Norwegian School of Economics
Bergen, Spring 2020

Valuation of VOW ASA

- A fundamental analysis of a company turning waste into value

By:

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Master thesis, Economics, Business and Administration –

Financial Economics (FIE) and Business Analysis and Performance Management (BUS)

Abstract

The aim of this thesis is to obtain an unbiased target price of Vow ASA by applying a three-stage weighted average cost of capital model, supported by a relative valuation approach. We conduct a thorough analysis of key aspects with the industries they deliver solutions to and significant company-specific factors. Necessary assumptions based of the analysis are made to forecast future performance of the company and to finally carry out the valuation.

Based on the global environmental "mega-trend" in the cruise and aquaculture market, companies delivering solutions to environmental problems have experienced substantial growth in demand the recent years. Driven by governmental pressure, higher prices of carbon, and an increased focus on sustainability, these trends are expected to continue. Having experience, a solid customer base and well-developed technology Vow ASA is well positioned in these markets. With a record high backlog, containing cruise, aquaculture and land-based projects Vow is set to continue and possibly accelerate their growth going forward as they are entering new land-based industries.

Taking these factors into account our fundamental valuation yields an estimated share price of **NOK 19.6** for Vow ASA. Supported by a relative EV/EBITDA and Price/sales valuation, the analysis indicates a downside to the quoted stock price. Although the results contain a great amount of uncertainty which is revealed through a sensitivity analysis, we conclude that Vow is currently overvalued, and we would as of 31/12-2019 come with a **sell** recommendation.

Due to the impact the Covid-19 virus had on the stock market and expected future revenue streams we have chosen to do the valuation based on the stock price and available data as of 31/12-2019. Events that took place in the winter/spring of 2020 will be addressed to further confirm or disconfirm our final price target.

Preface

This thesis completes our Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH). With majors in Financial Economics and Business Analysis and Performance Management, this thesis combines and utilizes the knowledge that we have obtained through a variety of courses we have attended during our degrees.

During our two years at NHH we have attended courses such as Corporate Finance, Investments, Valuation with financial statement analysis and Sustainable business models. This provide us with a solid theoretical base and the necessary skills to carry out a complete valuation. It also spiked our interest in companies with business models built around sustainability. This thesis has also thought us how important a thorough strategic analysis is when assessing industry-specific and macroeconomic value drivers.

The motivation behind the topic of our thesis is the ever-increasing focus on making the world more sustainable. This trend has affected the stock market in later years with companies classified as ESG-companies has outperformed indexes. Through this thesis our objective is to determine if the substantial growth in the later years could be justified based on fundamental values or if the financial markets seem to overvalue these companies based on the outlooks. Examining Vow has been both an interesting and challenging task due to the company being present in several different markets in different stages of the cycle.

We would like to thank our supervisor Are Oust for useful feedback and advice as well as always being available. His feedback throughout the process has been vital and has helped us tremendously.

Bergen, June 20. 2020

Filip Morthen Olav Aase Mæland

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1. Introduction

For decades climate changes have been a top priority for world leaders and organisations. The global initiative for sustainable development to protect the environment and improve human lives started in 1992. Today the Sustainable Development Goals are viewed as the blueprint for a better world and is adopted by all the 193 member states of the United nations (The United Nations, 2020). The ever-growing focus on sustainability are putting pressure on different industries to obtain solutions and technology to reduces their impact on the environment.

The cruise industry has long had a reputation for bad environmental performance being caught discharging trash, fuel and sewage directly into the ocean (Ellsmoor, 2019). With ever stricter regulation and increased focus on their environmental performance the industry needs solutions and technology to make their ships cleaner and compliant with regulation. Initiatives such as carbon pricing are increasing every year (The World Bank, 2018). This lays pressure on industries using fossil sources in their production to find sustainable alternatives.

Vow is one of the companies that addresses the problems mentioned above. Their entire business model is built around developing solutions that purify wastewater and convert waste into valuable resources and clean energy.

To estimate the fair value of Vow ASA this thesis will assess key drivers and characteristics of the industries were their solutions are applicable. Both general drivers as presented above and industry-specific development will be examined. Due to Vow delivering their solutions to a wide range of industries with different outlooks the thesis will divide the solutions and markets into three main categories, cruise, aquaculture and land-based.

We have chosen to structure the thesis in the following manner. Chapter 2 is a brief introduction to the company, a timeline with important historical events and the current structure of the company and ownership structure. In chapter 3 we present available theoretical valuation methods and argument for the suitable approach when valuing Vow ASA. Chapter 4 is a presentation of the solutions they deliver to the different markets. Chapter 5 consists of a presentation of the different markets, the key drivers and the level of competition. In chapter 6 we perform strategic analysis`s. In chapters 7,8 and 9 we analyse financial statements, estimate the demand and present the company cost of capital. Chapter 10 presents the results from the fundamental and relative valuation as well as a sensitivity analysis. Lastly chapter 11 presents events that happened after the time of valuation.

The thesis uses a weighted cost of capital supported by a relative valuation to determine the value of VOW. The data we use is publicly available information from annual reports, operational updates, and estimates from DNB Markets and Nordea Markets analysist following the company. The data period is from 2012-2019. Due to the extraordinary circumstances with the Covid-19 pandemic, all the data and corporate structure will be presented as of 31.12.2019.

2. Vow ASA

In this chapter we are going to present the company, notable events in the company's history and the corporate structure as of 31/12-2019

2.1 - About

Vow ASA is a public Norwegian company that specialize in, as the name suggest, Valorization of Organic Waste. Formerly known as Scanship Holding ASA, the company changed its name to Vow ASA in January 2020, following the acquisition of French company ETIA Ecotechnologies in August 2019.

Headquartered in Lysaker, Norway, Vow is a global group providing cruise, - aquaculture- and land-based solutions for purifying wastewater and converting waste into valuable resources or clean energy. Founded in 1993, the company quickly became one of the largest suppliers of wastewater treatment solutions to the cruise industry (Vow, 2020a)**.** In fact, every second cruise ship delivered to the market between 2014 and 2020 is equipped with the company`s systems (Scanship, 2020a). In recent years, the company has entered the aquaculture industry using the same technology to purify water and to recover of valuable resources from fish farming. By acquiring ETIA, Vow will accelerate the access to different land-based markets with ETIA as the operational platform (Scanship, 2019a).

Vow is listed on Oslo Stock Exchange main index, the OSEBX with the ticker VOW. During 2019 the stock price increased roughly 650% and as of 31.12.2019 the market capitalisation of Vow was BNOK 3.2. The repricing of stocks fitting the ESG-profile has been pointed out as the single most prominent trends on the stock exchange in recent years (Dovre forvaltning, 2019). ESG stands for Environmental, Social and Governance. In many cases this is referred to as sustainability. In a business context, sustainability is related to how a company's products and services contribute to sustainable development (Nordea, 2020). The fact that Vow ASA fits the ESG profile is contributing to the extraordinary return.

2.2 - Timeline

The two subsidiaries that now form Vow ASA, Scanship and ETIA, both trace its roots back three decades. The company that would later be known as Scanship was founded in 1993 and ETIA were founded in 1989. After spending years working on separate fields, but with a common mission to valorize waste, Scanship acquired ETIA in 2019 to join forces.

The acquisition of ETIA is one of the most important events in the history of the company. By acquiring ETIA the company gained access to new technology and expertise focusing on solutions to land-based markets. Vow also accelerated their growth in these markets by acquiring a company which already had a foothold in land-based solutions. This meant that they did not have to start from "scratch" when they entered this new market segment. In table 2.1 we present some important historical events.

Table 2.1: Notable events and milestones in Scanship`s history before the acquisition of ETIA and subsequent rebranding to Vow ASA. Because ETIA is a private company in France, the publicly available historical information is scarce.

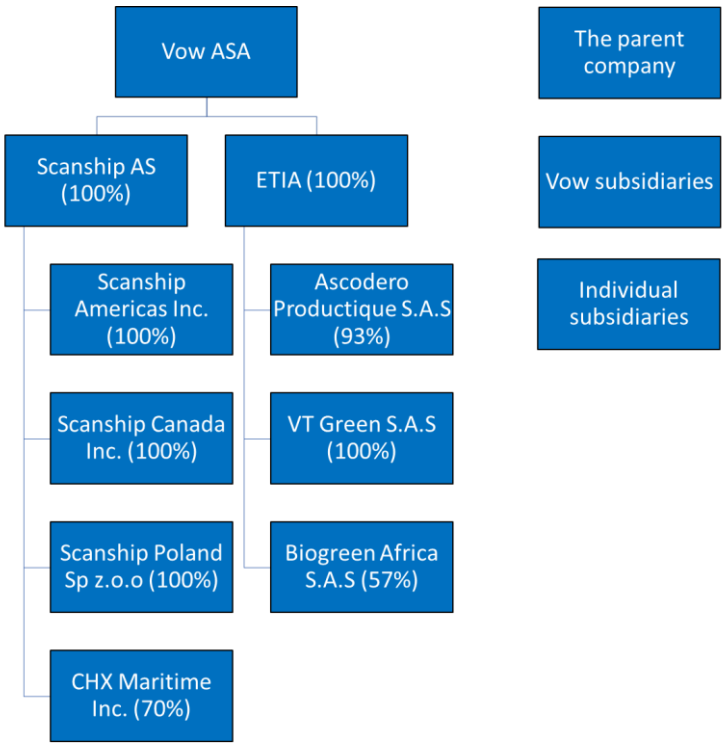
Year	Event
2007	Scanship AS was incorporated and made the parent company in the Scanship Group
2011	Scanship Holding AS was established as the new holding company of the Scanship Group
2014	Scanship Holding ASA was listed on the Oslo Axess, a marketplace authorised and fully regulated by the Oslo
2015	Scanship signed its first contract within the aquaculture market
2019	Scanship commercialized the MAP technology to advance into land-based markets
2019	Scanship Holding ASA shares were transferred to the Oslo Stock Exchange main index, the OSEBX
2019	Scanship Holding ASA acquires French engineering company Etia Ecotechnologies
2020	Scanship Holding ASA changed its name to Vow ASA

Source: (Vow ASA, 2020)

2.3 - Subsidiaries and ownership structure

The Vow ASA group consists of Vow ASA as the parent company and the subsidiaries ETIA and Scanship. In this thesis Vow ASA with its subsidiaries is termed the "Group". When referring to the individual subsidiaries, we will use "Scanship" and "ETIA". Note that both Scanship and ETIA also have several subsidiaries. These are included in the terms "Scanship" and "ETIA" rather than addressed individually. We chose to do this to avoid any confusion regarding the company structure. Scanship has offices in Norway, USA, and Poland, and ETIA is incorporated in France. In figure 2.2 we will present the ownership structure within the Group.

Figure 2.2: Illustration of Vow`s company structure. Vow ASA is the parent company, with subsidiaries Scanship AS and ETIA. The two subsidiaries themselves have several subsidiaries. Percentages represent Vow ASA ownership in the respective subsidiaries.



Source: (Vow ASA, 2020)

Scanship Canada Inc. is under liquidation. Vow ASA own 100% of the equity and voting shares in all Scanship subsidiaries except CHX Maritime Inc. They own 100% of ETIA and are majority shareholders in all its subsidiaries. In 2018 the Group had 120 employees in Norway, France, Poland and the US (Scanship, 2020b).

Ownership structure

Vow ASA has one class of shares with equal rights of all shares. One share gives one vote at the General Meeting. The management and board of directors are quite heavily invested in the Group. Ingerø Reiten Investment Company AS is owned by chairman of the board Narve Reiten and board member Bård Brath Ingerø. Daler Inn, Exproco, and Badin Invest are owned by CTO Asgeir Wien, COO Johnny Hansen, and CEO Henrik Badin, respectively. Claiming 60% of total shares, they hold most of the Groups equity and voting power.

Table 2.2: Number of shares owned by group management and board of directors. It illustrates the strong ownership position among top 20 of investors and among the total amount of investors.

Investor	Number of shares	Fraction of total outstanding shares
Ingerø Reiten Inv. Company AS	32 345 000	30,4 %
Daler Inn Limited	10 600 000	9,9 %
Exproco Limited	10 560 000	9,9 %
Badin invest Limited	10 500 000	9,9 %
Sum	**64 005 000**	**60,1 %**
Total number of shares	**106 563 566**	**100 %**

Source: (Vow ASA, 2020)

Turning the clock back to 31.12.2018, the management and board of directors owned 65,9% of the Group. There are two reasons for the decline in ownership. 3.9 million shares were issued to ETIA in September 2019 as part of the settlement. The CEO and COO of ETIA later decided to sell (at least part of) the shares from the settlement. Combined with a private placement of 7 million new shares in November 2019, the management and board`s ownership has been diluted. The free float of shares is roughly 35% (Business Insider, 2020).

3. Valuation methods

In this chapter are going to present valuation methods that are relevant for the thesis. There are several different models an analyst can use to estimate the value of a company. Although these models often make very different assumptions, they do share some common characteristics. (Damodaran, 2012) suggest three different approaches for valuation: discounted cash flow valuation (DCF), relative valuation and contingent claim valuation. We will provide an overview of the different methods in the coming chapter, before a discussion on the most suitable method for this thesis concludes this chapter

3.1 Discounted Cash Flow (DCF)

The DCF valuation is the most widely used method in the world, and it lays the foundation for all other valuation approaches. The goal is to estimate the intrinsic value of an asset based on its fundamentals. Intrinsic value is best described as the value an unbiased analyst with all public available information and correct discount rate attach to a firm. Rather than using the current market price of an asset, analysts perform financial modelling to see if the asset is over- or undervalued. Moving on, DCF valuation relates the value of an asset to the present value (PV) of expected future cash flows on that asset. To present the basis for DCF valuation, consider formula 3.1. It illustrates the value of an asset as the sum of cash flows (*CF*) over its lifetime (*n*), divided by a discount rate (*r*) by the power of time (*t*) (Damodaran, 2012). The discount rate is set to reflect the riskiness of the estimated cash flows and will be discussed further when we address the individual DCF-models.

Formula 3.1: The basis for DCF valuation. Value equals sum of cash flows divided by a discount rate.

$$Value = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

As DCF models requires a lot of details to compute the intrinsic value of a firm, it requires a series of assumptions. The DCF analysis will be better if analysts are confident about the assumptions being made (Corporate finance institute, 2015).Thus, the approach is best applied for firms whose current cash flows are positive and can be estimated with “some reliability” in the future. It also requires a proxy for risk that can be used to obtain discount rates. (Damodaran 2012) lists a few scenarios were DCF valuation need to be adapted. A prime example is for firms in trouble. Since the method values the firm as going concern, it is difficult to estimate future cash flows for distressed firms with high probability of bankruptcy. A second concern is for highly cyclical firms. These can be under- or overvalued based on the analysts biased prediction of the future economy. Also, future cash flows

are harder to predict for firms heading into uncertain times or in possession of unutilized patents. Note that the DCF valuation can still be used to estimate firms in these positions, but it requires adapted models.

A final consideration is the life cycle of the firm to be valued. (Damodaran, 2012) separates firms into three cycles. The first one is the one-period model for firms growing at a stable rate. They have reached steady state, and thus a constant growth model provides a good estimate of the value.

Formula 3.2: Computation of firm value in one-period models. The cash flows are discounted by the cost of capital minus the perpetual growth rate, g_n.

$$Value\ of\ the\ firm = V_N = \frac{CF_1}{r - g_n}$$

Moderate-growth firms grows at a rate "moderately higher than the nominal growth rate in the economy". For such firms, the two-stage growth model is applied. It allows for an initial phase with volatile growth and a subsequent steady state where the growth rate is stable. The third and final firm grows at a rate much higher than the nominal growth rate in the economy. It will go through a period of rapid growth and then enter a transition period before it reaches steady state with stable growth. Since cash flows cannot be estimated forever, analysts stop their estimations of cash flows at some time in the future and insert a terminal value that reflect the value of the firm at that point, i.e. when reaching a steady state (Damodaran, 2012).

Formula 3.3: Computation of firm value in multi-period models. The sum of cash flows is discounted by the cost of capital until some time in the future, and then added a terminal value when it reaches stable growth. Note that V_N is computed in formula 3.2.

$$Value\ of\ a\ firm = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t} + \frac{V_N}{(1+r)^N}$$

DCF models are categorized into what claim it estimates. One option is to value just the equity stake in the firm, such as in the FTE- model. Another option is to include all other claimholders in the firm to value the entire firm, such as in the WACC- and APV-models. The calculated future cash flows and discount rates differ between the categories and models. In the following sections, we will address the three mentioned DCF-models.

3.1.1 Weighted Average Cost of Capital (WACC)

This model discounts the free cash flow to firm (FCFF) by the firms weighted average cost of capital, or WACC. The FCFF will be paid to both equity and debt holders, and is defined as "the residual cash flows after meeting all operating expenses, reinvestment needs, and taxes, but prior to any payments to either debt or equity holders" (Damodaran, 2012). WACC is the average cost of capital the firm must pay to all its investors and will be described in chapter 9.

Formula 3.4: Computation of Free Cash Flow to Firm. This cash flow is available to all the firms` investors.

$$FCFF = \text{EBIT} * (1 - \tau_c) + \text{Depreciation} - \text{CAPEX} - \text{Increase in NWC}$$

Next, we seek to obtain the enterprise value (EV). That is simply the value of the firm`s underlying business (Berk & DeMarzo, 2014). It is calculated as the sum of future FCFF discounted by the WACC:

Formula 3.5: Computation of enterprise value.

$$Enterprise\ value = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1 + r_{WACC})^t}$$

Typically, the WACC method is the easiest to use when the firm will maintain a fixed debt-to-value ratio (Berk & DeMarzo, 2014). (Damodaran 2012) suggests that firms with high leverage or in the process of changing their leverage should be valued using the WACC-model. The reason is that volatility induced by debt payment makes it much harder to value just the equity stake in the business. Also, assumptions about growth and risk have a bigger impact on equity.

A potential problem with this model is tied to firms with high debt ratios. Whereas the cash flow to equity includes debt and would illustrate distressed firms, FCFF are unlikely to reflect this. Another problem we want to highlight is the use of a debt ratio in the cost of capital (WACC). We assume that it is stable throughout the period of valuation, but this would require a firm to issue large amount of debt when their market value increase. Therefore, as we mentioned in the section above, the approach is better for firms with stable debt ratios (Damodaran, 2012).

3.1.2 Flow-to-Equity Method (FTE)

As opposed to valuing a firm based on its free cash flow to firm, this method explicitly calculates the free cash flow available to equity holders. This is the additional cash the firm have available to pay dividends or repurchase shares. FCFE can be computed directly from its FCFF by adjusting for after-tax cost and adding net borrowing (Berk & DeMarzo, 2014)

Formula 3.6: Illustration of the FTE method. FCFE are computed by adjusting FCFF for after-tax interest payments and net borrowing.

$$FCFE = FCFF - (1 - \tau_c) * (Interest\ Payments) + (Net\ Borrowing)$$

Then, the cash flows are discounted using the equity cost of capital to get the firms value of equity.

Formula 3.7: Computing the value of equity by discounting FCFE with the equity cost of capital.

$$Value\ of\ Equity = \sum_{t=1}^{t=n} \frac{FCFE_t}{(1 + r_e)^t}$$

The FTE method directly calculates the value of equity. It can offer an advantage if the firm`s capital structure is complex, and market value of other securities are not known. In such instances, the FTE method computes the value of equity directly. In contrast, FCFF methods computes the EV/firm value and thus need a separate valuation on components of the capital structure to determine value of equity. (Berk & DeMarzo, 2014) state that FTE may be a more transparent method for discussing benefits of a company`s project to shareholders.

Equity cost of capital consists of a company`s levered beta. The levered beta reflects the company`s capital structure. Thus, FTE face the same problems as WACC in that a constant debt-equity ratio must be assumed. If it changes over time, the risk of equity will change as well. Another complication with the method is the need to compute the debt capacity to estimate future interest and net borrowing. This estimation is not necessary in the WACC approach.

3.1.3 The Adjusted Present Value Method (APV)

This approach is an alternative method to WACC and FTE. It starts with the unlevered value of the firm (V^U), that is the value without any debt. To get to the unlevered value, FCFF are discounted by the unlevered cost of capital, r_u. This is a pre-tax WACC discount rate, so it does not account for the tax shield (Berk & DeMarzo, 2014).

Formula 3.8: Computing the value of the unlevered firm. FCFF are discounted by the unlevered cost of capital, a pre-tax WACC.

$$V^U = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1 + r_u)^t}$$

Next, we add debt to the firm. Given a level of debt, it brings an expected benefit in the form of tax shield. The tax shield is equal to the interest paid, that is *Debt* times cost of debt r_d, multiplied by the corporate tax rate τ_c (Berk & DeMarzo, 2014)**.** The tax shield is discounted by the cost of debt, r_d, to reflect the riskiness of the cash flow.

Formula 3.9: Computing the benefits of leverage. Interest tax shields are discounted by the cost of debt.

$$\textit{Benefits of leverage} = PV(Tax\ shields) = \sum_{t=1}^{t=n} \frac{\tau_c * r_d * Debt_t}{(1 + r_d)^t}$$

The third and final step of the method is to estimate the default risk of the firm and expected bankruptcy costs, based on the given level of debt. This is computed by multiplying the probability of bankruptcy with direct and indirect cost of bankruptcy. Because neither the probability of bankruptcy nor the cost of bankruptcy can be estimated directly, this step poses significant estimation problems. Combining all three steps gives the levered value of the company, V^L.

Formula 3.10: Computing the levered value of a company. The present value of tax shields is added, and bankruptcy costs are withdrawn, from the unlevered value.

$$V^L = APV = V^U + PV\ (Tax\ shields) - PV\ (Bankruptcy\ costs)$$

(Berk & DeMarzo, 2014) lists the APV methods advantages. Contrary to the previously mentioned methods, it provides and explicit valuation of the tax shield (and bankruptcy costs). Also, it is easier to apply on firms with volatile debt-equity ratios because it values the debt separately.

However, analysts face a circularity problem with the APV method. The debt levels must be known to compute the interest tax shield, but with a constant debt-equity ratio the value must be known to

compute the debt level. So, implementing the APV approach with a constant debt-equity ratio requires solving for debt levels and value simultaneously.

3.2 Relative Valuation

This method of valuation values a firm based on the pricing of comparable firms. Prices are compared by using a common variable such as earnings, cash flow, book value, or revenues. (Damodaran, 2012) illustrates three multiples. The most common valuation multiple is the industry-average price-earnings (P/E) ratio. This method assumes that the firms in the same industry are comparable and priced correctly by the market. Price-book (P/B) value ratio is also widely used. Firms with a lower multiple relative to comparable firms are considered undervalued. A third multiple is the price-sales (P/S) ratio. A lower P/S ratio translates to a more attractive investment.

(Berk & DeMarzo, 2014) addresses the commonly used valuation multiples based on the firm`s enterprise value. EV is an advantageous metric if we want to compare firms with different leverage ratios, because it reflects the total value of the firm`s underlying business. Common multiples are EV to EBIT, EBITDA, and free cash flow. As with the P/E multiple, the EV/EBITDA multiple is higher for firms with high growth rates and low capital requirements.

Whereas DCF valuation search for the intrinsic value company of a firm, relative valuation relies more on the market being right. The market is “right” in the way it prices stocks on average, although it makes errors on the pricing of individual stocks. When analysts compare a firm against industry multiples, they assume it to be “right” so that one can address whether the firm being valued is potentially under- or overvalued. Under- or overvalued firms are expected to be corrected over time (Damodaran, 2012).

The main advantage with multiples is the simplicity. Analysts can easily obtain estimates of value for firms, given a significant number of traded comparable firms in a correctly priced market. Also, the multiples approach is based on actual prices of real firms, rather than forecasts of future cash flows which may be somewhat unrealistic.

On the other side, no two firms are identical in terms of risk and growth. Thus, multiples are easily misused and can be manipulated based on the subjective choice of comparable firms. A biased analyst can choose the group of comparables that reinforce his biased opinion. Another limitation of multiples is that they only value the firm relative to other comparable firms. It would not reflect in any way if the entire industry is under- or overvalued. This issue can turn out to be especially problematic during “booms” (Berk & DeMarzo, 2014).

3.3 Contingent Claim Valuation

This third and final approach uses techniques from option pricing models to value assets with similar characteristics to options. The approach has developed from the idea that the value of an asset may be larger than the present value of cash flows, if the cash flows are *contingent on specific events*. (Damodaran, 2012) argues that assets such as patents or undeveloped reserves are options, and should be valued as such, rather than by using DCF models. DCF models tend to underestimate the value of such assets because it is based on the current outlook and does not consider that those assets will only be implemented under certain circumstances.

The benefits of this approach lie in the discussion above, as it reflects the value of some assets better than the DCF model. For instance, a patent can be described as a call option on a product under development. The investment outlay is the strike price, and the patent life becomes the time to expiration of the option. Also, equity can be considered a call option of the value of the underlying firm. Valuing the equity of a distressed firm might prove troublesome with DCF and relative valuation but can be obtained by applying the face value of debt as the strike price.

A primary limitation to the approach is related to long-term options on nontraded assets. Whereas the assumptions made about constant variance and dividend yield are negligible for short-term options, they are a concern when options have a longer lifetime. The underlying value of nontraded assets cannot be obtained from financial markets, and thus implies more estimation error.

3.4 Choice of approach and method

After presenting different approaches to valuation and discussing their respective applicability, the next step is to decide on the most suitable approach for Vow. We will address the characteristics of the Group and the industries to settle on suitable valuation approach(es).

Since Vow ASA are listed on Oslo stock exchange, audited annual and quarterly results are available. The quarterly results go back to the listing on Oslo AXXESS in 2014, while annual results can be traced another year back in time to 2013. This provides us with the detailed financial information required for the DCF approach. Also, the obtainable period of historical financials should prove sufficient to analyse the longer trends. The Group deliver solutions to several different market and industries. While they have supplied the cruise industry for a long time, they quite recently targeted the aquaculture- and land-based industries. The growth assumptions may differ between these industries, and thus the outlook for the Group in each market.

Because the Group develop solutions to such diverse industries, it is rather challenging to link them to one specific industry. The closest fit will be to the waste management industry. However, as the

Group experience rapid growth the market perception may not reflect the underlying fundamentals. Companies with a similar ESG-profile to Vow are also potential peer companies and may prove to better reflect the Group`s future growth. Berk & DeMarzo (2014) consider relative valuation a "shortcut" to the DCF methods of valuation. They highlight that DCF methods allows one to incorporate firm specific information and are potentially more accurate than the use of a valuation multiple.

Choosing a DCF approach as the main tool for valuation, a further discussion on specific methods is required. The different methods described in section *3.1* all have certain characteristics. A key element is the implementation of a firm's capital structure. Since Vow has had a stable equity ratio about 30%-40%[1] in the last years, we believe the APV approach is unnecessary. Note that Vow went through a relatively large acquisition of ETIA in 2019 and maintained their equity ratio. FTE and WACC seems to be the most suitable methods. (Berk & DeMarzo, 2014) suggests that the FTE method should be used in "complicated setting where the values in the firm`s capital structure or the interest tax shied are difficult to determine". We feel comfortable in stating that Vow does not fit this statement. Therefore, we choose to perform a complete firm valuation through a WACC-model.

A critical consideration in every DCF analysis is the life cycle of the firm. Vow experienced a volatile revenue growth in the mid 2010`s. Revenue growth delivered a CAGR of 25% from 2017 to 2019, and the rapid growth is expected to continue after the acquisition and subsequent move to new verticals. As the new land-based segment in particular will develop in the coming years, we believe the Group will grow sincerely for five years. The Group then enters a transition period set to five years, before it reaches steady state by 2030. A three-staged WACC-model is considered the most suitable approach to forecast future cash flows.

Although the relative valuation approach was deemed a "shortcut" to the DCF methods, it can serve as a useful supplement to our fundamental valuation. Companies with similar ESG-profile might prove to be suitable peers. This allows us to test the results from the DCF-approach up against market prices. Lastly, Vow possess some assets with somewhat similar characteristics to options, primarily the newly developed MAP technology. However, the market potential of such can be implemented in a DCF model, so we will not include the contingent claim approach in our thesis.

In conclusion, we will conduct a fundamental analysis using the WACC-method, and then perform a relative valuation to comment on our results.

[1] Based on book values of equity and debt

4. Solutions

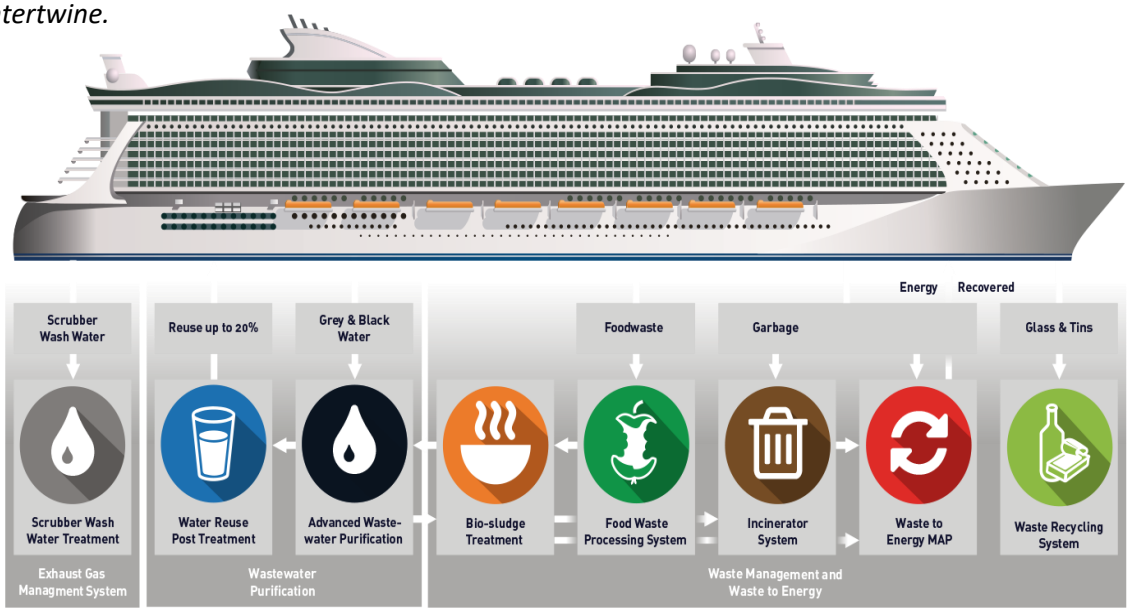
In this chapter we are going to give an overview of the different technologies and solutions that the Group delivers. The Group provides solutions for purifying wastewater and to convert biomass and waste into valuable resources or clean energy. The solutions will be divided into three categories, depending on markets they are targeting. These categories are cruise, aquaculture and land-based solutions. Scanship delivers systems and technology to both the cruise- and aquaculture industry, while ETIA`s solutions target the land-based industries. First, we will present the cruise solutions in section *4.1*, then aquaculture solutions in section *4.2*, the land-based solutions in section *4.3* before ending the chapter of with patented systems in section *4.4*

4.1 Cruise

The cruise solutions are systems custom-made for cruise ships. The systems vary from purification of wastewater and treatment of bio-sludge to garbage- and food waste handling and waste recycling. The systems can be installed as individual systems, or they can be bundled together to create the "Scanship total clean ship system". Scanship describes this system as a highly efficient system with seamless interface, reduced footprint and low cost of operation (Scanship, 2020c). The systems can be installed on older ships in operation as retrofits, or on newbuild ships.

In the section below we will take a closer look on the different subsystem included in the Scanship Total Clean Ships System (STCSS)

Figure 4.1: Illustration of the Scanship total clean ship system (STCSS). The STCSS is divided into three subsystems: Waste management (WMS), Wastewater purification (AWP) and Exhaust gas management. The figure shows all the components that are included in STCSS and how they intertwine.

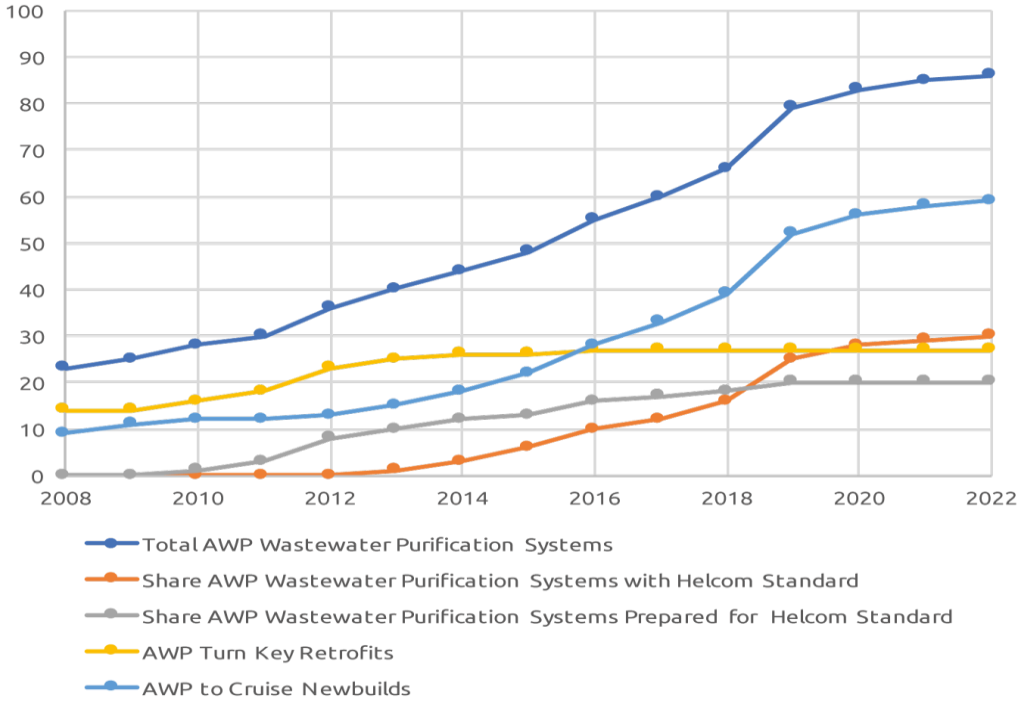


Source: (Scanship, 2020c)

4.1.1 Advanced Wastewater Purification (AWP)

The most widespread of the systems is the Advanced Wastewater Purification system, this will be called AWP-system from now on. The AWP-system treats all types of wastewater generated on a maritime vessel. It is designed according to rules set by the International Maritime Organization (IMO) regarding nutrient removal. It also removes organic matter, suspended solids, residual chlorine and fecal coliforms. As shown in figure 4.1 the AWP-system treats black and grey water. Black water is more commonly known as sewage and grey water is wastewater from showers, sinks, laundries and kitchens (EPA, 2019). The system can also treat the reject water from dewatering of bio-sludge. Bio-sludge is mainly food waste and sewage, and dewatering is extraction of fluids to minimize the volume of bio-sludge. Since the system can handle 100% of the wastewater generated onboard it will reduce, and often eliminate, the need for discharging the wastewater in-port. This will reduce the fees associated with discharging wastewater in-port. Scanship is the market leader in AWP-systems to the cruise industry. In the period between 2014-2020, 42 out of 75 newbuilt vessels will be equipped with Scanships AWP-system. (Scanship, 2020a)

Figure 4.2: Number of AWP-systems installed and projected in the period 2008-2022. The dark blue line shows the cumulative number AWP-systems installed and projected. The light blue line is the cumulative number of AWP-systems installed on newbuilds, and the yellow line show the cumulative number of AWP-system delivered as retrofits. AWP-systems that complies with or are prepared for the Helcom-standard is represented with the red and grey lines, respectively. The Helcom-standard will be present in section 5.1 Cruise industry



Source: (Scanship, 2020a)

4.1.2 Bio-sludge treatment

All the sludge from wastewater and foodwaste is processed in the Bio-sludge treatment system. The main target of this system is to reduce the volume by dewatering and drying bio-sludge, as well as disinfecting the sludge. By dewatering the sludge, the original volume can be reduced by 90%. Reject water from the dewatering process can be treated in the AWP-system. To further decrease the volume of the sludge it goes through a drying process. This process reduces the sludge down to 5% of the original volume. The end product can be incinerated or used for energy production aboard, or it can be delivered at dock to be used in other applications onshore (Scanship, 2020d). These onshore applications are described in section *4.3*

4.1.3 Foodwaste Handling

To align with future requirements the cruise industry chooses to process all the foodwaste aboard the ship. The solution Scanship offer uses a vacuum system to collect, transport and further process the foodwaste. Using vacuum to transport reduces the need for complicated pumps and pipelines. It also does not have any infectious water in circulation between the feeding stations and the processing equipment. The vacuum transportation ensures safe transport through the pipes and to the central processing system. It also contributes to homogenizing the foodwaste before further processing (Scanship, 2020e)

4.1.4 Water Reuse

Safe, clean water aboard ships have been taken for granted for a long time. Traditionally water could be bunkered in port or produced aboard by distilling seawater with waste heat and cheap fuel. The traditional view is now changing. More and bigger ships, rising fuel prices, changing environmental and natural resources conditions, concerns about environmental footprint and awareness of waterborne pathogens are putting pressure on ship and port water supplies.

