possible into the initial processing steps.

We consider and optimize the entire process chain, which is necessary for an outstanding product and an economical operating process chain. This is a strong competitive advantage and is one of the basis for the unique product quality. By combining the necessary process steps within small units we are able to process our raw material in a more economical way than any other competitor.

In terms of product development we plan to expand our product portfolio (see **Figure 15**), based on the produced **grape seed oil** as a raw material. This means that we have two main target groups in focus. One group is the food industry where we want to establish the VoiGuat OG as a supplier of the top level segment. The second group is the cosmetic and wellness industry where these types of oils are already used and the margins are high.

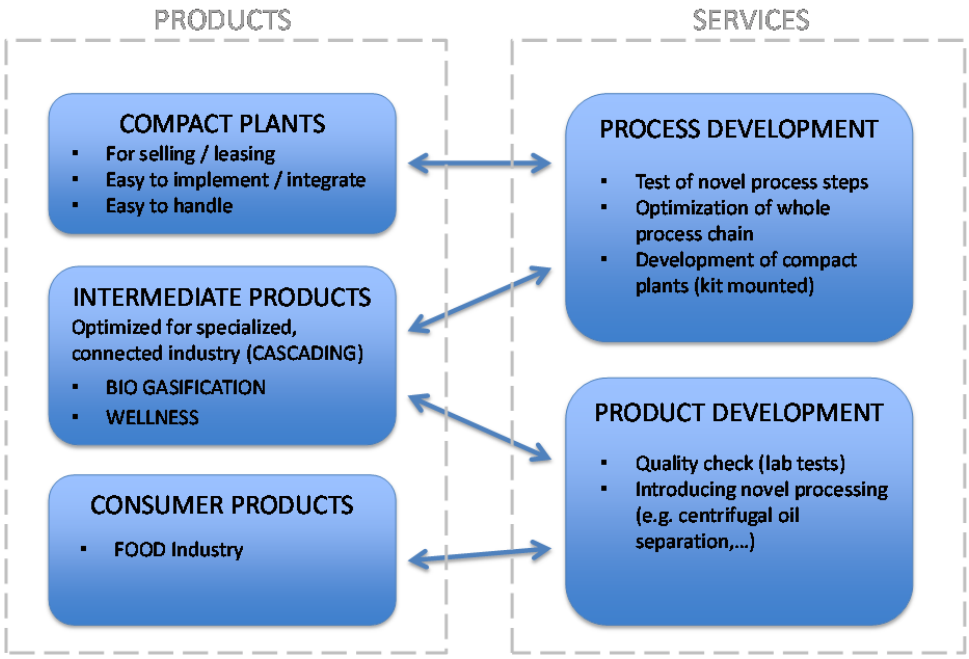


Figure 15: Products & Services Voiguat OG

In addition to the grape pomace we target a couple of **other interesting agricultural residue fractions** as a possible raw material for natural oil. We plan to develop other innovative and unique process chains based on the same principles. The prove of concept for first additional resources are already done. So we finalized a process concept for harvesting the seeds out of berry pomace (black and red current, aronia berry). Also here, we go an alternative way compared to the existing process chains, with a minimum of single steps. The unbeatable short processing time will lead to an outstanding product quality. In general with the chosen raw material we focus on extraordinary organic oils.

Our **midterm perspective** is to operate on different pomace fractions within the local market. After two years of operation we plan to fine tune the proven process design for 2 to 3 berry pomace like currant, chokeberry and hollander. We also plan to do the first tests for a new group of pomace containing hard shell seed like cherry, peach, apricot and plum. All these fruits exist locally in the area we focus on. We plan to improve and simplify our concept and techniques

further. Our final midterm perspective is to fit all necessary process steps for different pomace fractions on single container racks. This will give us the possibility to **multiply and expand our concept** easily. Rental or Selling concepts for pre-mounted container racks are planned. It gives us also the possibility to expand to other countries without a huge initial investment.

As a **long-term perspective** we plan to expand globally. We are convinced that our concept and process know how gives us the possibility to respond to any seed pomace available. By designing modular container concepts, which are easy to adjust to different pomace fractions, we see also our chance to introduce this concept on **different markets worldwide** (see **Figure 16**).

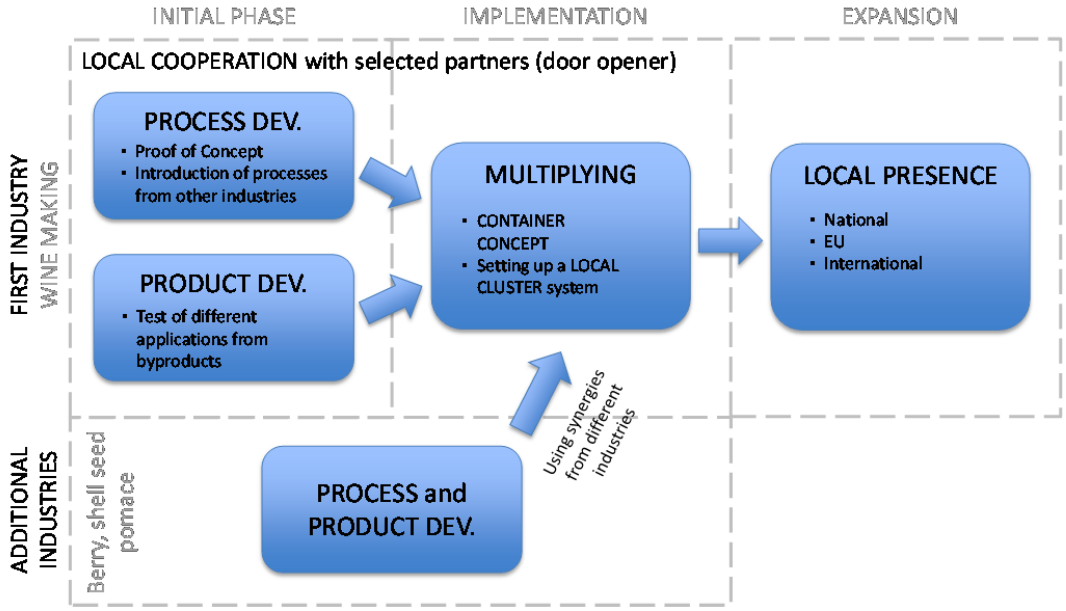


Figure 16: timeframe for different expansion and development scenarios

2.3 Type of Industry

With our **process developments** we have tested production units within the **agriculture processing** industry. Right now we are focused on:

- Wine processing
- Fruit processing

In addition, the byproducts of our concept can be used in different bio processing units or fertilization processes. Therefore a holistic point of view of each processing and the supporting industry is mandatory.

With our **products** we currently target the consumers in two different industry sectors:

- Food industry
- Cosmetic and Wellness Industry

Our main objective is to create **novel, high-quality, local products from organic residues.** The grape seed oil, as our first product, represents also other aspects, which we would like to emphasize: **natural, excellent taste and health benefits**.

For cosmetic products further attributes such as wellness and exclusivity are the attributes which we focus on.

We see a great potential in both industry sectors which we would like to develop step by step.

2.3.1 Agriculture processing

In general there is a growing attention of suppliers on the reuse of agro-industrial wastes rich in health plant ingredients. As described in the first part, currently up to 210 million tons of grapes are produced annually where 15% of the produced grapes addressed to the wine-making industry. This activity generates a large amount of solid waste (up to 30%, w/w of the material used) (see also part A, chapter 4.2).

2.3.2 Food industry

Functional food is one of the current trends in the food industry. Also the market for natural oils shows the same trend. The consumption of vegetable, high-quality food oils increased in the past years constantly, exactly as the consciousness for healthy and good nutrition increased. High-quality oils are ambassadors for healthy food far beyond national borders.

As a result the Slow Food Society is getting stronger. More and more people appreciate quality products and their enjoyment. They are also willing to pay more for these products. Here is a new consumer awareness evident, which is shown in the growth figures of high quality restaurants and in deli retail. Especially in this area regional top quality products are increasingly requested and processed (see also 4.1.1).

We expect that with special oils, reflecting high health value and extraordinary taste, higher spans compared to conventional products can be obtained. With the current product range we address a fastidious, health-conscious target group, whereby our products are settled in the Slow Food and Gourmet Food range.

For instance, our first product grape seed oil: It is a very healthy, natural vegetable oil and represents a group of dietary oils. With the chosen cold pressing method, all natural, precious ingredients (essential unsaturated fatty acids, antioxidants, vitamins) remain in the oil. Many different applications of this oil are known (see also part A, chapter 4.2 – Grape pomace).

2.3.3 Cosmetic and Wellness industry

All of our products are already used in the cosmetic and wellness industry. As an example we have already masseur as customers. They rely on the healthy effect of from massage institutes.

2.4 Mission Statement

The VoiGuat OG reflects the following **objectives:**

- ***Love the nature, being local and origin-related***
- ***Innovative upgrading of selected organic raw material***
- ***Integration of innovative process and product developments***
- ***Holistic point of view – Integration the earlier the better***
- ***Producing outstanding products***
- ***"Being fast, flexible and precise!"***
- ***"The more challenging, the better!"***

Guided by these objectives we developed our first process and product idea: We designed a partly integrated refining process, in order to minimize any negative effect of storage time, and can finally guarantee a premium quality of the end product. This approach and process design is unique on the market.

We design and engineer the process and the main components by ourselves. We also do the necessary pretests, prototyping etc. independently. For this we are good positioned with two chemical engineers with extensive experience in the paper industry and the mechanical engineering field. Working independently, minimizes also the budget input for any production facility. E.g. for the grape seed oil, purchasing the machines on the market would cost us 10 times more, than doing all the process development, design and engineering by our own (12.000,- vs. 120.000,- EUR). Of course our focus is on economically easy processes.

We also focus on test sales of our products, through our sales channels via our own internet shop (www.voiguat.at) / present boxes for companies (combination of our own products and the products from the contracted producers of the residues) / high quality gastronomy. An expansion towards the organic cosmetic and health industry is a desired scenario. In general we are interested in establishing a B2B business. Test sales should give us a feedback from potential end customers.