The water reuse unit (WRU) was made to address the problems mentioned above and is made possible with the AWP system. The WRU “polish” water from the AWP-system to near-drinking water purity. This allows the water to be recycled and to be used for wash down, laundry, sanitary flushing, technical machinery water, fuel water emulsions, plant irrigation and other non-potable and non-recreational water uses aboard the ship. Using water from the WRU to non-potable application will lower the cost of operation due to the lower water consumption.

The WRU can also be used to polish and prolong the use for recreational waters. Recreational waters on a maritime vessel is water used in spas and pools (WHO, n.d.). Using the WRU will keep the water "fresh" for longer periods without heavy chemical dosage. This could further reduce the need for costly discharging of water. Alongside keeping the recreational waters "fresh" it can also disinfect condensation from HVAC-systems (Heat, Ventilation and Air Conditioning). The system meets the safety standards set by the World Health Organization for non-potable ship water supplies and safe water reuse systems (Scanship, 2020f).

Clean water is viewed as a precious and valuable resource. Scanship delivers custom water treatment system specified to the customer's needs. These systems meet or exceed the standards specified in the MARPOL. MARPOL is the international convention for prevention of pollution from ships (IMO, 2020a). The convention has several annexes with requirements regarding discharging of different types of water, for instance water containing oil or water containing residues from bulk cargo such as grain, coal or gravel. A custom water system can reduce or eliminate the need for discharging in port and the fees connected with it. It can eliminate the need for planning routes for discharging and thereby lower the fuel and emission cost. The systems also make it possible to recover usable materials. In conclusion, this will contribute to raising the bottom line (Scanship, 2020g).

Alongside the other cleaning systems for water they also deliver water treatment systems for marine scrubbers. Marine scrubbers are a system that uses water to clean gas from the exhaust system. Once the scrubber water is treated, the pH-levels are analysed, and the water are checked to see if it is within the requirements. The water is then pumped to a clean holding tank, directly overboard or recycled to the scrubber. Wash water residues are then dewatered to minimize the volume and collected for proper handling on shore-based reception facilities (Scanship, 2020h).

4.1.5 Waste Recycling and Garbage handling

In addition to deliver a wide variety of different water treatment systems, Scanship delivers several waste and garbage handling systems. Their waste recycling systems can do a wide range of task: separating waste streams, crushing glass, shredding various materials, compacting-, baling-, and palletizing waste. This can make the environmental liability that waste is into a saleable commodity. The waste recycling system prevent accumulation of recyclable waste during the voyages. The system makes standardized packets of materials to ensure efficient offload and minimize the work hours related to waste handling (Scanship, 2020i).

Material that does not have a recycling value is treated as garbage. The garbage handling system that Scanship delivers has incinerators with low flue gas emission and comply MARPOL regulations. There is an automatic feeding system to ensure the most homogenous combustion and low dust emission.

In addition to burning garbage, the system is also ideal for burning the sludge from wastewater and foodwaste from the bio-sludge treatment system. The incinerator can also be equipped with a sludge oil burning system. The main chamber in the combustion is pyrolytic, meaning it burns with limited supply of oxygen. There is an automatic ash removal system which is continuous. The ash is removed through either a chute below the incinerator into a container or via cooling system to a bagging device. To ensure a complete breakdown of gases and residual components there is a second combustion chamber. The second combustion performs a purification of the flue gases making the emissions much lower than conventional incinerators. (Scanship, 2020j)

Waste to energy (MAP)

Alongside the more conventional incinerators Scanship is developing a system to turn waste into energy. This system can process all carbon-based waste such as – food, sewage, paper, cardboard, plastic, wood and oils. The input is converted by a fast pyrolysis into flammable gas, bio-oil, charcoal or usable heat. A system of this kind will turn waste into a usable resource, and in addition to a cleaner environmental operation it can also influence the bottom line in a positive way (Scanship, 2020k).

4.2 Aquaculture

The cruise systems have other areas where they can be applicable. Land-based and closed-cage production of Nordic Salmon and other sea food has the need for water purification and to treat residues. By treating the water in the fish tanks the water consumption can be minimized and thereby reduce the environmental impact. The water treatment system is called Recirculation Aquaculture System (RAS).

This technology minimizes the water consumption and enhance the fish production. Separated solids from RAS is pumped to a sludge treatment system. Scanship delivers the sludge treatment system, using the same technology as in the cruise industry. The sludge will be filtered to increase the concentration of dried material. After the filtration, the sludge is dewatered by centrifuges, this will further increase the dryness. By using a flocculant, the dryness is increased, and the reject water is purified.

Once the sludge is dewatered it goes to the batch dryer system. This will dry the sludge further before it can be bagged. This process reduces the volume of the residues down to about 0,5% of the original volume. Further use of the dried bio residuals varies in the different fish plants. It can be used for agricultural soil enhancement, heat and energy recovery or as a valuable feedstock in other industrial applications (Scanship, 2020l)

4.3 Land-based

The land-based solutions are delivered to a broader range of industries and produces several different products. We have therefore chosen to divide this section into four parts. The first part will focus on the solutions Scanship delivered for land-based application prior to the acquisition of ETIA. The second part will focus on ETIA`s technology and how it works. The third and fourth part highlights the different products made by ETIA`s technology and their applicability in different industries.

4.3.1 Wastewater and garbage handling

The waste processing and water purification systems can be used onshore as well as offshore. The systems can be used in a variety of land-based industries. These industries either have a requirement regarding discharge from production or a need to refine products using the separation, dewatering, or drying solutions of Scanship.

In addition to the industrial use, the systems can be used on municipal applications such as wastewater treatment plants and garbage handling facilities. The wastewater technology is installed in many municipalities in the Nordic region.

Scanship delivered two larger waste management systems (WMS) to the international airports Norman Manley and Sangster which are the two international airports in Jamaica. These systems include garbage recycling equipment and waste incinerators. The systems process all the waste generated by the terminals and waste from arriving airplanes. (Scanship, 2020m)

4.3.2 Biogreen pyrolysis technology.

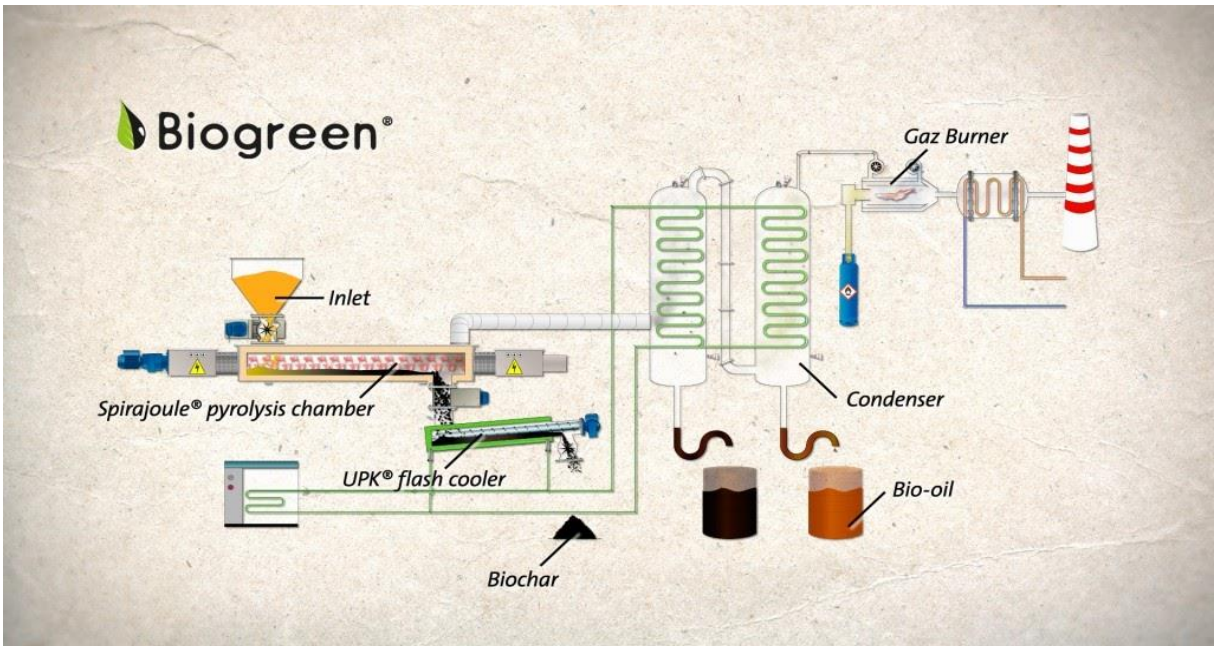
The acquisition of ETIA has given the Group access to a wider range of land-based markets. ETIA has solutions that makes products from feedstock such as biomass, biosolids and waste. The products are made by applying thermochemical treatment on the organic feedstock. This type of thermochemical treatment is called pyrolysis. In this treatment, the feedstock is exposed to high temperature with the absence of oxygen.

Pyrolysis always produces three different products: a solid phase, a liquid phase and non-condensable gases. Depending on the temperature in the process both the composition and yield of the products vary. Lower process temperatures (250-400°C) gives the highest production of solid product such as bio coal. Moderate temperatures (450-600°C) increases the production of liquids such as pyrolysis oil, and high temperatures (650-800°C) enhances the production of syngas which are non-condensable gases. (Biogreen, 2020a). We will take a closer look at the different products in section *4.3.3*.

The technology ETIA delivers consists of different systems that together create the Biogreen Pyrolysis technology. At the core of the process is the Spirajoule which is the pyrolysis unit. The Spirajoule is a screw conveyor and is heated by using electricity. It can reach temperatures up to 850°C. The screw conveyor transports the feedstock through the pyrolysis chamber. Once the feedstock is exiting the pyrolysis chamber it goes into a cooler system called the UPK flash cooler. This cools down the feedstock with the help of water, steam or other thermal fluids. The cooling is needed to bring the products from pyrolysis to a stable temperature for further management (ETIA, 2020a, Biogreen, 2020b).

The gas created in the pyrolysis exits the chamber and enter a condensator. This allows the gas to be separated into the condensable and non-condensable phase. The condensable phase is then collected for further processing. The non-condensable phase is either collected for other uses or burnt to provide a fossil-free energy alternative.

Figure 4.3. The Biogreen Pyrolysis process. The figure shows the whole pyrolysis process and the different end products.



Source: (Biogreen, 2020c)

4.3.3 Bio-based products

This section will focus on the different products produced by the Biogreen system and their applicability.

Bio coal

Bio coal is a carbon-neutral alternative that can replace the need for fossil coal used in industrial processes. It is made by pyrolyzing wood biomass or biosolids such ass crops or sludge digestants. The thermal conversion of the biomass is done without oxygen. Doing this allows it to remove cellulose components and volatile organic compounds. This is done to create a uniform and solid biofuel with similar characteristics as fossil coal.

Compared to raw biomass such as, wood, pellets or briquets the bio coal is significantly different. The bio coal has higher energy density, high carbon content, hydrophobic properties and significant resistance to biological degrading. The bio coal can be used as a reducing agent in blast furnaces, where raw biomass cannot be used. These attributes make bio coal a sustainable and fossil-free alternative to industries such as metallurgy.

95% of all ore-based steel is produced in blast furnaces that use coking coal as the reduction agent and the source of heat. In the furnace, the iron oxide is reduced to metallic iron by fossil carbon sources. These furnaces produce emissions of about 2,3 tonnes of CO2 per tonne of steel produced. To meet the worldwide climate objectives a significant reduction of the CO2 footprint is needed. Bio coal could contribute to this.

The Biogreen system for bio coal allows continuous and repeatable production of solid fuels. The system offers a fossil-free production of bio coal. Parameters such as temperature and residence time in the process are precisely monitored. This makes so it able to target specific parameters of bio coal and adjust the end product according to target market demands and still keep a stable production over time. (Biogreen, 2020d)

Biochar

Biochar is another product obtained by applying pyrolysis on biomass. It is a carbon-rich and porous material which has a wide range of applications such as soil improvement, remediation and pollution control. The biochar is different from charcoal because it is produced on a higher temperature. Burning or deteriorating biomass releases a significant quantity of carbon dioxide into the atmosphere. By making biochar through pyrolysis, most of the carbon will remain as a solid product together with minerals and most of the nutrients. Therefore, the biochar is not poisonous to plants, but charcoal is.

Biochar is mainly used in agriculture to fertilize soil, improve plant growth and provide crop nutrition. A secondary use in agriculture is to use biochar as an additive in animal feed to livestock to further improve the overall farming productivity. This contribute to minimize emissions while creating fertile soil that needs no chemical adjustments. Gases from the production of biochar are a source of energy and can help reduce dependency on fossil fuels. This could reduce the overall fossil consumption and represent a sustainable approach to cut greenhouse gas emissions in developing countries.

In addition to using biochar to fertilize and nutrient the soil it can also be used to minimise the water usage. It does so by increasing the water storage capacity of the soil and enhances the growth by managing to deliver water to the root system of the plants. This is an organic and natural alternative to the synthetic and artificial products for hydro-retaining (Biogreen, 2020e)

Syngas

During the production of biochar and bio coal the gases produced are called syngas. Syngas is a mixture of different gases and condensable compounds. This is the majority product of high temperature pyrolysis on any biomass, residues and waste. The hot syngas leaving the reactor consists of a non-condensable and a condensable phase. The non-condensable gases are methane, hydrogen, carbon monoxide and dioxide. The condensable compounds are called pyrolysis oil. The main application for produced syngas is heat and electricity production. Generated heat can be used for drying feedstock, and steam- and energy production. Hot syngas can also be used as a replacement for conventional fuel.

Cooling down the syngas makes it possible to extract the liquid phase. It also broadens the use and eases the transportation of syngas. Ambient temperature syngas can be sold or used to generate electricity via internal combustion engine and gas turbines. It can also be used for methane and hydrogen production (Biogreen, 2020f).

Pyrolysis oil

Pyrolysis oil is the liquid phase of the syngas when it has cooled down. It is a complex blend of molecules consisting of more than 200 different compounds as a result from the pyrolysis of the feedstock. The quality of the oil is dependable on the feedstock. Clean biomass pyrolysis makes it possible to obtain high quality oil. This oil can be used in either food aromas such as liquid smoke or in pesticides and plant enhancers such as wood vinegar. Regular pyrolysis oil can be further refined to be used as fuel (Biogreen, 2020g).

4.3.4 End of life tires

Performing pyrolysis on end of life tires solves two problems, as it allows local processing of waste which is difficult to get rid of and it creates a valuable resource from waste. Tires are separated from metals and shredded. The crumbed rubber can be processed to generate high energy syngas, pyrolysis oil and char. The solid product produced by tyre pyrolysis are called reCB which stands for recovered/recycled carbon black. reCB can be used in paints and coatings, ink production and as a filler in the rubber industry. Recycled carbon black from tyre pyrolysis is an environmentally friendly alternative to carbon black from oil-based processes (Biogreen, 2020h)

4.4 Patented systems

Scanship has delivered patented solutions to the cruise industry for years. Their AWP-systems complying with IMO-regulations have made them the market leader. A well-developed WMS consisting of patented solutions, and the new waste-to-energy (MAP) technology have put them in an ever-stronger position. We will take a closer look at the MAP-system in this part. MAP turns waste to energy, captures carbon and provides end-of-waste solutions and have several possible applications. A contract for the deliverance of MAP on two "mega sized cruise ships" was signed in March 2019 (Scanship, 2019b). While most cruise ships use an incinerator aboard to burn waste to ashes, the MAP system converts waste into biofuel. All carbon-based waste can be re-processed to power the cruise ship, thus reducing the ships carbon footprint (The Explorer, n.d.). Henrik Badin, the CEO of Vow, described the contract as a "commercialization milestone" for the MAP technology (Scanship Holding ASA, 2019)

MAP also has a large potential in land-based industries. Biogas plants struggle with microplastic from sewage sludge and food waste. MAP is capable of degrading microplastics into biochar as an end-of-waste solution (Scanship Holding ASA, 2019). The Group has signed the first contract to deliver a full-scale land-based MAP project in April 2019. We take a closer look at the contract in section *5.3*.

The acquisition of ETIA added more patents to the portfolio for land-based solutions. Biogreen system is the patented pyrolysis system of ETIA mentioned in section *4.3*. The UPK cooler system and The Spirajoule are patented solutions in the Biogreen system. The Spirajoule and UPK cooler are additionally included in other patented systems such as the Safesteril® and SaltX. The Safesteril® is a system developed by ETIA for sterilizing spices, herbs, dehydrating vegetables, seeds, grains and other food and pharmaceutical ingredients with the help of the mentioned solutions (Safesteril, 2018). SaltX uses the Spirajoule unit to discharge nano-coated salt and are a part of the EnerStore solution for storing energy and release heat and steam (ETIA, 2018). Another patented solution is

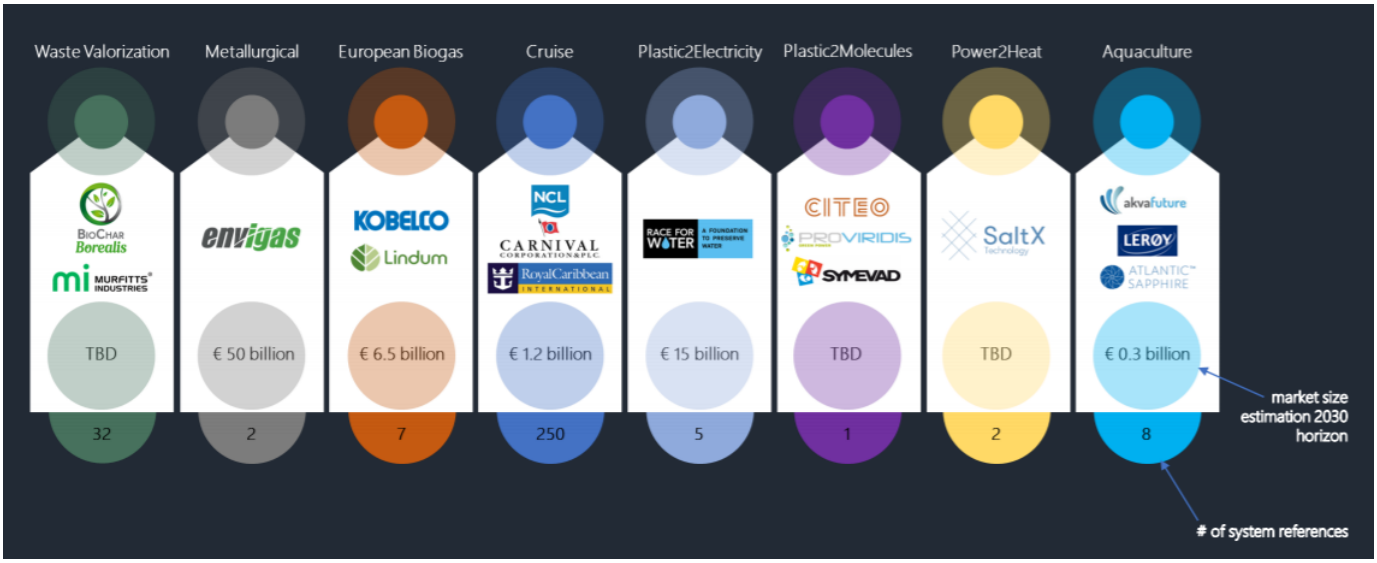
Synthane®. This solution produces synthetic methane from gases coming from the Biogreen system with the help of gas purification and methanation process.

5. Target markets

In this chapter we will take a closer look at the markets which the Group targets. Mimicking the layout in chapter 4. Solutions, the markets will be separated into cruise, aquaculture, and land-based. This chapter will provide a fundamental insight to the development and outlook in the target markets and will lay the foundation for our strategic analysis.

Figure 5.1 illustrates the addressable industries for the Group. Major customers from the cruise industry and aquaculture industry are included. The remaining industries are categorized as land-based. Companies included in land-based industries are either existing customers or potential projects. Vow has estimated the market size for 2030. This reflects the market potential of the solutions they deliver, *not the industry itself*. Land-based industries have a huge market potential compared to the cruise- and aquaculture industry.

Figure 5.1: Target markets and industries. The figure illustrates the three target markets: cruise, aquaculture, and land-based. The land-based market consists of six addressable industries. All major customers and potential projects within each industry is included, and the market size for 2030 are Vow`s own estimates. The value of some industries is yet to be decided (TBD).



Source: (Scanship, 2019a)

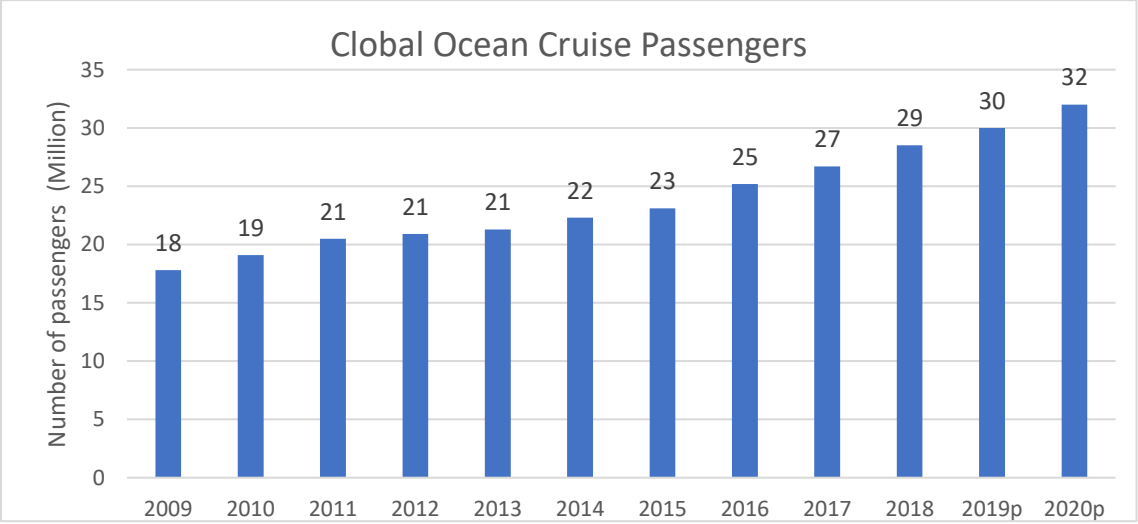
5.1. Cruise

This section takes a closer look at the cruise industry and will be divided into three different parts. The first part will focus on general outlooks in the cruise industry and how the industry is dominated by a few large players. The next part will focus on drivers for the solutions Vow delivers and the third and final part will present costumers and contracts.

5.1.1 General outlook and market players

The cruise newbuilding industry grows at a significant pace. An underlying factor for the high newbuilding activity is a strong global cruise passenger growth. For the past 10 years the annual growth rate has been 5,4% (CLIA, 2019). Industry revenues have grown from USD 15.7 billion in 2010 to an estimated USD 31.5 billion in 2020, delivering a 7.2% CAGR (Micallef, 2020). Cruise Lines International Association (CLIA) predicts that the market will continue to grow in the short-term, as they expect 32 million cruise passengers worldwide by 2020.

Figure 5.2: Global cruise passengers (in millions) from 2009 to 2020. Note that the 2019 and 2020 numbers are predicted by CLIA.



Source: (CLIA, 2019)

Proving to be one of the largest growing sectors in the tourism industry, the cruise industry expands into new destinations making it more accessible. The Confederation of British Industry identify three major factors driving the global growth in cruise tourism (CBI, 2020):

- A strong economic recovery resulting in increased consumer spending and leisure travel expenses.
- A substantial increase in repositioning cruises, referring to a cruise in which the embarkation port and the disembarkation port are different. The availability of cost-effective one-way flights for tourists to return to their homes, and the price advantage compared with regular cruising, has sparked consumer interest in repositioning cruises.
- The cruise ship capacity is predicted to reach 39.6 million yearly passengers in 2027. This translates to a CAGR of 3.1% from 2020 to 2027, using the predicted 2020 number from figure 5.2.

Cruise lines

The global cruise industry counted 314 vessels with a combined capacity of 537 000 passengers at the end of 2018. The industry is dominated by a handful of cruise lines. The largest player is Carnival Corporation & plc with several established brands in its portfolio (Cruise Market Watch, 2018a). Together with Royal Caribbean Cruises Ltd. (RCCL) and Norwegian Cruise Lines Holdings (NCLH) they are often referred to as the "big three" within the cruise industry.

Table 5.1: Overview of the global cruise market. The figure illustrates the "big three" players with their main cruise lines. Their market shares regarding passengers and revenue is included. Some of the largest cruise lines outside the «big three" are also listed.

Parent	Brand	Ship count	% of passengers	% of revenue
Carnival	Carnival	26	22,00 %	8,90 %
	Princess	17	6,40 %	9,10 %
	AIDA	13	4,60 %	4,60 %
	Costa	12	6 %	4,80 %
	Other	35	8,4 %	12,0 %
	Total	**103**	**47,40 %**	**39,40 %**
Royal Caribbean	Royal Caribbean	26	19,20 %	14 %
	Other	16	3,80 %	6,2 %
	Total	**42**	**23,00 %**	**20,20 %**
Norwegian	Norwegian	16	8,70 %	8,40 %
	Other	10	0,80 %	4,2 %
	Total	**26**	**9,50 %**	**12,60 %**
	MSC Cruises	15	7,20 %	6,80 %
	Disney	4	2,30 %	2,20 %
	TUI Cruises	6	2 %	2,30 %
	Other	118	8,6 %	16,5 %
	Total	**143**	**20,10 %**	**27,80 %**
	Grand total	**314**	**100,00 %**	**100,00 %**

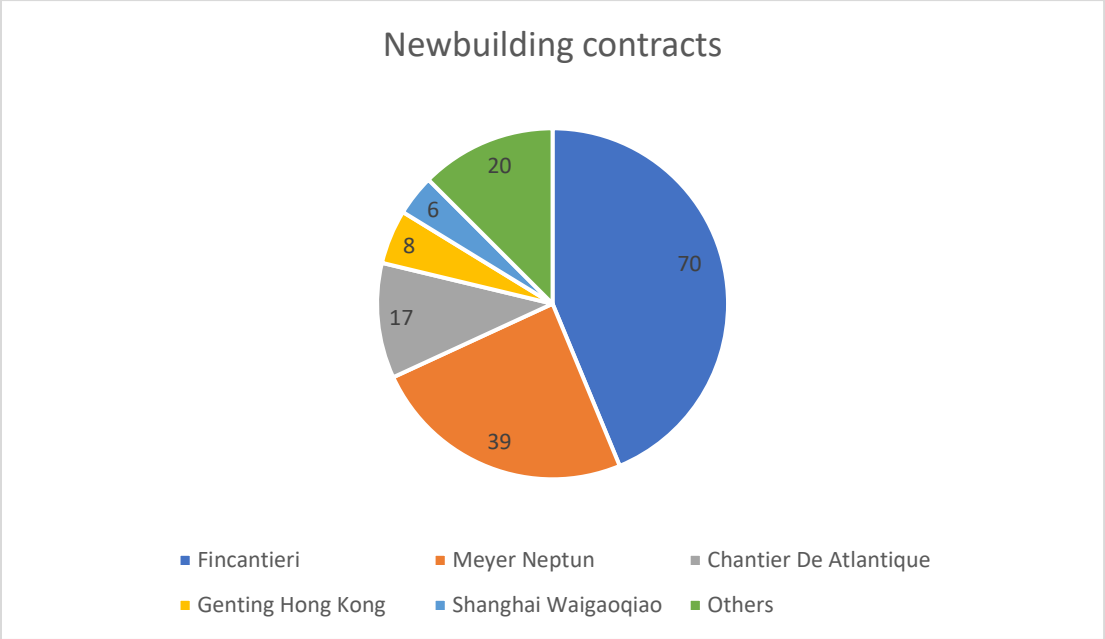
Source: (Cruise Market Watch, 2018b)

Shipyards

Shipyards from around the world build new cruise ships every year to face the increasing number of cruise passengers. The cruise shipbuilding industry has historically been dominated by three large players, namely Fincantieri, Meyer Neptun and Chantiers de Atlantique. The industry has been through several consolidations. Previous industry giants STX Europe faced financial distress and sold STX Finland to Meyer Werft, a part of the Meyer Neptun Group, in 2014 (Meyer Werft, 2014).

Fincantieri bought the majority stake of STX France in 2017 and renamed it Chantier de Atlantique (Fincantieri, 2017). Eventually STX Europe went bankrupt and are therefore not included in figure 5.3. Figure 5.3 illustrates the number of larger[2] cruise shipbuilding contracts awarded to shipyards from 2008 to 2019 (Lian, 2020).

Figure 5.3: Cruise shipbuilder by number of contracts awarded, from 2008 to 2019. The figures show how the three large shipyards has dominated the market in the period.

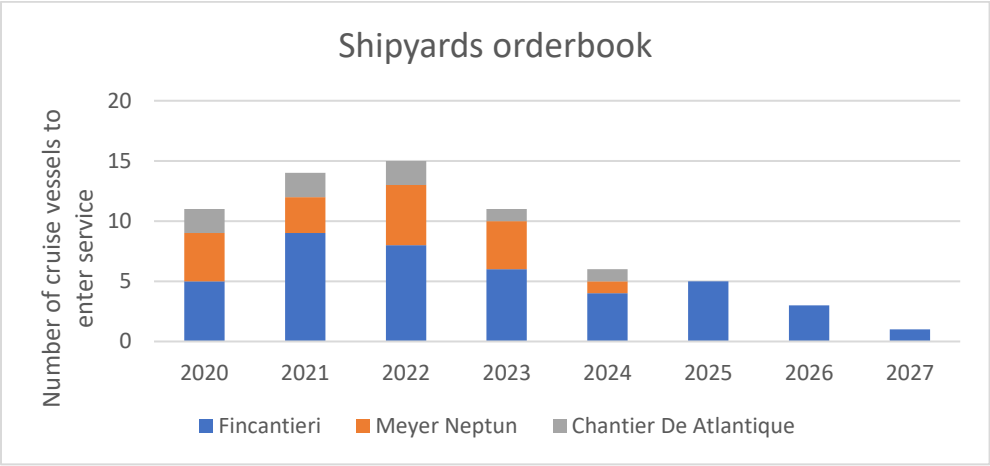


Source: (Lian, 2020)

Figure 5.3 illustrates the historical dominance of the three shipyards, accounting for 80% of the newbuilding contracts in the given period. Their capacity very much dictates the amount of orders in coming years. Looking forward, scheduled cruise newbuild in their orderbook is set to increase from 11 in 2020 to 15 in 2022. Lian (2020) states that the cruise orderbook of the main shipyards are full until 2023-2024, i.e. 4-5 years ahead. Beyond 2024, Fincantieri is the only yard to have secured contracts.

[2] Cruise ships of 200 berths (passenger capacity) or more

Figure 5.4: The three largest shipyards cruise orderbook from 2020 to 2027, by number of vessels. Note that the yards have available capacity from 2023-2024.



Source: (Lian, 2020)

5.1.2 Market drivers

Regulatory market drivers

CLIA is the world`s largest cruise line trade association, accounting for 95% of global cruise capacity. CLIA and its members have pledged to cut carbon emissions with 40% by 2030 (compared to 2008). They have therefore identified new technologies and cleaner fuels as a top priority for the cruise industry. All CLIA members must manage their waste in accordance with sound environmental principles and in compliance with all regulatory requirements. The International Maritime Organization (IMO) make sure that CLIA members are subject to comprehensive, consistent, and uniform international standards (CLIA, 2020).

IMO enforced Annex IV of MARPOL in 2003, prohibiting the discharge of sewage (blackwater) within a specified distance from the nearest port. Only ships with approved sewage treatment plant aboard can discharge within the specified distance. This is commonly referred to as the “Alaskan regulation”.

The most recent amendment to Annex IV was enforced in 2013. It introduced stricter regulations for certain “special areas”. In addition to complying with the previous regulation in Annex IV, ships must also meet the nitrogen and phosphorus removal standard to sail in these “special areas”. HELCOM is a commission set to protect the marine environment of the Baltic Sea from pollution. Through cooperation with IMO, they have managed to designate the Baltic Sea as a “special area”. This is currently the only “special area”, but this could be expanded. Newbuilt cruise ships must be

compliant with the regulations from 2019, and existing cruise ships[3] by 2021, in order to sail in "special areas" (IMO, n.d.).

The latest IMO regulation come in effect from January 1. 2020. This regulation lowers the allowed sulphur content in ship emissions from 3,5% to 0,5% (IMO, 2020b). IMO regulation regarding sulphur emissions first came in effect under Annex IV of MARPOL in 2003 and has been tightened ever since. Cruise lines must either find alternative fuel sources or clean their exhaust gas to meet the requirements. This regulation increases the pollution standard regarding marine scrubbers. Scanship deliver cleaning systems that purify the wash water from marine scrubbers.

Friends of Earth, an international environmental organization, issue an annual cruise ship report card. They grade 16 major cruise lines and 185 cruise ships on four environmental factors. The report card illustrates the poor environmental standard of several large cruise lines. An ageing cruise fleet with an average age of 14.1 years in 2019 (CLIA, 2019) is much to blame for the grim report. Note that all the cruise lines committing criminal violations are part of Carnival Corporation.

Figure 5.5: Friends of Earth` cruise ship report card from 2019. 16 cruise lines are graded on four different factors: sewage treatment, air pollution reduction, water quality compliance and transparency. Additionally, criminal violations are also considered for the final grade. Further explanation on the factors are presented in the figure above the report card.

Sewage Treatment:	Air Pollution Reduction:	Water Quality Compliance:	Transparency:
Whether a cruise line has installed the most advanced sewage and wastewater treatment systems available instead of dumping minimally treated sewage directly into the water.	Whether a cruise line has retrofitted its ships to "plug in" to available shoreside electrical grids instead of running polluting engines when docked.	To what degree cruise ships violated 2010-2018 water pollution standards designed to better protect the Alaskan coast.	Did the cruise lines respond to our requests for information regarding their environmental practices.

[3] Existing ships are vessels built before the amendment on Special Areas in 2013.

CRUISE LINE	Sewage treatment	Air pollution reduction	Water quality compliance	Transparency	Criminal Violations	2019 FINAL GRADE
Disney	A	D+	A	A		A-
Princess	B	C	A-	F	✓	F
Norwegian	A	D-	A	F		C-
Holland America	B+	D-	A	F	✓	F
Seabourn	A	F	B+	F	✓	F
Celebrity	A	D-	N/A	F		D+
Cunard	A	F	N/A	F	✓	F
Regent Seven Seas	C-	F	A	F		D
Royal Caribbean	A	F	N/A	F		D
Carnival Cruise Line	F	D	A	F	✓	F
Silversea	D	F	A	F		D
Oceania	C-	F	C+	F		D-
MSC Cruises	C-	F	N/A	F		F
P&O Cruises	D-	F	N/A	F	✓	F
Costa	F	F	N/A	F	✓	F
Crystal	F	F	N/A	F		F

Source: (Friends of Earth, 2019)

Other motivational factors

The section above illustrates that Scanship`s solutions to comply with environmental regulations are a necessity for cruise ships to operate. Cruise owners face a couple of other motivational factors for choosing environmentally friendly behaviour, namely financial and “greenwashing”.

According to the company, installing AWP and WMS and combining it with the new waste-to-energy (MAP) technology can save large cruise ships for yearly costs of MUSD 1. This gives a payback of approximately five years. If the price of carbon increases the payback time will be even shorter (Kleiven, 2019).

The cruise industry has long had a reputation of paying little attention to the environment, culminating with Carnival Corporation`s MUSD 20 fine in 2019 for dumping plastic waste in the Bahamas (Nace, 2019). Consumers today have an increased focus on sustainability and the environment. Cone Communications conducted a survey on 1000 Americans in 2017 where 87% responded that they would have a more positive image of a company that support environmental issues (Butler, 2018). Cruise owners have picked up on this and strive to “greenwash” their image, making compliance with environmental regulations a selling point (World Cruise Industry Review, n.d.). Whether cruise owners are motivated to become greener for the sake of the environment, or if it is to attract and retain aware tourists, is hard to conclude upon.

5.1.3 Customers and contracts

Since the cruise industry is dominated by few cruise lines and shipyards, it is critical for the suppliers to build long-lasting relations. System orders for Newbuilds is a two-step approach. Step one involves cruise lines placing a system-specific order at a shipyard. Then, the yard puts out a tender for the specified orders to accommodate the company's request. Subcontractors then submit tender offers which are evaluated based on different criteria, and the best tender is finally awarded with a contract. When Scanship delivers systems to newbuilds, the yard is installing it with supervision from Scanship.

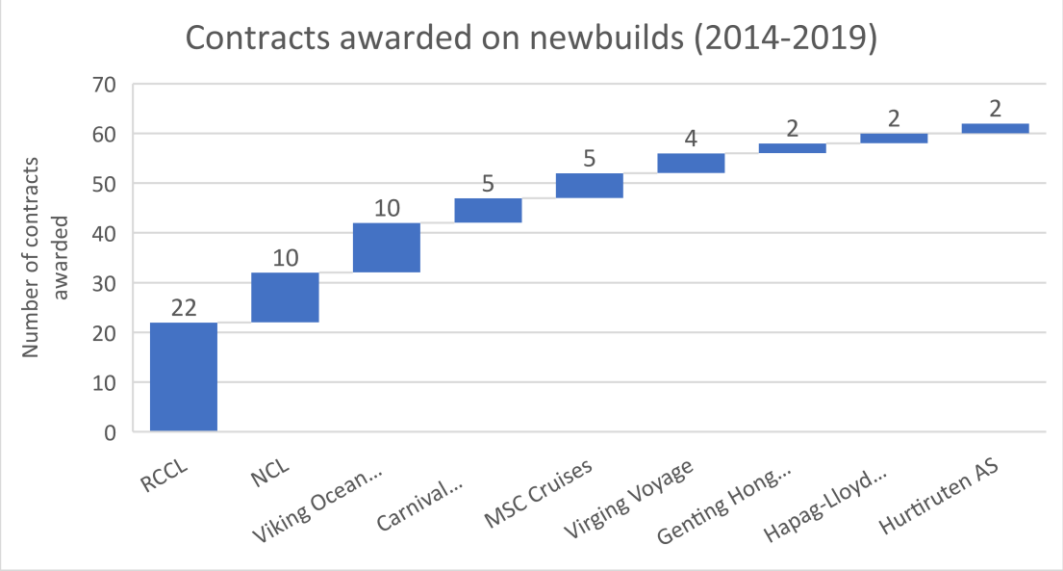
Contracts on solutions delivered as retrofits are awarded directly by the shipowners. Previously, engineers would stay on board and install the systems while the ship was in operation. This prevented the need for a lengthy dry-docking, but engineers would take up capacity. As a major retrofit would take up to 60,000 hours, it translated to lost bookings for the owners. Scanship engineers can now prefabricate the systems and deliver them as turn-key solutions (World Cruise Industry Review, n.d.). Turn-key solutions are easily deployed and ready to use. Scanship are still responsible for the installation (Vow ASA, 2020).

Cruise lines may favour certain system suppliers, so it is important to build relations with both the cruise owners and shipyards (Nordea Markets, 2019). The Group has very much succeeded in doing so. Moreover, we mentioned that a ship`s compliance with environmental regulations have become a selling point over the last years. Thus, operators and owners are “more likely than ever” to talk up their waste treatment suppliers (World Cruise Industry Review, n.d.).

Newbuilding market

Scanship are awarded contracts for newbuilds according to the two-step approach described above. This section seeks to link together Scanships` largest customers (cruise lines) in the past and the contracts awarded by shipyards on future deliveries (backlog). Figure 5.6 illustrates the number of awarded contracts on newbuilds from 2014 to 2019 by vessel owner.

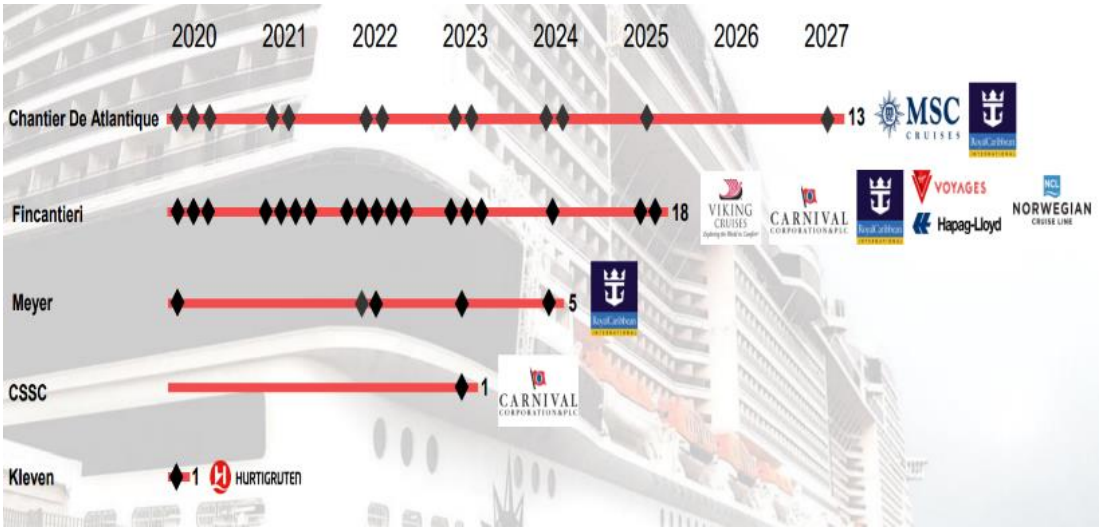
Figure 5.6: Number of awarded newbuilds from 2014 to 2019 by vessel owner



Source: (Lian, 2020)

Figure 5.7 show the number of Scanship-equipped newbuild vessels set to enter service from 2020 to 2027 (backlog) sorted by shipyard. Note that the yards place the order for installation of systems about two years before the ship is completed (Nordea Markets, 2019). In other words, ships set to enter service in 2020 where installed with Scanship solution(s) in 2018.

Figure 5.7: Number of newbuild deliveries from 2020 to 2027 (order backlog) with Scanship systems by shipyard. 38 ships are currently on order worldwide.



Source: (Vow, 2020c)

RCCL has been the largest customer from 2014 to 2019. Scanship have been awarded contracts to deliver systems on 22 newbuilds from RCCL owned lines, mainly Royal Caribbean Int., Silversea Cruises and TUI Cruises[4]. Moreover, orders were secured from all the main yards. Most notable was the contract awarded by Chantiers de Atlantique in November 2019 on AWP systems to the fourth ship in the RCCL Oasis class of vessels, entering service in 2023. Option for a fifth Oasis class ship set to enter in 2025 is also included. The Oasis class vessels are among the largest cruise ships in the world (Scanship, 2019c).

Scanship has delivered systems to NCLH newbuilds since 2004 (Scanship holding ASA, 2016). In total, 19 ships in the fleet of NCLH (NCL, Oceania Cruises and Regent Seven Seas) are equipped with Scanship AWP-systems per November 2019 (Scanship, 2019d). Because Scanship consistently have been awarded contracts on NCLH vessels from such an early phase, they are one of, if not the, most important client. Between 2014 and 2019, 10 NCL newbuilds were awarded to Scanship. Among those are the contract from Fincantieri for the supply of STCSS for the next generation of NCL newbuilds arriving in 2022 to 2025 (Scanship, 2017a).

Scanship quite recently expanded its client base with Carnival Corporation. Contracts for delivery of AWP-systems on three Carnival Corporation newbuilds (Carnival Cruise Line and Costa) was awarded by Fincantieri in 2016 (Scanship Holding ASA, 2017). Carnival Corporation announced a joint venture with China State Shipbuilding Corporation (CSSC) in 2018. They seek to build cruise ships in China that are tailored to Chinese travellers, to accommodate the expected growth in the Chinese cruise market (Carnival Corporations & plc, 2018). Although there is no explicit contract between Scanship and CSSC per 31.12.2019, figure 5.7 from 2H 2019 indicate that a firm order is in place.

Scanship have been awarded 10 contracts by Fincantieri on Viking Ocean Cruises newbuilds. They are considered important customers, especially since every single contract has been for the supply of STCSS**.** The seventh, eighth, ninth and tenth ship built by Fincantieri for Viking Ocean cruises are set to enter service from 2021 to 2023. Scanship delivered systems starting 2019 till 2021 (Scanship, 2018a).

MSC Cruises is the largest player in the industry excluding the “big three”, accounting for 7% of total passengers and revenues in 2018. Only industry giants Carnival Corporation have ordered more newbuilds than MSC, making them an attractive client. Scanship were awarded its first contracts on MSC Cruises in 2017, delivering STCSS for two ships built at STX France (Chantier de Atlantique) (Parr,

[4] TUI Cruises is a joint venture between TUI AG and RCCL

2017). Another contract for STCSS to the fifth MSC Meraviglia Plus class vessel was awarded in 2019 (GlobeNewswire, 2019). The vessel is set to enter service in 2023.

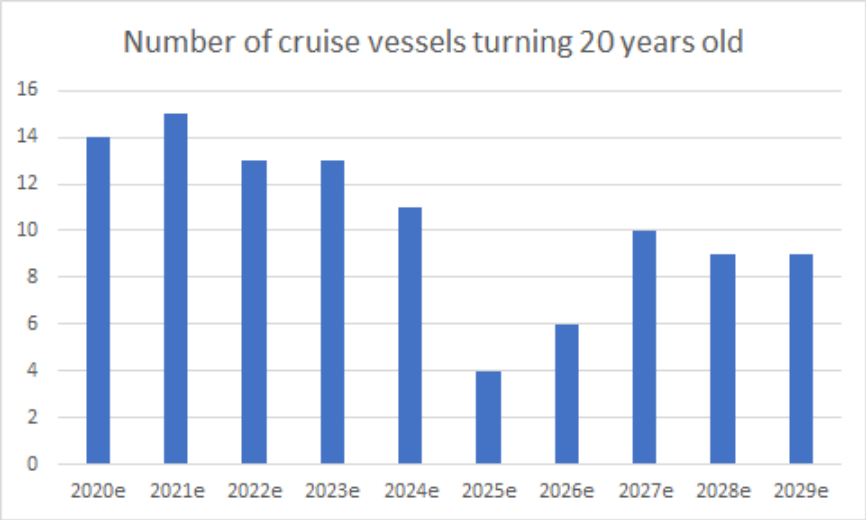
The last customer we want to highlight is Sir Richard Branson`s newly established Virgin Voyages. Scanship and Virgin Voyages made an agreement in 2017 on the development of MAP. Virgin would promote MAP and install the system on its ships once it "has shown to be effective and assuming that the cost is reasonable" (Scanship, 2017b). Note that Virgin Voyages emphasizes its environmental profile as a selling point and addresses Scanship directly. Contracts on all four of Virgin Voyages` newbuild have been awarded to Scanship, with the latest in 2019 for a total clean ship system (Scanship, 2019e). The Group states that it delivered the MAP technology for two "mega sized cruise ships" in March 2019. Whether they are part of the delivery to Virgin Voyage is not confirmed by the Group (Scanship Holding ASA, 2019).

Retrofitting market

Retrofits used to make up a big part of Scanship`s system deliveries. Looking at figure 4.2 from section *4.1.1*., Scanship delivered more AWP-systems for retrofits than for newbuild until the mid-2010`s. They had delivered a total of 30 systems as retrofits per 2014, of which 25 were AWP-systems and 5 were WMS (Lian, 2020). Among the retrofits were AWP-systems to 10 vessels under RCCL. Scanship began retrofitting the vessels in 2010 to meet the new HELCOM-standard, now replacing the previous Alaskan as the new industry standard (Scanship Holding ASA, 2016). Turning our attention to figure 4.2 again, it becomes clear that the activity in the (AWP) retrofit market severely decreased from 2014, almost coming to an immediate stop.

As mentioned in section *5.1.2*, existing ships must be compliant with the Helcom-standard by 2021 to sail in "special areas". Whereas most newbuilt ships comply with the standard, Lian (2020) estimates that 37% of total cruise vessels lack AWP to comply with the legislation and thus make out potential targets for retrofitting. Moreover, FoE`s ship report card from 2019 illustrated the grim environmental standard of several cruise lines. We argued that the fleets average age of 14.1 years is a contributing factor. Lian (2020) argues that the lifespan of AWP-systems are around 20 years, after which it should be replaced. Many ships are turning 20 years old in the coming years, representing an opportunity for a coming wave of retrofits.

Figure 5.8: Estimated number of cruise vessels turning 20 years old. The figure illustrates the estimated number of vessels turning 20 years in the period 2020-2029.



Source: Lian (2020)

Scanship has noticed a growing concern in the cruise industry for environmental regulations, as the retrofit activity has picked up in the last couple of years (Vow ASA, 2020). They were awarded a contract with Carnival Cruise Line in 2018 to ``support the line`s ongoing commitment to advanced wastewater purification systems in accordance with the IMO MARPOL MEPC 227(64)[5]`` (Scanship, 2018b). Considering the line has over 100 vessels and a very poor environmental score, it represents a very large potential customer in the retrofit market. AWP retrofitting for a vessel sailing under NCLH`s subsidiary Oceania Cruises was awarded to Scanship in 2019. The installation will be done during the spring of 2020 (Scanship, 2019f).

Aftersales

Aftersales includes sales of chemicals, spare parts and services within operational assistance, maintenance, and repairs. It comprises all activities related to sale of spares and consumables, as well as service on systems delivered to the cruise market (newbuild and retrofit) and the aquaculture market. Because the cruise industry is by far the biggest market for the company, most aftersale revenues are linked to this market. Scanship offers service and operational assistance onboard cruise ships through its service department, covering the complete lifecycle of its systems.

As the number of delivered systems is increasing, so are the market for aftersales. Recurring revenue from the Aftersale segment will strengthen as Scanship build up an increasing base of systems installed on the fleet of cruise vessels worldwide. The Group highlights that the 38 ships currently on

[5] Referred to as the Helcom-standard

order worldwide as shown in figure 5.7 are added to their installed base, and thus represents opportunities in the Aftersale segment (Vow ASA, 2020)

Aarvik & Nilsen from Pareto Securities emphasize that once a Scanship-system is installed, it practically gives them a monopoly on maintenance and repairs. Hence, as the base of Scanship-equipped cruise vessels increase, the revenues from Aftersale will also increase. All systems delivered to cruise ships must be maintained, making it a predictable revenue for the Group (Kleiven, 2019). Lian (2020) states that *annual* Aftersales revenues per vessel in operation have reached approximately MNOK 1 in recent years. Considering the predictive nature of revenues from the segment, they will grow with the number of installed Scanship systems.

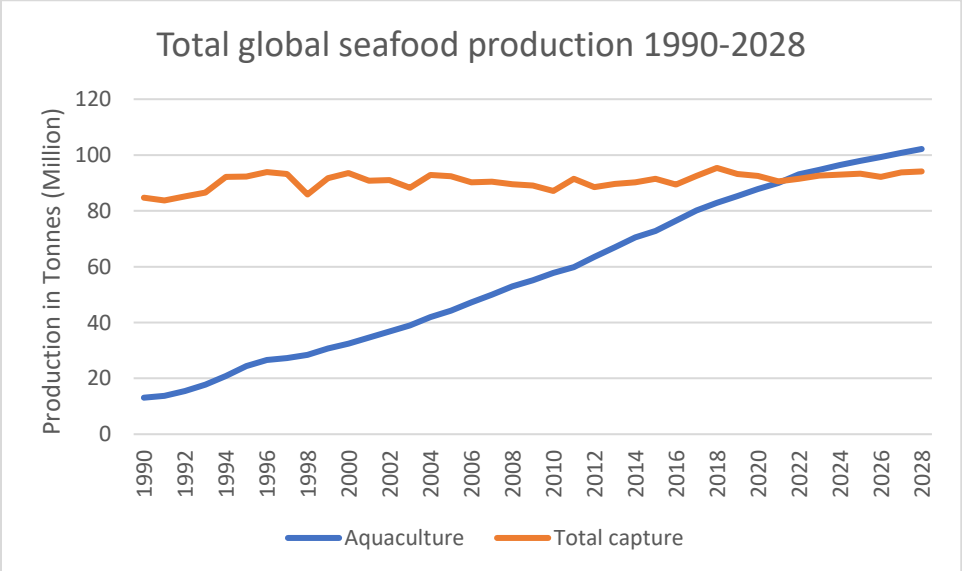
5.2 Aquaculture

In this section we will focus on land-based- and closed-cage aquaculture, because these are the types of farming where Scanships systems are applicable. The section will start with a general outlook on the aquaculture market before we will narrow it down to RAS-systems and how they might affect the market in the future. We will further narrow the scope and focus on the salmon farming, both smolt production and full-sized production. Thereafter the market for RAS suppliers to salmon farmers and how the Group are positioned will be highlighted. Lastly, we will present contracts. Due to the limited impact aquaculture has on the Groups revenues the market will only be discussed briefly.

Volumes from global captured seafood reached 85 million tonnes in 1990 and have been relatively flat since then. Increased aquaculture production has accounted for the latest growth in global seafood production. In 1990 aquaculture contributed with about 15% of the global production but in 2017 it accounted for about 47% of the production. This is illustrated in figure 5.9. Also include in the figure is the predicted production until 2028. The global seafood production is predicted to reach 201 million tonnes in 2030, with aquaculture contributing 109 million tonnes. If the prediction strikes aquaculture will account for about 55% of the global production of seafood in 2030.

The predictions are provided by FAO and OECD. FAO is the Food and Agriculture Organization which is a specialized agency of the United Nations that leads international efforts to defeat hunger (FOA, 2020a) OECD is the Organisation for Economic Co-operation and Development and is an international organisation that works to build better policies for better lives. (OECD, 2020a)

Figure 5.9: Historical development and predictions in global seafood production from 1990 to 2028. The figure shows the increase in aquaculture production and the relatively stable capture production in the period. The aquaculture production is the blue line and capture production is the orange line.



Source: (OECD, 2020b)

Drivers towards more land-based and closed-cage aquaculture

(Bjørndal & Tusvik, 2017) does in their workpaper refer to (Basu, 2015) which said that 4,5% of the total aquaculture market uses RAS systems. RAS uses less water, lowers the cost of pumping and energy, and has therefore become increasingly popular. (Basu, 2015) also predicts that RAS-systems will produce over 40% of the total aquaculture output in 2030. RAS are the types of systems used in both land-based -and closed-cage farming.

Norway is the largest producer of salmon in the accounting for 52% of the total production of Atlantic salmon world-wide (Lian, 2020). The production almost entirely came from traditional open net pen farming in 2016. The consensus from the industry leaders presented in the PWC Seafood Barometer is that only 53% of produced volume would come from traditional farming methods in 2050. This signals a move towards alternative technologies in the future (DNB Markets, 2017).

Customers

RAS-systems accounted for 30% of the total production of salmon smolt in Norway in 2017 according to the industry leader (DNB Markets, 2017). There are three large providers of RAS, namely: Billund Aquaculture, Kruger Kaldnes and AKVA group. These three had a combined market share of 90% in 2015. Billund was the market leader with 44% market share, followed by Kruger Kaldnes with 30% and AKVA group with 16% (DNB Markets, 2017). These three also appears to be the market leaders in full-size salmon production with all having current projects. Billund Aquaculture reported high demands with at least one quote for a new project every week. The requests came from at least 15 different countries in Europe, Asia, North America, and Africa (Bjørndal & Tusvik, 2017).

As mentioned earlier Scanship is the market leader in advanced wastewater systems to the cruise industry. They also cooperate with the three large suppliers in RAS systems having delivered systems to all of them. These two factors contributed to giving them a unique position in the market (Nordea Markets, 2019). Because they have delivered proven and tested solutions to the cruise industry for years, we believe their sludge-handling systems in RAS meets the same standards.

Contracts

Scanship has a total of eight contracts in the aquaculture market. Most of the sludge-handling systems are delivered to smolt factories for leading companies in aquaculture such as Lerøy and SalMar.(Oslo børs, 2017; Scanship, 2018c) They also have contracts on large full-sized production facilities for land-based farming with Atlantic Sapphire (Scanship 2018d) and closed-caged farming

with AkvaFuture.. Under we will highlight the two full-sized facilities and a pilot project which can further enhance their unique position.

Atlantic Sapphire is constructing the largest onshore production facility with Billund Aquaculture responsible for the RAS system. Scanship delivers their sludge-system to Billund and the initial contract is for the first of three steps. The total production from the facility when all the three steps are done is expected to reach 90 000 tonnes of salmon (Nordea Markets, 2019). The other project where they deliver systems is AkvaFuture from the AKVA group. This facility is closed-cage farming placed offshore and it aims to have a total production of about 72 000 tonnes of salmon.

In 2018 a pilot project was carried out to attempt to commercialise fertiliser from sludge generated by salmon farming. This project was a joint project between MOWI, IVAR, Skrettling and HOEST. It would convert sludge residuals from MOWIs smolt facility in Steinvik to fertiliser and then deliver it to Vietnam. The project was successful and a contract between MOWI and HOEST was established. Scanship delivered the sludge-handling system and this open doors to new verticals within the aquaculture market (Nordea Markets, 2019)

5.3 Land-based

Land-based solutions is the newest addition to the Group's portfolio. Scanship signed a contract for a land-based industrial system in April 2019. The contract was to deliver full scale industrial MAP as part of a research program. The program focuses on valorization of biochar from pyrolysis of organic waste. Scanship received attention on its MAP technology as it was relevant for many land-based applications (Scanship Holding ASA, 2019). The acquisition of ETIA in August 2019 expanded the Group`s offering of land-based solutions where pyrolysis can be deployed (Vow ASA, 2020).

In the following section, all land-based markets from figure 5.1 will be briefly described, and companies/projects relevant for the Group are presented.

Waste valorization (with pyrolysis)

This market introduces applications for production of biogenic materials and fuels. Biochar is used as soil enrichment or soil remediation and capture carbon, and bio coal can replace fossil coal in power plants. Also, end of life tires can be recycled to black carbon which can be re-used in rubber compounds. Approximately 10 billion tons of wood and agricultural residues are available annually. Valorization of this biomass through pyrolysis would save over 10 billion tons of CO2 emissions (Scanship, 2019a). The size of the market is yet to be decided.

The Group identifies Murfitts Industries and Biochar Borealis as possible projects. Murfitts recycle tyres to make rubber granulate for artificial pitches and rubber mulch for playgrounds (Murfitts Industries, 2017). They also produce recovered carbon black from end of life tyres granulate, which can be reintroduced in rubber industry as reinforcing filler and is a more economical added value material than shredded tires (Moulin, Da Silva, Bounaceur, Soudais, & Herblot, 2017). Murfitts represents a potential vertical for the Group as the recycling of carbon black involves pyrolysis. Biochar Borealis on the other hand valorise forest residues by thermochemical conversion technology. As the name suggests, the company mainly produce biochar (Biochar Borèalis, N/A).

Metallurgical

The decarbonizing metallurgical industry produce biocoke with pyrolysis to replace fossil coal as reducing agent in metallurgic applications. Biocoke is a new biomass fuel that is produced by applying heat and compression (Ohashi & al., 2016). The metallurgical industry produces 1.7 billion tons of steel annually, consuming approximately 1 billion tons of fossil coke. This equals to 10% of the global CO2 emissions. Aiming to replace 20%-50% of fossil coke with a renewable source would require 500 million tons of biocoke. If 30% of the fossil coke is replace by biocoke, the industry has an estimated value of BEUR 50 by 2030 (Scanship, 2019a).

As the metallurgic industry is currently consuming fossil coal and is under strong CO2 emissions scrutiny, the Group identifies the search for carbon neutral fuels to replace conventional fuel as a new market vertical. The Swedish company Envigas produce carbon-neutral fuels for the metallurgic industry (Vow, 2020c). ETIA delivered a pilot plant to Envigas in 2017 and will be delivering the first large-scale plant in 1Q 2020 (Vow, 2020b).

European biogas

Biogas is a category of biofuel that is produced when organic matter such as animal manure, sewage waste, and food scraps, breaks down primarily in an anaerobic environment (Fortune Business Insights, 2019). The European biogas market is expected to grow from current ≈ 16.000 plants to 24.000+ plants by 2025 with EU 2030/2050 targets. The *entire* European biogas market is estimated to be worth BEUR 6.5 by 2030 (Scanship, 2019a).

The EU state through the "European green deal" to decarbonize the European gas grid, propelling the growth in infrastructure. The Group identifies a target market of 500 plants with a full potential of MEUR 900 in revenues. Scanship were selected as technology partner in the currently ongoing project at Lindum. The goal of the project is to demonstrate technology that convert waste digestate into products for soil enrichment, remediation and sorbents (Vow, 2020c). This project was the Groups first full-scale land-based MAP project mentioned earlier in this section.

Plastic2Electricity (P2E) & Plastic2Molecules (P2M)

P2E and P2M are two possible solutions for plastic waste that include pyrolysis. ETIA provide a P2E solution by applying high temperature pyrolysis of plastic. This process which is carried in Biogreen-system results in production of syngas, a key element in waste to energy production of electricity, steam, and heat (ETIA, 2020b). The market is estimated to BEUR 15. In P2M however, the objective is to concentrate ultra-high temperature pyrolysis for the exploitation of non - recyclable plastic waste in the forms of hydrogen and pyrocarbon (graphite and graphene). The process is considered chemical recycling of plastic. The value of the market is yet to be decided (Scanship, 2019a).

Race for water (R4W) collaborated with ETIA to develop a machine capable of converting plastic waste into electricity (Race for water, 2018). The R4W ACT program has ambitions to set-up 4000 container-based sites globally to process up to 14 million tons per year. Up to 2.5 MWh electricity can be produced per ton, covering the need of around 6,000 households in certain targeted areas (Scanship, 2019a). ETIA have also been involved as a technology partner for CITEO in a three-year project to demonstrate high temperature pyrolysis of plastic to hydrogen and pyrocarbon (Vow, 2020c). The Group also engages in a project cooperation with Symevad, a large waste-management

company in Northern France, and Proviridis, a company specializing in the implementation of multi-energy stations and hydrogen (Scanship, 2019a).

Power2Heat

The P2H market involves storing energy at production peaks and enables it to be used when the demand is high. Although the Group do not provide an estimate for the market, the European *industry* is expected to be worth BEUR 4.5 (Scanship, 2019a).

ETIA delivered the first demo unit to Swedish company SaltX Technology for energy storage in 2018, called EnerStore. The solution is based on nano-coated salt – a patented SaltX solution. By using ETIA patented Spirajoule units, it performs energy charging and discharging (ETIA, 2018). Their pilot plant in Berlin opened in November 2019. The plant is then evaluated to bring the industrial energy storage solution closer to commercialization (Market Screener, 2019).

Contracts after the acquisition

ETIA were awarded with a contract for delivering Biogreen system to a "major international corporation of consumer goods" in November 2019 (ETIA, 2019a). The project aims to increase the customers share of renewable energy used by offsetting the natural gas consumption. The importance of the contract is highlighted by the Group, as the customer operates more than 40 production facilities and want to increase the share of renewable energy (Vow ASA, 2020). The installation for the current single-facility project is planned to be completed during the fall of 2020.

ETIA entered an equipment delivery contract in December 2019 to provide the first Biogreen-system in Germany. The project will convert wood to the renewable products that the Biogreen-system make. This customer also seeks to expand the use of such technology in coming years. The installation for this single-plant project is set to be completed at the end of 2020 (ETIA, 2019b).

5.4 Competitors

Getting an overview of the Group's main competitors is a rather challenging task as they operate in a wide range of markets. Scanship has traditionally delivered solutions to cruise ships. Most of the revenue is still generated through projects and aftersales delivered to cruise vessels, so our focus will be on this industry. Few players compete within the cruise markets. The main competitors are highlighted in this analysis, namely Evac and Wärtsilä.

Scanship only first entered the Aquaculture industry in 2015 (Lian, 2020). Only 8.5% of revenues in 2018 and 1% of revenues in 2019 were attributable to aquaculture solutions. However, with ever more aquaculture projects in the order book, the industry may prove more prominent for the Group (Nordea Markets, 2019). Finding suitable competitors is challenging because the market for land-based and closed-cage aquaculture is still in an early phase. We have identified Norlex as a possible competitor

Due to the early phase of the land-based markets it is difficult to identify competitors for the solutions the Group deliver. The competition could in the future come from other new entrants but as of now we have not managed to find any suitable competitors. We will discuss the possibility of new entrants in the market in section *6.1.1*

Cruise

EVAC

The Finnish company Evac is the world's leading provider of integrated water and WMS, as well as corrosion-protection systems, for the marine, offshore, and building industries (Evac, n.d. a). They have applications on different types of cruise vessels, from small luxury cruise ships to the world's largest liners. Through their Evac Complete Cleantech Solution, they deliver water and waste management systems (Evac, n.d. b). Public information on the company is scarce since it is private, but revenues of MUSD 79.25 were reported in 2018 (Dun&Bradstreet, n.d.).

Wärtsilä

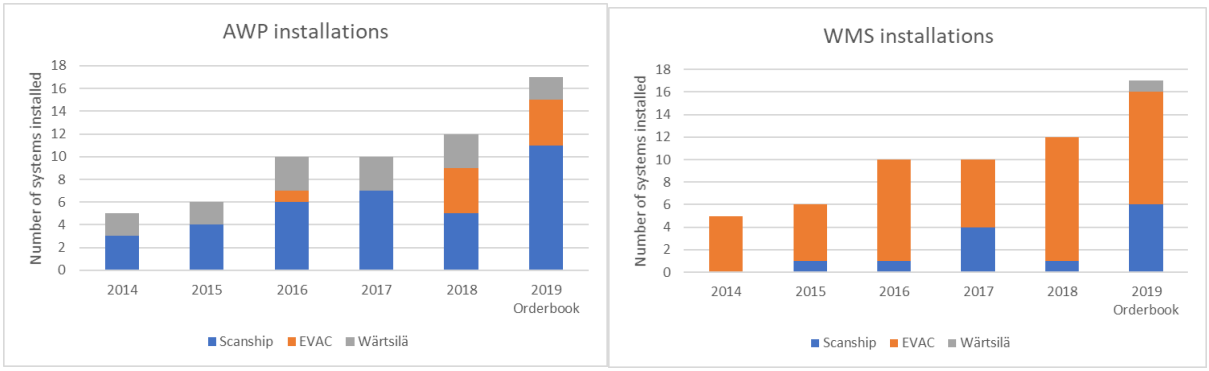
The Finnish group Wärtsilä is the global leader in smart technologies and complete lifecycle solutions for the marine and energy markets. In the marine sector, it operates on a larger scale than Evac and Scanship, supplying engines, gears, propulsion equipment and control systems, among many other things (Wärtsilä, 2020a). They reported net sales of BEUR 5.3 in 2019, of which BEUR 3.33 originated from the marine business. Note that marine business includes traditional merchant vessels, gas carriers, ferry-, navy-, and special vessels, as well as cruise ships (Wärtsilä, 2020b). They started to

deliver wastewater treatment and WMS to the cruise industry after they acquired Hamworthy in 2012 (Nordea Markets, 2019).

Market shares for cruise solutions

Evac, Wärtsilä and Scanship are the main suppliers for solutions to cruise ships. Figure 5.10 illustrates the number of AWP- and WMS installed from 2014, and the order book for 2019. During the period, these companies equipped 60 ships with solutions. Note that it represents 120 systems delivered in total. AWP and WMS are separate systems and *could* potentially be delivered by two different suppliers, e.g. Scanship deliver AWP and Evac deliver WMS (Nordea Markets, 2019).

Figure 5.10: Number of AWP and WMS installations from 2014 to 2019. Scanship has historically been the market leader in AWP-solutions, and Evac the market leader in WMS.