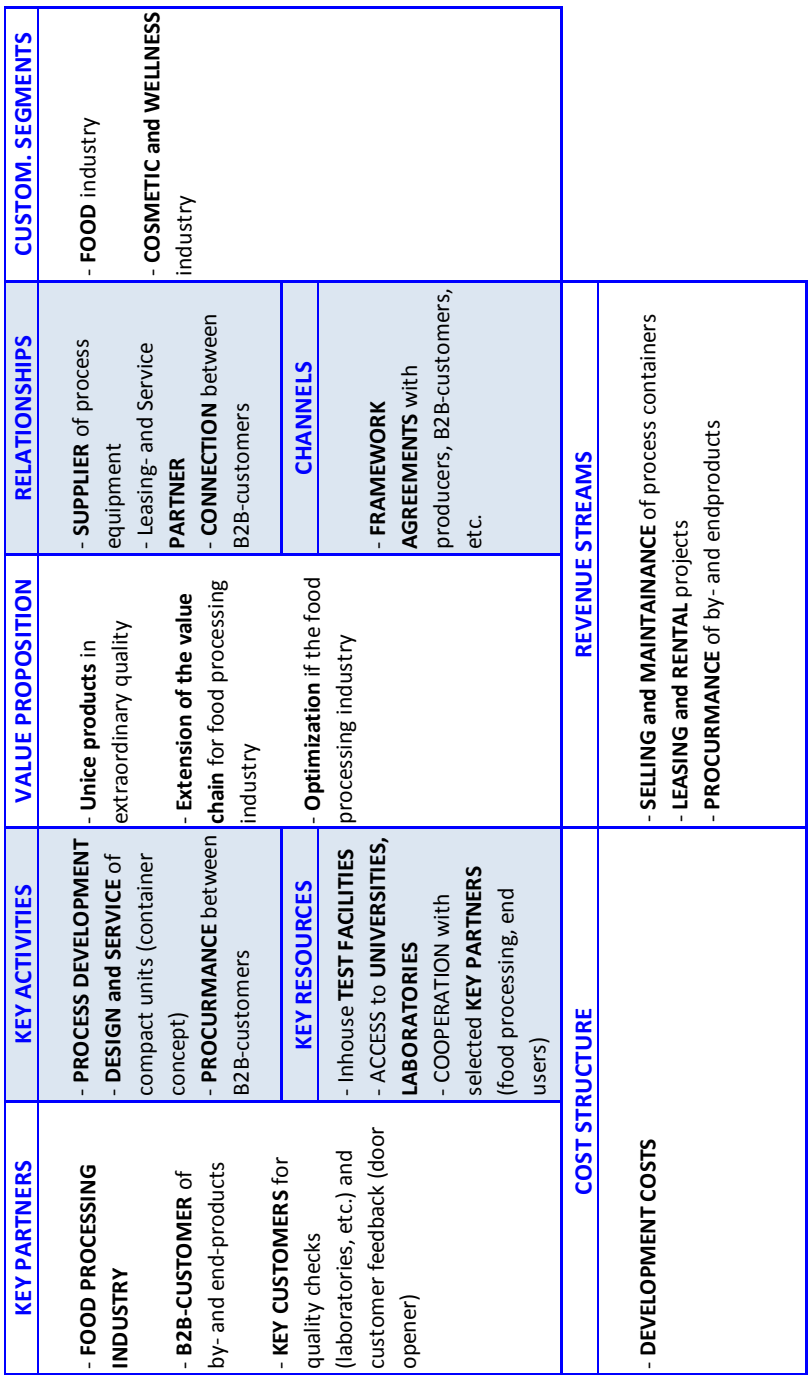
Different ways in order to diversify our product portfolio are possible and necessary in order to maximize the added value for our clients. E.g. the pressing residues from processing the grape seed oil could be used as another raw material for different products in the consumer industry (chocolate, pasta, bread, ..). Or the oil itself is used as raw material for cosmetic and health products.

In terms of additional residues we are also looking for exotic fruits and residues where the refining process is challenging. Beside the local approach we also would like to use our international connections to Brazil, Finland and New Zealand, where each of the shareholders has family. On the long run we could also imagine to license our processes globally.

2.5 Business Model

The principle business model is summarized in the following business model canvas (**Table 4**).

Table 4: Business model canvas VoiGuat OG



3 Technology Plan

3.1 Description of the Technology

The VoiGuat OG based its technological success around process improvements within established industries. Many of the basic principles are borne from a different point of view, where the need of simplifying certain process steps is seen from the outside. It is not about developing certain single process steps, it is about implementing and adopting established processes within different industries.

3.1.1 Innovation

The food processing industry is a conservative, "old fashioned" industry. Many of the established process steps, especially at the beginning of the whole value chain, where the harvested fruits are prepared, pressed and further processed, are optimized with the focus on having the most efficient single process steps. The focus is rather in specialization than in optimization of the overall process chain or any further end or intermediate products. Therefore specialized companies were established. As a result, the number of battery limit increased with higher intermediate quality requirements at each battery limit. Especially in the food industry this can lead to negative effects on the overall quality, where processing time is a crucial factor. One of the guiding questions in this perspective is the question regarding the most efficient overall process: "Which steps can be canceled or erased in general?"

Also new possible intermediate products are not in the focus of any process design process. In the last decade a huge research effort regarding the extraction of different wine processing byproducts was established. What is missing so far is a holistic point of view, where the focus is set on an optimized overall process chain, with involvement of final product quality, environmental protection and additional innovative by-products. This could mean, that new single process steps will be established in order to eliminate unnecessary, energy consuming battery limits. This also means that internal unused energy resources could be implemented into the overall process chain.

Innovation was the primary driving force for **our first product** and will be also our success factor for all further products and processes. We develop all process chains in self-direction and can rely on extensive experience in the area of process engineering and development in the environmental and in the pulp and paper industry (see resume A. Gruber-Waltl, M. Kramer). Another benefit based on the various industries, where our professional experience comes from, brings a refreshing "out of the box" view into the food processing industry. It helps us also to introduce new technologies into conservative industries like the food processing industry.

In addition we cooperate with universities in order to test and optimize new technologies in the lab (see **Figure 17**)

Figure 17: Pictures from laboratory test at the University of Leoben with different raw material (2013)

3.1.2 Process development

Our approach to any process development is a stepwise approach. The first step is to **proof the concept**, where each single step of a new process chain has to be proven and optimized. Therefore it is necessary to focus on the crucial design factors. Factors that influence the quality of each intermediate step most. For instance for the wine processing industry we developed and optimized each single process steps over the first two years (see **Figure 18**) individually.

2011: first trail run – proof of concept	2013: final design
	
	

Figure 18: First version of sieve drum (2011) and final version (2012)

After optimizing with the focus on the crucial design factors and introducing new technologies we combine the whole concept into **one single process chain**.

With this approach we could optimize the total output and reduced the overall process time from 3 days to 10 hours. Another important issue is to introduce and proof the applicability of **proven technologies, which are new for this industry**. For instance in the vine processing industry we introduced a centrifuging technology at the end of the whole process chain. With this technology we were able to separate negative particulate matter from the oil before filling it into bottles. Usually this was done by sedimentation, a time consuming and quality critical approach (**Figure 19**).

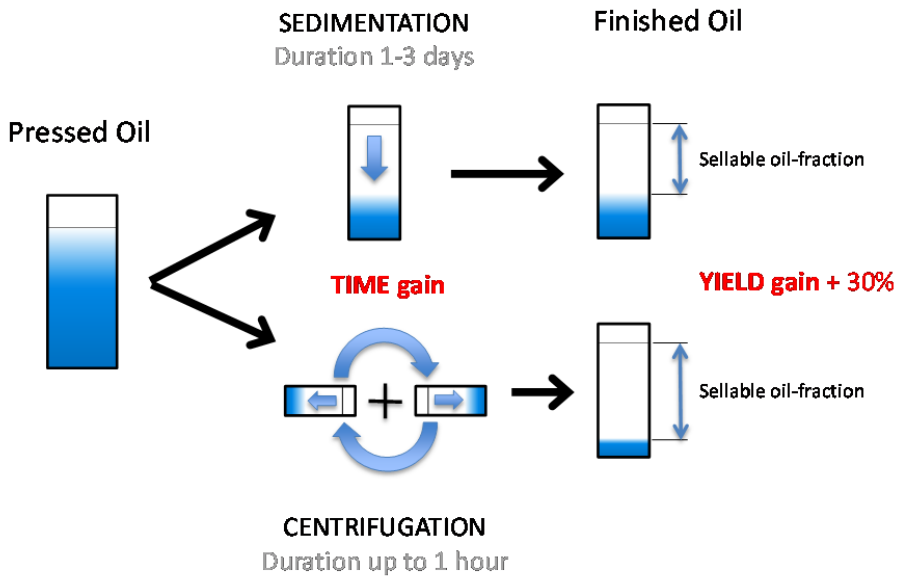


Figure 19: Comparison oil finishing technology – conventional sedimentation vs. centrifuge

In addition to saving time, we could increase the yield by 30% and assure a constant quality by introducing an established technology from a different industry. Also here we did some principle tests in a water treatment laboratory (proof of concept) before we selected a suitable technology.

Another key factor is the ongoing **quality check**, where we cooperate with independent, accredited laboratories. For vegetable oils, one of the key quality factors is the sum and type of negative ingredients, which can be analyzed in the oil. Especially pesticides have to be in the focus before you can release any product to the stores. Some grocery chains have here their own limits and except only a minimum amount of defined pesticides. Any new fraction, which we produce, is therefore analyzed in detail. With this approach we could also localize the exact harvesting area of the processed grapes. By analyzing the final product, any unsuitable fertilizer was identified and finally the fertilizing plan for the farmers was optimized.

In addition to the described process development for the processing of grape pomace we currently experiment with other residue fractions from the fruit and berry juice production. First tests are already done (see also **Figure 17**), and first promising processing concepts are developed. Before establishing any of these developments we will also check on the possibility of protecting the process and detail findings. Here securing the **intellectual properties** are aspired.

After proofing the concept, we turned our focus on **multiplying the whole process**. Therefore an optimization of each single process step into scalable steps is another key issue for our goal. Our goal on the long run is to establish a multipliable process concept. For the vine processing industry we are thinking about a container concept with the focus on easy handling and reduced operation

and installation costs (**Figure 20**). This container concept should be easily intergraded and adapted to any wine processing industry. Therefor several expansion stages are possible.