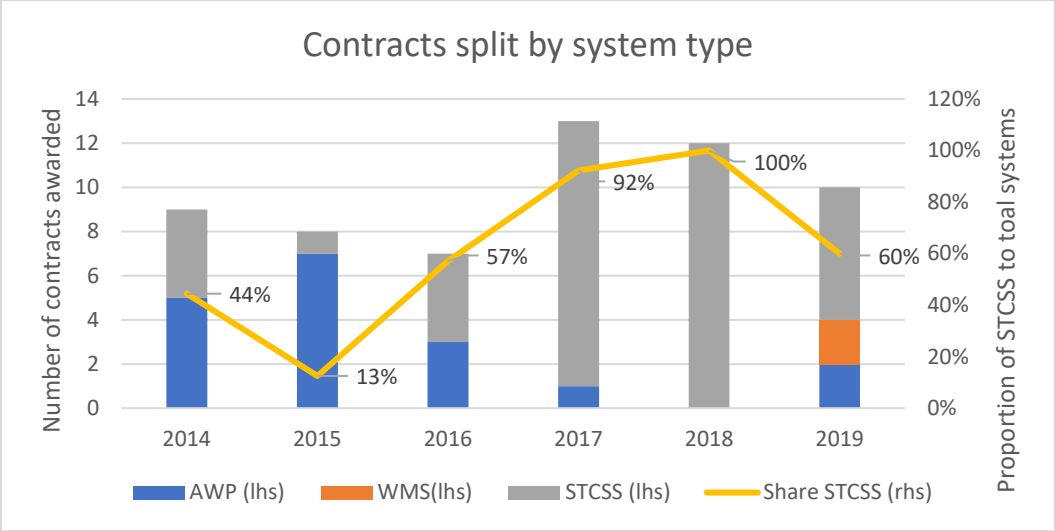
Source: (Nordea Markets, 2019)

Scanship is the market leader in AWP-systems. Following stricter environmental regulations in 2003 and again in the 2010`s, the cruise lines became more aware of environmental solutions. Scanship received several orders which would comply with environmental regulations not yet ratified. This is the main reason for their market leading position in AWP solutions (Odenrud, 2018). Evac on the other hand dominates the market for WMS. Targeting AWP installations, they underbid the newbuild market in 2016 and were awarded with contracts on complete solutions (Evac, 2016). Note that the effect is first visible in 2018, because that was when they *installed* the system. Wärtsilä have lost market share in AWP-systems in the last years due to Evac`s entrance, but have recently entered the market for WMS as they installed a ship with the total clean ship system in 2019 (Nordea Markets, 2019).

(Lian, 2020) points to a recent trend where systems are packaged in total clean ship systems, moving away from the separate deliverance of AWP and WMS. This trend is very much observable in the contracts awarded to Scanship in recent years mentioned in section *5.1.3*. Their contracts on future newbuild deliveries (backlog) are almost exclusively for the deliverance of STCSS. Whereas most

contracts awarded between 2014 - 2016 were for separate AWP-systems, over 80% were for STCSS from 2017 to 2019. Note that figure 5.11 show when the contract is awarded, and figure 5.10 when the system is installed. Systems are usually installed 2 years after the agreement is made.

Figure 5.11: The Groups newbuild contracts awarded from 2014 to 2019 split by system type. The columns illustrate the annual number of newbuild contracts by system type, and the lines show the proportion of STCSS to total systems.



Source: (Lian, 2020)

As the systems two individual systems are now bundled together more frequently, it is harder to predict what market share Scanship will have in the future. This issue is addressed in section *6.2.2.* and *8.1.1.*

Aquaculture

Sludge handling systems delivered to the aquaculture industry is a small part of the industry and companies that deliver these types of systems are few and far between. We consider Norlex Group a possible competitor since they have solutions that solves the same problems as Scanship. Both systems filter and sanitize the sludge generated and has the possibility to make biochar from the residues.

Norlex

The Danish company Norlex Group is one of the of the market leaders in the Nordic countries for chemicals and water treatment solutions (Norlex, 2020). The group reported gross profits of MDKK 14.8 in 2019. Norlex Systems which is the subsidiary that delivers the water treatment systems,

reported gross profits of MDKK 3.5 (Proff, 2020). Currently the group have one order for sludge treatment systems for aquaculture. (Norlex systems, 2019)

Comparative companies that deliver the same aquaculture solutions as Scanship are hard to identify. We have therefore chosen to broaden the view on competitors and included companies which could become competitors in the future. We will only highlight the actual companies in this section, a further discussion on regarding the effects will be presented in section *6.1.1*

RAS suppliers

The suppliers of RAS such as Billund Aquaculture, Krüger Kaldnes and AKVA Group could develop their own systems. We believe that the suppliers would prefer their own system instead of Scanship`s solutions.

EVAC and Wärtsilla

The two main competitors from the cruise industry, EVAC and Wärtsilla, could choose to broaden their business portfolio to include aquaculture. If they choose to do so would deliver systems that have the similar characteristics as Sanships system.

As of now sludge-handling systems in aquaculture is not that widespread and competitors are as mentioned hard to find but this could change.

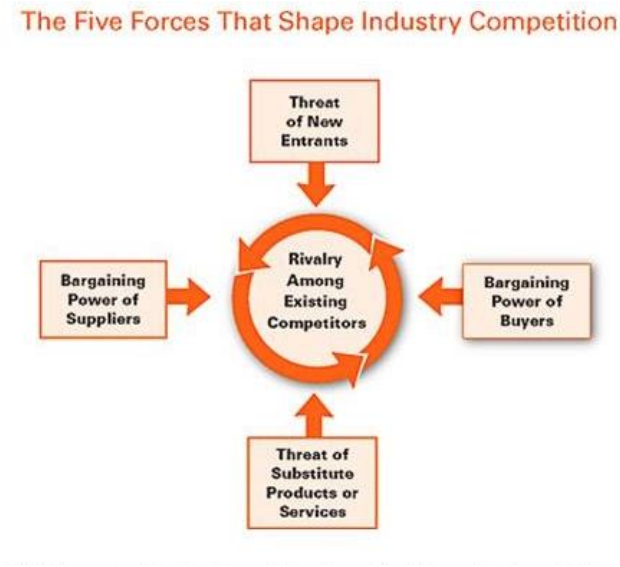
6. Strategic analysis

Having presented the solutions the Group delivers in chapter 4 and the different target markets in chapter 5, this chapter will focus on strategic elements which will help analysing the prospects of the company. The chapter will consist of four different strategic analyses. The first analysis will be a presentation of the structure and level of competition in the industries by using Porter`s five forces. Secondly, the resources which the company possess will be analysed using the VRIO-framework by Barney. The third part is an analysis of the macro environmental factors that influences the company, both current and future. Lastly, we will conduct a firm specific analysis to determine the competitiveness of the company using a SWOT-analysis. The strategic analysis's is conducted to get an understanding of how the current and future structure of the industry and how the Group is positioned to meet competition. This is vital for the fundamental valuation and provides us with important input to the assumptions in our final estimations.

6.1 Porter`s five forces

The structure-conduct-performance (SCP) framework is a strategy model that underlies what drives competitive advantage. It illustrates how the structure of an industry effects the behaviour of competitors, which is critical for the industry`s performance. This framework has been immensely popular since Michael Porter applied it to company strategy and presented his five forces; the threat of new entrants, power of suppliers, power of buyers, threat of substitute, and the degree of rivalry among existing competitors (Koller, Goedhart, & Wessels, 2015)**.** Porter explains that by analysing all five competitive forces, one gains an overview of what is influencing profitability in the industry. Based on that, one can then develop a strategy to improve a company's long-term profits (Porter, 2008).

Figure 6.1: Illustration of Porter's 5 Forces. The threat of new entrants and substitutes, in addition to the bargaining power of suppliers and buyers, effects the degree of rivalry among existing competitors.



Source: (Porter, 2008)

6.1.1 New entrants

New entrants to the industry bring new capacity and increased competition for market shares. They put pressure on prices, costs, and the level of capital expenditure necessary to compete. In a situation where the threat of new entry is high, the existing market players must keep prices low or boost investment to keep new competitors away. Porter arguments that the threat of entry put a cap on the profit for an industry. Moreover, he suggests that it is the *threat* of new entry that holds down profitability, not whether entrance actually occurs. The threat of new entrants will rely on the height of the entry barriers present in the industry, and the existing players reaction to entrants. These entry barriers can be perceived as advantages the existing players have relative to new entrants (Porter, 2008).

We will start by looking at the arguably most important entry barrier, capital requirements. Competitors can be deterred from entering the market if they need to invest substantial financial resources. In the industry for cruise solutions, the capital required to deliver these solutions are rather low. It is common for the market participants to have subcontractors to manufacture parts in the system. All Scanship systems are manufactured by subcontractors (Vow ASA, 2020), and then installed at shipyards with Scanship`s supervision. Thus, operations require little investment in fixed facilities and inventory.

On the other hand, it requires a fair amount of investment in technology to compete with the existing players and their patented solutions. Capital invested in technology is unrecoverable, as it is considered sunk cost if entrance is unsuccessful. We believe this prove a major barrier for start-ups trying to compete in the industry. However, the competitors who have entered the market in the past years were already well-established companies. For companies such as EVAC and Wärtsilä, the required investment in technology did not represent a major entry barrier. We consider the delivery of AWP-systems and WMS a niche market within the cruise industry. For as long niche keeps growing and provides healthy margins, entrants will be provided with the funds they need to enter (Porter, 2008).

The capital requirements are somewhat similar for developing aquaculture solutions. Scanship uses subcontractors to manufacture the systems so investment is primarily related to technology. Sludge treatment systems are a niche in the aquaculture market. Scanship are rather unchallenged in the niche, but this could change if the predicted growth in sustainable farming is realised. The RAS-suppliers would face a relatively small cost if they were to develop their own sludge systems.

ETIA on the other hand "designs and provides plants" (Vow ASA, 2020)**.** Although not stated explicitly, we interpret it as ETIA is manufacturing their own systems. This require investments in tangible assets. However, potential newcomers can outsource the manufacturing to subcontractors, like Scanship does.

Another entry barrier is incumbency advantages. Considering there are three large players in the industry for cruise solutions, they certainly possess quality advantages that are not available for possible competitors. As new entrant will face these established brand identities, it might prove difficult for them to win tenders, considering relations and past cooperation is important. New entrants run the risk of losing tender offers, a costly process, whereas the existing players know which tenders to take part in.

Within the aquaculture and land-based solution, proprietary technology is a deterring barrier. Considering that Scanship supplies systems to the dominating RAS-producers, they certainly possess an incumbency advantage for sludge handling systems. Several of the industries targeted by land-based solutions are still in the early phase, so we can`t identify any incumbency advantages for the Group in these markets.

The Group receives grants for the development of environmentally friendly technology. For instance, Skattefunn and Innovasjon Norge contributes with substantial funding for the development of solutions, and the Norwegian Research Council has granted 50% funding for the research program

with MAP technology (Scanship Holding ASA, 2019). New entrants can certainly apply for similar funding, which will ease the capital requirements and lower the barriers.

Moreover, newcomers will fear to enter the industry if they can expect retaliation from existing players. Incumbents can cut prices if they face competition from outsiders to retain their market share and making it hard for newcomers to establish. Going back to the situation in 2016 where Evac tried to enter the market for AWP solutions, they chose to underbid the market. As a result, Scanship were outcompeted and lost on costly tenders. This led to a negative EBITDA margin for the Group in the segment Projects (Scanship Holding ASA, 2017). Hence, the Group will likely be more careful if new entrants try to penetrate the market by underbidding. Still, EVAC and Wärtsilä can choose to underbid newcomers to retain their market share and thereby making it less attractive for new entrants.

In conclusion, we believe the threat of new entrants is modest in the cruise market, because it is set with three large players. It is higher in the aquaculture market, as the existing RAS-suppliers can find it profitable to develop their own sludge handling systems. New entrants are likely to occur in the vast “land-based markets”, due to its large size and early phase.

6.1.2 Power of suppliers

Suppliers can capture more of the value for themselves through several means, most often by charging higher prices. If the players in the industry are unable to pass on cost increases in their own prices, the powerful suppliers can squeeze profitability out of the industry (Porter, 2008).

The largest players in the market for marine solutions use subcontractors to produce their systems. The Group`s cost of goods is mainly related to subcontractors. Thus, they potentially hold substantial power as suppliers to the industry. By increasing the price for system deliveries, they could put a pressure on profitability (Nordea Markets, 2019). Porter suggests that suppliers are more powerful if they do not depend heavily on the industry for its income. We reckon that the subcontractors can easily perform other tasks beside producing and installing solutions on cruise ships, and thus require compensation to maximize profits. Another factor is the switching costs related to changing suppliers. As systems will be slightly differentiated from ship to ship (Evac, n.d. c), we assume the subcontractors need in-depth knowledge of the systems. It might prove costly to transfer knowledge to new suppliers.

As mentioned in section *4.2*, the sludge handling solution delivered to RAS-suppliers is the same as the solution delivered to cruise ships. We assume that the same subcontractors produce the sludge

handling systems. Thus, the Group run the same potential risk of powerful suppliers in the aquaculture market.

Considering ETIA manufacture their own systems, the costs will be more related to the purchase of raw materials and other inventory items. We believe the bargaining power of their suppliers is lower as ETIA could switch to cheaper alternatives.

6.1.3 Power of buyers

Powerful customers can capture more value by playing industry participants against each other. They do so by forcing down prices, demanding better quality or more services. Like powerful suppliers, this squeeze the profitability out of the industry. Customers are powerful if they can exploit industry participants through negotiation leverage (Porter, 2008).

As described in section *5.1.3*, system order is a two-step process. Shipyards seek to find the cheapest alternative complying with the specific order to maximize their profits. The lines on the other hand may prefer a specific supplier based on relations and past deliveries. Because Scanship`s solutions are either sold to shipyards for newbuilds, or to ships in operation as retrofits (Vow ASA, 2020), both shipyards and cruise lines must be considered customers within the cruise market. Whereas in the aquaculture industry, Scanship only sell their solutions to the RAS technology suppliers, not directly to the aquaculture farmers. In the land-based markets the customers are both private companies and public institutions from a wide range of industries.

The cruise industry is dominated by few large players, and Projects are conducted at a handful shipyards (Lian, 2020)**.** Pressure is on the system suppliers to win tenders. Adding that the systems they provide are quite undifferentiated, shipyards can play the suppliers against one another. With the buyers holding the bargaining power, suppliers run the risk of mispricing and subsequently unsatisfactory margins (Nordea Markets, 2019). Long-term relations with cruise lines is the key to avoid underbidding. As for aquaculture solutions, buyers are powerful in the sense that they can decide to produce their own sludge systems. Observing the profitability of their suppliers, they can choose to become providers of a total system to the industry and capture more value. This is called backwards integrations and is a source bargaining power for the buyers. Finally, buyers in both industries will most likely face low switching cost in changing system suppliers.

Next, Porter states that buyers are especially powerful if they are price sensitive. If the product or service represents a significant part of their cost structure, they are more likely to bargain hard. According to DNB, Scanship`s system for newbuilds account for less than 0,5% of the total cost of a larger cruise ship vessel (Lian, 2020). Aquaculture solutions will also make up a tiny fraction for large multi-million facilities (Olsen, 2018). It is difficult to comment on the cost of Vow` solutions to land-

based applications, but we assume it accounts for a relatively small part. However, Scanship`s solutions are crucial for the buyer's products. We mentioned in section *5.1.2* that disobeying the strict IMO regulations can prove costly for cruise lines, both in terms of fines and denied access to "special areas". Additionally, it can save large cruise ships for yearly costs of MUSD 1 and attract evermore environmentally aware passengers. Sludge handling systems are also a vital component of RAS-systems.

In conclusion, there is significant bargaining power due to the concentrated and large buyers tendering for undifferentiated products, and risk of backwards integration. However, buyers are not price sensitive because of the importance and low relative costs of solutions. Still, buyers use tenders to play participants against each other, making mispricing and the subsequent squeezed margins a potent threat.

6.1.4 Threat of substitutes

A substitute performs the same or similar function as the industry's product but by different means. Porter emphasize that substitutes are always present but can be very hard to detect as they differ from the industry's product. Like the threat of new entrants, substitutes put a cap on profitability. Industry participants must differentiate their product to evade substitutes and maximize profits (Porter, 2008).

Because it is hard to detect substitutes for the *systems* delivered to the cruise industry, we choose to take a step back and address the cruise industry itself. It is divided into the luxury, premium and contemporary segments, and thus represent an option to all from the wealthiest to families on vacation. The most prominent substitutes are airline transport, rail, and road. However, they do not provide a tourist with the same recreational facilities while travelling (UK Essays, 2016). Other substitutes in the vacation industry are increasing in quantity, such as theme parks and resorts (Kamery, n.d.). This can make the cruise industry less attractive for consumers. In conclusion, the cruise industry seems to enjoy a limited number of adequate substitutes, illustrated by the high growth in passengers and revenues.

Taking a similar approach as we did with the cruise industry; we will address substitutes to the aquaculture industry itself. Historically, production of seafood has come from capture. Section *5.2* pointed out that production from aquaculture is currently surpassing capture production in global seafood production. It is a more sustainable alternative to meet the protein required for a growing population. This will be further addressed in section *6.3.3.* Moving in on land-based- and closed-cage farming, the most prominent substitute is traditional open net pen farming. The yield from open net

pen farming might be higher, but it is far more polluting. This is one of the main reasons for why land-based- and closed-cage farming are becoming ever more popular.

ETIA deliver Biogreen pyrolysis applications to facilities to generate bio energy as a replacement for fossil energy (ETIA, 2020c). If we consider fossil fuel a substitute for bio energy, the price of fossil fuel can determine the demand for ETIA`s solutions and put a cap on prices. A drop in global energy prices would lower the incentive to invest in pyrolysis and choose bio energy (Lian, 2020). ETIA must deliver a solution that differentiates from substitutes to avoid being displaced when the price of fossil fuel is low. On the other side, facilities will face severe costs of switching to a substitute after having installed pyrolysis technology.

6.1.5 Rivalry among existing competitors

The fifth and final of Porter's five forces is rivalry among existing competitors. The rivalry can lead to price pressure, new products, advertising campaigns, and service/product improvement. Depending on the intensity and basis of competition, rivalry limits the profitability of an industry (Porter, 2008).

Porter lists two factors contributing to the intensity of rivalry. The first factor revolves around the number and relative size of competitors. The industry for cruise solutions consists of few players which are somewhat similar in size. Evac and Wärtsilä report way higher revenues than Vow, but WMS- and AWP-solutions only account for a small part of their business. In this oligopolistic market, rivals find it hard to gain market share without poaching business. Showing compelling growth in passengers and revenues, cruise is proving to be one of the fastest growing sectors in the tourism industry. For as long a significant amount of new ships is being built to meet demand, the players will act less aggressively in tenders. However, the cruise industry is cyclical in nature (Nordea Markets, 2019). Newbuild deliveries can be scarcer in tough times, and thus increase the competition for tenders.

Competition in the aquaculture industry for sludge treatment systems is very different. Scanship provide the major technology suppliers with their solutions and face little competition except from start-ups targeting smaller projects (Nordea Markets, 2019). Presuming that the aquaculture industry moves towards more sustainable farming with increased usage of RAS-systems, the niche will grow and become more sought after for established players, thus increasing the intensity of competition. Rivalry among land-based competitors is harder to comment on because Vow is set to target a wide range of industries.

The basis on which rivals compete is the second factor to impact an industry's profit. Rivalry has a negative impact on profitability if it leads to price competition. Undifferentiated products or services with low switching costs for buyers are especially exposed. We concluded upon earlier in this chapter

that solutions for cruise ships are quite undifferentiated, and switching costs are low for yards/cruise lines. Solutions for aquaculture share the same characteristics. Players must compete on other dimensions to differentiate their product/service and avoid price competition. In the cruise industry, delivery time will be especially important. For instance, doing retrofits for cruise ships require docking the ship and thus lost revenue for the lines. Players can streamline their entire service to provide an option that is more time effective and thereby differentiates from competing products.

In conclusion, rivalry among existing competitors in the industry for cruise solutions is fierce. Because contracts are awarded through tenders, price competition is likely to occur. The intensity of rivalry might increase in the aquaculture- and land-based markets in the coming years. Considering the industries are still in an early phase, the degree of competition will be determined by the development in the coming years.

6.2 VRIO - Resource-based view

Jay Barney introduced a variation of the SCP-model in 1991, called the resource-based view (RBV). This view on competitive advantage examines the connection between a firm`s internal resources and performance, and he named it VRIO. The first step is to identify and map a firm's resources, and then discuss whether these resources provide the firm with a temporary- or sustained competitive advantage. Firm resources include all assets, capabilities, attributes, etc. controlled by the firm. Further, these resources can be divided into four categories: financial capital, physical capital, human capital, and organizational capital. Financial resources include money, from all different sources, that the firm can use to implement strategies. This includes cash from equity holders, banks, and retained earning that are reinvested in the company. Physical resources include technology, Property, Plant & Equipment (PPE), geographic location, and access to raw materials. Human resources include the expertise, experience, and insight of individual employees in the firm. Organizational resources include infrastructure, controlling and coordinating systems, and relations within the firm and between the firm and those in its environment (Barney & Hesterly, 2015)

A resource is considered **V**aluable if it helps the firm to implement strategies that enhance efficiency and effectiveness. Attributes of the firm only become resources once they exploit opportunities or neutralize threats in the firm's environment.

A resource is **R**are if competitors do not possess the same volume or quality of resources. When implementing a value-creating strategy that is not copied simultaneously by other firms, the firm achieves a (temporarily) competitive advantage.

A resource is imperfectly **I**mitable if competitors cannot obtain, copy, or replace the resource without facing a cost disadvantage. Valuable and rare resources enable a sustained competitive advantage if it is imperfectly imitable.

Finally, the firm must be **O**rganised to exploit the resource to provide sustained competitive advantage (Barney, 1991). Note that a resource must fulfil the previous criteria before it can be evaluated further.

Kinserdal (2019) suggests that while Porter`s five forces explains the margins in the industry, the VRIO framework explains the expected future margins of individual companies. We will use the VRIO framework to analyse important financial-, physical-, human-, and organizational resources that the Group possess.

*Table 6.1: The VRIO-framework. This figure seeks to illustrate if a resource is **V**aluable, **R**are, **I**mitable, and exploited by the **O**rganisation. Based on the fulfilment of the criteria's, the framework shows the competitive implications and subsequent economic performance.*

Valuable?	Rare?	Costly to imitate?	**Exploited by organisation?**	**Competitive Implications**	**Firm performance**
No	-	-	No	Competitive disadvantege	Below average
Yes	No	-	Yes	Competitive parity	Average
Yes	Yes	No	Yes	Temporary competitive advantage	Above average
Yes	Yes	Yes	Yes	Sustained competitive advantage	Persistently above average

Source: (Newman & Johansson, 2010)

6.2.1 Technological expertise

Section *6.1.1* highlighted the Group`s proprietary technology as an entry barrier within all industries they compete. The Group possess extensive technological expertise, gained by developing solutions over years and continuously renewing them. For example, Scanship were quick to deliver AWP-systems to comply with new IMO, and they recently commercialized their "game changing" MAP technology.

We consider the Groups technological competency to be a valuable resource in a rapidly evolving market. Continuously developing technology have made them market leaders for AWP-systems delivered to cruise ships and put them in a favourable position in aquaculture solutions. Technology also serves as the primary barrier for newcomers. Moreover, the Group's ability to be at the forefront of technological development is rare, enabling them to compete in multiple markets. They tend to make investment in new technology early, and thus realize advantages from being the technological leader. The newest example is MAP, that once fully realized, is stated to make conventional waste destruction systems "a thing of the past" (Scanship, 2020k). Barney & Hesterley (2015) states that patent-protected new technology may enhance a firm's performance. We believe it is imitable, as competitors will find solutions with somewhat similar applications. Whether competitors will face a cost disadvantage in obtaining similar technology to MAP and ETIA`s Biogreen is hard to say. Barney & Hesterley (2015) refers to a study stating that imitators can duplicate first movers' patent-based advantages for about 65 percent of the first mover's costs. So, although developing new technology will come at a cost, we consider it rather negligible for the competitors, especially within the cruise industry. The Group seems to be organized to exploit the resource, quickly delivering newly developed technology to the market. Contracts for MAP-systems are signed

with both the cruise- and land-based market. All in all, we consider the resource a temporary competitive advantage for the Group.

6.2.2 Well-developed customer relations

We introduced the importance of building relations with both cruise lines and shipyards to be awarded contracts in section *5.1.3.* Vow provides the world's largest cruise lines and shipyards with their solutions. Customer relations is important and will continue to be so as cruise owner are more likely than ever to address waste treatment suppliers themselves. Section *5.2* pointed to the unique position Vow holds in the industry for aquaculture sludge systems as they cooperate with the largest suppliers of RAS systems.

The Group`s strong customer base has been built over years and is very valuable. Scanship has been in the cruise- and aquaculture industry for years and built up a good reputation with the largest players in the industry. Their customer base might prove to be ever more valuable. (Nordea Markets, 2019) predict that the big players in the cruise industry will become even larger and closed-caged- and land-based farming is expected to increase heavily. ETIA has also been operating with land-based industries for years, but it is harder to pick out large, recurring customers.

Deciding whether it is a rare resource is a tougher task and require a closer look at their market position. The Group holds an especially strong position in AWP-installations, maintaining the role as market leader over several years. Evac on the other hand have historically been superior in WMS, conducting installations for all the largest cruise lines. The integrations of systems into total clean ship system from AWP and WMS previously delivered by two separate companies might pressure their market position in the AWP segment, but also increase their market share on WMS (Lian, 2020). Based on the three large shipyards orderbook from 2020 to 2024 in figure 5.4, and the number of Scanship-equipped ships set to enter service from these yards in figure 5.7, Scanship hold an average market share of 55%. Hence, Scanship seem to emerge as the market leader. One reason might be their well-developed relations with shipyards. When cruise lines order additional sister ships to an existing series, the system supplier on previous vessels in the series are likely to receive contracts for the new ships as well (Nordea Markets, 2019). Also, we believe the Group has unique relations with the largest RAS-suppliers in aquaculture. It is too early to point out strong customer relations in the land-based segment. We fall to the conclusion that Vow`s customer relations are a rare resource.

We find it unlikely that newcomers will manage to build relations with the largest customers in the target markets, making it hard for them to imitate the resource. The established competitors in the cruise industry however are continuously competing for the same customers and trying to build relations for future cooperation. Although we consider it possible to imitate customer relations, it

may come with a cost disadvantage. Evac`s underbidding in 2016 on complete solutions illustrates a cost related to gaining market share. The price they "paid" for market shares was lower margins due to the low prices on the contracts they were awarded. Note that increased market shares do not necessarily translate into long-lasting customer relations.

Lastly, the Group are organized to exploit the benefits of customer relations. They can scale up operations to provide solutions for sister ships, as they use subcontractors to produce and install solutions. In conclusion, we believe the resource provide the Group with a competitive advantage. We do not think it can be sustained, due to the competitive nature of the market for cruise solutions.

6.2.3 Strong financial position

The Groups operations require investment in, and acquisition of, technology to compete in the target markets, as mentioned in section *6.1.1.* Financial capital is vital to finance future projects and verticals. Being listed on the Oslo Stock Exchange, Vow has access to capital from investors. They completed a private placement in November 2019, generating net proceeds of MNOK 100.9 to facilitate future growth. They report an equity ratio of 38%, which they consider to be "appropriate to the company's objectives, strategy, and risk profile" (Vow ASA, 2020).

The financial capital of the Group is valuable, as it enables them to develop innovative technology and endure any headwinds in the industries they supply. However, it is not considered rare, as competitors also possess strong financial resources. We believe the Group is organised to use the resource to exploit any opportunities, such as technological breakthroughs or suitable acquisitions. The Group`s financial capital is considered to give competitive parity.

6.2.4 Exchanging knowledge between subsidiaries and industries

The acquisition of ETIA gave the Group access to expertise and technology within land-based markets. Furthermore, ETIA provides vast experience and new insight to the organization, which can be shared between the subsidiaries. The Group possess a unique resource in exchanging knowledge across the organization, enabling strengthened access to new geographies and entrance to new verticals (Vow ASA, 2020). We highlighted MAP`s applicability toward land-based industries in section *4.4*. Combining the two subsidiaries expertise we believe the Group is well positioned to engage in new land-based verticals.

We define the resource as "expertise and experience from different industries which can be shared between the subsidiaries". The resource enables the Group to apply solutions in new markets and is considered valuable. Whether or not the resource is rare requires a closer look. Both Wärtsilä (Wärtsilä, 2020c) and Evac (Evac, 2020) acquire companies regularly to strengthen their offering of

solutions. The question remaining is whether they manage to exchange the knowledge between the subsidiaries and engaging in new verticals. Clearly there is no absolute answer, but by looking at companies they have acquired in the past, and the solution they offer today, we believe they possess the resource. Considering the Groups recent commitment to land-based projects, we believe they are well organised to exploit the resource. In conclusion, the resource is regarded to give competitive parity.

6.3 PESTEL - Analysis of macro-environmental factors

To get an understanding of the external influences the Group faces we are going to perform a PESTEL analysis. This type of analysis mainly provides a general idea about the macro environmental conditions and situations of a company (Yüksel, 2012).

PESTEL is an acronym for each of the different macro environments that the analysis examines. The environments included in the analysis are: *Political, Economic, Socio-cultural, Technological, Environmental and Legal.* The first time PESTEL analysis was mentioned was in 1967 by Francis Joseph Aguilar in his dissertation "Formulating Company Strategy: Scanning the Environment". Aguilar arranged the letter to create the acronym ETPS which stands for: *Economic, Technological, Political* and *Social* (Aguilar, 1967). The abbreviation was later reorganized as STEP for use in strategic evaluation of trends. It was later modified to address macro analysis of external environment or scanning for environmental change and was then defined as STEPE. In 1980s the Legal factor was added to this approach and hereby created the PESTEL analysis (Richardson, 2006) in (Yüksel, 2012)

As mentioned earlier the Group are present in a wide range of markets. In the sections below we are going to take a closer look at the macro environments and different challenges and opportunities for the Group.

6.3.1 Political

The Groups political landscape is complex due to the many targeted markets. First, we will focus on the cruise market and how they are affected by political factors. Thereafter we will take a closer look on the aquaculture market and finally the land-based markets will be discussed.

Cruise

In the cruise market there are mainly two political players with influence. The first one is the IMO which is the global standard-setting authority for safety, security and environmental performance of international shipping. Their main role is to create a regulatory framework for the shipping industry that is universally adopted and implemented (IMO, 2020c).

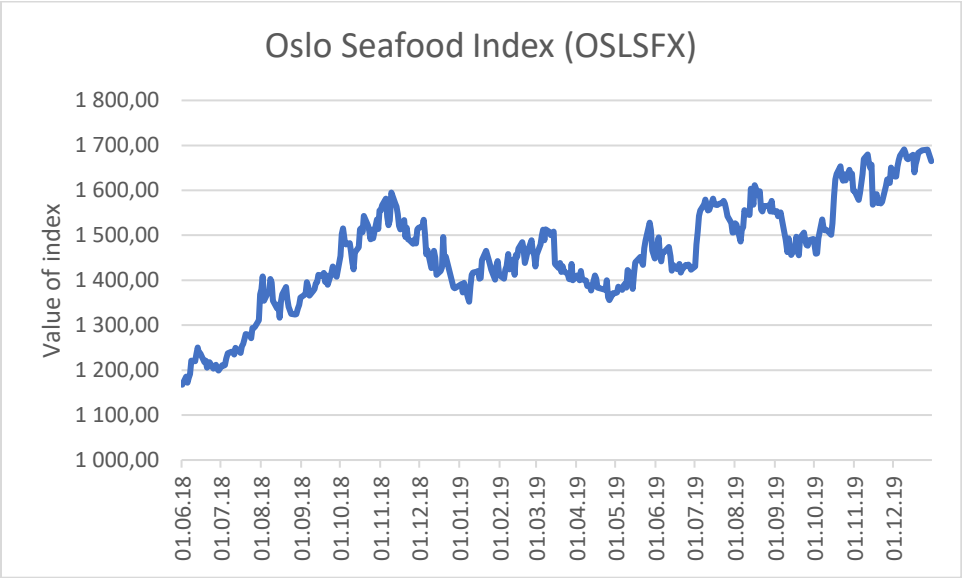
The biggest regulation from the IMO is the MARPOL. This convention has several annexes which regulates what can be discharged and the amounts of it while out on open sea. With regulations becoming ever stricter the requirement to the systems are rising. Scanship deliver systems that either meet or exceeds the regulations in MARPOL. We addressed how they do this in section *5.1.2*

The second political factor is the local governments were the cruise lines both are based and operates. The three largest lines, Carnival, Royal Caribbean and Norwegian all have their headquarters in Miami, Florida but they are registered in respectively Panama, the Bahamas and Liberia. All these countries have a low level of taxation and according to annual reports their average tax rate is 0,8%. This is way below the 21% corporate tax in the US (The Hustle, 2020). The low level of taxation makes cruise an attractive industry. Taxes can also influence the cruise industry negatively. In 2019 Amsterdam introduced tourist taxes for cruise passengers which increased the price of tickets. Other popular cruise destination such as Barcelona and Venice have implemented similar taxes and should more follow it will lead to higher overall ticket prices (The Telegraph, 2019). Increased ticket prices could lower demand for cruise tourism.

Aquaculture

In the aquaculture market where the Group operates the political influences are mainly regulation of the coastal environment and taxation. Farmers are required to have a license to operate in open net pen farming in Norway. The prices of these licences are determined by auctions and are increasing. In 2014 the average price for traditional license was MNOK 60. During the last auction in June 2018 the price of a license had risen to MNOK 145. In the same period the Oslo Seafood Index had risen approximately 270%. Licences seems to track the stock market value, as the price increased by approximately 240%. From June 2018 to 31.12.2019 the index rose another 70 % as shown in figure 6.3. Using the assumption that license pricing is following the Seafood Index, the market price of a license would be MNOK 246.5 as of 31.12.2019. The investment in required equipment is NOK15/kg for traditional farming methods. (DNB Markets, 2017)

Figure 6.3: Oslo Seafood index from 01.06.2018 to 31.12.2019. The OSLSFX Index consists of the stocks that operates within the seafood sector, listed on both the OSBX and Oslo Axess.



Source: Oslo Børs (2020a)

Licences for land-based farming is allocated on an ongoing basis with no licensing fee. The investment in required equipment is according to the DNB Seafood - special report from 2017 NOK 90/kg for land-based facilities producing over 1,000 tonnes annually. Required investments for land-based farming has fallen with technological development and increased scale and the risk is reduced due to experience from operations and examples of successful production. As required investment of traditional farming are increasing and land-based are decreasing there could be a change to more land-based farming and therefore increase the demand for the sludge handling systems. Another contributing factor to increasing the demand for land-based farming is that new traditional farming licenses are rare. The reason is that the Norwegian government is reluctant to award new licenses due to biological challenges associated with traditional farming. Some of the challenges can be salmon lice, escaped farmed fish and emissions of nutrients from food and medicine (DNB Markets, 2019).

Taxation is another factor that could further increase land-based farming. Norway suggested a special taxation for traditional farming methods in November 2019. This taxation would apply to sea-based farming of salmon and would be like the taxation that is on petroleum- and waterpower-production in Norway. Implementing this taxation policy could lead to a further increased demand for land-based farming (Fisk, 2019)

Land-based

In the land-based markets, both national and international politics influence the Group. The United Nations has due to its unique international character a great influence on politics all over the world. The UN has 193 member states and addresses issues such as climate change, sustainable development, human rights, food production and more (United Nations, 2020a). To cope with the different issues, they have developed the Sustainable Development Goals (SDG). The SDGs are 17 goals that the UN describes as the blueprint for a better and more sustainable future for all (United Nations, 2020b). All the member states adopted the SDGs in 2015 and this worldwide goal to get a more sustainable world.