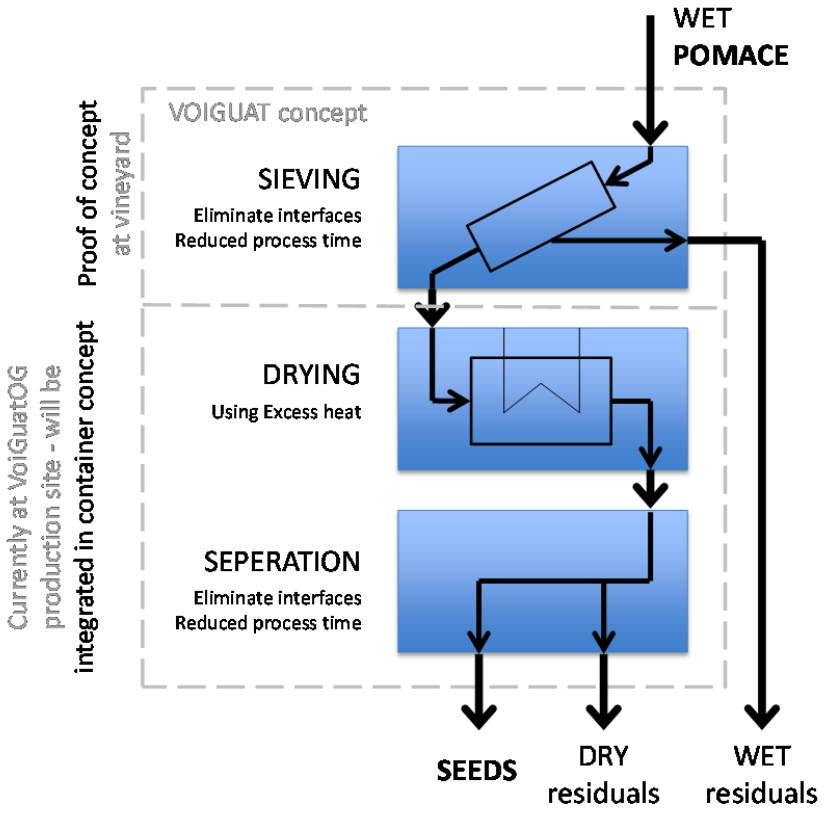


Figure 20: Principle model of a multipliable container concept

It might also be possible to combine several winemakers within a harvesting period by moving the containers from one vineyard to another.

In the future we will also shift our focus on **raw material from organic sources**. With these sources we can eliminate a huge group of pesticides up front. This is also a strong argument by selecting possible partner companies for the installation of our reference plants. In Styria we have here an excellent supply base and the growing rate in the organic food sector is promising.

In general a **holistic approach** is for us a crucial success factor in order to design and offer new processes with an incomparable economical approach. Thereby we differ fundamentally from different specialist companies, which care only about the treatment of the delivered products. In most of the cases this happens independently from the previous processes and results in increased storage and transport expenses and other unnecessary interfaces. We assume that we can expand our product range by another innovative product in the near future.

3.1.3 Product development

As described before, our main competence is the process development. In addition we also follow new product ideas. We also assess product introductions to new industries. Our focus lies on expanding and maximizing the overall value chain together with our partner companies.

In the case of the grape seed oil, we tested several usages of the press residuals. For instance the press cake found some applications in the cosmetic industry like crèmes, peelings and shampoos. Up to now we didn't elaborate on this issue any further.

We also could increase the value of the pomace itself by extracting the seeds directly at the vineyards. The processed, seedless pomace is a good feedstock for existing bio gasification facilities. Unprocessed pomace with seeds showed several operation problems because of clogging and rust plugging over time.

Some of the byproducts or even processed raw material as described before are new to the vineyards. The excess to the market therefore is a big topic, therefore we see our self also as a **facilitator between different industries.**

3.2 Technology Comparison

The VoiGuat OG currently combines two established industries around the processing of residual waste within the farming industry. On the one hand there exist a few residual waste refineries, which are specialized in mechanical separation of specific waste fractions. On the other hand there are oil refineries, which buy the processed raw material for instance for vegetable oil and produce different oils.

Both industries have to process a certain quantity of material in order to be successful. In our case we go the different direction. Parts of the whole process chain are implemented directly at the producer of the residual waste (see Figure 13). With this approach we see several advantages. Especially for the producer the revenue, the quality and also the environmental footprint on interesting byproducts will be improved. For instance the whole value chain, depending on the producers' individual goals and needs can be extended.

Table 5 shows a comparison between typical residual waste refineries with our approach from the perspective of a vineyard.

Table 5: Comparison of residual waste refinery with Voiguat OG concept

		RESIDUAL WASTE REFINERY		VOIGUAT CONCEPT	
	Pt.	**PRO**	**CON**	**PRO**	**CON**
REVENUE	1	no additional tasks for the vineyard necessary			additional tasks for the vineyard necessary (intermediate product handling, cleaning,...) **>> COMPACT UNITS**
REVENUE	2	vineyard must not deal with the disposal of the processed pomace			the residuals from the processed pomace have to be disposed or an additional user has to be found **>> COMPACT UNITS**
REVENUE	3		the waste refinery needs a certain amount within a short time (truck load)		certain throughput is necessary in order to make an investment worth **>> LEASING CONCEPT, >> COOPERATION**
REVENUE	4		3 stakeholders (vineyard, waste and oil refinery) instead of 2 are involved	2 stakeholders (vineyard and oil refinery) > overall costs and costs on endproduct are optimized	
QUALITY	5		"oversizing" of battery limits	no "oversized" single battery limit between the process steps	
QUALITY	6			first crucial step is located directly at the producer	
QUALITY	7		no differenciation between different grapes is possible	vineyard can decide which specific grape should be processed	
QUALITY	8		vineyard has no influence on quality of end product	vineyard can directly influence the used raw material	
ECOLOGY	9		seperate transport from vineyard to processing company needed > quality disadvantage	no additional, quality reducing transport effort necessary	
ECOLOGY	10			possibility to integrate excess heat	

Point 1: Usually the residual waste refinery provides a truck for the pomace which will be processed for the oil refineries. For this task the waste refinery takes care of the handling of the

pomace. In general the vineyard itself disposes the pomace also by trucks. In our case, additional equipment will be permanently onsite. If pomace is processed with our equipment, then additional workload for cleaning and handling the in and output stream is necessary. If no pomace is processed for further processing, then our equipment will be bypassed.

Point 2: In cases, when pomace is taken by the residual waste refinery, the vineyard has the additional benefit, that no pomace has to be disposed. For big vineyards the disposal can be a big issue because of the huge amount of processed grapes. In worst cases not only the transport of the residuals has to be calculated. I our case the handling of the different fractions can mean an additional work load for the vineyard. For the first demonstration plants we took care of this issue by ourself. In this case we immediately took the seeds after filtering out of the pomace and transferred it to the next step. Therefore no time was wasted.

Point 3: Up to now at our demonstration plants the vineyards had no additional investment costs to consider. Further on we would sell or lease the necessary equipment to the vineyards. In order to argument these costs a certain amount of throughput is necessary. On the other hand the waste refineries will also expect a certain amount of pomace within a short time.

Point 4: With our concept we see a benefit of less stakeholders involved within the whole processing chain - from the pomace to the final product. More stakeholders mean higher end prices or less benefits for each one. It also means a higher processing effort and finally quality loss based on more battery limits between each stakeholder.

Point 5: The more battery limits are involved, the more the quality of the end product can suffer. In order to guarantee a minimum quality of the end-product, or even of the intermediate or by-products from one stakeholder to the next, the quality guarantees tend to be “oversized”. As a result the effort to reach a certain quality standard is high.

Point 6: At this point our concept has a clear advantage. As described before, we save crucial processing time by implementing the first important step directly at the vineyard. The cores are separated before any oxidizing or other quality degradation can occur.

Point 7: Vineyards process different grapes from different locations or vine types. Especially the medium sized vineyards (appr. 100 ha of cultivated area) have to switch very fast between each different wine source. With the conventional refinery concept the different charges cannot be separated. With the VoiGuat concept, the vineyard can decide independently when it makes sense to process separately and when it is fine to combine different charges.

Point 8: As described in point 7, the vineyard has no influence on the processed pomace. As the whole process chain is outsourced, there is no possibility to influence the final product quality by the vineyard. With our concept, it is mainly within the responsibility of the vineyard to choose any

fraction of pomace which the want to process. Good raw material can be taken, bad material will be ignored.

Point 9: With the conventional processing concept, some of the critical factors, for instance the processing time from the vineyard to the refineries cannot really be influenced. The extra time of the unprocessed pomace is critical, because it is further sensitive to any negative quality impacts.

Point 10: For the final extension stage we will implement more single steps directly and concentrate mainly the uncritical steps outside of the vineyard. Our plan is to integrate also the drying process directly at the vineyard. With this approach we could use available excess heat and save energy.

Based on this analysis we derived the following **final concept**, where we see several USP's compared to conventional existing refineries:

- Development of **compact processing units,** which are easy to operate and handle. They should be easily adopted, combined and equipped for different sizes and sources; The producers e.g. vineyards would have to deal mainly with a minimum of additional work load; all the transfer tasks from one battery limit to the next and the additional process steps would be organized by the VoiGuat OG;
- These compact units should be pre **mounted on skids** in order to move it easily between the vineyards. Therefore the vineyards could process mainly the amount of pomace which they want to in order to get their original oil. They would extend their whole value chain by gaining a high valuable product out of pomace which is usually seen as waste.
- The compact units could be **bought** (by leasing or capital investment) **or** event **rented by the producers** over time. This would give us the benefit to use certain units also in different industries like the fruit and berry industry etc. Therefore the whole processing period could be extended throughout the year.
- We could also imagine transferring our best practice concept into a **cooperation concept** where we organize the order of the by-products for different industries, oil refineries etc. Therefore **some key tasks would remain** within the responsibility of VoiGuat OG. For instance the quality checks or even the production of oil as long the total amount does not extend our possibilities of the test facilities, could be done by us.

3.3 Commercialization Requirements

VoiGuat OG sees the following commercialization requirements, as mandatory considerations in order to transfer the initial process idea into a commercial successful business.