As a result of the SDG more and more countries are implementing carbon pricing. As of 2018 The World Bank states that there are 51 initiatives for carbon pricing implemented or scheduled for implementation by 2020. The prices on the initiatives vary from USD 1-139 per tonne CO2 emissions (The World Bank, 2018). Since the price of carbon vary so much around the world the incentive for the businesses to cut their emissions for a strictly financial point of view are different. Companies in Sweden, the country with the highest carbon price, has a much greater incentive to cut their emissions than companies in Poland and the Ukraine, which has the lowest price on carbon.

Both the carbon pricing and how widespread policies becomes in the world will determine the incentive to get production and processes that are more climate friendly. If the prices keep rising and more policies are implemented the systems, the Group`s solutions could greatly increase in demand. The systems they deliver has low emissions, and the products produced by the systems could lower emissions in other productions, such as bio-coal in the metallurgical industry. Rising carbon prices and more initiatives could make it necessary for companies to invest in cleaner technology for production to keep making a profit. The land-based markets are therefore considered the markets with the most potential for the Group, both due to the fact that it is a new market segment, and that many companies need to make necessary changes to cope with international and national initiatives.

6.3.2 Economic

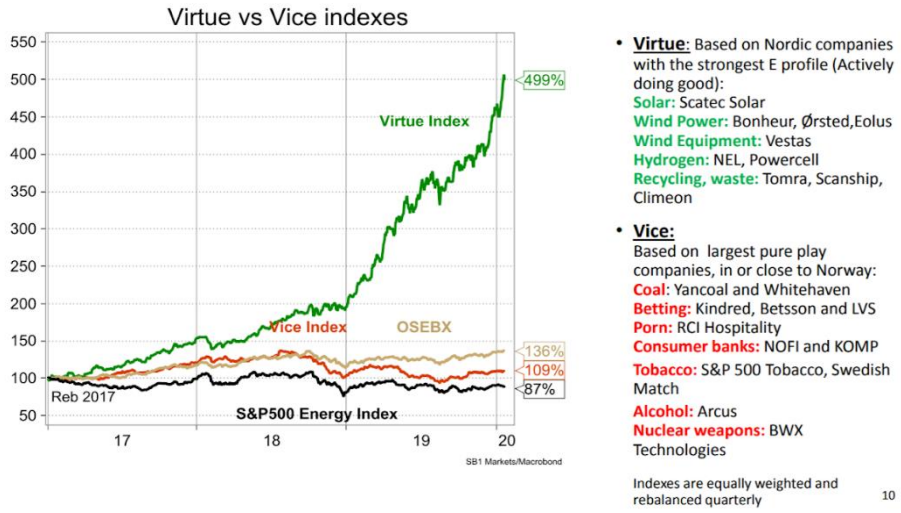
The economic factors that influences the Group are stock market trends, interest rates, currency rates and availability of credit. We will not divide the factors into the different markets because they all influence the Group as a whole. First Vow`s performance on the stock market will be presented and thereafter the interest rates, currency rates and availability of credit will be touched upon.

Stock markets trend

Norsif conducted in-depth interviews with Norwegian fixed income portfolio managers in 2018, to learn about how investors approached ESG in their investment process. From the discussion with Norwegian investors, a range of motivations emerged. While some used it as a box ticking exercise of compliance with internal guidelines, other investors emphasized ESG as a competitive advantage. A third factor was to encourage good corporate behaviour. The most common motivation for ESG integration however was to better understand the downside risk and receive better risk-adjusted returns (Norsif, 2018). EY conducted a similar survey were 260 institutional investors illustrated the increasingly important role ESG plays for shareholders. In 2018, 63% of investors said they would "rule out immediately" investment that "disclose risks or history of poor governance practices", a significant increase from 38% in 2017. Similarly, in 2018 48% of investors would immediately rule out investments that disclose risks from climate change, up from 8% in 2017 (EY, 2018).

As investors worldwide show an increasing focus in ESG, the result is a lot of money chasing the same few "virtue shares". Nordic companies with strong environmental profile are referred to as "virtue shares" in this segment. "Vice shares" on the contrary consists of pure play companies, in or close to Norway, that (presumably) score low on ESG (SpareBank 1 Markets, 2020). The indexes are compared to OSEBX and S&P500 Energy Index in the figure 6.4.

Figure 6.4: Virtue- and Vice shares vs. major indices from 2017 to 2020. The green lines represent the Virtue index, and the red line the Vice index. The OSEBX (the Oslo Stock Exchange main index) is represented with a yellow/beige line, and the S&P 500 Energy Index is the black line. The S&P 500 Energy Index consists mainly of fossil fuel companies.

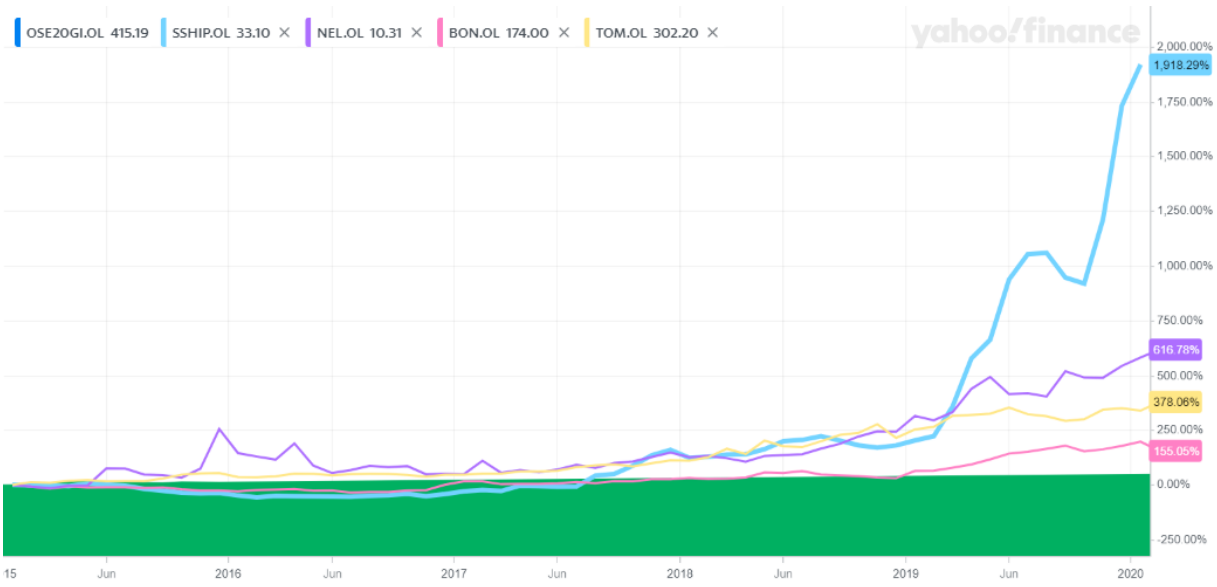


Source: (SpareBank 1 Markets, 2020)

The trend of repricing ESG-stocks becomes clear with the recent outperformance by the virtue index. According to Sparebank1 Markets greenwashing is the key value driver, meaning that traditional institutions have a large stake in at least one Virtue share. The fact that ESG funds buy ever more ESG shares, and retail investors see momentum in green shares and "jump on", also contribute to the trend (SpareBank 1 Markets, 2020). We only want to point out the ESG-trend as a factor for Vow`s performance and will not engage in a discussion on a possible "ESG-bubble".

Vow is included in the Oslo Stock Exchange GICS Industrials Sector (OSE20GI). The index consists of companies whose businesses are dominated by one of the following activities: manufacture and distribution of capital goods, including aerospace & defence, construction, engineering & building products, electrical equipment and industrial machinery (Oslo Børs, 2020). NEL, Bonheur, Tomra, and Vow are included in both the OSE20GI and the Virtue index.

Figure 6.5: Vow ASA (SSHIP.OL), Nel, Bonheur and Tomra vs OSE20GI in the period 01/01/2015 – 01/01/2020. The OSE20GI index is coloured green in the figure, Vow is light blue, Nel is purple, Bonheur is pink and Tomra is yellow.



Source: (Yahoo finance, 2020)

After being listed on Oslo Axess in April 2014, Vow yielded a return lower than the industry index. The price remained quite stable until 2018. However, the stock made an almost unprecedented return in 2019. The recent trend with outperformance by virtue stocks becomes quite clear, although we have not conducted a regression to back up this hypothesis.

Currency

The Group mainly has earnings in NOK, EUR and USD and the operation and administration expenses are also mainly in NOK, EUR, and USD. In addition to this the Group has bank deposits, receivables, and short-term liabilities in foreign currencies (Vow ASA, 2020). To reduce the currency exposure the Group hedges the net foreign currency connected to major projects. This factor will help to mitigate the currency risk.

Interest rates

The Group has a total of MNOK 92,7 in long-term borrowing as of 31.12.2019. This is a great increase from MNOK 0,9 in 2018. The increase in long-term borrowings are mainly related to the acquisition of ETIA, partly financed by a loan of MNOK 85. The loan has an interest rate of NIBOR 3M plus a spread of 4,5% p.a. Considering the NIBOR 3M rate was 1.84% per 31.12.2019, the loan has an interest rate of 6.34%. (E24, 2020)

The Group also have a long-term loan of MNOK 0,5 related to financing company cars and other short-term interest-bearing debt of MNOK 16,5. The interest rates of these loans are not available for us. They hold a bank overdraft with a limit of MNOK 50. It has an interest rate of NIBOR 1M + 2.2%, totalling 3.89% per 31.12.2019.

Finally, lease liabilities are measured at the present value of remaining lease payments discounted with an interest rate of 3.26% (Vow ASA, 2020). The discount rate is the interest rate implicit in the lease (Deloitte, 2018)

The loans tend to have this structure with a fixed- and a fluctuating interest rate. The combination of fixed and fluctuating interest gives the Group quite predictable payments on interest. Also, they effectively pay less interest in “bad” times and more in “good” times. The fluctuating element are the NIBOR 1M and NIBOR 3M. NIBOR is the Norwegian Interbank Offered Rate and intendeds to reflect the interest rate level a bank requires for unsecured money market lending in NOK to another bank (Finans Norge, 2020).

Availability of credit

We would consider the availability of credit for the Group as good. They have a bank overdraft facility with a limit of MNOK 50 as mentioned above. As of 31.12.2019 they had used MNOK 16.3. They also have a trade finance facility with a limit of MNOK 15. They had used MNOK 4.3 of the trade finance as of 31.12.2019. Both credits cannot exceed a utilisation of 50% of the sum of trade

receivables and contracts in progress, this was 13,2% as of 31.12.2019. MNOK 9.4 of the MNOK 85 loan regarding the acquisition of ETIA is a conditional loan related to Research and Development (R&D). This conditional loan increases the availability of credit related to R&D activities.

Another source of credit are private placements which could be executed to raise funds. The listing on the Oslo main index gives the Group a broader range of investors which can participate in future placements. A limiting factor to the availability of credit is the loan associated with the acquisition of ETIA. This loan is secured by PPE, inventory, and trade receivables - the same as the overdraft facilities.

6.3.3 Socio-cultural

We have identified the socio-cultural factors that influences the demand in the Groups target markets and the demand for solutions to be social classes, health consciousness and ethical concerns. The factors will be presented by order, and we will highlight which markets they influence.

Social classes

Social classes are an important driver in demand both for the cruise and the aquaculture industry. The global middle class is estimated by the European commission to reach 5.3 billion people in 2030, this is an increase from 3.5 billion in 2017 (European Commission, n.d.). The spending's from the growing middle class is also expected to reach TUSD 64 in 2030 which is almost a doubling from TUSD 37 in 2017. According to Homi Kharas in his report from 2017 on the growing middle class, households entering the middle class will seek to purchase services such as education, health, entertainment and tourism. He also expects that the vast majority (88%) of the next billion people entering the middle class will come from Asia. (Kharas, 2017)

The Group has indicated that they have a contract with the CSSC in section *5.1.3.* This is the first large-scale cruise shipbuilding contract in China and according to (Wang, 2019) this has ushered a new era in large-scale cruise shipbuilding. The firm order could be the first of many for the Group if the growth and origin of the middle class is according to Kharas report. Getting a foothold early in the Asian cruise ship building market could prove a vital strategic advantage in the future.

The increasing middle class also leads to higher protein consumption. More of the disposable income can be used on higher quality foods. Salmon yield 1kg for every 1,5kg feed used versus beef which yields 1kg for every 6-10kg feed. Today salmon aquaculture is the fastest growing food production systems in the world (Nordea Markets, 2019). According to Nordea estimates and FOASTAT the

protein consumption per person has doubled from 1961 until today. An increasing demand for protein is an important driver for the aquaculture market and this could lead to increased demand for the solutions that the Group delivers. (Nordea Markets, 2019)

Health consciousness

The increasing focus on health in the general population is another driver in the markets. In the aquaculture market health-conscious consumers are, according to Medical News Today, looking for foods with high protein and omega-3 fat content (Nordea Markets, 2019). Salmon is a popular food among these consumers and with the growing middle class as mentioned above these types of consumers will increase in the years going forward.

In the land-based markets we identify the reduction of pollution coming from production and waste to be the health focus. WHO states that air pollution is a major environmental health risk. Reducing the air pollution levels the risk of getting diseases such as stroke, heart disease, lung cancer and other respiratory diseases (WHO, 2018). The Group also delivers systems to reduce the pollution from waste "laying around". The Plastic2electricity solution mentioned in section *5.3.* can transform plastic into a useful resource, electricity. This could greatly increase the incentive to clean up places with lots of plastic waste that would not get cleaned up otherwise.

Ethical concerns

The ethical concerns of consumers are impacting the markets and are increasing the demands for solutions that are in line with or exceeds the expectation to ethical behaviour from the market players. In the cruise market the passengers have higher demands to the systems installed on the cruise. As mentioned in section *5.1.2* the passengers are increasing the focus on sustainability and the environment and would have more positive image of companies that support environmental issues. This requires the cruise lines to operate in an ethical way. This includes water treatment, waste handling and general pollution from the ships to be within strictly regulated standards. The increased focus on processing waste in an environmentally friendly way increases the demand for systems that could handle this in a cost-effective way.

In the aquaculture market the ethical concerns are much related to the same as in the cruise market regarding pollution from the facilities. The pollution is a mentioned earlier connected to diseases such as salmon lice, escaped farmed fish and nutrients and metals released into the ocean. The closed-cage or land-based facilities eliminates these problems due to the production environment being controlled, which is not the case with traditional farming methods. This could increase the

demand for sustainable farmed salmon as consumers are more likely to choose products that produced in an ethical way. Ethical production of salmon is related to how the fish is treated in the production, if the fish is free for pollution and unwanted substances and that the products has the properties that is communicated via marketing and announcing (Sørensen, 1998).

6.3.4 Technological

We consider the technological factors that influences the Group to be technology incentives and R&D activity. The factors will be presented in the order they are listed, and the affected markets will be highlighted.

Technology incentives

Incentives to invest in cleaner and more efficient technology are increasing. We believe one of the reasons for this is the negative financial impact that poor environmental performance can have on a company. Pricing of carbon, fines for discharging waste into the sea and fines for escaped farmed fish are some of the negative effects companies in the markets are trying to reduce or eliminate. Another contributing factor is that waste from the different markets typically has a cost connected to get rid of it. Systems that can transform waste into a resource could raise the bottom line of the companies. This is done by either selling the refined product or using the waste to create energy to lower the total cost of operations.

The markets affected by technological intensives are all the target markets for the Group. In the cruise market for instance the MAP-system could lead to up to a cost reduction of MUSD 1 per year. This reduction in costs could make the system pay for itself in approximately five years. In addition to this, AWP and WMS reduce the need for storage of waste and contaminated water aboard. This could potentially free up the space that was earlier used for storage to more cabins, stores or restaurants and thereby increase the yields for the cruise ships.

In the aquaculture market, RAS makes it possible to produce aquaculture closer to the end-consumer since the systems can be placed onshore. If the RAS-technology continues to develop and improving this could change the incentive to use the RAS instead of traditional methods of farming. On the other hand, if the project by Atlantic Sapphire mentioned in section *5.2* proves unsuccessful, the incentive to invest in RAS-technology for full-size farming would decrease significantly.

In the land-based markets the reduction of carbon emissions is the technological incentive. The increasing carbon prices adds incentive to have technology that reduces or eliminates carbon emissions. This would have a positive impact on the bottom line. Both in the form of lower carbon

taxes for the company, and additional value created by resources the company could sell or use. Increased focus on the environment could make a consumer choose the products from a company using eco-friendly technology over a company that chooses not to use it.

R&D activity

To access R&D activity in the different markets are a comprehensive task due to the size of the markets and the types of solutions delivered now. We will engage in a market-specific analysis because of the limitations to the thesis but we will come with some general assumptions. As the prices of carbons only seems to rise it would become more and more profitable for companies to create solutions that are environmentally friendly and reduce emissions. This would imply that the R&D activity is high regarding developing solutions to the markets where the Group is present. There are most likely a "first-mover advantage" associated to creating a solution that can be used in a market and across different markets as well. The MAP-system could be a multi-market system, being able to use the technology in all the markets targeted by the Group. Both the financial motive of increasing demand for solutions, and the strategic advantage of developing a system first would indicate that the R&D activity in the markets are high.

6.3.5 Environmental

We argue that environmental factors are most important in the macro environment. The reason for this can best be described with the Groups own words. "Vow's entire business is built on the fundamental belief that we need to take better care of the world." (Vow ASA, 2020). We identify the most important environmental factors as attitude towards green products/services, pressure from NGO`s, and support for renewable energy and green projects.

Attitude towards green products/services

As mentioned earlier the attitude towards green products and services have over the last years become a larger part of consumers choice on products and services. This will have an influence on all the markets which the Group targets. The increased focus has a positive impact on the demand on the types of systems that the Group delivers. Companies could find it necessary to invest in systems that makes the products or the service they provide "greener".

Pressure from NGO`s

NGO stands from Non-Governmental Organization and they often cooperate with international projects regarding human rights and environmental protection (Helgheim & Knudsen, 2020).

Increased pressure from NGO`s contributes to a further increase in the incentive to invest in technology and products that are environmentally friendly. Friends of the Earth from section *5.1.2.* is an NGO that grades major cruise lines based on multiple criteria. We believe consumers will prefer cruise lines with a high environmental score over on with a lower score. In the aquaculture and the land-based markets the pressure from NGO`s could be to further reduce emissions and pollution from the facilities.

Support for renewable energy and green projects

We would also highlight that financial support for "green projects" increases the incentive to acquire "green" technology or to carry out "green projects". Both national governments and international instances, such as the EU, the World Bank or the Alliance to end plastic waste, can offer financial support for green solutions (Vow, 2020c).

The three factors mentioned in this section do on their own provide an incentive for companies to become "greener". Combining the factors does however create a stronger incentive. Both because of the positive impact on the company`s image as well as lowering expenses through financial support. This is the reason we identify the environmental factors as the most important driver for the demand for the solutions the Group delivers.

6.3.6 Legal

The legal factors have much in common with the political factors, but they go more into actual laws. The factors we identify as important for the Group are copyright and patent laws, and employment laws

Copyright and patent laws

Many of the Groups solutions are patented, such as the MAP technology, the Biogreen system and the Spirajoule unit. The patented solutions protected by laws makes the solutions harder to copy for competitors. However, patents are territorial rights and are only applicable in the region or country the patent has been filed and granted (WIPO, 2020). Hence, if the patents are not granted in all regions across the world, there is no law stopping the solutions from being copied and distributed. This represent a risk for the Group if they either fail to get the solution patented in a region or if a competitor creates a similar system and gets that system patented in the region before the Group.

Employment laws

Employment laws mainly influences the cruise market. Since most of the cruise lines are registered in countries with poor employment laws the cruise lines are sheltered from US employment and safety laws. Most of the employees on cruise ships comes from regions where they are willing to work for low wages. Low wages combined with a gruelling workload is possible due the country of registration. As mentioned in section *5.1.1.* the “big three” cruise lines are registered in Panama, the Bahamas and Libera (The Hustle, 2020). If the employment laws were to change in the country of registration this would cut into the profit of the cruise lines due to increase wages and required staff. The cruise owners would have to increase the prices by the same amount as the change in employee expenses to keep their profits at today's levels. Increased prices could reduce the demand for cruise tourism, and thereby the demand for systems, should it lead to slower growth in newbuilds.

6.4 SWOT - Analysis of the competitiveness

The SWOT-analysis was introduced by Albert Humphrey in the 1960`s and represents **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats. The analysis considers internal and external elements that may affect how the company performs in the future. Our goal with this analysis is to evaluate how the Group is positioned in the target markets, to examine potential drives of growth going forward and to identify sources of risks in the years to come. Using Porters fives forces, the VRIO- and PESTEL analysis from earlier in this chapter will provide us with a solid foundation for the SWOT-analysis.

The internal elements in the analysis are the **S**trengths and **W**eaknesses, and the external elements are **O**pportunities and **T**hreats. We will start by assessing the strengths and weaknesses by taking elements from Porters five forces and the VRIO analysis. Then the opportunities and threats will be reviewed using elements from Porters five forces and the PESTEL analysis to assess the industry specific and macro environment, respectively.

Strengths

One of the strengths of the Group is the technological expertise they possess. They have delivered solutions to the cruise industry for close to two decades and have shown that they can quickly adapt their systems to comply with new standard even before they have entered into force. For instance, with the “Alaskan regelation” from 2003 and the new Helcom-standard from 2019. The solutions developed for the cruise industry gave them the possibility to the aquaculture market in 2015. The systems delivered to the two industries are virtually the same and this provides a synergy effect, as they provide better solutions for two markets using the same technology. The latest addition to the technological expertise is through the acquisition of ETIA in August 2019. ETIA`s field of expertise is within land-based industries, but they could provide the Group with broad technological expertise in all their target markets.

Another strength we would like to highlight is their well-developed customer relationships. The cruise market is as mentioned earlier dominated by a few large cruise lines and ships yards. The consumer base has been built over years and are still growing as smaller players in the cruise industry chooses Scanship as their supplier. In the aquaculture market the Group has well-developed customer relationships despite them only entering the market in 2015. They have contracts with all the largest RAS-suppliers giving them a unique position. In the land-based markets the customer relationships are not that developed yet. ETIA has been been operating with land-based industries for years, but it is harder to pick out large, recurring customers. Based on ETIA`s experience and

Scanship`s customer relationships, we believe that the Group will have well-developed customer relationships in the land-based markets in the future.

Weaknesses

A weakness of the Group is their size compared to their competitors. This mainly applies to the cruise market where both Wärtsilla and EVAC are reporting way higher revenues. The larger competitors can choose to enter a price war without much effect on their financials, since they operate in more market and on a much larger scale. When the underbidding occurred in 2016, the Group reported significantly lower revenues compared to both prior and after the price war. Also, their EBITDA turned negative. Even though the Group have a strong financial position we assume that their competitors could withstand lower revenues for longer.

Opportunities

Opportunities represents the external factors that have a positive influence on the company`s performance. Political factors such as increased taxation and stricter regulation increases the demand for the solutions the Group delivers. The ESG-trend in the stock market gives them access to fresh financial capital through private placements as well as increased equity as investors seek to invest in “green” stocks. Social factors such as the increased purchase power of worldwide social classes, as well as a greater focus on health further increases the demand in the markets, which again could increase the demand for the solutions. Technological and environmental factors such as increased incentive from companies to acquire “green technology”, the consumers attitude towards green product/services and financial support for greener technology could further increases the demand for the Groups solutions. All these macro environmental factors imply the demand for the solutions delivered by the Group should increase in the future.

Another opportunity for the Group is to enter new markets with the solutions they already have. They did enter the aquaculture industry with the same technology as used in the cruise industry. They entered the land-based markets prior the acquisition of ETIA but through the acquisition they gained access to both technology and expertise which is accelerating the access to this market.

The opportunities within the target markets are quite different because their time of presence vary so much. In the cruise industry the opportunities for the company is to supply more total systems, which has been the trend in the industry the last years. This gives them the opportunity to get a larger market share in WMS. In the aquaculture market, the project with Atlantic Sapphire mentioned in section *5.2* will determine the opportunities in the market. Should the project be a

success, the demand for RAS-technology and then again for sludge-handling systems would increase. We believe the land-based markets represent the greatest potential for growth for the Group, due to the predicted size of the markets and the newly acquired technology and expertise from ETIA.

Threats

Threats represents external factors that can cause trouble for the company in the future. The main threats are linked to the new markets the Group has recently entered, and the verticals they are set to enter. More specifically, new markets can be smaller or less profitable than predicted or have a greater level of competition. As mentioned earlier, the market and demand for RAS in aquaculture is dependent on the success rate of the project with Atlantic Sapphire. If the project is a failure this will significantly reduce the demand for RAS for full-scale farming and thereby the demand for the Groups solutions. Another potential threat is new and disruptive technology making the Group`s solutions obsolete.

The threat from new entrants in the markets could for instance come from EVAC or Wärtsilla if they choose to enter the aquaculture market. This is a likely scenario because they deliver the same type of systems as Scanship and the Group did the exact same five years ago. There will likely come many new entrants in the land-based markets, but because of the large size and multiple verticals, the new entrants pose a rather low threat. Although, it is important for the Group to develop strong customer relationships to keep gaining market shares in this ever-growing market.

In conclusion, the SWOT-analysis uncovered that the strengths and opportunities seem to out-weigh the weaknesses and threats. We believe this is due to the global trend of going towards a greener and more sustainable world. This will be reflected in our forecast.

7. Financial statement analysis

The previous chapters have focused on the outlook in the different target markets and strategic aspects, both on industry- and company-specific level. These areas are crucial when we form our prognosis in chapter 8. The last thing that needs to be addressed before we can forecast future performance is the historical financial statements of the Group.

The financial statement analysis will be divided into two main sections: 7.1 historical performance and 7.2 normalizing financial statement. The section on historical performance will start with consolidated income statement going back to 2012. It shows that the growth in revenues and EBITDA-margins have been very volatile. Next in this section we will present the balance sheets from 2017 to 2019 to show the changes the Group has gone through the last years. The acquisition of ETIA, new accounting policies and the issuance of new shares will be highlighted. Finally, we will present ETIA`s financials prior to the acquisition.

The section on normalized financial statement will start with the normalization of the income statements. Certain adjustments are made to meet new accounting policies and historical non-recurring costs. The normalized income statements will prove the basis for our prognosis. Next in this section we will rearrange the balance sheet for 2019 to get the Net financing assets/debt. This figure will ultimately be subtracted from the estimated enterprise value to get the equity value of the Group. Finally, this chapter will discuss CAPEX and working capital demands needed for future operations.

Note that the statements being analysed are the *consolidated* financial statements of the Group. The Group has historically consisted of Scanship AS and its subsidiaries, before ETIA (with its subsidiaries) are included from Q4 2019. The historical financial statements of ETIA *could* potentially have been translated to Norwegian accounting standards and implemented in Scanship`s historical statements, but due to the purpose and time-limit on this thesis we have chosen not to consolidate their past operations.

7.1 Historical performance

7.1.1 Consolidated income statement

The consolidated income statement dating back to 2012 is presented in table 7.1. Statements dating before 2012 are not publicly available. However, the time period should be sufficient to illustrate the longer trends. We get to see the Groups development from shortly after Scanship Holding ASA was established as the new holding company in 2011, through listings on Oslo Axess and later on Oslo Stock Exchange, to the acquisition of ETIA and the subsequent rebranding to Vow ASA.

Table 7.1: Vow ASA consolidated income statement, 2012-2019.

Consolidated income statement (MNOK)	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Revenues	136	170	146	200	172	247	330	381
Total operating revenues	**136**	**170**	**146**	**200**	**172**	**247**	**330**	**381**
- Revenue growth		*25,0 %*	*-14,3 %*	*37,5 %*	*-14,3 %*	*43,9 %*	*33,4 %*	*15,5 %*
COGS	-84	-117	-99	-136	-124	-171	-230	-259
Gross profit	**52**	**53**	**46**	**64**	**48**	**76**	**100**	**122**
- Gross margin	*38,5 %*	*31,2 %*	*31,8 %*	*31,9 %*	*28,0 %*	*30,7 %*	*30,3 %*	*31,9 %*
Employee expenses	-20	-16	-23	-28	-28	-29	-37	-48
Other operating expenses	-17	-16	-19	-25	-23	-20	-23	-28
EBITDA before no-recurring cost	**15**	**21**	**4**	**11**	**-3**	**26**	**39**	**46**
- Margin	*11,2 %*	*12,3 %*	*3,0 %*	*5,6 %*	*-1,5 %*	*10,7 %*	*11,9 %*	*12,1 %*
Non-recurring cost	0,0	0,0	-2,4	0	-0,8	-1,4	0	-19,2
EBITDA	**15**	**21**	**2**	**11**	**-3**	**25**	**39**	**27**
- EBITDA margin	*11,2 %*	*12,3 %*	*1,4 %*	*5,6 %*	*-2,0 %*	*10,1 %*	*11,9 %*	*7,0 %*

Source: (Scanship Holding ASA, 2013, 2014, 2015, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

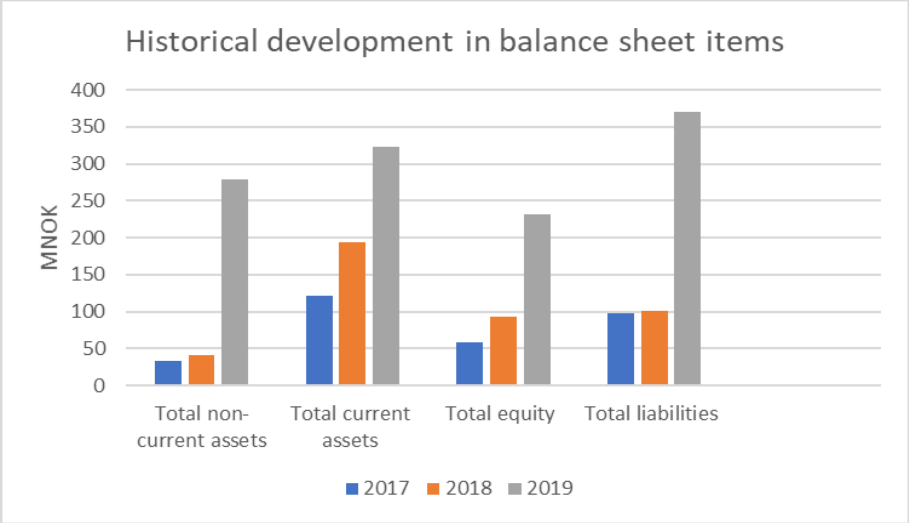
The Group experienced a troublesome period after 2013. Revenues were volatile in the mid 2010`s with severe negative growth in 2014 and then again in 2016. Underbidding by EVAC in the newbuild market is considered the main contributor to the negative growth in 2016. Gross margins in the period however were relative stable, as COGS, consisting primarily of variable costs, also dropped in the period. But as employee expenses and OOE increased in the period, Vow reported EBITDA margins (before non-recurring cost) of 3% in 2014 and -1.5% in 2016. Since then, revenues and margins picked up, reaching MNOK 381 and 12.1% in 2019, respectively.

Note that the adoption of IFRS 15 in 2018 changed the timing for recognition of revenues, and the adoption of IFRS 16 changed the requirements for capitalisation of lease liabilities. The consequences for the income statement will be discussed in section *7.2.1.* Also, ETIA`s revenues are included in Q4 2019, and a large “non-recurring cost” in incurred in 2019. All the mentioned aspects make the income statement from table 7.1 unsuitable for our prognosis.

7.1.2 Balance sheet

When analysing the historical balance sheet, we have limited the scope down to the last 3 years. This is because the items on the balance sheet were quite stable before it underwent a major transformation in 2019. As the growth in assets prior to 2018 was modest, it may appear as if it suddenly exploded in 2019.

Figure 7.1: Development in balance sheet items from 2017 to 2019. Note that the items are sorted by year. The figure is purely meant to illustrate the balance sheet`s increase in 2019 (grey column).



Source: (Scanship Holding ASA, 2018, 2019) and (Vow ASA, 2020)

Not surprisingly, most can be related to the financing- and acquisition of ETIA, plus a private placement and the adoption of IFRS 16 for leases. We will first present the four factors mentioned, before a comment on the major items in the balance sheet follows. The balance sheet for 2019 will be in focus.

Financing the acquisition of ETIA

The acquisition of ETIA consisted of a cash consideration, shares, and vendor notes. The cash consideration of MNOK 85 was debt financed. MNOK 9.4 out of the loan was classified as short-term, while the remaining MNOK 75.6 is long-term interest-bearing debt. The share consideration was settled with an issue of 3.9 million shares valued at NOK 15.8 each. The last part of the settlement was vendor notes payable 9 months after closing (of the transaction). These notes have the option to be converted to Vow ASA`s ordinary shares and were worth MNOK 45.2 at the time of the transaction (15.10.2019). The vendor notes are discounted to reflect the net present value. They were valued at MNOK 40.1 as of 31.12.2019. As Vow ASA`s share price increased after the transaction, the *conversion rights* of ETIA`s vendor notes increased. The conversion rights were

valued at MNOK 25 as of 31.12.2019 using an option pricing model. The total value of vendor notes and conversion rights were MNOK 65 at 31.12.2019 and are presented in the balance sheet as a convertible loan (Vow ASA, 2020).

Table 7.2: Details of the purchase consideration as of 15.10.2019

MNOK	On acquisition
Cash	85,4
Share issued	61,4
Vendor notes	45,2
Total consideration	**192,1**

Source: (Vow ASA, 2020)

Assets and liabilities recognised from the acquisition of ETIA

IFRS 3 Business Combinations outlines the accounting when an acquirer obtains control of a business. Steps in applying the acquisition method are: [IFRS 3.5]

1. Identification of the 'acquirer'
2. Determination of the 'acquisition date'
3. Recognition and measurement of the identifiable assets acquired, the liabilities assumed and any non-controlling interest (NCI, formerly called minority interest) in the acquiree
4. Recognition and measurement of goodwill or a gain from a bargain purchase

All assets acquired and liabilities assumed in a business combination are measured at acquisition-date fair value. [IFRS 3.18] (Deloitte, 2020a). Although there are some exceptions to the recognition and measurement principles, they will not be discussed further. Table 7.3 show assets and liabilities recognised as a result of the acquisition of ETIA. Goodwill is measured according to step 4 of IFRS 3.5:

Goodwill = Total consideration - Net identifiable assets + Non-controlling interest

Table 7.3: Assets and liabilities (in brackets) recognised from the acquisition of ETIA

The assets and liabilities recognised as a result of the acquisition are:

(Amounts in NOK million)	**Fair value**
Intangible assets	48.5
Right-of-use assets	11.4
Property, plant and equipment	16.6
Inventories	13.5
Financial instruments	0.5
Cash and cash equivalents	12.8
Receivables	33.1
Long-term liabilities	(31.1)
Deferred tax liabilities	(9.4)
Trade creditors and other payables	(26.0)
Other current liabilities	(15.7)
Net identifiable assets acquired	54.1
Non-controlling interest	(1.0)
Goodwill	138.9
Total	192.1

Source: (Vow ASA, 2020)

Issuance of shares

Vow completed a private placement in November 2019. As mentioned in section *6.2.3*, a total of 6.5 million new shares were issued at NOK 16.5 each, generating *net* proceeds of MNOK 100.9. The proceeds from the placement will be "used to accelerate the company's growth within land-based products and services, with a focus on plastic waste handling, the European biogas market, and metallurgic applications of biocoke from pyrolysis" (Vow ASA, 2020). Together with the share consideration from the acquisition of ETIA, this explains most of the increase in share capital and premium from 2018 to 2019. Note that the *nominal value* per share in Vow ASA is NOK 0,10 (Scanship Holding ASA, 2019). The net proceeds from each issuance is divided into share capital (nominal value $*$ number of new shares) and share premium.