Technological Requirement:

- Multipliable concept > container concept
- Multi-usable concept in order to process other interesting agricultural residue fractions (berries pomace, hard shell fruits, etc.) in order to extend into different industries in general, but also to expand the operation time throughout the year
- The design should be easy to adopt, integrate and handle in order to avoid extensive higher workload for the producers
- Integration of available excess energy (process heat etc.), in order to reduce the environmental food print of the overall process

Strategic requirements:

- Long term cooperation with selected raw material suppliers (producers) in order to set up a base of partnership with guaranteed access to high quality sources and reputation (gate opener, promotion,…)
    - By taking care of the product streams (by-products, waste streams) and operating as a facilitator between different industries
    - Organizing the smooth operation and preparation before the harvesting period starts
- Long term binding with existing specialized processing and end consumers in order to minimize external costs for producers;
    - Combining the available amounts of intermediate products from different producers
    - Guaranteeing a consistent quality of the intermediate products
- Cooperation with small equipment producers
    - VoiGuot OG does the design and detail engineering of the process equipment;
    - the production will be done by selected equipment producers;
- Cooperation with selected end users like high quality restaurants, small producers of cosmetics and wellness products
    - These cooperations would help to promote the produced end products
    - although VoiGuat OG is not interested in the B2C business

4 Description of Industry

4.1 Future Outlooks and Trends

The participated industry shows promising growth potential in the mid and long term perspective. Especially the food and cosmetic industry reflects this trend, especially in the high quality and bio dominated sectors. These are the main sectors, where we plan to operate with different stakeholders.

4.1.1 Food Industry

Our goal is to establish our products and services within the high quality segment, reflecting the current trend of this sector. For us a clear goal is to focus to the bio sector. The bio-food sector shows almost constant growth rates within the food sector (**Figure 21**). According to these figures, in 2015 Germany invested 11,1 % more into bio-food as in the year before.

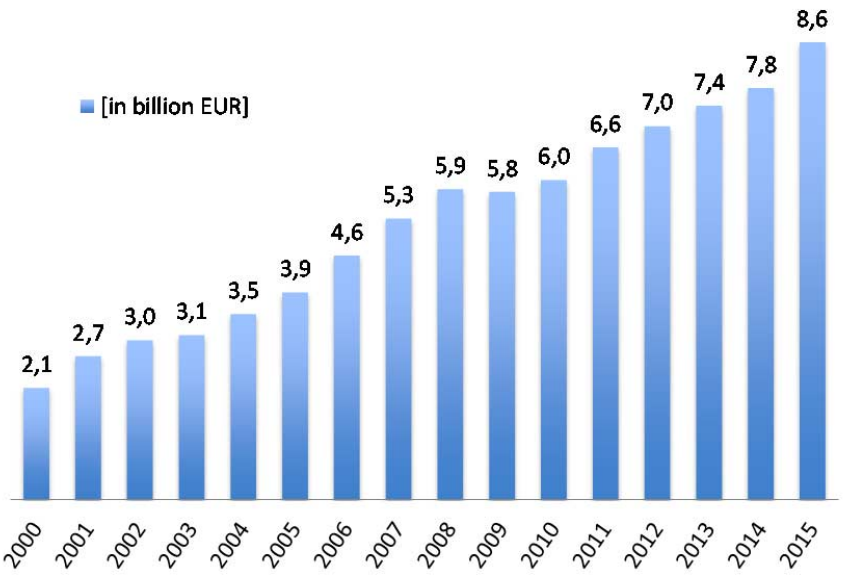


Figure 21: Revenue form bio-food sector in Germany [BOELW, 2016]

Although the figures for edible oils in general show moderate development potential (see **Table 6**), the BOELW study [BOELW, 2016] prognoses a growth rate for bio edible oil of over 20%.

Table 6: Year-on-year Market size growth, based on revenue (source: Euromonitor Int.[1])

	2011-12	2012-13	2013-14	2014-15	2015-16
Austria	3,8%	4,1%	4,3%	4,0%	4,0%
Germany	2,5%	2,4%	0,7%	0,9%	-0,1%

A current Nestle study [Nestle 2012, 2016] summarizes current and future food trends of customer behavior in Germany. The main target customers for VoiGuat OG products, regarding to the Nestle study, are three out of seven defined individual target groups:

a) The "Health Idealists" which represent 12.1% of the population are
   - Mothers of all ages whereas the majority are academics;
   - are willing to pay more for **quality food**;

b) The "Nest Warmer" representing 15.8% of the population
   - Have children in most of the cases and are well off.
   - Focus on a **fresh and balanced diet**; quality is worth a **higher price**; they are passionate cooks;
   - To assure an excellent quality, nest warmer ask for the **origin of the purchased food**.

c) The "Modern Multi Optional", 19.6% of the population
   - Men and women between 20 and 50 years. They are usually better educated and hold a good position.
   - What they cannot fit into a working week will be rescheduled and celebrated on weekends. They enjoy a balanced diet consisting of **fresh ingredients and organic products**; they also enjoy cooking and **socializing** with family and friends;

In summary the following attributes were found to be important for our target customers:

- High standard on the quality and taste to assure a healthy diet is more important than the price;
- Transparency at the origin of the product – local products are preferred;
- Sustainability of the product;

[1] http://www.euromonitor.com/, accessed through the WU Executive Academy library network

A study in Austria showed a similar picture (see **Figure 22**):

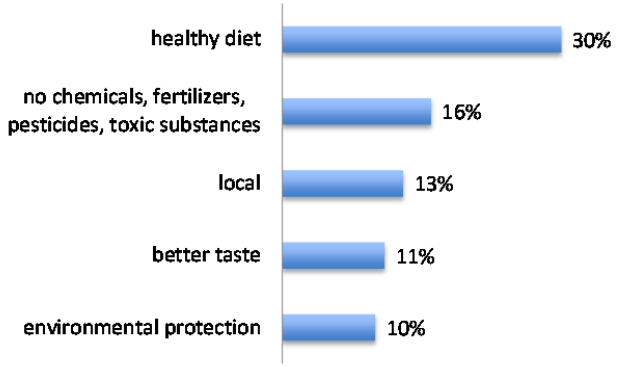


Figure 22: Motivation for buying bio products in Austria (source: AMA Marketing, 2015[2])

4.1.2 Cosmetic / Wellness Industry

Also in this segment natural cosmetics show the highest growth rates. According to a study conducted in 2009 [], the natural cosmetics in Germany saw a yearly growth rate of 15% with a market share of 5%. It was also found, that natural cosmetics have the highest market share in the segment of body and hand care products, which are seen as basic cosmetic products.

Over the past few years, controlled natural cosmetics have been able to expand their market share to around 8%. The market research institute "Information Resources IRI in Düsseldorf (GER) found a sales volume for controlled natural cosmetics at around EUR 920 million in 2013.

Overall, Europe holds well a fifth of the global natural cosmetics market, which according to Kline & Company Market Research, Parsippany, New Jersey (USA), is more than 13 billion US dollar sales. In addition to the German market of EUR 920 million (2013), France is an important sales market with an estimated EUR 400 million (2013) and Italy with an estimated EUR 410 million (2014).

[2] http://www.amaexport.at/en/ama-marketing.html

5 Marketing Plan

5.1 Market Segment

As described in the chapters before the VoiGuat OG will operate within the market sector of food processing industry and the connected sales activities.

The VoiGuat OG is interested in establishing a **B2B network** between individual partners. Within the **food processing industry** we will seek cooperation directly with producers like vineyards, juice producers, where we like to establish our process developments. We will also establish a partnership network with the **specialized industry** in order to establish and coordinate clusters, where existing and new by-products will be used further (see also **Figure 23**). Here we see ourselves as a networker between the producers and B2B partners in order to open new distribution channels for the by-products from the producers.

Finally we will seek B2B collaboration with the **food and cosmetic industry**. Here we plan to offer intermediate but also final products.

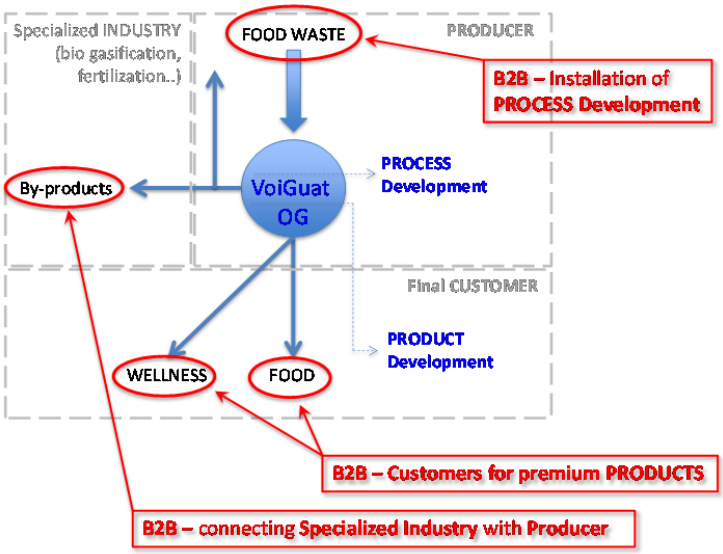


Figure 23: Overview distribution strategy VoiGuat OG

According to the international established industry coding system, therefore our main business areas are classified within the following codes:

1) **Food processing industry:**
   - **ONace Code:** Primary code: C10410 - Herstellung von Ölen und Fetten (ohne Margarine u. ä. Nahrungsfette)

- **NAICS 2012 Code:** Core Code: 3112 - Grain and Oilseed milling / Primary code: 311224 - Soybean and other Oilseed Processing
- **US SIC Code:** Core Code: 207 – Fats and Oils / Primary code: 2076 – Vegetable Oil Mills, except Corn, Cottonseed and Soybean

2) General sales activities within the food and cosmetic / wellness industry:

- **ONace Code:** Primary code: G47290 – Sonstiger Einzelhandel mit Nahrungs- und Genussmitteln
- **NAICS 2012 Code:** Core Code: 4452 – Specialty Food Stores / Primary code: 445299 – All Other Specialty Food Stores
- **US SIC Code:** Core Code: 549 – Miscellaneous Food Stores / Primary code: 5499 – Miscellaneous Food Stores

Both businesses are not restricted in Austria.

5.2 Pricing

Detailed calculations about the pricing of our current end product, the grape seed oil, are found in the appendix 1A1).

The **price calculation of the end products** is based on the commercial available price for high quality oils in this sector.

The net costs of our current production are shown for 2013. In the following year, besides making the production more efficient, we could also improve our sales efficiency. As a result the net costs per sales could be reduced from 42 % COGS/sales down to 33% in the following year. Here we see further potential by developing and focusing B2B sales in the future.

The **price calculation for process implementation** has to be done case by case. Based on the experience from our demonstration facilities, we expect single unit prices of 15.000,- EUR for the producers. Considering a medium size vineyard (appr. 100ha cultivated area), where the lower amount of produced oil will be 300l, an amortization period of 4 years can be expected. Co benefits by selling the by products are not considered in this estimation. Precondition for this consideration are optimized process units which are based on our experience from the demonstration facilities.

In addition, different financing methods are possible. For instance single processing units could be leased out to small producers. So no final investment

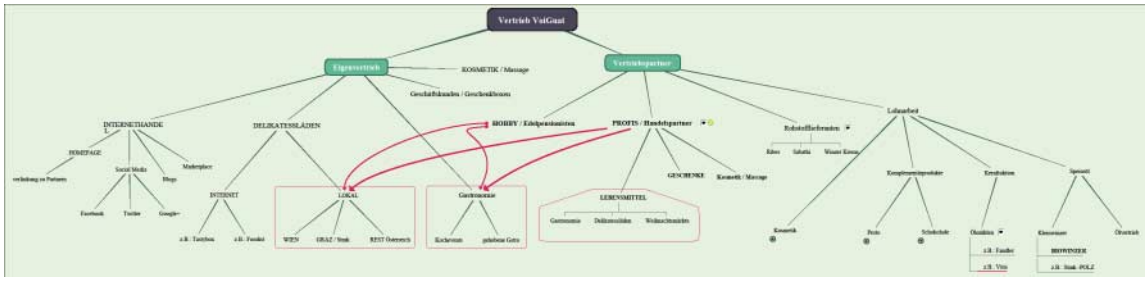
5.3 Distribution

For analyzing and focusing on the relevant distribution channels, we asked for additional help from sales specialists. As a startup business, we needed to find cost saving help and therefore came

across the ASEP[3] (Austrian Senior Experts Pool) organization. ASEP is an organization, where retired specialists offer focused support within different disciplines. In our case we requested sales and promotion support from two specialists. Within the first workshop (see **Figure 24**) we analyzed, based on the identified needs of the end customers and our direct customers, the most promising distribution channels.

Figure 24: Picture from first ASEP workshop (01/2013)

After analyzing the possible options (see **Figure 25**) we decided to focus on sales cooperation in the first place and to target selected key customers directly. With key costumers we hoped to find door openers, where we could promote our products and show them to selected users.



[3] http://www.asep.at/

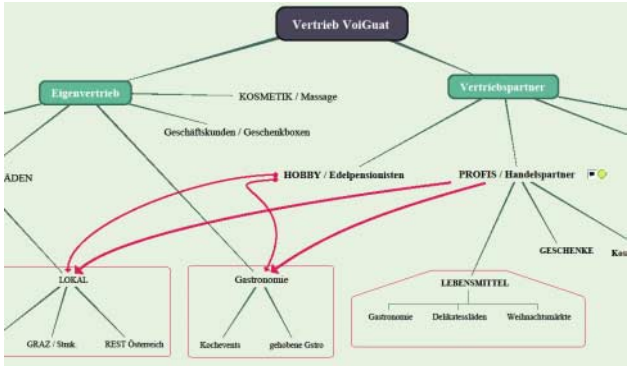


Figure 25: Summary of possible distribution channels identified during first ASEP workshop

After two years of sales experience the following main customers were identified (see also **Figure 26**):

- **Vineyards** – the vineyards we cooperated with were found to be the best sellers for our first product, the grape seed oil; most of the medium size or big vineyards have established a wine tasting area, where they promote also related products in addition to their own wines; Some of the bigger vineyards have established even theme parks, where they see a high customer frequency – for instance Winzerkrems[4], one of our cooperation partners, sees 30.000 tasting customers per year;
- **Large customers** – direct sales to large sales partners; here we could get some promising feedback from existing sales partners of our vineyards in cooperation;
- **DELI's** – here we got the feedback from local and online deli markets; especially the online market has, as shown before a big potential to grow;
- Promotion – of course we had to invest in several promotion activities; here we tried out different gift giveaways at special local economy events or oil tasting events with our premium customers;
- **Premium Customers** – in order to promote our end products we also sought cooperation partnerships with premium costumers; these selected customers like high end restaurants or local deli shops were door openers for further cooperation;
- **Gift boxes** – gift boxes, where we combined our products with the corresponding wine products or other high quality deli products were a great base sale for the first two years; in the future we want to put the financial effort and physical resources into other sales channels;
- **Direct sales** – is a sales channel, which we followed also at the beginning (sales over homepage, farmers markets); we abandoned these activities and will focus on our B2B network in the future;

[4] http://www.winzerkrems.at/en/

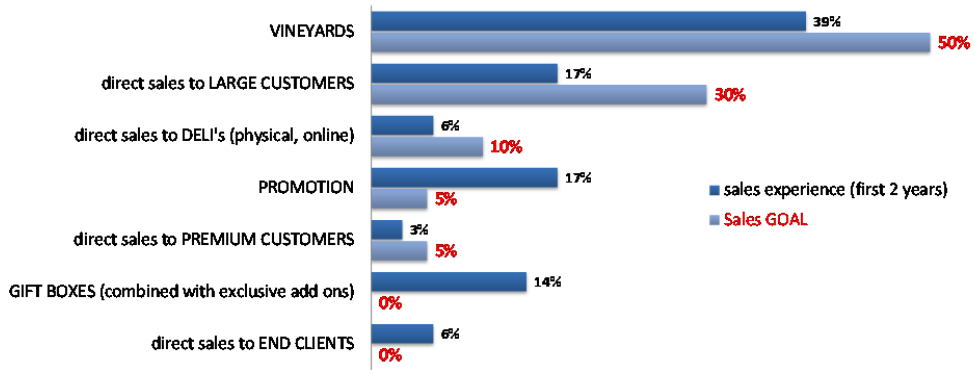


Figure 26: Customer profile out of experience (first 2 years) and the GOAL for future activities

Based on this customer profile we derived an ambitious sales plan, where we plan to focus on 5 out of the 7 described main customers (see

Table 7). The red labeled sale GOALS in **Figure 26** are our target customers for the coming years. We plan to setup a sales network in order to fulfill these goals, where we see the best growth potential for our business.

Table 7: Conclusions and future activities for the targeted customer profile

customers	sales experience [%]	sales goal [%]	conclusion out of sales experience	derived sale activities
VINEYARDS	38,9%	50%	showed to be the largest customers with additional potential, especially at big vineyards, where vine degusting is part of the business	cooperation contracts; a certain amount of processed oil will be part of the cooperation in order to sell under the VoiGuat label for promotion
direct sales to LARGE CUSTOMERS	16,7%	30%	especielly in the online business has a high potentiol to multiply the business	here we see two different ways to approach this topic: - the vineyards will try to use their existing sales network - we could directly sell oil from our contracted vineyards under VoiGuat
direct sales to DELI's (physical, online)	5,6%	10%	goes along wiht the large customers, also here we expect the online business as our main business for the future	see activities - LARGE CUSTOMERS
PROMOTION	16,7%	5%	reflects the first two years of sales activities; goal is to bring it below 10%	idle would be a combination with our premium customers - e.g. tasting or cooking event, promoted by a premium customer
direct sales to PREMIUM CUSTOMERS	2,8%	5%	these premium customers are DOOR OPENERS and promoters for the current and future products	the current connections will be intensified, direct contact to these premium customers are crucial
GIFT BOXES (combined with exclusive add ons)	13,9%	0%	was a good business for the first years of operation, the handling is too time consuming and will not be followed in the future	
direct sales to END CLIENTS	5,6%	0%	not included in our business model for the future	

Beside the end customer oriented distribution channels we will need to develop a B2B network in order to push the **implementation of our process development**. The first selected cooperation partners might act as promoters and door openers in different industries. As a next step we would

need to address cooperation partners and special industries at the same time. The focus on the described small, flexible units is the key in order to multiply this business idea.

5.4 Promotion

Based on our targeted customers we focus on the following promotion channels:

- **Professional Homepage**, in order to have a connection base for any interested customers
- Special Events for our **business partners**
- For the targeted **end consumers** we organized information material and participated tasting events

As a first step to show a professional appearance we developed a corporate design. The design should underline our professional background and approach to process and product developments in the wider range of food processing industry.

5.4.1 Homepage

The homepage (see **Figure 27**) was established as a connecting point and as a base for basic information about our products and services which we offer. Based on the targeted customer profile a direct selling of end products through the homepage was cancelled.

Figure 27: Impressions of homepage VoiGuat OG[5]

[5] http://www.voiguat.at/

5.4.2 Business Partners

As a first step we will address potential cooperation partners directly in order to implement our process developments. In addition we will focus on special events, where we can also promote the end and by-products which we produce through our process implementations. Further on publications in specialized journals will be helpful add-ons.

5.4.3 End customers

Beside the distribution channel from our partners, we use different channels to reach the end users in order to promote the end and by-products. Preferably we do this in connection with our key customers and partners which act here as multipliers to get the most attention. What we did so fur was:

- Organizing information material in order to promote the health benefits and to give additional usage ideas
- Organizing tasting events together with key partners like top restaurants, cooks etc.
- Organizing giveaways for selected events
- Participating tasting events in order to promote awarded products (see also **Figure 14**)
- Through the internet there are several possibilities which we use to reach final customers (food blogs, online sellers, …)

Figure 28 shows some examples of information material which we organized fro promoting our end consumer engagement.

Figure 28: Examples of folders, invitations, information material VoiGuat OG

6 Financial Plan

6.1 Pro Forma Income Statement

Details about the Pro Forma Income Statement can be found in the **appendix**.

Within this Income Statement we consider two different scenarios. In the first scenario[6] we focus on the sales of the end and by-products. The implementation of our process ideas is driven mainly on the market share which we can reach with the end products primarily sold under our own brand. The idea was to develop our brand to a well-known marked participant, associated with high quality products.