Table 7.4: Increase in share capital and share premium from 2018 to 2019. The figure shows how the acquisition of ETIA and the private placement influences the share capital and share premium in the Group.

	2018	ETIA transaction	Private placement	2019
# of new shares (Million)		3,9	6,5	
Share price (NOK)		15,8	16,5	
Net proceeds (MNOK)		61,4	100,9	
Share capital (MNOK)	9,6	0,4	0,7	**10,6**
Share premium (MNOK)	77,9	61,0	100,3	**239,2**

Source: (Vow ASA, 2020)

The calculations on the share consideration to ETIA is shown below:

$$\textit{Share capital} = \textit{Nominal value} * \textit{number of shares} = \textit{NOK } 0.1 * 3.9\textit{m} = \textit{MNOK } 0.4$$

$$\textit{Share premium} = \textit{Net proceeds} - \textit{Share capital} = 61.4 - 0.4 = \textit{MNOK } 60$$

Accounting policies

The Group adopted IFRS 16 Leases effective 1. January 2019. This had a massive impact on the balance sheet. The previously used IAS 17 - Leases separated operating leases from financial leases. Financial leases transfers substantially all the risks and rewards of ownership to the company. Financial leases are capitalized. The Group identified no financial leases during our time of analysis. An operating lease on the other hand occurred if the lease did not transfer substantially all the risks and rewards of ownership (IFRS, 2017a). Operating lease costs would be expensed as Other operating expenses (OOE) in the income sheet.

The adoption of IFRS 16 meant that the separation between financial and operating leases were erased. Now most of the leased assets and liabilities are capitalized. Only leases with a lease term less than 12 months and low-value leases are still expensed (IFRS, 2017b). Lease liabilities were measured at the present value of the remaining lease payments, discounted with an interest rate of 3.26% (Vow ASA, 2020).

This newly adopted policy adds MNOK 21.2 in assets, and MNOK 21.4 in current- and non-current liabilities. If IFRS 16 had been adopted a year earlier (in 2018), the Group would have recognised right-of-use (leased) assets and complementary lease liabilities of 12.5 MNOK per 01.01.2019 (Vow ASA, 2020).

Assets

Table 7.5 lists the Group`s assets and each line items percentage of total assets. Intangible assets have historically been the largest non-current assets, accounting for approximately 20% of total assets in 2017 and 2018. Further internal development of projects and acquired R&D and technology from ETIA increased the item in 2019, although it now accounts for a smaller proportion of total assets. Goodwill from the acquisition account for 22,6% of total assets. Adding the capitalized leased (Right-of-use) assets following the adoption of IFRS 16, total non-current assets now accounts for 46,2% of total assets, as opposed to approximately 21,5% from earlier.

Table 7.5: Vow`s assets and each line items percentage of total assets, 2017-2019.

Assets (MNOK)	2017	% of total assets	2018	% of total assets	2019	% of total assets
PPE	2,4	1,5 %	3,2	1,6 %	20,5	3,4 %
Intangible assets	31,3	20,2 %	38,3	19,7 %	100,5	16,7 %
Goodwill					136,1	22,6 %
Right-of-use assets (leasing)					21,2	3,5 %
Total non-current assets	**33,7**	**21,7 %**	**41,5**	**21,4 %**	**278,3**	**46,2 %**
Inventories	3,9	2,5 %	4,5	2,3 %	9,3	1,5 %
Trade receivables	58,8	37,9 %	62,6	32,3 %	135,6	22,5 %
Contracts in progress	43,3	27,9 %	62,5	32,2 %	60,8	10,1 %
Other receivables	10,1	6,5 %	16	8,2 %	32,6	5,4 %
Cash and cash equivalents	5,6	3,6 %	7	3,6 %	85,5	14,2 %
Total current assets	**121,6**	**78,3 %**	**152,6**	**78,6 %**	**323,8**	**53,8 %**
Total assets	**155,3**	**100,0 %**	**194,1**	**100,0 %**	**602,1**	**100,0 %**

Source: (Scanship Holding ASA 2018, 2019) and (Vow ASA, 2020)

Trade receivables is still the largest current assets, accounting for 22,5% of total assets in 2019. Notice that The Group recognised receivables of MNOK 33.1 from the acquisition. Contracts in progress used to be a significant item, but now only account for 10,1% of total assets. We also want to highlight the increase in Cash and cash equivalents, primarily due to the private placement. All in all, total assets have tripled in size from MNOK 194.1 to MNOK 602.1.

Equity

Looking at the Groups equity from table 7.6, the impact of the issuances of shares becomes clear. Share- capital and premium increased with the mentioned share consideration to ETIA and the private placement. Note that it still accounts for 41.8% of total equity and liabilities in 2019.

Table 7.6: Vow`s equity and each line items percentage of total equity and liabilities

Equity (MNOK)	2017	% of total equity and liab.	2018	% of total equity and liab.	2019	% of total equity and liab.
Share capital	9,6	6,2 %	9,6	4,9 %	10,7	1,8 %
Share premium	77,5	49,9 %	77,9	40,1 %	240,7	40,0 %
Other capital reserves	0,3	0,2 %	0,3	0,2 %	1	0,2 %
Translation differences	0,8	0,5 %	1,7	0,9 %	-2	-0,3 %
Retained earnings	-30,2	-19,4 %	3,9	2,0 %	-19,7	-3,3 %
Non-controllin interest					1	0,2 %
Total equity	**57,9**	**37,3 %**	**93,3**	**48,1 %**	**231,7**	**38,5 %**

Source: (Scanship Holding ASA, 2018, 2019) and (Vow ASA 2020)

The Groups negative retained earnings needs an elaboration. They have recorded negative earnings in all years back to 2012, i.e. the first year of publicly available data. Negative *results* prior to 2012, and again in the "down" years of 2014 and 2016 is to blame for the negative equity item. However, it was positive in 2018 after an especially strong result of MNOK 26.2. Then, after facing a large non-recurring item and subsequent negative results, combined with a dividend payout of MNOK 9.6, it was again approximately MNOK -20 in 2019. As the Group has reached healthy EBITDA-margins (before non-recurring items) in the last years, accumulated retained earnings will move towards positive numbers in the coming years. Total equity makes up 38.5% of total equity and liabilities per 31.12.2019.

Liabilities

An overview of the Groups liabilities is listed in table 7.7. Long-term borrowings have increased to MNOK 92.7 in 2019. The majority was used to finance the cash consideration in the acquisition of ETIA. With the capitalized non-current lease liability from IFRS 16, total non-current liabilities now make up 22,1% of total equity and liabilities. This represents a big increase from previous years.

Table 7.7: Vow`s liabilities and each line items percentage of total equity and liabilities

Liabilities (MNOK)	2017	% of total equity and liab.	2018	% of total equity and liab.	2019	% of total equity and liab.
Deferred tax liabilities	7,2	4,6 %	14	7,2 %	25,7	4,3 %
Long term borrowings	1,1	0,7 %	0,9	0,5 %	92,7	15,4 %
Non-current lease liabiliy		0,0 %		0,0 %	14,9	2,5 %
Total-non current liabilities	**8,3**	**5,3 %**	**14,9**	**7,7 %**	**133,3**	**22,1 %**
Current liabilites						
Current borrowings					16,5	2,7 %
Trade creditors	47,6	30,7 %	44,3	22,8 %	69,2	11,5 %
Convertible loan					65	10,8 %
Contract accruals	10,6	6,8 %	25,7	13,2 %	36,8	6,1 %
Unrealised change fair value FX derivatives	1,5	1,0 %	3,4	1,8 %	-0,1	0,0 %
Income tax payable	1,4	0,9 %	-0,3	-0,2 %	1,7	0,3 %
Bank overdraft-/ Trade finance facility	20,8	13,4 %	2,1	1,1 %	20,6	3,4 %
Lease liability					6,6	1,1 %
Other current liabilities	7,1	4,6 %	10,7	5,5 %	20,7	3,4 %
Total current liabilities	**89**	**57,3 %**	**85,9**	**44,3 %**	**237**	**39,4 %**
Total liabilities	**97,4**	**62,7 %**	**100,8**	**51,9 %**	**370,3**	**61,5 %**
Total equity and liabilities	**155,3**	**100,0 %**	**194,1**	**100,0 %**	**602,1**	**100,0 %**

Source: (Scanship Holding ASA, 2018, 2019) and (Vow ASA, 2020)

Trade creditors has historically been the largest (current) liability. Whereas it made out 30.7% of total equity and liabilities in 2017, it only makes 11.5% in 2019. The other large item is the convertible loan, which was part of the consideration to ETIA. Note also the non-current lease liability emerging from IFRS 16, and the newly engaged current borrowing. Most of this short-term loan was used in the cash consideration to ETIA. In conclusion, total liabilities increased by a staggering 370% in 2019.

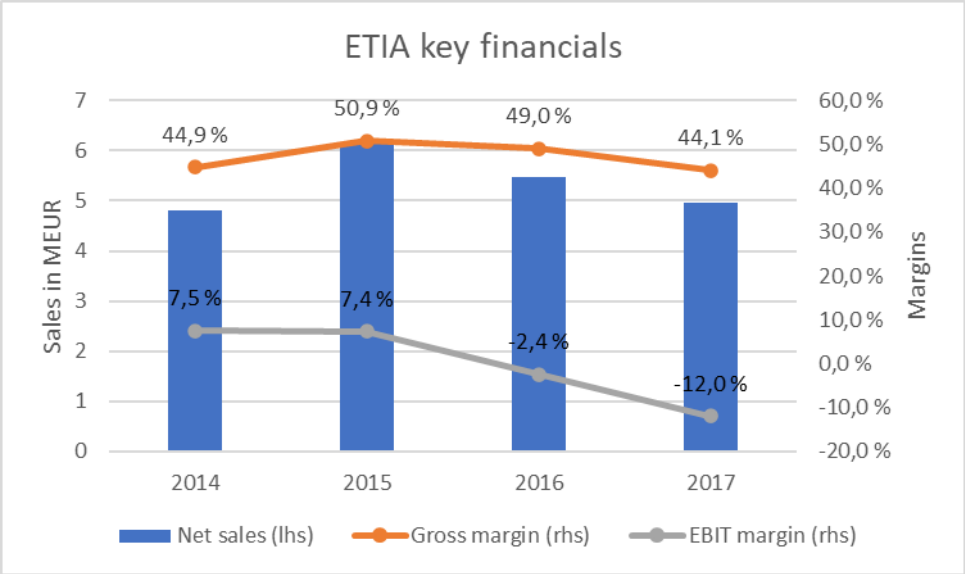
7.1.3 ETIA financials pre-acquisition

When the purchase agreement for ETIA was announced in August 2019, key financial information on the company (in MNOK) was released (Scanship, 2019g). The information dated from 2016 to 2018. We chose to acquire the complete financials of ETIA to get a better picture of the trends. The discussion below is primarily based on the obtained P&L statement and balance sheet of ETIA from 2014 to 2017. An extraction from the financial statement can be found in *Appendix 1*. Released key financial information from the acquisition helps with financials in 2018 as we were unable to obtain statements from that year.

ETIA recorded negative revenue growth in 2016 and 2017, falling from MEUR 6.1 in 2015 to about MEUR 5 in 2017. They had relatively high gross margins throughout the period, but it decreased when revenues dropped. Although they received considerately higher grants in 2016 and 2017, they

suffered from severely falling revenues, higher lease expenses (OOE) and higher fixed costs. Thus, their operating (EBIT) margin turned negative in the same period.

Figure 7.2: ETIA financial pre-merger. Net sales is presented in MEUR. Note that operating margins turn negative from 2016.



Source: Appendix 1

Based on the released key information, the negative trend was reversed in 2018. Operating income increased significantly, while operating margins and net results were slightly positive. In conclusion, we note that ETIA`s gross margins are far higher than those of the Group, whereas the operating margins have been lower. ETIA contributed with revenues of MNOK 19.1 in Q4 from the consolidated income statement, but EBITDA for the Land-based segment came in at a negative MNOK 1.5. Lian (2020) suggests that ETIA potentially will have a near-term negative impact on (operating) margins before operations are scaled up.

Turning our attention to ETIA`s balance sheet in table 7.8, total assets grew from MEUR 4.9 in 2015 to MEUR 11.6 in 2017. Growth in current assets such as receivables and liquid assets was the largest contributor. On the passive side, equity more than doubled in 2017 following an issuance of shares. The company took out a loan of MEUR 1 in 2016. Combined with a massive increase in deferred income in 2017, total liabilities increased to MEUR 6.9 in 2017.

Table 7.8: ETIA balance sheet summary pre-merger, from 2014 to 2017. Note that all numbers are in KEUR.

In KEUR	2014	2015	2016	2017
Non-currents assets	797	877	2305	2983
Current assets	3756	4024	4254	8621
Total assets	**4554**	**4901**	**6560**	**11604**
Equity	1650	2115	2133	4707
Liabilities	2903	2785	4425	6869
Total equity and liabilities	**4554**	**4901**	**6560**	**11604**

Source: **Appendix 1 – Legg in appendix 1 I kildeliste.**

7.2 Normalizing financial statement

7.2.1 Income statement

EBITDA is frequently used to measure a company`s ability to generate cash. It considers the income and expenses that a company incur in its day-to-day operations and is available in a company`s financial statement. However, the EBITDA of a company must be normalized through adjustments to function as a benchmark for forecasting (Naidji, 2020). These adjustments involve removing any non-recurring and one-time items that may distort EBITDA, checking all income items with provision in the balance, and consider newly adopted accounting standards (Kinserdal, 2019).

Historical time period of normalization

The very first thing to settle is the time period of the analysis. The period is based on several factors, of which we can divide companies into two categories:

1. An established company with somewhat stable revenues and margins. Forecasting would require 5-10 years of historical financial data to show the long trends.
2. An unstable company with bigger fluctuation in revenues and margins. A shorter historical time period is required for companies who are subject to restructuring or expanding to new business areas after acquiring a significant company. The main reason is that past performance does not paint the correct picture of present operations (Kinserdal, 2019).

Vow ASA clearly falls in the second of the two categories due to newly acquired access to land-based market following the acquisition of ETIA. Past performance is to a lesser degree relevant for present and future operations. However, ETIA is first included in the income statement from Q4 2019, which makes it possible to show the longer trends of Vow`s operations. Based on these concerns, we

choose to normalize the income statement for the past 5 years. To get to the adjusted EBITDA, we must normalize the company's operating revenues- and expenses.

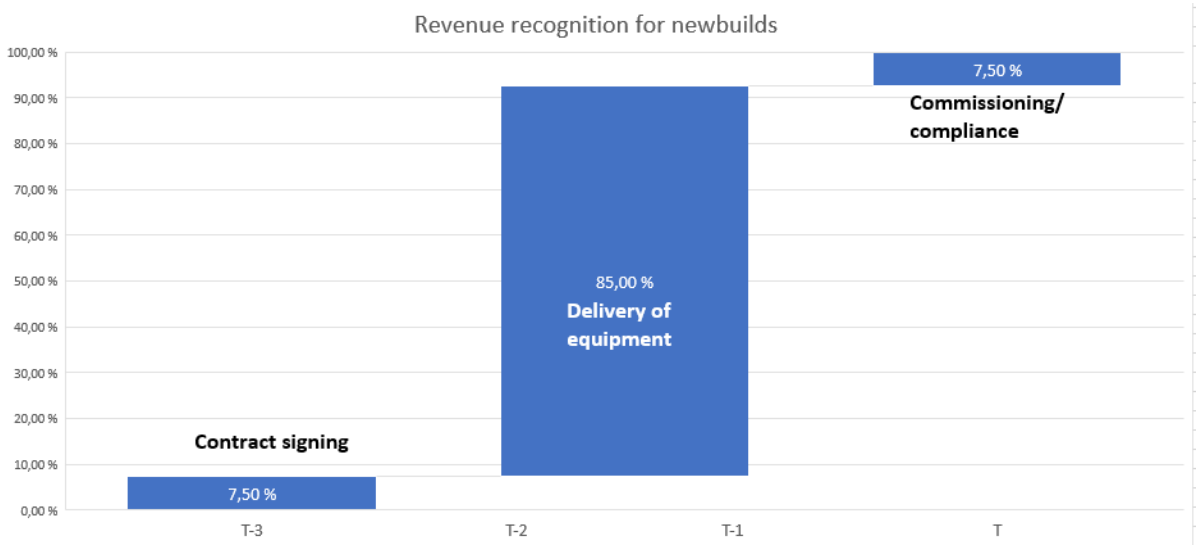
Revenues

IFRS 10 state that: `` Consolidated financial statements eliminate in full intragroup […] income […] relating to transactions between entities of the group`` (Deloitte, 2020b). Vow split revenues between its two segments: Projects and Aftersales. Transactions within the segments are eliminated. All the transactions between business units are based on market terms (Scanship Holding ASA, 2019).

Vow implemented a new accounting standard in 2018. Whereas they earlier used IAS 18 and IAS 11 for revenue recognition, they switched to IFRS 15 (Scanship Holding ASA, 2019). Under IAS 18, the timing of revenue recognition from the sale of goods is based primarily on the transfer of risks and rewards. IFRS 15 on the other hand, focuses on when control of those goods has transferred to the customer. This different approach may result in a change of timing for revenue recognition for some entities (Deloitte, 2014a)**.** IAS 11 lacks specific guidance in identifying distinct goods and services within a contract, whereas IFRS 15 provides a more detailed guidance on the new rules on how revenue is allocated between different items. Consequently, entities may have to amend their current accounting policies (Deloitte, 2014b).

The revenue recognition for the Project segment was affected by IFRS 15. As mentioned earlier, the yards place the order for installation of systems to a cruise newbuild about two years before the ship is completed. More specifically, suppliers start delivering equipment two years prior to the ship is ready to enter service, and contracts will be awarded another year in advance. As newbuild cruise vessels will normally be performed in phases over a 3-year period, Scanship projects will also have a 3-year span in total. They state that “The payment terms for newbuilding cruise contracts are normally between 5-10 per cent at contract signing, 80-90 per cent at delivery of the equipment and 5-10 per cent at commissioning/ compliance.” (Vow ASA, 2020). Figure 7.3 is our interpretation of revenue recognition for newbuilds from signing the contract three years prior, to delivering and installing the equipment a couple years in advance, to commission and compliance in the year the ship enter service.

Figure 7.3: Revenue recognition for newbuild, from being awarded with the contract three years (T-3) prior to the ship enter service in delivery year (T). The fraction of revenue recognised at each time is illustrated with percentages.



Source: (Vow ASA, 2020)

Turning attention to the newly adopted IFRS 15, recognition of the revenues from newbuilds will be affected, and revenues from aquaculture might. Under IFRS 15 Vow is recognizing revenue from contracts with customers over time, in accordance with point 15.35c in the standard. Over the total lifetime of a project however, the sum of revenue and cost recognised on the project will be the same (Scanship Holding ASA, 2018). Also, the revenue recognition for Vow`s operations in the Aftersales segment will generally not be affected by this new accounting standard. Table 7.9 illustrates the impact on (Project) revenue recognition for the years of adoption, 2018. Since Cost of goods sold (COGS) are also affected by the new standard, the gross- and EBITDA margins remain virtually the same.

Table 7.9: Effects on revenue and gross profits from adopting IFRS 15 in 2018. The figure illustrates the unaudited revenue and gross profit using IFRS 15 and IAS 18/11.

2018 (MNOK)	Project revenues IFRS 15	Project revenues IAS 18/11	Total revenues IFRS 15	Total revenues IAS 18/11
Revenues	229,8	193,8	329,6	293,6
Total revenues	**229,8**	**193,8**	**329,6**	**293,6**
COGS	-163,4	-133,8	-229,8	-200,2
Gross profit	**66,4**	**60**	**99,8**	**93,4**
- Gross margin	28,9 %	31,0 %	30,3 %	31,8 %
Employee expenses	-19,1	-19,1	-37,4	-37,4
OOE	-12,7	-12,7	-23,4	-23,4
EBITDA	**34,6**	**28,2**	**39**	**32,6**
- EBITDA margin	15,1 %	14,6 %	11,8 %	11,1 %

Source: (Scanship Holding ASA, 2019)

Normalization of the income statement includes adjusting for new accounting standards. Implementing IFRS 15 for the years prior to 2018 will prove virtually impossible with the available financial information. Therefore, we only want to illustrate that a big part of the increase in revenue from 2017 to 2018 comes from the timing of revenue recognition.

R&D Capitalisation

The Group has several different ongoing development projects developing waste to energy/waste- and wastewater solutions. IAS 38 (Deloitte, 2020c) states the following on R&D costs:

Initial recognition: research and development costs

- Charge all research cost to expense. [IAS 38.54]
- Development costs are capitalised only after technical and commercial feasibility of the asset for sale or use have been established. This means that the entity must intend and be able to complete the intangible asset and either use it or sell it and be able to demonstrate how the asset will generate future economic benefits. [IAS 38.57]

Initial recognition: in-process research and development acquired in a business combination

- A research and development project acquired in a business combination is recognised as an asset at cost, even if a component is research. [IAS 38.34]

Basically, any research cost is charged as an expense, while developments costs with commercial feasibility and acquired R&D are capitalized. Vow`s additions to intangible assets are presented in table 7.10. Vow states that they invested MNOK 4.1, 9.4 and 18.2 on its product development activities in 2017, 2018 and 2019, respectively. Note that all of which was capitalised, or added, as intangible assets. A significant part of this is working hours.

Table 7.10: Additions to intangible assets in the period 2014-2019

MNOK	2015	2016	2017	2018	2019
Additions to intangible assets	6,9	5,9	4,1	9,4	18,2

Source: (Scanship Holding ASA, 2015, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

Vow capitalize the investment because they consider it “development projects”. They believe that all costs related to the projects meet the criteria for capitalization from IAS 38.57. Rather than expense internally developed R&D under OOE as incurred, they assess each project yearly to see if there is any indication that the asset may be impaired. Projects with no future value are impaired. In accordance with IAS 38.34, intangible assets acquired from ETIA of MNOK 48.5 were capitalised as

R&D (MNOK 15.4) and Technology (MNOK 33.2)) (Vow ASA, 2020). Although it is unusual to capitalize *all* costs related to R&D, we choose to follow their statement that all projects meet the criteria from IAS 38.57. Hence, we do not adjust, i.e. add, any R&D costs.

Leases

Vow adopted IFRS 16 on leasing in 2019, as mentioned in *Accounting policies* from section *7.1.2* Balance sheet. Under the previously used IAS 17, finance leases were recognized as assets and operating leases were recognized as expenses. Vow stated that they had no financial leases, so (operational) lease expenses went under OOE (IFRS, 2017b). With the new IFRS 16 on leasing virtually all leases are capitalized.

For fiscal year 2019, the implementation of IFRS 16 resulted in lower OOE of MNOK 5, increased depreciation of NOK 4.9 million and increased finance costs of NOK 0.5 million (Vow ASA, 2020). As we seek to find the adjusted EBITDA, we are not concerned about an increase in depreciation and finance cost. However, lower OOE increase EBITDA. To compare with earlier years, we need to implement IFRS 16.

Previous annual reports do not state whether leasing contracts are classified as short-term and/or low-value and therefore still expensed under IFRS 16. But we know that Vow expensed lease costs of MNOK 3.1 in 2019, and had it not been for the implementation of IFRS 16, they would have expensed another MNOK 5.

Assuming VOW held the same proportion of short-term and low value assets in past years, we lower lease expenses by:

$$5 / (5 + 3.1) = 62\%.$$

Table 7.11: Elimination of lease expenses due to adoption of IFRS 16. Lease expenses are reduced by 62% based on our assumption on the retrospective impact of IFRS 16.

OOE (MNOK)	2015	2016	2017	2018	2019
Travelling expenses	3,8	4,1	3	4,3	7,8
Lease expenses	2,0	2,1	1,8	2,0	3,1
Consultants and other fees	8,1	4,8	6,6	7,5	9,1
Other office expenses	3,1	3,1	3	3,8	4
Other expenses	4,5	5,2	3,1	2,3	3,8
Total	**21,5**	**19,3**	**17,5**	**19,9**	**27,8**

Source: (Scanship Holding ASA, 2016,2017,2018,2019) and (Vow, 2020)

Adjusting for the acquisition of ETIA

Considering the normalized income statement will provide the basis for our prognosis, we are interested in the organic growth. That is the growth of the company excluding mergers and acquisitions. Hence, we must adjust for the inclusion of ETIA in Q4 2019. Table 7.12 show their generated revenues and costs after the inclusion in the Group.

Table 7.12: ETIA`s revenues and cost since the inclusion in the Group.

ETIA (MNOK)	**Q4 2019**
Revenue	19,1
COGS	11,5
Gross profit	**7,6**
- Gross margin	*39,8 %*
Employee expenses	7,2
OOE	1,9
EBITDA	**-1,5**
- EBITDA margin	***-7,9 %***

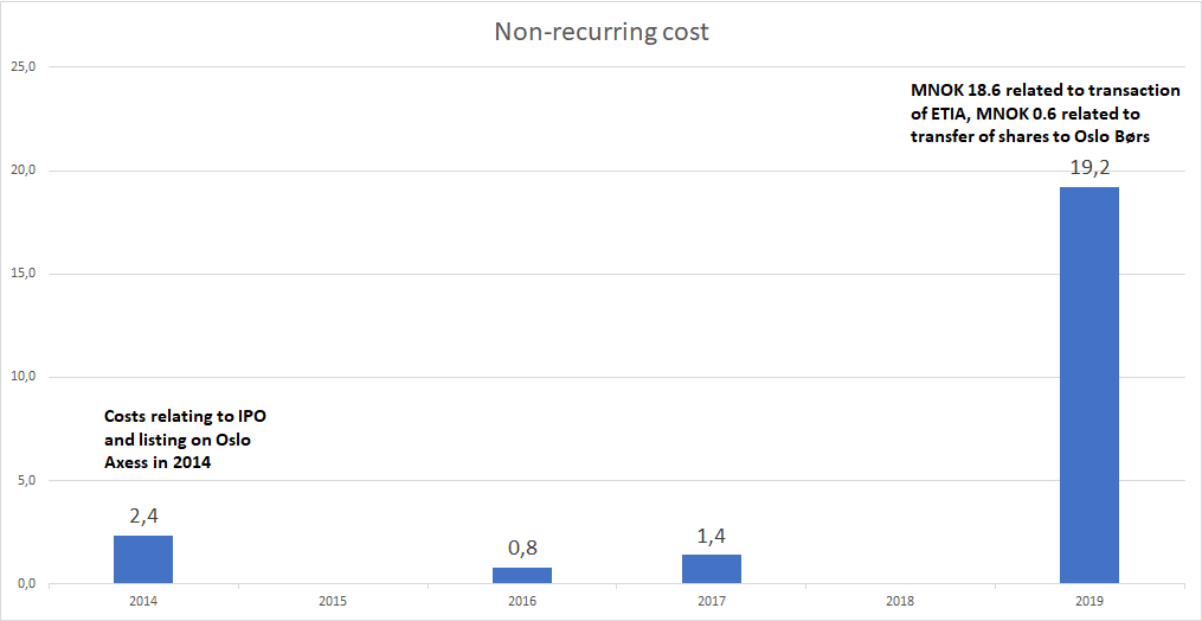
Source: (Vow ASA, 2020)

ETIA`s Q4 2019 revenues and cost will be subtracted from the Groups statement in 2019, as shown in table 7.13.

Non-recurring items

Vow has expensed non-recurring operational items for some years. These costs are due to listing on Oslo Stock Exchange, restructuring, and the acquisition of ETIA with subsequent integration processes. So, the question remaining is whether these costs really are non-recurring. Will they have to account for a small restructuring cost, and/or will acquisitions be part of their business model in the future? Based on the past, we believe that they do not have to account for it. The answer may differ as Vow expands. Although, we choose not to include any non-recurring items in our adjusted EBITDA, and they will not be addressed in our prognosis.

Figure 7.4: Overview of Vow`s non-recurring costs, 2014-2019. Numbers in MNOK.



Source: (Scanship Holding ASA, 2015, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

Conclusion

To sum it up, we have adjusted for the new accounting policy on leases and the entrance of ETIA and excluded non-recurring costs. We have not adjusted for the adoption of IFRS 15 for revenue recognition in 2018. The margins in table 7.12 will form the basis for our prognosis on *Scanship`s* future operations.

Table 7.13: Adjusted historical income statement

MNOK	2015	2016	2017	2018	2019
Revenues	200	172	247	330	362
Total operating revenues	200	172	247	330	362
- Revenue growth	*37,5 %*	*-14,3 %*	*43,9 %*	*33,4 %*	*9,7 %*
COGS	-136	-124	-171	-230	-248
Gross profit	**64**	**48**	**76**	**100**	**114**
- Gross margin	*31,9 %*	*28,0 %*	*30,7 %*	*30,3 %*	*31,5 %*
Employee expenses	-28,1	-28,1	-29	-37,3	-41
-% of revenue	*14,0 %*	*16,4 %*	*11,7 %*	*11,3 %*	*11,2 %*
Other operating expenses	-21,5	-19,3	-17,5	-19,9	-26
-% of revenue	*10,7 %*	*11,2 %*	*7,1 %*	*6,0 %*	*7,2 %*
Adjusted EBITDA	**14**	**1**	**29**	**43**	**47**
- Adjusted EBITDA margin	***7,2 %***	***0,4 %***	***11,9 %***	***12,9 %***	***13,1 %***

Source: (Scanship Holding ASA, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

7.2.2 Balance sheet

A key part in the valuation of Vow is the rearrangement of the balance sheet. Aimed at isolating the value of the underlying operations, the balance sheet is divided into operating and financing items. This exercise seeks to find the Net financing assets/debt. Sine the WACC-method estimates the value to all claimholders, the Net financing assets/debt must be subtracted to get the value of equity to the shareholders.

Assets associated with operations are separated from financing assets. Operating assets are the ones that the company require to run daily operations. Financing assets could be sold without affecting the daily operations to reduce financial liabilities. Like the separation on the active side of the balance sheet, the liabilities on the passive side are also split into operating and financing. Operating liabilities arise from daily operations, whereas financing liabilities are composed of interest-bearing debt, of which the interest is not expensed above EBIT in the income statement (Kaldestad & Møller, 2016).

Table 7.14: Reclassification of balance sheet. OperA is operating assets, FinA is financing assets, OperL is operating liabilities, FinL is financing liabilities.

Classification	Assets (MNOK)	2017	2018	2019
OperA	PPP	2,4	3,2	20,5
OperA	Intangible assets	31,3	38,3	100,5
OperA	Goodwill			136,1
OperA	Right-of-use assets (leasing)			21,2
	Total non-current assets	**33,7**	**41,5**	**278,3**
OperA	Inventories	3,9	4,5	9,3
OperA	Trade receivables	58,8	62,6	135,6
OperA	Contracts in progress	43,3	62,5	60,8
OperA	Other receivables	10,1	16	32,6
FinA/OperA	Cash and cash equivalents	5,6	7	85,5
	Total current assets	**121,6**	**152,6**	**323,8**
	Total assets	**155,3**	**194,1**	**602,1**

Classification	Liabilities (MNOK)	2017	2018	2019
OperL	Deferred tax liabilities	7,2	14	25,7
FinL	Long term borrowings	1,1	0,9	92,7
OperL	Non-current lease liabiliy			14,9
	Total-non current liabilities	**8,3**	**14,9**	**133,3**
	Current liabilites			
FinL	Current borrowings		0	16,5
OperL	Trade creditors	47,6	44,3	69,2
FinL	Convertible loan		0	65
OperL	Contract accruals	10,6	25,7	36,8
OperL	Unrealised change fair value FX derivati	1,5	3,4	-0,1
OperL	Income tax payable	1,4	-0,3	1,7
FinL	Bank overdraft-/ Trade finance facility	20,8	2,1	20,6
OperL	Lease liability			6,6
OperL	Other current liabilities	7,1	10,7	20,7
	Total current liabilities	**89**	**85,9**	**237**
	Total liabilities	**97,4**	**100,8**	**370,3**
	Total equity and liabilities	**155,3**	**194,1**	**602,1**

Source: (Scanship Holding ASA, 2018, 2019) and (Vow ASA, 2020)

The reclassification of the balance sheet items is shown in the table 7.14. Put into the framework used by Kinserdal (Kinserdal, 2019) in his lectures, it is mostly a straightforward task. Items such as PPE, inventories, trade receivables and trade creditors (payables) are necessary for daily operations. Also, non-current and current borrowings from credit institutions are interest-bearing and thus clearly financial. However, a few of the items need an elaboration.

Cash and cash equivalents

Companies often hold more cash and marketable securities than they need to run the business. Thus, we must make an estimate of how much the business needs for operations. Kinserdal presents a rule of thumb, where he assumes a company requires 10 percent of inventories and trade receivables in cash to operate the business.

*Operating cash = 10% * (Inventories + Trade receivables)*

The excess cash is considered financing

*Financing cash = Cash and cash equivalents – 10% * (Inventories + Trade receivables)*

Leased assets and liabilities

The capitalized right-of-use (leased) assets are measured at the amount equal to the lease obligation (Vow ASA, 2020). Related mainly to leased properties, these assets can be perceived as being owned, and should therefore be treated the same as other fixed assets (Kaldestad & Møller, 2016). Right-of-use assets will therefore be classified as an operating asset.

As Vow is obliged to pay a set amount over a defined period, the lease liability has many similarities with a loan. Also, it is interest-bearing, and these are not expensed above EBIT in the income statement. Thus, they seem to fulfil the definition of financing liabilities. However, we believe lease assets and leased liabilities should fall under the same category, i.e. either operating or financing. Because the leased assets clearly are operating assets, we choose to define the leased assets as operating.

Convertible loan

The convertible loan was presented in section *7.1.2* as a part of the settlement with ETIA. Note that the item consists of a principal and a conversion right. The convertible loan was issued to the ETIA management. They have an option to convert the loan into Vow`s ordinary shares at a conversion price of NOK 19.33 per share. If ETIA`s management decide to convert to Vow shares 9 months after closing, the debt will be recognised as paid in equity. Also, the convertible loan is interest-free and fair value adjustment of the conversion rights will not have any cash effect for the Group (Vow ASA, 2020).

Moving on to the classification of the convertible loan, it is a rather tricky item. We cannot state that it arises from daily operations and thus do not have seem operating, but it is interest-free and therefore not clearly financing either. It is impossible to say whether it will be exercised “9 months after closing”, i.e. July 2020, or not. We choose to emphasize that the fair value adjustment of conversion rights is included under EBIT and classify it as a financing liability.

Rearranged balance sheet

After all the adjustments are made, the final rearranged balance sheet is presented in table 7.15.