In the second scenario we develop in parallel a second business area, where we push our process developments and try to multiply this part of our business. The distribution to the end customers should be done mainly by partners preferential under their own brand. In addition we see here a potential to lower the costs per product unit, which is reflected under the year 2015-NEW.

The first scenario was our initial business direction. Now we focus on the second scenario, where we see better chances in order to succeed with our business idea (see **Figure 29**). The first changes are considered to be taken in 2015:

- Additional investments in Q1 and Q2 reflect the necessary financial input for finalizing the described compact process units
- A cheaper production price of the offered oil products was considered.

For both scenarios, the sales of the end and by-products will be based on the described customer profile (see part B, 5.3)

[6] Scenario 1 reflects our experience from the first three years of operation. A change in strategy was not taken so far. With Scenario 2 an alternative, promising approach is described. The hypothetic year of change is mentioned as 20015-NEW in the Appendix.

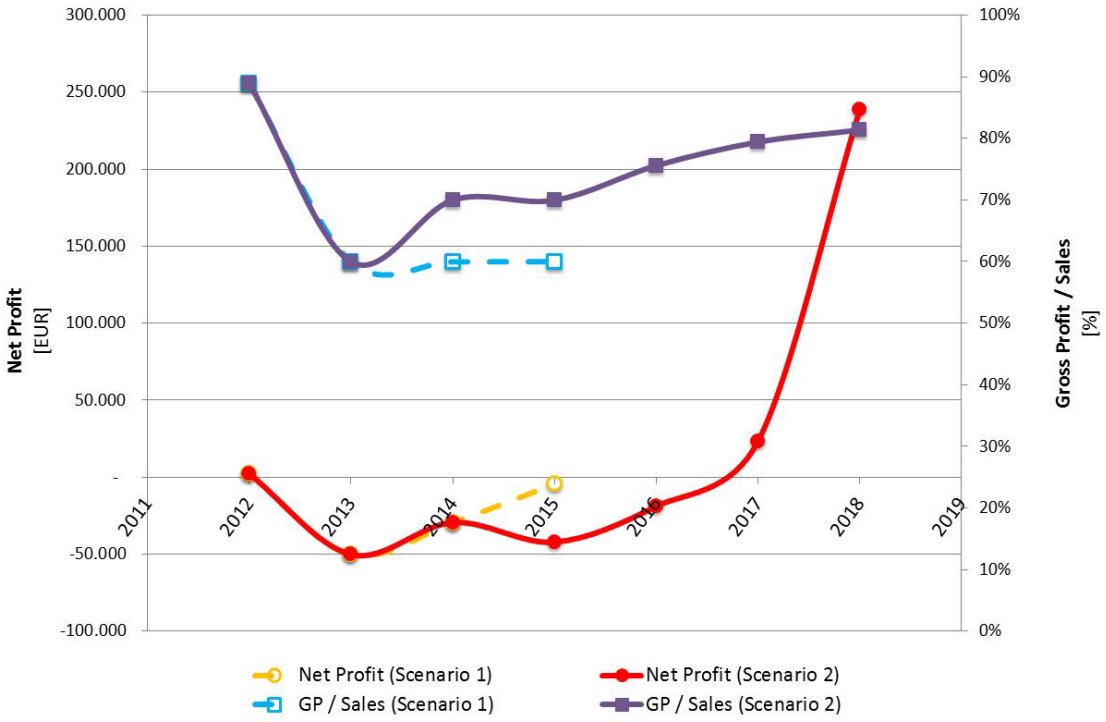


Figure 29: Graph - Net Profit and Gross Profit / Sales

6.2 Pro Forma Cash Flow Statements

Details about the Pro Cash Flow Statements can be found in the **appendix**.

The cash flow for our startup business was only adjusted by two national funding within the first two years. In May 2013 we could fix a startup loan which helped us to operate through the first two years. This loan has to be paid back within the following three years. In addition we received a funding for our prototypes in Q2/2014.

The cash flow shows a big fluctuation throughout a business year (see **Figure 30**). This is based on the type of industry, where the primary financial input happens in the fall, which is the main harvesting time for vineyards. We will compensate this issue by two strategies. First, we are interested in extending our process development into different industries like the juice processing industry, where different harvesting periods are common. Second, we want to focus on the sales of the described small compact process units. This will help us to maintain our cash flow throughout the year.

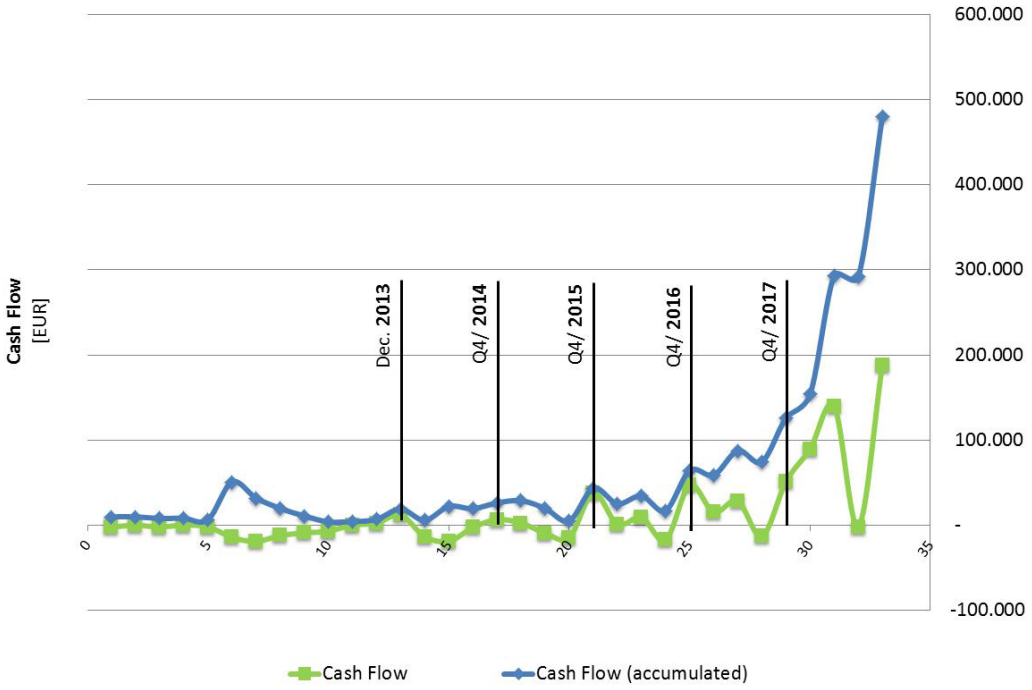


Figure 30: Cash Flow through the first operating years

The overall positive development of the cash flow at the end of the considered period in 2018 reflects already the two described strategies. **Figure 31** compares the two scenarios, which are described in chapter 6.1.

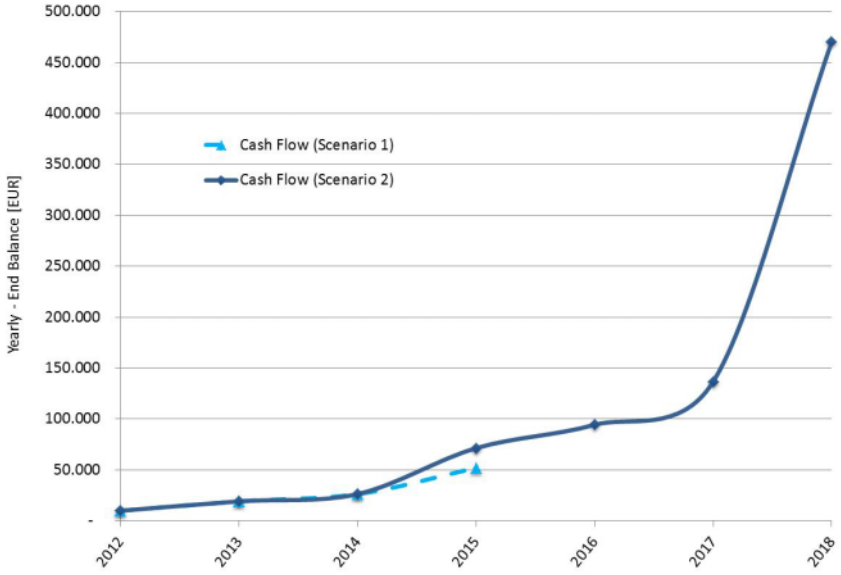


Figure 31: End of the Year - Balanced Cash Flow

7 Organization Plan

7.1 Form of Ownership

For the beginning of the operation an ownership with equal partnership of the three founders was chosen. Within this organization all three partners have unlimited liability with a little amount of initial capital input necessary. Now a change, also because of a need of external founding, will be necessary. This topic needs further investigation and is not part of this thesis.

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Appendix

A1) Pricing calculations

Table 8: Net price Calculation, exemplarily for 2013

total costs	based on production	based on available amount
total costs / Liter	**€ 14,74**	**€ 18,43**
labor costs / Liter	€ -	€ -
total costs / bottle 100 ml	**€ 3,92**	**€ 4,29**
labor costs / 100 ml	€ 1,33	€ 1,33
total costs / bottle 250 ml	**€ 6,13**	**€ 7,05**
labor costs / 250 ml	€ 1,33	€ 1,33
costs / bottle 500 ml	€ 9,82	€ 11,66
costs / bottle 1000 ml	€ 17,19	€ 20,87

Input parameter	
harvesting days	15
grapes [t] / day	35
oil [l] / tons grapes	1,2
Stundenlohn	€ 20

results	
oil [l] / days pressed for seeds	42
oil Liter / year	**630**
promotion, lost	20%
available amount of oil	504

Investitionskosten	
investment total	€ 50.000
AFA / year	€ 5.000
AFA / Liter	**€ 7,94**

fixed costs	
fixed costs farm	€ 1.000
fixed costs / Liter	**€ 1,59**

seed processing	
Sieving [h] / day	1,5
Transport [h] / day	1,5
labor drying [h] / day	3
labor packing, storage [h] / day	2
labor seeds [h]	8
labor costs / day	€ 160
labor costs / prod. Liter	**€ 3,81**
transport costs	€ 2.000,00
transport costs / day	€ 133,33
transport costs / prod.Liter	**€ 3,17**
drying costs	€ 787,50
drying costs / day	€ 52,50
drying costs / prod.Liter	**€ 1,25**
procurement costs / prod.Liter	**€ 8,23**

pressing		
duration / l [min]	60	
pressing costs / L	**€ 1.200,00**	

filling, final processing		
duration / bottle [mi	4	
bottles / h	15	
finishing / bottle	**€ 1,33**	

material	100ml	250ml
bottles	€ 0,494	€ 0,700
cap	€ 0,170	€ 0,170
label	€ 0,200	€ 0,200
product informtion	€ 0,20	€ 0,20
additional	0,05	0,05
material costs / b	**€ 1,11**	**€ 1,32**

labor processing	
hours external costs	0
hours internal costs	120
total hours processing	**0**
total labor costs	**€ -**

additional costs processing	
additional costs	€ -
contingencies	€ 500,00
total additional costs	**€ 500**

Table 9: Detailed calculation, single units

	2012		2013			
	direct selling		B2B partner		direct selling	
amount in ml	100	250	100	250	100	250
Net profit / Liter	€ 17,52	€ 21,61			€ 27,45	€ 31,55
Net profit	**€ 1,75**	**€ 5,40**	**€ 0,21**	**€ 1,95**	**€ 2,75**	**€ 7,89**
costs	**€ 5,28**	**€ 9,54**	**€ 4,29**	**€ 7,05**	**€ 4,29**	**€ 7,05**
Net - own costs	€ 7,04	€ 14,94	€ 4,50	€ 9,00	€ 7,04	€ 14,94
Net - own costs / Liter	€ 70,36	€ 59,76			€ 70,36	€ 59,76
sales costs	15%	15%			15%	15%
sales costs / Liter	€ 10,55	€ 8,96			€ 10,55	€ 8,96
Net sales	€ 8,09	€ 17,18			€ 8,09	€ 17,18
sales tax	10%	10%	10%	10%	10%	10%
sales price	€ 8,90	€ 18,90	€ 4,95	€ 9,90	€ 8,90	€ 18,90
sales price / Liter	€ 89,00	€ 75,60	€ 49,50	€ 39,60	€ 89,00	€ 75,60

Table 10: Sales, turnover calculation - per year

		100ml oil	250ml oil	box 1	box 2	box 3	box 4	SUM		
2012	turnover bottles	800	200	100	100	20	5	**1225**		
	turnover Liter	80	50	10	25	2	1,25	**168,25**	**312**	avilable amount in 2012
	Sales EURO	€ 7.120,00	€ 3.780,00	€ 2.450,00	€ 3.800,00	€ 380,00	€ 132,50	**€ 17.662,50**		
	profit Euro	€ 1.401,36	€ 1.080,41	€ 780,99	€ 1.414,58	€ 132,20	€ 56,73	**€ 4.866,26**		
	costs of goods	€ 2.493,76	€ 1.224,40	€ 1.452,34	€ 2.043,76	€ 204,47	€ 58,69	**€ 7.477,42**	42,34%	COGS / sales
	salary oil production	€ 1.733,33	€ 683,33	€ 216,67	€ 341,67	€ 43,33	€ 17,08	**€ 3.035,42**		
	checking COGS	€ 2.493,76	€ 1.224,40							
2013	turnover Flaschen - EIGEN	1000	800	150	150	50	50	**2200**		
	B2B partner	1000	150							
	turnover Liter	200	237,5	15	37,5	5	12,5	**507,5**	**504**	avilable amount in 2013
	Sales EURO	€ 13.850,00	€ 17.955,00	€ 3.675,00	€ 5.700,00	€ 950,00	€ 1.325,00	**€ 43.455,00**		
	profit Euro	€ 2.955,39	€ 6.601,05	€ 1.171,49	€ 2.121,87	€ 330,50	€ 567,29	**€ 13.747,58**		
	cost of goods	€ 2.956,76	€ 4.576,72	€ 2.303,51	€ 3.378,13	€ 552,84	€ 691,04	**€ 14.459,00**	33,27%	COGS / sales
	salary oil production	€ 1.333,33	€ 1.066,67	€ 200,00	€ 200,00	€ 66,67	€ 66,67	**€ 2.933,33**		
2014	turnover Flaschen - EIGEN	2500	1500	500	500	200	100	**5300**		
	PB2B partner	1500	500							
	turnover Liter	400	500	50	125	20	25	**1120**	**1134**	avilable amount in 2015
	turnover Euro	€ 25.725,00	€ 33.300,00	€ 12.250,00	€ 19.000,00	€ 3.800,00	€ 2.650,00	**€ 96.725,00**		
	profit Euro	€ 9.408,51	€ 15.590,03	€ 3.904,95	€ 7.072,89	€ 1.321,98	€ 1.134,58	**€ 38.432,94**		

A2) Appendix - Pro Forma Income Statement

Table 11: Pro Forma Income Statement

	2012	2013	2014	2015	2015-NEW	2016	2017	2018
Sales	**12.000**	**51.700**	**92.000**	**196.700**	**196.700**	**242.000**	**287.000**	**951.000**
COGS	1.332	20.700	36.836	78.756	59.100	59.100	59.100	177.300
Gross Profit (Scenario 1)	**10.668**	**31.000**	**55.164**	**117.944**				
Gross Profit (Scenario 2)					**137.600**	**182.900**	**227.900**	**773.700**
GP / Sales (Scenario 1)	**89%**	**60%**	**60%**	**60%**				
GP / Sales (Scenario 2)			**70%**		**70%**	**76%**	**79%**	**81%**
Saleries [a)]	3.100	9.000	19.000	69.000	69.000	69.000	69.000	138.000
Rent	1.500	2.000	2.500	2.500	2.500	2.500	2.500	2.500
Utilities		18.000	17.600	6.000	6.000	12.000	12.000	36.000
Advertisement / Marketing		7.500	5.300	7.200	7.200	15.150	17.400	56.700
Sales Expensis	500	7.000	8.400	10.100	10.100	10.100	10.100	20.200
Production Costs	1.500	2.000	4.500	4.500	4.500	4.500	4.500	13.500
other costs	1.422	34.808	25.734	21.164	21.400	29.457	29.914	90.655
depreviation	600	1.000	1.600	2.000	2.000	3.000	3.000	4.000
Total operation expensis	**8.622**	**81.308**	**84.634**	**122.464**				
GOAL - Total operation expensis					**179.800**	**201.807**	**204.514**	**534.855**
TAXES	-	-	-	-	-	-	-	-
Net Profit (Scenario 1)	**2.046**	-50.308	**-29.470**	-4.520				
Net Profit (Scenario 2)					**-42.200**	**-18.907**	**23.386**	**238.845**

values in €

a) from 2015 intensified workload forVoiGuat OG / from 2018 one person full operating for VoiGuat OG

A3) Appendix - Pro Forma Cash Flow Statement

Table 12: Pro Forma Cash Flow Statement - 2013

	2012	2013												2013
	Dezember	Jänner	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	TOTAL
SALES TOTAL		-	200	300	500	700	1.000	1.800	3.000	4.000	7.500	12.000	20.700	51.700
Sales	6.000		200	300	500	700	1.000	1.300	2.000	3.000	6.000	10.000	18.000	43.000
Sales of new products (neue Ole derzeit in der Experimentierphase)								500	1.000	1.000	1.500	2.000	2.700	8.700
Sales - Process Implementation [a]														
Sales - Licencies etc. [b]														
														-
investcosts						6.000	13.000	7.000	7.000					33.000
COGS	1.332	-	88	132	220	308	440	792	1.320	1.760	2.940	4.680	8.028	20.708
Saleries	3.100									3.000	3.000	3.000		9.000
Rent	1.500									1.500				1.500
Utilities						5.000	5.000	5.000		3.000				18.000
Marketing						3.400	400	400	2.900	400				7.500
Sales Expensis	500		2.000		2.000		500	500	500	500	500	500		7.000
Insurance														-
Production Costs	1.500									500	500	500		1.500
Ext. Kosten, Taxes						143	543	143	143	143	143	543	143	1.940
Office expansis	90		4	6	10	14	20	26	40	60	120	200	360	860
Inventar														-
TOTAL DISBURSEMENT	8.022	-	2.092	138	2.230	14.865	19.903	13.861	11.903	10.863	7.203	9.423	8.531	101.008
														-
CASH FLOW	- 2.022	-	- 1.892	162 -	1.730	- 14.165	- 18.903	- 12.061	- 8.903	- 6.863	298	2.578	12.170	- 49.308
FUNDING [c]						58.500								
START Balance	12.000	9.978	9.978	8.086	8.248	65.018	50.854	31.951	19.891	10.988	4.126	4.423	7.001	68.478
ENDE Balance	9.978	9.978	8.086	8.248	6.518	50.854	31.951	19.891	10.988	4.126	4.423	7.001	19.170	19.170

a) from 2016 the process implementation is part of the business model as described

b) from 2016 a back flow from licences by connecting producers with special industries for by-products are ecpected

c) FUNDING - for the first 3 operating years we got funding and a startup credit from a state fund and could save our cash flow without additional funding

d) 2015 NEW - shows an adopted cash flow calculation, where COGS savings are considered