Table 7.15: Rearranged balance sheet

Rearranged balance sheet	2017	2018	2019
Operating non-current assets	33,7	41,5	278,3
Operating current assets	122,4	152,3	252,8
Total operating assets	**156,1**	**193,8**	**531,1**
Operating non-current liabilities	7,2	14	25,7
Operating current liabilities	68,2	83,8	128,3
Total operating liabilities	**75,4**	**97,8**	**154**
Financing non-current assets		-	-
Financing current assets	-0,7	0,3	71,0
Total financing assets	**-0,7**	**0,3**	**71,0**
Financing non-current liabilities	1,1	0,9	92,7
Financing current liabilities	20,8	2,1	102,1
Total financing liabilities	**21,9**	**3**	**194,8**
Net financing assets/debt	**-22,6**	**-2,7**	**-123,8**

Source: (Scanship Holding ASA, 2018, 2019) and (Vow ASA, 2020)

Where:

Net financing assets/debt = Total financial assets – Total financial liabilities

In conclusion, the Group has net financing debt of MNOK 123.8 per 31.12.2019.

7.2.3 Capital Expenditures – CAPEX

Vow has seen a significant increase in revenues over the last years. It has become a larger and more complicated organisation in need of higher investments, or CAPEX, to facilitate future growth (Vow ASA, 2020). CAPEX consists of investments in non-current assets, minus "normal" disposal of non-current assets. Assets gained from acquisitions and non-current items are *not included*. In addition to investment in tangible non-current assets, such as PPE, investment in *intangible assets* can also be considered CAPEX (Kinserdal, 2019).

Vow has had a relatively low and stable investment in PPE, which is mainly office furniture and equipment. The investment in intangible assets on the other hand varies a lot depending on the number and size of current R&D projects. Increased investments over the last years is related to the development of the MAP technology (Scanship Holding ASA, 2019). The historical CAPEX of Vow is presented in table 7.16.

Table 7.16: Historical CAPEX

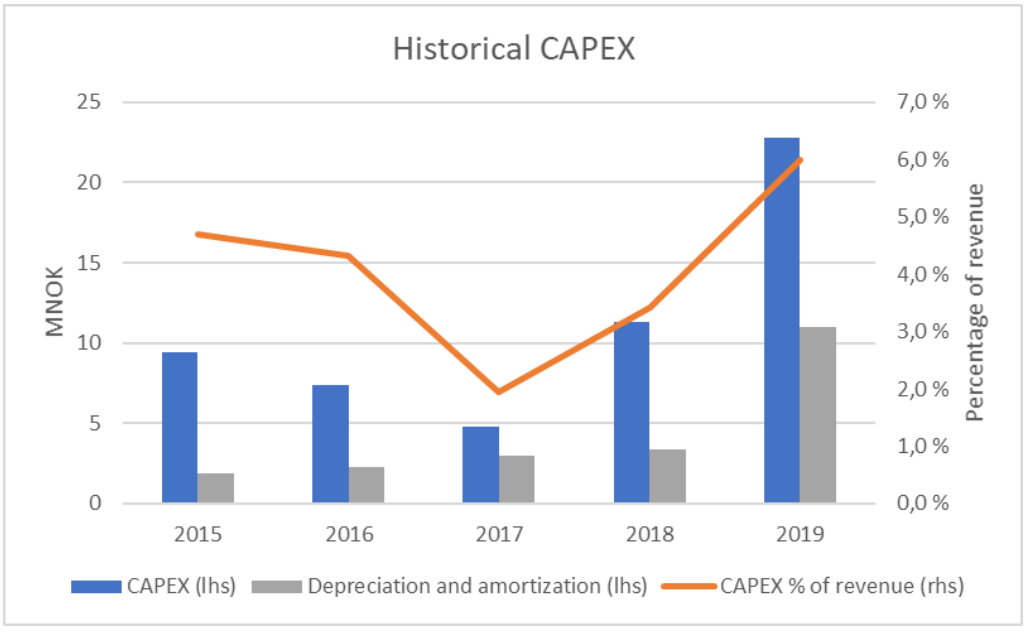
Historical CAPEX (MNOK)	2015	2016	2017	2018	2019
Purchase of PPE	2,5	1,6	1,5	1,9	4,6
Investment in intagible assets	6,9	5,9	3,3	9,4	18,2
Net cash flow from operating activities	**9,4**	**7,4**	**4,8**	**11,3**	**22,8**

Source: (Scanship Holding ASA, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

Due to the volatility of historical CAPEX, they must be normalized before we can estimate the level of CAPEX in future cash flow. Damodaran introduces a couple of methods. The simplest method is to average CAPEX over a number of years. Firms with limited history or firms with changed business mix over time can alternatively look at industry averages of CAPEX as a percent of base-input (Damodaran, 2012).

Due to the Groups increased investments in future growth, smoothing CAPEX will not be suitable before the company reaches steady state. When a company reach steady states, its investments is equal to depreciation and amortization (D&A). Figure 7.5 illustrates that Vow clearly will not approach steady state anytime soon.

Figure 7.5: Historical CAPEX and D&A in MNOK, and CAPEX in % of revenue, 2015-2019.



Source: (Scanship Holding ASA, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

On another note, one might argue that Vow went through a business mix after acquiring ETIA and should therefore look at industry averages. As we will discuss in section *9.3* however, several of the waste-management and ESG peers have substantial investments in tangible assets. Vow almost exclusively invest in *intangible* assets. Since Vows CAPEX can be tracked back in time, we believe it will be better to forecast future CAPEX based on historical CAPEX in percentage of base input. This issue will be addressed in section *8.4.*

7.2.4 Working capital

Working capital is defined as the difference between current assets and current liabilities. For valuation purposes, investment in marketable securities and excess cash is excluded from current assets, and all interest-bearing debt is excluded from current liabilities. This gives us the *operating working capital,* which addresses assets necessary for operation of the business and liabilities related to the ongoing operations in the firm (Koller, Goedhart, & Wessels, 2015). Also, only items that grows with revenue should be included (Kinserdal, 2019).

Formula 7.1: Items included in the net working capital (NWC)

NWC=Account Receivable + Inventory + Operating Cash – Accounts Payable

We will first break down Vows operating current assets from table 7.5, and then assign them to one of the items in formula 7.1. The Group holds trade receivables and other receivables. Other receivables consist mainly of VAT receivable and prepaid expenses. Trade receivables and other receivables clearly fall under Account Receivable in NWC. One additional asset is included in the item: contracts in progress. That is the "value of construction work performed less payment by customers", and it is due from customers (Scanship Holding ASA, 2019). The Groups modest inventories are naturally included in Inventory. As mentioned in section *7.2.2*, the amount of operating cash can be obtained by a rule of thumb:

*Operating cash = 10% * (Inventories + Trade Receivables)*

The next step is to analyse the components in operating current liabilities shown in table 7.7. The most common are those related to suppliers, employees, customers and the government (Koller, Goedhart, & Wessels, 2015). Vow`s largest liability due to suppliers is trade creditors, followed by contract accruals. If payments from customers exceed the net amount earned, this is presented under "Contract accruals" (Scanship Holdind ASA, 2019). Income tax payable are due to the government. Vow`s Other current liabilities consists of public duties payable and other payables & accruals for incurred cost.

Most companies will tie up more working capital as they grow. An analysis on the historic level of working capital will make the foundation for forecasting future levels (Kaldestad & Møller, 2016). The historic NWC levels for Vow are presented in table 7.17. However, it gets harder when we turn our attention to predicting future levels of NWC, due to their volatile nature. Koller et. al. (2015) suggests estimating most items as a percentage of revenues or in days` sales, as it is generally uncontroversial to let working capital grow proportionally with revenues. They list some possible exceptions for items that are tied to other inputs. More specifically, inventories and account payables are due to suppliers and hence tied to input prices. These can instead be estimated as a percentage of COGS. We choose to follow their advice. Each item`s normalisation ratios (Average ratios) is also presented in table 7.17

Table 7.17: Vow`s historic levels of working capital in MNOK and in percentage of base input (revenue or COGS), from 2015 to 2019. Normalisation ratios are the average percentage of base input. Also, NWC are presented in MNOK and in % of revenue.

MNOK	**2015**	**2016**	**2017**	**2018**	**2019**	**Norm ratio.**
Account receivable	115,8	85,9	112,2	141,1	229	
% of revenue	57,8 %	50,1 %	45,4 %	42,8 %	60,1 %	**51,5 %**
Inventory	5,7	3,5	3,9	4,5	9,3	
% of COGS	4,2 %	2,8 %	2,3 %	2,0 %	3,6 %	**2,9 %**
Operating cash	6,7	6,1	6,3	6,7	14,5	
% of revenue	3,3 %	3,6 %	2,5 %	2,0 %	3,8 %	**3,0 %**
Operating current assets	**128,2**	**95,5**	**122,4**	**152,3**	**252,8**	
Trade creditors	36,7	31,5	47,6	44,3	69,2	
% of COGS	26,9 %	25,5 %	27,8 %	19,3 %	26,7 %	**24,9 %**
Contract accruals	27,7	8,2	10,6	25,7	36,8	
% of COGS	20,3 %	6,6 %	6,2 %	11,2 %	14,2 %	**11,8 %**
Income tax payable	0,7	0,5	1,4	-0,3	1,7	
% of revenue	0,3 %	0,3 %	0,6 %	-0,1 %	0,4 %	**0,3 %**
Other current liabilities	12,5	10,2	7,1	10,7	20,7	
% of revenue	6,2 %	5,9 %	2,9 %	3,2 %	5,4 %	**4,6 %**
Operating current liabilities	**77,6**	**50,4**	**66,7**	**80,4**	**128,4**	
Net Working Capital	**50,6**	**45,1**	**55,7**	**71,9**	**124,4**	
% of revenue	**25,3 %**	**26,3 %**	**22,5 %**	**21,8 %**	**32,7 %**	**26,2 %**

Source: (Scanship Holding ASA, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

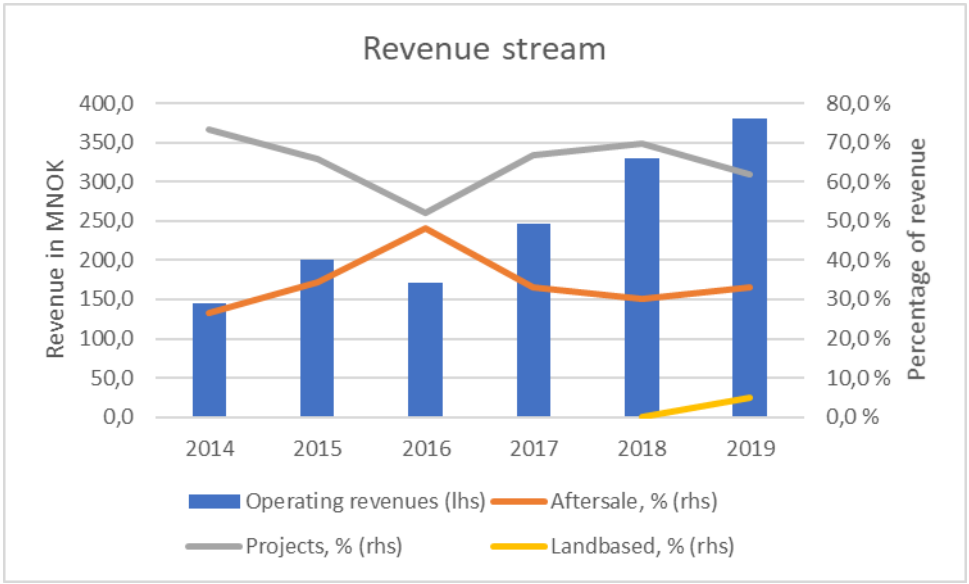
Future levels of operating working capital will be addressed in section *8.4.*

8. Prognosis period

This chapter will start by assessing the Group`s main value drivers, based on the outlook of the target markets and the strategic analysis. Combined with the normalized financial statement analysis this will lay the foundation of forecasted operating income.

The Group divides the operations into three different operating segments: *Projects, Aftersales and Landbased.* Looking at the historical revenue stream in figure 8.1., around 60%-70% have been generated from Projects and 30%-40% from Aftersales. The revenue distribution from the two segments converged in 2016 when the Group was underbid by a competitor. The new segment *Landbased* was introduced in Q4 2019 and accounted for approximately 5% of the total operating revenue in 2019. Prior to 2019, the (insignificant) revenues from land-based projects was included in Projects, and land-based aftersales in Aftersales.

Figure 8.1: Revenue stream from 2013-2019. The grey line shows the % of revenues which comes from projects. The red line show % of revenues which comes from aftersales. The yellow line shows % of revenues which comes from land-based. Note that the land-based segment for 2019 only includes Q4 and not the entire year.



Source: (Scanship Holding ASA, 2015, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

Considering the rapid growth in revenues and newly engaged verticals in land-based industries, a three-stage DCF-model is applied. The first five years will focus on projects under construction and the backlog. The next five years will focus on the general outlooks of the markets and development towards a more stable intake of projects, for the Group as a whole.

8.1 2020 – 2024: Increased growth

Going forward, we will mimic the layout in earlier chapters and present the expected growth in each market, i.e. the cruise-, aquaculture and land-based. For the coming five years, a deeper analysis of expected revenues will be forecasted, and margins will be predicted based on the normalized financial statement. Data on solutions to the cruise market is obtainable and will be estimated by a set of assumptions. Due to the limited time and available resources for a thesis such as this, we will rely more on the consensus among analysts covering Vow to predict the level of future revenue from the aquaculture- and land-based industries, and then adjust for our findings. Then, more general assumptions are made for the transition period between 2025-2029, before the Group is set to enter steady state by 2030.

8.1.1 Cruise

Section 4.1 highlighted the high and stable global passenger growth in the cruise industry. Based on CLIA numbers it has grown at an annual rate of 5.4% for the past years. It is expected to grow in the future, but at a lower rate, delivering a CAGR of 3.1% from 2020 to 2027.

Newbuild

We have developed a model to predict revenues from newbuilds in the coming five years. The fundament is the Group's current order backlog from figure 5.7. and options on "Scanship equipped" sisterships. Several assumptions are made to forecast revenues for our base-, bear-, and bull case. First, a general assumption about the future number of ships to enter service from each of the three main shipyards is made, based on figure 5.3. Note that the orderbook is full until 2023-2024. We believe the number of ships to enter service from these yards peek around 2021-2023. The reason why the number of ships to enter service are predicted after 2024 is because of the Groups revenue recognition (see figure 7.3), where the vast majority of revenue from newbuilds is recognised 1-2 years prior to the ship`s entrance. A second general assumption is the proportion of solutions delivered that are Scanship Total Clean Ship Systems (STCSS). Figure 5.8 illustrates the trend were total clean ship systems are becoming more common, replacing orders for separate AWP and WMS. We estimate that total clean ship systems will make up 80% of future orders.

Base case

Our base case predicts a future of persistent, stable growth. The first concern is Scanship`s market share going forward. Whereas they were market leaders in AWP installations, EVAC was the main supplier of WMS (see figure 5.11). Section *6.2.2* pointed to the implied market share of 55% based on

the three main yards orderbook from 2020 to 2023. We want to emphasize their well-developed customer relations as mentioned in the same section and assume that a market share of 60% is reasonable. Thus, 60% of expected future orders from the three main yards will accrue to Scanship. Note that additional orders from "other yards" (CSSC and Kleven) will be estimated for each case. For our base case, we expect Scanship to equip 3 ships set to enter service from the two yards by 2027.

The price for individual contracts is normally not communicated by the Group. Instead, it can be obtained from statements in annual reports. They stated that during the second half of 2017, "six new cruise industry contracts have been signed for approx. MNOK 196" (Scanship, 2017c).

Because most contracts awarded this year where for STCSS, it translates to a price of MNOK 35 for such. Considering 80% of all contracts are assumed to be for STCSS, the average price per *contract* is MNOK 28.

Bear case

Our bear case also builds upon the current backlog and options, but it points to a relevant threat. We discussed the consequences of someone trying to break into the market and/or existing players stealing market shares in section *6.1*. It could potentially lead to underbidding in the market, starting a price war. We stated that Vow`s is a small company relative to the existing competitors, meaning a price war might hit them harder. If it were to happen soon, only orders on ships to enter service from 2024 or 2025 would be affected, since the order book is full until 2023-2024. Because Scanship lost on tenders when it last happened in 2016, they would likely be cautious about participating in the future. On the other side, they must also defend their position as market leaders. On that note, we predict that prices on ships set to enter service from 2025 fall to MNOK 30, and their market share decrease to 45%. Note that the backlog and options are the *minimum* number of annual contracts. Following a fall in market prices, Scanship will exercise the options which we assume to have a strike price of 35. Only the additional contracts will be priced at MNOK 30. We assume they will struggle to get a foothold in the Chinese market and predict Scanship will equip two ships set to enter service from CSSC in 2027.

Bull case

On the contrary to our bear case, we predict the outcome of a successful commercialization of MAP on cruise vessels. This can lead to a temporary competitive advantage before competitors duplicate the technology. According to Scanship`s own statement from section *5.1.2*, combining AWP and

WMS with MAP will save a large cruise ship for yearly costs of MUSD 1, providing a payback time of approximately five years. Thus, such a system will cost MUSD 5, or roughly MNOK 45[6].

Considering the poor environmental score of several cruise lines, we believe some owners will only invest a bare minimum to comply with regulations, i.e. resist investing in the more expensive MAP-technology. Thus, Vow will still exercise the options. Assuming they are the sole providers of MAP on newbuilds set to enter service between 2025 and 2027, we increase their market share in the period to 70%. We predict that 50% of the *additional* orders will include MAP. Also, we assume the growth in the Chinese middle-class goes according to *section 6.3.3*, and that Vow enter the Chinese shipbuilding market successfully. They are awarded contracts on four ships set to enter service in 2027 in our bull case.

Table 8.1: The set of assumptions on newbuilds from 2020 to 2027 used to calculate earnings in the coming five years in the market. Note that time ships enter service in time T, and contracts are awarded three years in advance (T-3). Main shipyards orderbook is constant for all scenarios. Scanship equipped ships set to enter service from the yards will vary with the market share in each scenario.

Assumptions Newbuild	**Bear**		**Base**	**Bull**	
Proportion STCSS	80 %		80 %	80 %	
Ships set to enter service in	*2020-2024*	*2025-2027*		*2020-2024*	*2025-2027*
Market share	60 %	45 %	60 %	60 %	70 %
Price	35	30	35	35	45
Average price	28	24	28	28	36

Revenue recognition	T-3	T-2	T-1	T
	7,50 %	50 %	35 %	7,50 %

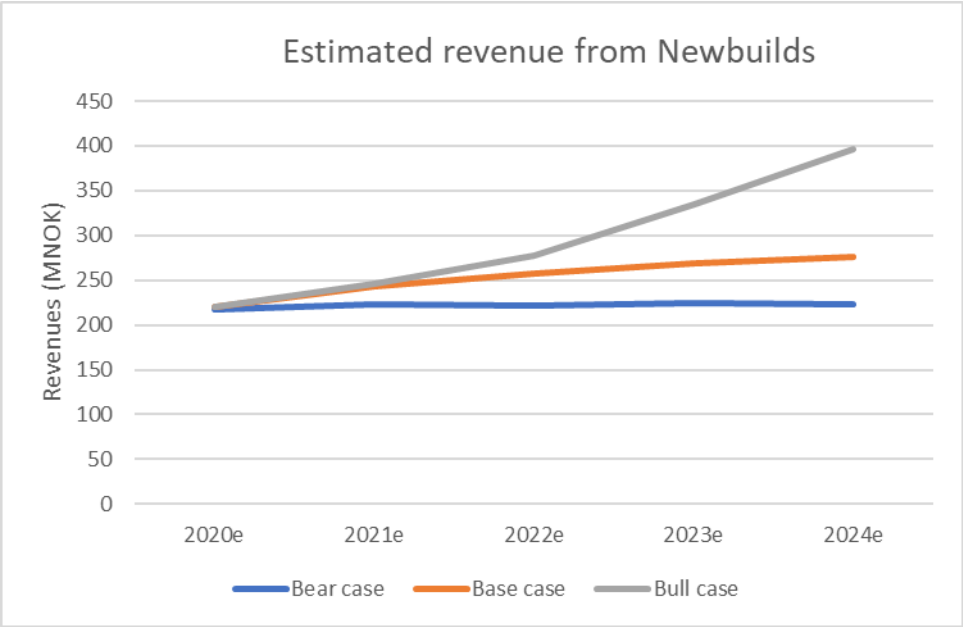
	2020	2021	2022	2023e	2024e	2025e	2026e	2027e
Main shipyards orderbook	11	14	15	13	14	13	13	13
Scanship equipped ships set to enter service from the "big three" yards **(base case)**	7	6	9	8	8	8	8	8
Orders from CSSC and kleven **(base case)**	1	0	0	1	1	2	2	3

Source: Own estimates

Based on our assumptions, we estimate revenues from newbuild for three different scenarios. The results are illustrated in figure 8.2. Our base case estimates a CAGR of 5.8% in the first phase, while a price war could case a CAGR of -1.2% and the commercialisation of MAP a whopping 13.6%.

Figure 8.2: Estimated revenues from newbuilds from 2020 to 2024 for our base-, bear-, and bull case.

[6] USD/NOK 8.78 per 31.12.2019



Source: Own estimates

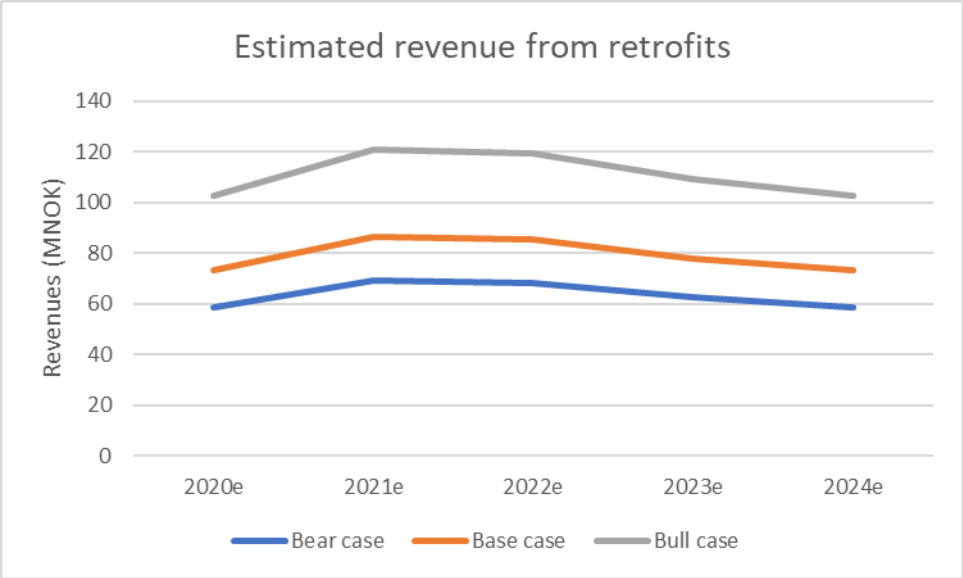
Retrofits

Retrofitting activity is picking up the pace after almost coming to a halt in the mid 2010`s. The recent comeback is a combination of an ageing global fleet, and the Helcom-standard`s demand for existing ships to be compliant with strict regulations by 2021 to sail in special areas. Figure 5.9 showed that many ships will soon reach 20 years of age, which is the expected usable life of AWP systems. These are considered the targets for retrofitting. For our base case, we expect 50% of the 20-year old ships will get a retrofit in the coming five years. For our bear and bull case, we consider the expansion of special areas. More specifically, in the bear scenario, we assume no additional areas are added, meaning only the Baltic Sea is considered a “special area”. This will lead to a lower penetration, which we set to 40%. In our bull scenario, a rapid expansion of special areas will put the line owners in a precarious situation. We expect a penetration of 70% in this scenario.

Section *5.1.3* pointed to the retrofit contract awarded by Carnival Cruise Line. They have a large fleet with outdated systems, representing a major potential customer. Scanship`s future market share is set to 60% in the future to reflect future cooperation with Carnival. AWP systems are the most common retrofit, considering 25 of Scanship`s 30 past retrofits have been AWP`s. This will likely continue. Lian (2020) estimates the size of contracts to MNOK 20. Revenues are usually recognised over two years. At the time of signing, 40% is recognised, and then the rest is recognised the year

after when the system is installed (Vow ASA, 2020). In all scenarios, retrofits will make up a much larger share of revenue from the *cruise Projects* than previously[7].

Figure 8.3: Estimated revenues from retrofits from 2020 to 2024 for our base-, bear-, and bull case. Note that reported revenues from retrofits were MNOK 31.1 in 2018 and MNOK 29 in 2019.



Source: Own estimates

Aftersales

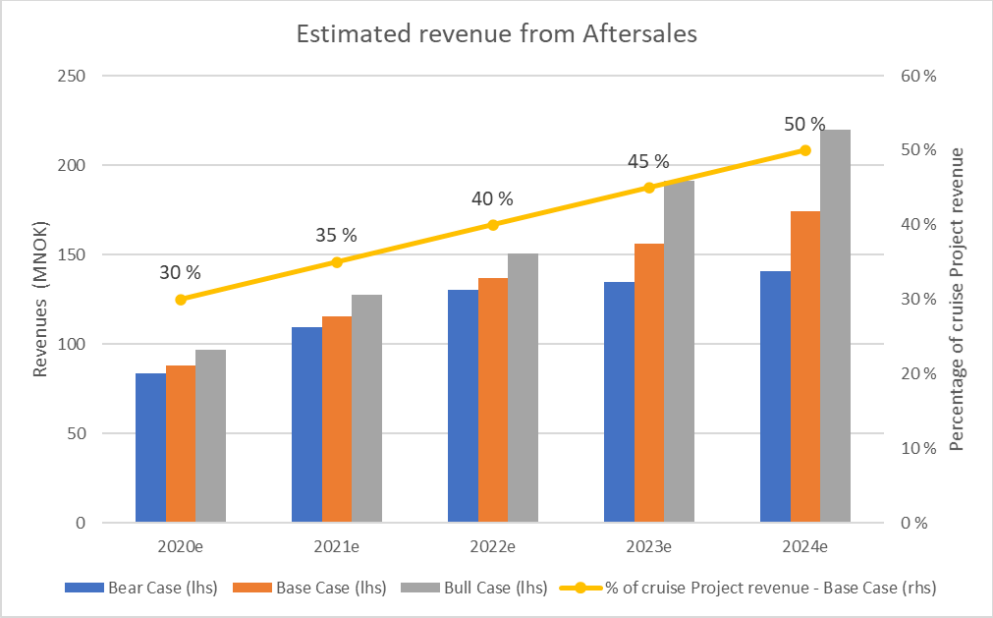
Aftersales have historically generated a large portion of Vow`s revenues. From looking at figure 8.1, it has on average accounted for 30%-35% of total revenues. As the number of delivered systems to cruise ships increase, both for newbuilds and as retrofits, so will the market for Aftersales. Also, once systems are installed with Scanship-technology, they basically have a monopoly on maintenance and repairs. As the number of project orders will vary over time, the Aftersale division provide a steady source of income.

Considering that the number of ships is the value driver, we believe there will be no difference in Aftersale revenue from *newbuilds* between the scenarios. The reason is that the number of ships set to enter service is practically determined until 2023-2024. In our prediction on retrofits however, the market penetration and thus number of vessels retrofitted vary between the scenarios. The gap in retrofitted vessels in coming years is the basis for each scenario. Since most revenues from Aftersales are recognised at the point of delivery to the customer, an increase in ships can be directly translated to an increase in Aftersales.

[7]15% in 2018 and 13% in 2019

There are two approaches for estimating revenues from this segment. One way is to collect data on current fleet, how often a ship requires repairs and maintenance and the average prices. The other approach is to obtain the ratio of Aftersales revenue to cruise Project revenues. Because we lack sufficient data to compute a model, we choose the second approach. Revenues from aftersales have historically made up around 50% of cruise Project revenues. However, we assume it will take at least two or three years before newly built and retrofitted ships need spare parts and repairs. Considering the substantial amount of newbuilds and retrofits in the coming period, we believe revenue from Aftersales will make up slightly less during the first years, before it again reaches 50% by 2024.

Figure 8.4: Estimated Aftersale revenues from 2020 to 2024 for our base-, bear-, and bull case. Aftersale revenues are estimated as a fraction of cruise Project revenues.



Source: Own estimates

8.1.2 Aquaculture

Since the Group first expanded to the aquaculture industry in 2015, they have been awarded a total of eight contracts. Aquaculture is currently surpassing capture production in term of global seafood production, and the use of RAS-systems for closed-cage and land-based farming is expected to increase drastically. The foundation is laid for growth in the industry.

The Group do not state explicitly how they recognise revenues from aquaculture, only that they are "recognised over time, as the deliveries are without alternative use, and the group has an enforceable right to payment for performance completed to date." (Vow ASA, 2020). Because the Group were awarded several contacts in 2018, and the revenue from the segment was higher this year compared to 2019[8], some revenue is recognised at the time of signing. Also, analysts from both Nordea (Nordea Markets, 2019) and DNB (Lian, 2020) assume revenue is generated for each tonne of salmon in the facilities.

Because aquaculture make up a smaller part of Vow`s business, and publicly available information on the Group`s projects in scarce, we choose to base our prediction on the estimated from Nordea and DNB. The given revenue generated by the systems is KNOK 5 for each tonne of salmon produced. Nordea estimates the volume from the closed-cage project with Akvafuture and the land-based project with Atlantic Sapphire. The total volume over the lifetime of Atlantic Sapphire`s facility is 90 000 tonnes, implying that the project is successful.

Because the report is from 2018, revenues are predicted for 2019. Since the reported revenues in 2019 where way lower, we interpret it as a delay in the production. Thus, we choose to postpone the estimated growth in volume for a year in our base case. The base case is the foundation for our bear- and bull scenarios.

Bear case

With an expected growth in closed-cage and land-based aquaculture, several potential competitors can find it profitable to enter the market. Section *6.4* pointed to the threat that existing competitors in the cruise market can deliver technology to the RAS-suppliers. Also, the RAS-suplliers themselves can develop their own sludge handling systems to capture value. While this can potentially lead to stiffer competition and lower margins in the future, another scenario pose an even bigger threat. The land-based farming is still in an early phase, and the technology is still very much untested. Thus, the main risk is related to the functionality of the sludge handling systems and RAS-technology in land-based aquaculture. In our bear case, we exclucde the revenues from Atlantic Sapphire before they

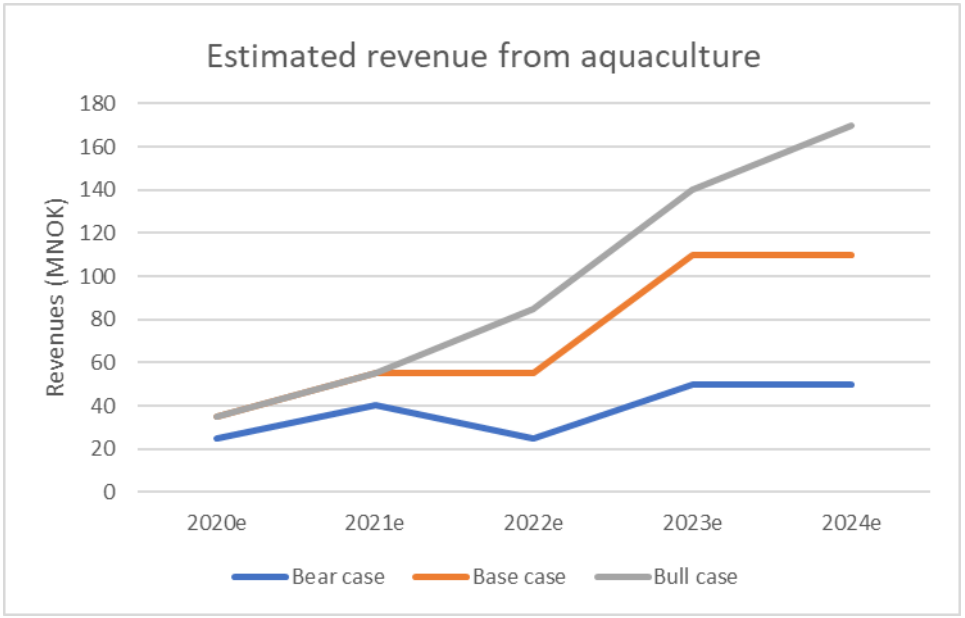
[8] Revenue from aquaculture: MNOK 27.8 in 2018 and MNOK 3.9 in 2019

reach the end of the “third step” in 2024-2026. We believe the first step is yet to start due to the low revenues in 2019. If the technology supplied is not satisfactory, Scanship`s revenues are expected to cut off after the first step, estimated to 2021.

Bull case

On the contrary to our base case, this scenario predict a succesful cooperation with the RAS-suppliers and Atlantic Sapphire. Also, the market positive outlook for land-based farming strikes, leading to higher demand for Scanships`s solutions and result in more contracts with RAS-suppliers for the deliverance to Atlantic Sapphire. In our bull scenario, an additional contract for a new Atlantic Sapphire facility with similar volumes is included from 2022.

Figure 8.5: Estimated revenues from aquaculture from 2020 to 2024 for our base-, bear-, and bull case. Note that reported revenues from aquaculture were MNOK 27.8 in 2018 and MNOK 3.9 in 2019.



Source: Own estimates

8.1.3 Land-based

Scanship only first entered the land-based market in recent time when their MAP-technology received attention outside the core cruise market. Considering the enormous market potential these land-based industries pose as shown in figure 5.1, Scanship Holding ASA acquired ETIA to accelerate its access into new verticals. All potential addressable industries and potential verticals are explained in section *5.3*. Also included in the section are the two contracts ETIA were awarded after their inclusion in the Group (Q4 2019). Our estimates on future estimates from the market will rely somewhat on analysts' predictions because information about contracts are scarce, as revenues from the market are only reported in the last quarter of 2019.

Like the aquaculture market, revenues from land-based industries are recognised over time as service and goods are transferred. The contracts awarded in November and December of 2019 are expected to be installed by the end of 2020. Thus, we set revenue recognition to span over two years. Next, the disaggregation of the Groups revenue show that MNOK 9.2 come from Biogreen (Vow ASA, 2020). We assume this is the revenue that occurred from the two Biogreen-projects in Q4 2019 and recognise MNOK 5 at the time of signing. Considering the reported backlog in the market of MNOK 77.9, a price can be computed with a few assumptions. First, other elements in the backlog may be the contract that Scanship where awarded with Lindum in 2019, and projects awarded to ETIA before the acquisition. Because they seem to have been awarded few projects during the last year and a half, we assume that the backlog consist of the two projects from Q4 2019, Scanship`s project at Lindum, and one project from before the acquisition. Thus, the *average* revenue from each project is MNOK 20 during year 2 when the system is installed, plus the MNOK 5 from signing. This is in line with Lian`s (2020) estimated price of MNOK 31. Note that the price may vary between the systems delivered. Additionally, the market will generate aftersales by time. We follow (Lian, 2020) estimates and assume it will amount to MNOK 0.75 per system per year. In a similar fashion to aftersales from cruise solutions, we assume it will take two years before land-based solutions require spare parts and repairs.

The number of contracts awarded in the future is highly speculative. Since they announced two single-systems contract in the span of three months, the annualised rate is eight projects. However, as they engage in new verticals and get to deliver more systems to existing customers, we assume this number to be higher. The primary reason for this is the Sustainable Development Goals by the UN, which leads to more widespread and higher carbon pricing. Many companies need to make necessary changes to cope with international and national initiatives, as mentioned in section *6.3.1*.