Table 13: Pro Forma Cash Flow Statement - 2014, 2015

	2012	2013	2014				2014	2015				2015
	Dezember	TOTAL	Qu-1	Qu-2	Qu-3	Qu-4	TOTAL	Qu-1	Qu-2	Qu-3	Qu-4	TOTAL
SALES TOTAL		**51.700**	**5.500**	**13.500**	**22.500**	**50.500**	**92.000**	**38.000**	**29.000**	**23.000**	**107.000**	**197.000**
Sales	**6.000**	**43.000**	4.000	10.000	14.000	35.500	**63.500**	26.000	20.000	18.000	72.000	**136.000**
Sales of new products (neue Öle derzeit in der Experimentierphase)		**8.700**	1.500	3.500	8.500	15.000	**28.500**	12.000	9.000	5.000	35.000	**61.000**
Sales - Process Implementation [a]												
Sales - Licencies etc. [b]												
		-										
investcosts		**33.000**	4.000	17.500	2.500		**24.000**	3.000	2.000			**5.000**
COGS	**1.332**	**20.708**	2.180	5.340	9.060	20.090	**36.670**	15.160	11.560	9.040	42.760	**78.520**
Saleries	**3.100**	**9.000**			4.000	15.000	**19.000**	15.000	15.000	19.000	20.000	**69.000**
Rent	**1.500**	**1.500**			2.000		**2.000**			2.500		**2.500**
Utilities		**18.000**	6.600	5.000	3.000	3.000	**17.600**			3.000	3.000	**6.000**
Marketing		**7.500**	1.500	1.000	1.300	1.500	**5.300**	2.500	2.000	1.200	1.500	**7.200**
Sales Expensis	**500**	**7.000**	2.000	2.700	1.500	2.200	**8.400**	2.500	3.100	1.500	3.000	**10.100**
Insurance		-					-					-
Production Costs	**1.500**	**1.500**			1.000	1.000	**2.000**			2.500	2.000	**4.500**
Ext. Kosten, Taxes		**1.940**	500	500	500	500	**2.000**	500	6.700	500	6.700	**14.400**
Office expansis	**90**	**860**	2.000	200	200	500	**2.900**	500	500	500	500	**2.000**
Inventar		-					-					
TOTAL DISBURSEMENT	**8.022**	**101.008**	**18.780**	**32.240**	**25.060**	**43.790**	**119.870**	**39.160**	**40.860**	**39.740**	**79.460**	**199.220**
		-										
CASH FLOW	**- 2.022**	**- 49.308**	- 13.280	- 18.740	- 2.560	6.710	**- 27.870**	- 1.160	- 11.860	- 16.740	27.540	**- 2.220**
FUNDING [c]				**35.000**								
START Balance	12.000	68.478	19.170	40.890	22.150	19.590	54.170	26.300	25.140	13.280	- 3.460	54.170
ENDE Balance	**9.978**	**19.170**	**5.890**	**22.150**	**19.590**	**26.300**	**26.300**	**25.140**	**13.280**	**- 3.460**	**24.080**	**51.950**

a) from 2016 the process implementation is part of the business model as described

b) from 2016 a back flow from licences by connecting producers with special industries for by-products are ecpected

c) FUNDING - for the first 3 operating years we got funding and a startup credit from a state fund and could save our cash flow without additional funding

d) 2015 NEW - shows an adopted cash flow calculation, where COGS savings are considered

Table 14: Pro Forma Cash Flow Statement – 2015 NEW, 2016

	2012	2013	2014	2015	2015 NEW [d]				2015	2016				2016
	Dezember	TOTAL	TOTAL	TOTAL	Qu-1	Qu-2	Qu-3	Qu-4	TOTAL	Qu-1	Qu-2	Qu-3	Qu-4	TOTAL
SALES TOTAL		**51.700**	**92.000**	**197.000**	**38.000**	**29.000**	**23.000**	**107.000**	**197.000**	**53.000**	**49.000**	**28.000**	**112.000**	**242.000**
Sales	**6.000**	**43.000**	**63.500**	**136.000**	26.000	20.000	18.000	72.000	**136.000**	26.000	20.000	18.000	72.000	**136.000**
Sales of new products (neue Öle derzeit in der Experimentierphase)		**8.700**	**28.500**	**61.000**	12.000	9.000	5.000	35.000	**61.000**	12.000	9.000	5.000	35.000	**61.000**
Sales - Process Implementation [a]									**-**	15.000	20.000			**35.000**
Sales - Licencies etc. [b]									**-**			5.000	5.000	**10.000**
		-												
investcosts		**33.000**	**24.000**	**5.000**	3.000	2.000			**5.000**	15.000	5.000	5.000		**25.000**
COGS	**1.332**	**20.708**	**36.670**	**78.520**	**11.400**	**8.700**	**6.900**	**32.100**	**59.100**	11.400	8.700	6.900	32.100	**59.100**
Saleries	**3.100**	**9.000**	**19.000**	**69.000**	15.000	15.000	19.000	20.000	**69.000**	15.000	15.000	19.000	20.000	**69.000**
Rent	**1.500**	**1.500**	**2.000**	**2.500**			2.500		**2.500**			2.500		**2.500**
Utilities		**18.000**	**17.600**	**6.000**			3.000	3.000	**6.000**	3.000	3.000	3.000	3.000	**12.000**
Marketing		**7.500**	**5.300**	**7.200**	2.500	2.000	1.200	1.500	**7.200**	3.788	3.788	3.788	3.788	**15.150**
Sales Expensis	**500**	**7.000**	**8.400**	**10.100**	2.500	3.100	1.500	3.000	**10.100**	2.500	3.100	1.500	3.000	**10.100**
Insurance		**-**	**-**	**-**					**-**					**-**
Production Costs	**1.500**	**1.500**	**2.000**	**4.500**			2.500	2.000	**4.500**			2.500	2.000	**4.500**
Ext. Kosten, Taxes		**1.940**	**2.000**	**14.400**	500	6.700	500	6.700	**14.400**	614	614	614	614	**2.457**
Office expansis	**90**	**860**	**2.900**	**2.000**	500	500	500	500	**2.000**	500	500	500	500	**2.000**
Inventar		**-**	**-**											
TOTAL DISBURSEMENT	**8.022**	**101.008**	**119.870**	**199.220**	**35.400**	**38.000**	**37.600**	**68.800**	**179.800**	**51.802**	**39.702**	**45.302**	**65.002**	**201.807**
		-												
CASH FLOW	**-2.022**	**-49.308**	**-27.870**	**-2.220**	2.600	-9.000	-14.600	38.200	**17.200**	1.198	9.298	-17.302	46.998	**40.193**
FUNDING [c]														
START Balance	12.000	68.478	54.170	54.170	26.300	28.900	19.900	5.300	54.170	24.080	25.278	34.577	17.275	54.170
ENDE Balance	**9.978**	**19.170**	**26.300**	**51.950**	**28.900**	**19.900**	**5.300**	**43.500**	**71.370**	**25.278**	**34.577**	**17.275**	**64.273**	**94.363**

a) from 2016 the process implementation is part of the business model as described

b) from 2016 a back flow from licences by connecting producers with special industries for by-products are ecpected

c) FUNDING - for the first 3 operating years we got funding and a startup credit from a state fund and could save our cash flow without additional funding

d) 2015 NEW - shows an adopted cash flow calculation, where COGS savings are considered

Table 15: Pro Forma Cash Flow Statement - 2017, 2018

	2012 Dezember	2013 TOTAL	2014 TOTAL	2015 TOTAL	2015 NEW TOTAL	2016 TOTAL	2017 Qu-1	2017 Qu-2	2017 Qu-3	2017 Qu-4	2017 TOTAL	2018 Qu-1	2018 Qu-2	2018 Qu-3	2018 Qu-4	2018 TOTAL
SALES TOTAL		51.700	92.000	197.000	197.000	242.000	68.000	69.000	33.000	117.000	287.000	234.000	247.000	109.000	361.000	951.000
Sales	6.000	43.000	63.500	136.000	136.000	136.000	26.000	20.000	18.000	72.000	136.000	78.000	60.000	54.000	216.000	408.000
Sales of new products (neue Öle derzeit in der Experimentierphase)		8.700	28.500	61.000	61.000	61.000	12.000	9.000	5.000	35.000	61.000	36.000	27.000	15.000	105.000	183.000
Sales - Process Implementation [a)]					-	35.000	30.000	40.000			70.000	120.000	160.000			280.000
Sales - Licencies etc. [b)]					-	10.000			10.000	10.000	20.000			40.000	40.000	80.000
		-														
investcosts		33.000	24.000	5.000	5.000	25.000	15.000	5.000	5.000		25.000	45.000	15.000	15.000		75.000
COGS	1.332	20.708	36.670	78.520	59.100	59.100	11.400	8.700	6.900	32.100	59.100	34.200	26.100	20.700	96.300	177.300
Saleries	3.100	9.000	19.000	69.000	69.000	69.000	15.000	15.000	19.000	20.000	69.000	30.000	30.000	38.000	40.000	138.000
Rent	1.500	1.500	2.000	2.500	2.500	2.500			2.500		2.500			2.500		2.500
Utilities		18.000	17.600	6.000	6.000	12.000	3.000	3.000	3.000	3.000	12.000	12.000	12.000	6.000	6.000	36.000
Marketing		7.500	5.300	7.200	7.200	15.150	4.350	4.350	4.350	4.350	17.400	14.175	14.175	14.175	14.175	56.700
Sales Expensis	500	7.000	8.400	10.100	10.100	10.100	2.500	3.100	1.500	3.000	10.100	5.000	6.200	3.000	6.000	20.200
Insurance		-	-	-	-	-					-					-
Production Costs	1.500	1.500	2.000	4.500	4.500	4.500			2.500	2.000	4.500			7.500	6.000	13.500
Ext. Kosten, Taxes		1.940	2.000	14.400	14.400	2.457	728	728	728	728	2.914	2.414	2.414	2.414	2.414	9.655
Office expansis	90	860	2.900	2.000	2.000	2.000	500	500	500	500	2.000	1.500	1.500	1.500	1.500	6.000
Inventar		-	-													
TOTAL DISBURSEMENT	8.022	101.008	119.870	199.220	179.800	201.807	52.478	40.378	45.978	65.678	204.514	144.289	107.389	110.789	172.389	534.855
		-														
CASH FLOW	- 2.022	- 49.308	- 27.870	- 2.220	17.200	40.193	15.522	28.622	- 12.978	51.322	82.486	89.711	139.611	- 1.789	188.611	416.145
FUNDING [c)]																
START Balance	12.000	68.478	54.170	54.170	54.170	54.170	43.500	59.022	87.643	74.665	54.170	64.273	153.984	293.596	291.807	54.170
ENDE Balance	9.978	19.170	26.300	51.950	71.370	94.363	59.022	87.643	74.665	125.986	136.656	153.984	293.596	291.807	480.418	470.315

a) from 2016 the process implementation is part of the business model as described

b) from 2016 a back flow from licences by connecting producers with special industries for by-products are ecpected

c) FUNDING - for the first 3 operating years we got funding and a startup credit from a state fund and could save our cash flow without additional funding

d) 2015 NEW - shows an adopted cash flow calculation, where COGS savings are considered