Table 8.2: The set of assumptions on the land-based market used to calculate revenues in the coming five years. Note that the predicted price and number of contracts is for the base case.

Assumptions Land-based						
Price base case	25					
Aftersales per system per year	0,75					
Revenue recognition	T	T+1				
	20 %	80 %				
Contracts awarded	2020e	2021e	2022e	2023e	2024e	
Base Case	16	30	40	47	54	

Source: Own estimates

Bear case

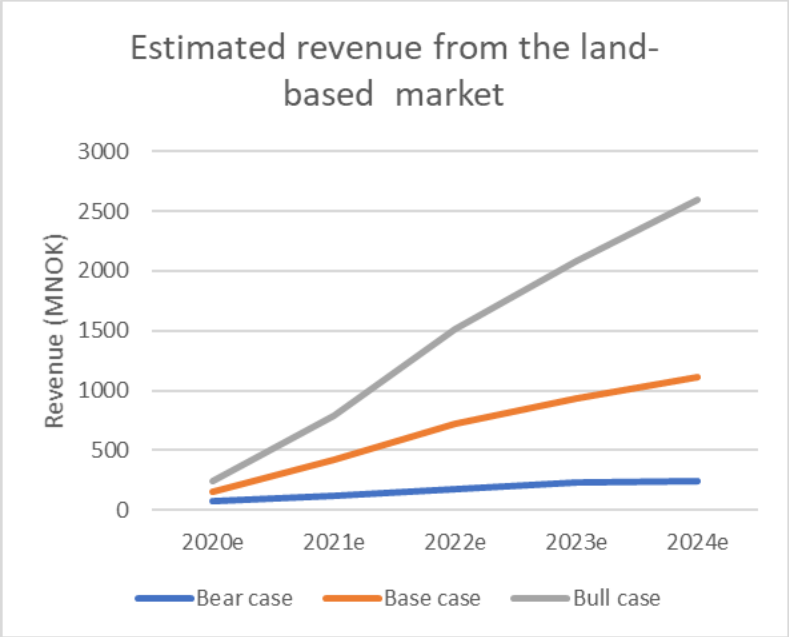
Considering the uncertainties that arise when predicting a new market with little available information, revenues will vary tremendously between our predicted scenarios. The suggested price from our base case is highly volatile. Systems are priced at MNOK 20 in our bear case to reflect smaller contracts, i.e. the *lack of* expected high-revenue systems such as Biogreen. Also, if the announced customers do not order any additional systems in future, the Group will struggle to get a foothold in the market. Adding that Scanship`s MAP-technology proves unsuccessful in the market; we assume they are only awarded contracts for 12 new systems in 2024.

Bull case

In our bull scenario, the price is set to MNOK 30 per system. Note that this price is even higher than for assumed high-revenue systems such as Biogreen. This scenario predicts that the value drivers in the market, such as price of carbon emissions and pressure to cut emissions, increase. Thus, the market price of land-based solutions will increase. Adding that the Group successfully exchange knowledge between the subsidiaries to improve their products, the foundation is laid for rapid growth. The Group are expected to be awarded contracts for 83 systems at the end of the first phase in our bull scenario.

Figure 8.6 illustrates the predicted revenue for each scenario. Many uncertainties give a highly volatile forecast with diverging results. Also, the land-based market is expected to be the most important market in the future, surpassing the cruise market by 2022 and making up 72% of revenues in 2024. Thus, the final value of Vow will depend heavily on our subjective expectations on the land-based market. This will be further addressed in section *10.1.1.*

Figure 8.6: Estimated revenues from aquaculture from 2020 to 2024 for our base-, bear-, and bull case.



Source: Own estimates

8.2 2025 – Stabilizing growth

After going through a period of rapid growth in the first five years of our forecast, Vow will most likely enter a more mature phase in the next period. Total Group revenues in our base case is expected to reach BNOK 1.93 in the first phase, translating to a CAGR of 35.3%. The largest contributor is, unsurprisingly, the land-based market. Because the information on projects 5 years ahead is very limited, this second phase will rely more on general assumptions and market outlooks.

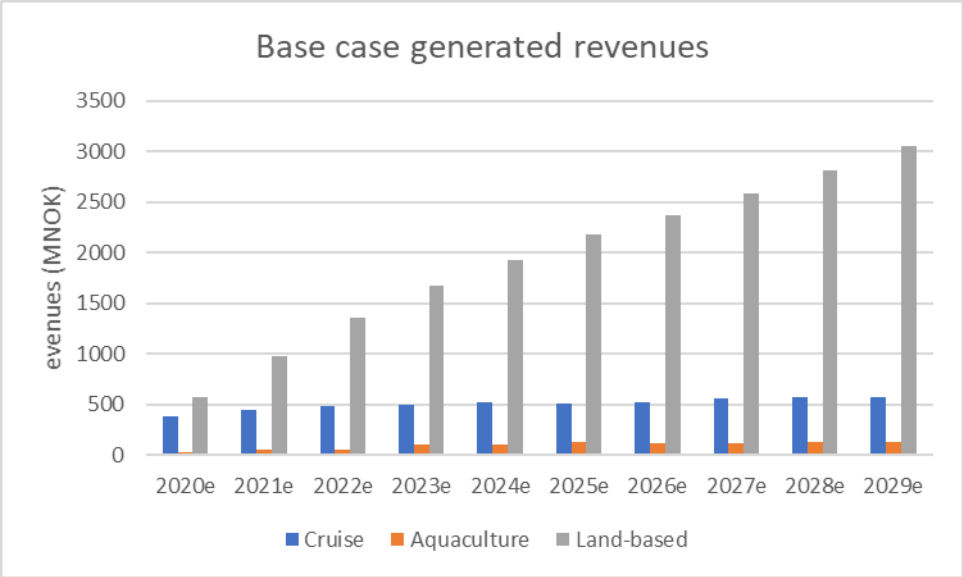
In the cruise market, the number of ships to enter service from the main shipyards are predicted to drop somewhat and stabilize, because of the predicted slowing growth of passengers. As we mentioned in section *6.3.3,* the number of Chinese tourists is expected to increase, so an increasing number of contracts from CSSC are estimated in this period. The underbidding in our bear case is expected to come to a halt, and thus prices is set to bounce back, but Scanship will likely not regain their original market share of 60% after the incident. The competitors will initially struggle to imitate the MAP technology but are expected to do so by 2025, resulting in a lower market price for orders on MAP-technology and lower market share on newbuilds set to enter from 2028**.** However, increased penetration in the Chinese market results in some growth in our bull scenario. The number of ships to reach 20-years of age drops drastically in 2025 before it stabilizes at around nine ships in the end of the phase. Holding previous assumptions constant, the wave of retrofits from the first

phase has passed. Consequently, the growth in Aftersales will be minimal, as the number of *total* cruise contracts stabilize.

Within the aquaculture market, we assume that the contracts with Akvafuture and Atlantic Sapphire are completed, and that the growth in the market stabilize. As Scanship`s technology was unsuccessful for land-based industries in our base case, only closed-cage projects are assumed in the last period. In our bull scenario however, the cooperation with RAS-suppliers and Atlantic sapphire is successful, resulting in another contract with similar volumes.

Due to the great uncertainties in the land-based market, we choose to base our growth predictions on the future outlook of the land-based industries. Whereas the cruise and aquaculture markets seem to have reached steady state, the land-based market still grows significantly. This is because the Group will continuously enter new verticals. We expect a lower growth rate in this period, but aftersales (MNOK 0.75 per system per year) will pick up as the Groups portfolio increase. Markets in different phases of the cycle proves to be one of the biggest challenges in this thesis, which will be thoroughly addressed in chapter 10. Figure 8.7 illustrate the massive impact the land-based market will have on the Group`s future revenues.

Figure 8.7: Estimated revenues from each market in our base case.

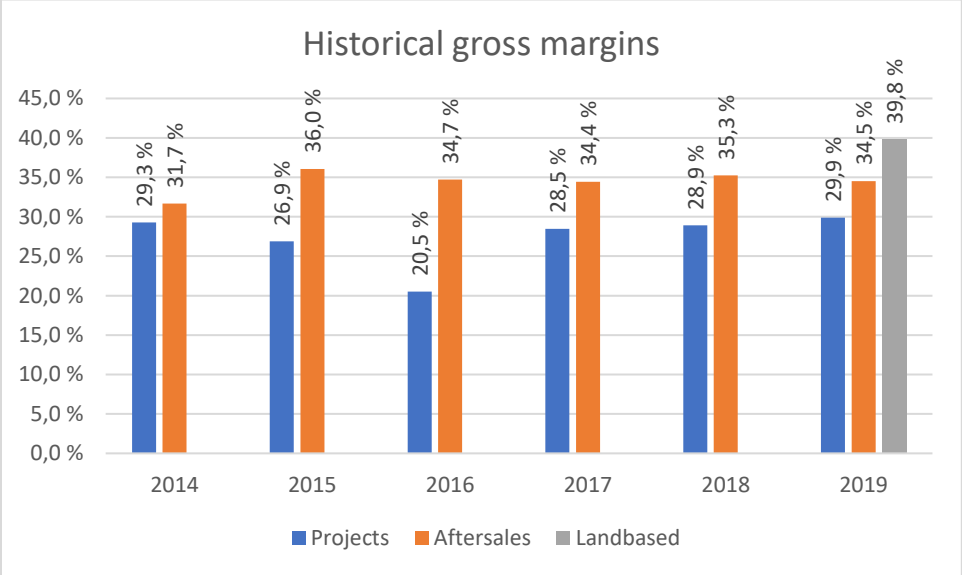


Source: Own estimates

8.3 Estimating margins

The next step in our forecast is to translate the revenues into profits. We will start by assessing the gross margins of the Group. While the *Adjusted* EBITDA-margins from figure *7.13* have fluctuated gross margins have been quite stable and slightly increasing. Figure 8.8 show that the Aftersales *segment* in particular delivered strong and persistent gross margins. Most revenues in the Projects segment has historically come from the cruise market. Considering the slow retrofit market after 2014, we practically observe the gross margins from newbuilds. They average at around 28%, unless for the sudden fall in 2016 following underbidding in the market. Figure 8.8 will be the basis for the coming discussion on future gross margins.

Figure 8.8: Historical gross margins between the three reported segments; Projects, Aftersales and Land-based. Note that Land-based are first included in Q4 2019.



Source: (Scanship Holding ASA, 2015, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

Within the cruise market, gross margins will likely depend on whether the contract is awarded Scanship directly from the shipowners or through shipyards. We assume that retrofitting contracts awarded directly by the shipowners provide higher margins relative to newbuild projects put out on tender by the yards. Because newbuild margins are estimated to 28% based on figure 8.8, we apply a higher margin of 32% for retrofits. Historical margins on aftersales of 35% are expected to persist in the future.

In the bear scenario where underbidding occurs on newbuilds, gross margins on *additional orders* will reflect the levels from 2016, because they still offer the same solutions but receive a lower price. Note that the main reason for the negative *EBITDA*-margins from 2016 was that they participated,

and lost, on costly tenders. We do not take any such costs into account, because they will likely choose which round to participate in more wisely, as pointed out in section *6.1.1.* We assume that the gross margin for the additional MAP system will be somewhat higher than for the total clean ship system, considering their commercialisation of MAP a (temporary) competitive advantage in section *6.2.1***.** Because Scanship are the only suppliers, a few cruise owners may address Scanship directly to acquire MAP and promote their environmental credentials, like Sir Richard Branson from Virgin Voyages did. When competitors duplicate the solution in phase two of our bull case, the competitive advantage has passed leading to the same gross margins as before of 28%.

Scanship are awarded contracts by the subcontractors (RAS-suppliers) in the aquaculture industry. Since they are not awarded contracts directly from the fish-farmers, it may seem like a margin like that for newbuilds is suitable. However, few players compete with Scanship for the contracts in the current market. We assume that gross margins for aquaculture are somewhere in between those from newbuilds and retrofits and place it at 30%. Note that gross margins will be the same in all scenarios, as the value driver is simply the number of awarded systems - the price is constant.

Looking at figure 8.8, the gross margin for the land-based market is a staggering 40%. That figure is computed with only three months of data. Hence, it is not a solid fundament to predict future gross margins. However, figure *7.2.* show that ETIA`s in fact had gross margins with an average over 45%. Because the trend is falling, and considering Lian`s (2020) expectations, we assume gross margins of 35% for the land-based market in our base case. Land-based aftersales will have the same gross margin as those originating from the cruise market.

Table 8.3: Gross margin assumptions for our base case.

Gross margin assumptons - base case	
Cruise	
-Newbuild	28 %
-Retrofit	32 %
Aquaculture	30 %
Land-based	35 %
Aftersales	35 %

Source: Own estimates

ETIA`s key financials show that the operating margin was 7.5% in 2014 and 2015, before it turned negative in 2016. High employee expenses and OOE are the main reason for the negative operating result. We emphasized that the different cost structures of the two subsidiaries in section *6.1.*2 is because ETIA manufacture their own systems. This is also reflected in ETIA`s short tenure with Vow,

as employee expenses make up a much larger share of revenue for the land-based market relative to the other markets. ETIA will potentially have a near-term negative impact on *EBITA margins*, but because of the high *gross* margins, this will soon change as operations are scaled up. Due to the higher market price on the same high-revenue systems in our bull scenario, gross margins will increase, holding everything else constant. The cheaper systems they sell in our bear case are assumed to have an equal gross margin.

Switching focus to Scanship`s future EBIITDA-margin, forecasted employee expenses and OOE will be based on the *adjusted* items from figure *7.13*. The *level* of both expenses was lower in the last three years, and we choose to base our prognosis on these levels. Note that the land-based market is assumed to never reach such low levels, even after their operations are scaled up.

Moreover, the operating expenses will vary with the Group`s activity level. More contracts mean higher employee expenses, and more lease- and consultant`s expenses. The latter two are the main components of OOE. Employee expenses and OOE will not vary with the price of the contracts, however.

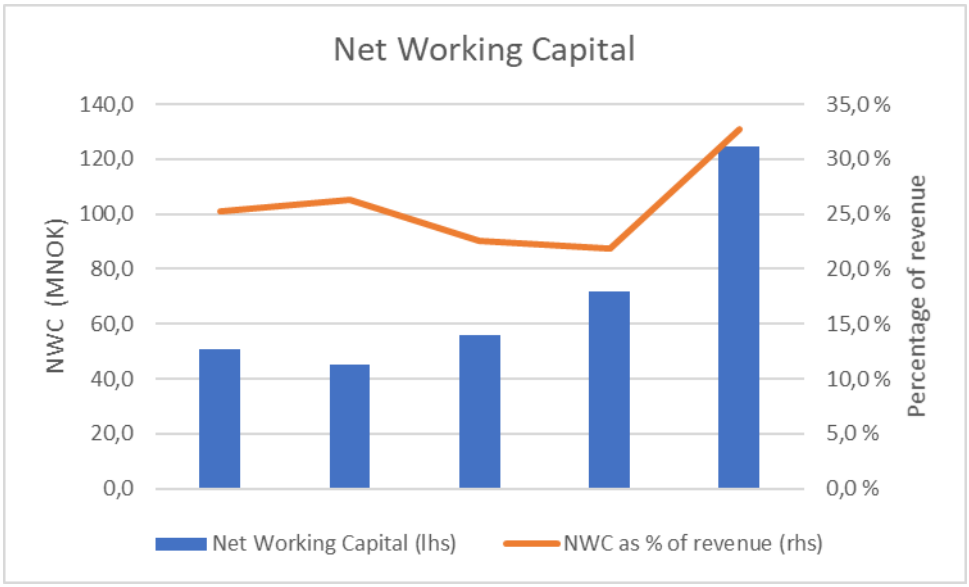
8.4 Estimating investments and operating working capital

Vow has historically had low investments, as seen in figure *7.5*. As they set to grow in existing market and expand to new verticals, they will need continuous investment in R&D. Investments measured relatively to revenue has grown substantially the last couple of years, reaching 6% in 2019. Most investments were allocated to develop MAP. However, since MAP is ready to be commercialised, and ETIA`s Biogreen and Safesteril solutions seem to be developed, investment *in R&D* as a percentage of revenue will gradually fall to 3% by 2024. We believe this level of investments is sufficient to further develop existing technology and engage in new technology, in order to reach and sustain the predicted market shares. However, ETIA manufacture their own systems and must therefore invest in PPE. Hence, CAPEX will increase slightly in the next years before it stabilizes when (relative) investments in R&D get lower. Depreciation & Amortisation are set to make up 50% of CAPEX in the first phase, before it catches up in 2029 when the Group enters steady state. CAPEX will make up the same percentage of revenue for both our bear- and bull scenario.

In section *7.2.4* we decided to forecast NWC based on historical levels. Kaldestad & Møller (2016) highlight the importance of checking for trends. Whereas Koller et. al. (2015) suggests estimating future items as a percentage of revenue or base input, Kinserdal (2019) approaches the forecasting issue by looking at the average level of NWC to revenues, and then adjust it for trends and outlook in the future. Table *7.17* illustrated that although each item changed rapidly (in percentage of base

input), the level of NWC to revenues was quite stable from 2015 to 2018, before it rose tremendously in 2019. This is illustrated in figure 8.9.

Figure 8.9: Historical Net Working Capital (NWC) from 2015 to 2019.



Source: (Scanship Holding ASA, 2016, 2017, 2018, 2019) and (Vow ASA, 2020)

The question remaining is whether this is a trend, or simply a result of acquiring ETIA. Reported financials of 2019 includes acquired assets from ETIA, but only 3-months' worth of revenues, which makes the *level* of NWC artificially high. Thus, we choose to build or prognosis on average historical levels. To better reflect the individual items valued drivers, we will use the Koller. et. al. (2015) approach from table 7.17 of tying the items to base input.

8.5 Effective tax

To compute the after-tax operating income, EBIT is multiplied with an estimated tax rate. Damodaran **(**2012) states that both the marginal tax rate and the effective tax rates are suitable for this purpose. Whereas the marginal tax rate for most firms in a given country is fairly similar, there are wide differences in effective tax rates between the firms. The main reason for the difference is that firms follow different accounting standards for tax and reporting standards. Foreign domiciles with different tax rates further complicate the matter. As we follow Kinserdal`s (2019) framework, we choose to implement the effective tax rate.

When deciding on Vow`s effective tax to use in the prognosis period, there a couple of concerns that must be addressed. As a rule of thumb, firms with higher investment level tends to have a lower effective tax rate than corporate tax rate. This is further reinforced by a higher level of growth. On

the other side, firms who operate within service industries and have a lower investment level tend to have an effective tax rate equal to the corporate tax rate (Kinserdal, 2019). Vow are predicted to grow at a significant pace, but they are still not particularly capital-intensive. Investments are primarily related to R&D and will remain a relatively low level. We choose to emphasize the high growth and therefore implement an effective tax rate lower than the corporate tax rate.

The second concern is the inclusion of ETIA. Since they were only recently acquired, just a small portion of revenues can be assigned to them. However, this may change significantly in coming years if the land-based market grows at the anticipated rate. We believe the French tax rate must be incorporated. The French corporate tax rate is currently 31% but will gradually decline to 25% in 2022 (KMPG, 2019). Considering ETIA will engage in a more capital-intensive growth, an effective tax rate lower than the corporate tax rate is appropriate.

Conclusively, the Norwegian corporate tax rate is 22%, and the French is expected to drop to 25% by 2025. According to Kinserdal`s (2019) rule of thumb, it would be suitable to assign an effective tax rate 2pp lower than the corporate tax rate for both subsidiaries, and hence the Group . Combining the effective implicit effective tax rates of 20% and 23%-24% (ETIA), we will assume an effective tax rate of 22% in our prognosis.

8.6 Conclusion prognosis

We have combined the normalised financial statements from chapter 7 with the assumptions on value drivers analysed above to forecast Vow`s future revenues, margins, investment levels and operating NWC for the first two stages of the DCF-model. The results from our base case is presented in table 8.4, while the results from our bear- and bull scenario are available in *Appendix 2***.** We wish to highlight the following results:

- Revenues grow at a significant pace in the first period, much higher than the average organic growth from table *7.13.*, before it stabilizes going into the second phase. The growth comes almost exclusively from land-based revenues in the second phase.
- Gross margins are set to continue the positive trend, and will converge toward the land-based gross margin of 35% as they make up the majority of revenue
- The EBITDA-margin will initially fall since ETIA`s operations require more operating expenses. Then, it will stabilize at a level around the adjusted EBITDA-margin when ETIA scale up operations.
- CAPEX will initially grow at a higher level because ETIA will invest in more PPE and the Group will invest in technology to secure future growth. The level of investment in R&D is set to fall

at the end of the first phase as Scanship and ETIA`s solutions are very much developed, so the level stabilizes in the second phase.

Table 8.4: Summarized results from our explicit prognosis period, split between the two phases.

Prognosis Base	Phase 1					Phase 2				
MNOK	**2020e**	**2021e**	**2022e**	**2023e**	**2024e**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**
Total operating revenues	576	976	1355	1678	1929	2180	2364	2590	2808	3056
Revenue growth	***51,3 %***	***69,3 %***	***38,9 %***	***23,8 %***	***15,0 %***	***13,0 %***	***8,4 %***	***9,6 %***	***8,4 %***	***8,8 %***
COGS	-394	-657	-904	-1117	-1281	-1446	-1565	-1714	-1856	-2018
Gross proft	**182**	**319**	**451**	**561**	**648**	**734**	**798**	**876**	**952**	**1038**
Gross margin	***31,6 %***	***32,7 %***	***33,3 %***	***33,4 %***	***33,6 %***	***33,7 %***	***33,8 %***	***33,8 %***	***33,9 %***	***34,0 %***
Employee expenses	-89	-151	-193	-218	-251	-283	-307	-337	-365	-397
Other operating expenses	-46	-78	-108	-134	-154	-174	-189	-207	-225	-244
EBITDA	**47**	**90**	**150**	**208**	**243**	**277**	**302**	**332**	**362**	**397**
EBITDA-margin	***8,1 %***	***9,3 %***	***11,1 %***	***12,4 %***	***12,6 %***	***12,7 %***	***12,8 %***	***12,8 %***	***12,9 %***	***13,0 %***
CAPEX	29	59	81	101	116	109	118	130	112	122
Depreciation & Amortisation	17	29	41	50	58	65	71	91	98	122
Operating NWC	152	262	366	454	523	592	642	704	764	832
Effective tax rate	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %

Source: Own estimates

9. The cost of capital

The approach with free cash flow to firm (FCFF) was selected as the primary tool for valuation in chapter 3. Cash flows will be paid to both equity and debt holders, and they both expect to make a return on their investments. Thus, the cost of capital used to discount future cash flows must reflect the cost of the different components of financing used by the firm, i.e. equity and debt (Damodaran, 2012). states that that while investors and lenders require a different rate of return, they both include a premium. Equity investors required return would include a premium for the equity risk in the investment, and lenders a premium for default risk. To adjust for the different required returns, the WACC is used to weight the cost of equity and debt on the market-based target level of equity and debt. Note that the WACC incorporates tax savings from debt (Berk & DeMarzo, 2014).

Formula 9.1: Computation of the Weighted Average Cost of Capital, WACC. This is the average cost of capital the firm must pay to all its investors, both debt and equity holders.

$$r_{WACC} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_c)$$

In the coming sections, all components of the WACC will be presented. We will start by discussing the cost of equity and after-tax cost of debt. Finally, the target weights are estimated and Vow`s WACC is presented.

9.1 Cost of equity

The cost of equity (r_e) is the rate of return required on an investment in equity. The actual return from such an investment may differ from the investors expected return, posing a source of risk. This risk can be divided into the one that can be diversified away by investors, and the risk that cannot. An investor holding an equity position in a firm is exposed to many risks. Some risks may only effect one or few firms. It is called firm-specific risk and can be diversified away. On the contrary, risks that effects all investments, such as macroeconomic factors, are called market risks and cannot be diversified away (Damodaran, 2012).

There are several models for measuring risk in finance. A common model is the Fama-French three factor model which adjust for size of firms, book-to-market values, and excess return on the market. However, the model is mostly used for market research rather than business valuation. The most common risk and return model is the capital asset pricing model (CAPM) (Damodaran, 2012). There are three main assumptions that underlie the CAPM model. The first is that investors can buy and sell securities at competitive market prices and borrow and lend at the risk-free interest rate. Secondly, investors hold only efficient portfolios of traded securities. That is, the portfolios that yield the maximum expected return for a given level of volatility. Finally, investors have homogenous expectations regarding the volatilities, correlations, and expected returns of securities (Berk & DeMarzo, 2014).

Formula 9.2: Computation of the capital asset pricing model, CAPM. The cost of equity depends on the risk-free rate r_f, the beta representing non-diversifiable risk β_i, and the market risk premium ($E[R_{Mkt}] - r_f$).

$$CAPM = E[Ri] = r_f + \beta_i * (E[R_{Mkt}] - r_f)$$

9.1.1 Risk-free rate

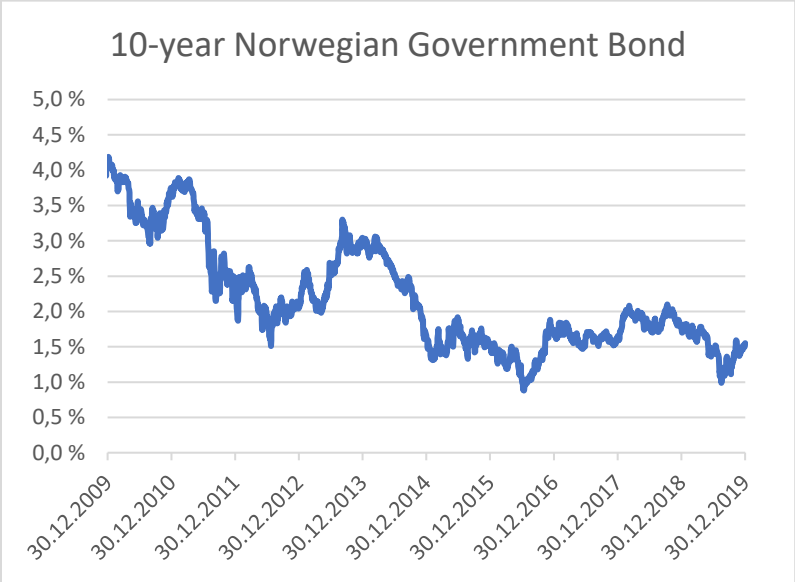
The first component from the CAPM is the risk-free rate, r_f, which is the return of a risk-free asset. For it to be defined as risk free, the actual return must be equal to the expected return. This holds if there is no default risk and no reinvestment risk. The first condition rules out any security issued by a private entity and presents government securities as the only security without default risk. Secondly, if the duration of the risk-free security does not match the duration of the future cash flows in the analysis, it violates the second condition of no reinvestment risk. Consider a default free five-year Treasury bond, and cash flows over an upcoming ten-year period. The bond would need to be reinvested after five years, but analysts can`t predict at what rates present time. Hence, it contains reinvestment risk and is therefore not *risk-free.* Thus, Damodaran (2012) suggests matching the duration of the default-free government security with the duration of the cash flows in the analysis.

Considering the prediction of cash flows 10 years ahead in this thesis, we turn our attention to 10-year government bonds.

Moving on, the risk-free rate used to compute expected returns must be consistent with the cash flows. Because Vow`s cash flows are estimated in NOK, the risk-free rate will be the 10-year Norwegian government bond rate. Surveys conducted by PwC show that our choice is in line with Norwegian analysts and economists. Half of the respondent used treasury bond rates as a proxy for risk-free rate, of which 34% preferred the 10-year Treasury bond rate (PWC, 2019). Additionally, the risk-free rate must reflect the *effective interest rate* of the government bond (Kinserdal, 2019)**.**

10-year Norwegian government bond rates dating back to 2009 are presented in figure 9.1. It shows the decrease after the financial crisis, and again after the oil crisis in 2014. It has the same fluctuations as bond rates in other western countries (Norges Bank, 2020), and considered a suitable proxy for risk-free rate. **The 10-year Norwegian government bond rate of 1.55%** from the 30th of December 2019 will be used in this thesis.

Figure 9.1: Development in the 10-year Norwegian government bond rate.



Source: (Norges Bank, n.d.)

9.1.2 Beta

After presenting the risk-free asset in the section above, we now turn our attention to risky assets. Investing in a risky asset will add risk to the investors market portfolio. If the risky asset moves independently of the market portfolio, it will not add much risk to the portfolio. Most of the risk of this asset is firm-specific and can be diversified away. However, if the risky asset fluctuates in the same way as the market portfolio, it will add risk to the market portfolio. The asset has more market

risk, or non-diversifiable risk. The beta, β_i, measures this added risk by dividing the covariance of the asset by the market portfolio (Damodaran, 2012).

Formula 9.3: Computation of the Beta of asset i.

$$Beta\ of\ asset\ i = \beta_i = \frac{Covariance\ of\ asset\ i\ with\ market\ portfolio}{Variance\ of\ the\ market\ portfolio} = \frac{\sigma_{im}}{\sigma^2_m}$$

The beta of the market, and the average asset in it, is 1. Looking at formula 9.3, the covariance of the market portfolio with itself is its variance, providing a beta of 1. Computing the covariance of asset *i* with the market portfolio gives a quantified measure of the assets risk relative to the market. (Berk & DeMarzo, 2014) states that the beta of a security is the expected % change in its return given a 1% change in the return of a market portfolio. Thus, assets with betas larger than 1 are riskier than the market, and betas lower than 1 are safer than the market.

Damodaran (2012) lists several approaches for estimating the beta. We have chosen two methods: regression on historical data and the bottom-up approach. Given that the firm has been publicly traded for "a length of time", one can run a regression of returns on the investment against return of a market index. The slope of the regression will be the beta, computed using formula 9.3. A second approach is to look at the fundamentals of the firm. Regression betas from comparable firms are adjusted for leverage and used to derive the levered beta of the firm in this approach.

Approach 1: Historical Market Beta

Damodaran (2012) lists three concerns that must be considered in the regression on historical data. The first is the length of the estimation period. Settling on a period, one must account for a trade-off. A longer estimation period gives more data, but the firm might have changed over time in term of business mix and basic risk characteristics. Given that Vow where listed in the spring of 2014, the estimation period is limited to roughly four and a half years. During that period, they expanded their solutions to aquaculture- and land-based industries. However, we believe this will have minor implications, and choose to include the full estimation period to reflect economic cycles.

The next concern relates to the return interval. Like the length of the estimation period, it comes with a trade-off. More frequent observations increase the statistical power of the regression, but it exposes the estimation process to a nontrading bias. Small firms who are rarely traded are more exposed to this bias, so weekly or monthly returns should be used instead of daily returns. Vow do not fall under this bracket, so the regression can essentially use all return intervals. It is common to use either 4 to 5 years of monthly returns or 1 to 2 years of weekly returns (Erhardt & Brigham,

2009). Since the data extends four and a half year back in time, we choose to base our regression on monthly returns.

The third and final consideration relates to the choice of a market index to be used in the regression. Note that the stock returns of the firm should be related to a market portfolio consisting of all traded assets to estimate the beta. Naturally, this market portfolio is unobservable. So, in practice, one must choose a stock index as a proxy for the market portfolio. The standard is to estimate the betas of the firm against the index of the market the stock trades. Since Vow is listed on the Oslo Stock Exchange, the standard market portfolio would be the OSEBX. This approach may yield a correct measure for a domestic investor, but an international investor might be better of using an international index. Also, smaller marked indices tend to be dominated by a few large companies. In such cases, the estimated betas are unlikely to reflect true measures of market risk.

Vow are affected by both the complications mentioned above. Excluding the shares held by the management and board of directors (see table 2.2), much of the equity is held by international investors. Moreover, Kinserdal (2019) refers to Oslo Børs as an "oil index". Assuming that investors are internationally diversified, it would be better to measure relative to an international index. We choose to estimate the return of Vow against both the OSEBX and the S&P 500 to better reflect the true market risk.

Table 9.1: Results from running a regression of Vow returns on OSEBX and S&P 500, using monthly data from 31.07.2014 to 31.12.2019. Note that the resulting betas vary from on index to the other, and that the regression has little explanatory power.

	OSEBX	S&P 500
Beta	0,79	1,15
R Square	0,02	0,05
Standard Error	0,16	0,16
Observations	64	64

Source: (Yahoo finance, n.d.) and (Oslo børs, 2020c, 2020d)

The results from the regression betas in table 9.1 illustrates the effect of using different indices. OSEBX provides us with a beta lower than 1, while S&P 500 on the opposite gives a beta higher than 1. The latter result is more in line with what analysts covering the group uses, such as (Lian, 2020). Keeping in mind that the OSEBX is very dependent on the oil industry, we believe that the beta from the regression on S&P 500 is a better measure of market risk. However, the R-squared from regressions on both indices is very low, so the regression have little explanatory power. Only 2% and 5% of the risk can be attributed to market risk using the OSEBX and S&P 500, respectively. The rest can be attributed to firm specific risk. Also, the standard errors reveal just how much error there

could be in the estimate and can be used as to compute confidence intervals for the "true" beta from our estimate. Although they are modest in both regressions, they imply a somewhat wide range of values. Thus, one should consider estimates of betas from regression with caution (Damodaran, 2012).

Approach 2: Bottom-up Betas

Damodaran (2012) explains that the bottom-up approach for estimating betas represent a "significant improvement" on regression betas. The idea behind is to base Vow`s beta on the beta of other publicly traded firms, adjusted for leverage. Thus, the approach requires no past return on an individual asset/firm to estimate its beta.

First, comparable companies from the same business as the firm operates in are identified. As mentioned in section *3.4* Choice of approach and method, it is rather tricky to place Vow in one specific industry. According to (Lian, 2020) they can be compared to fellow waste management companies, although they vary in core operations. Another option is to use ESG-peers to derive the betas. Note that all three waste management peers from table 9.2 are US companies, while the ESG-peers are listed on Oslo Børs.

All peer companies' regression betas are computed relative to the S&P 500 and presented in table 9.2. These are the *levered* betas, and they average at 0.64 for the ESG-peers and 1.37 for the waste management peers. Levered betas of peers are then *unlevered* to remove the financial leverage effect of the companies, using the following formula:

Formula 9.4: Computation of the unlevered beta. Delevering the regression beta is done by using market values of debt and equity, and the corporate tax rate.

$$\textit{Unlevered Beta} = \frac{Regression\ Beta}{1 + (1 - tax\ rate) * {}^{D}/_{E}}$$

The market value of equity is the market capitalization. (Kinserdal, 2019) uses Net financial debt as mentioned in section *7.2.2* as a measure for market value of debt. The market capitalization and net financing debt of all peer companies are listed in table 9.2. (Damodaran, 2012) recommends estimating the average unlevered beta for the peers by using average peer regression betas and leverage ratios. Average unlevered beta from both sets of peers are highlighted.

As mentioned in the section on Historical market beta, Vow is listed with a beta higher than 1 in current fundamental analyses. ESG-peers have a much lower beta. Waste management peers seem to better reflect the market risk of Vow. Thus, we subjectively weigh the ESG-peers unlevered beta at 20% and the waste management peers at 80%.

Table 9.2: Estimation of Vow levered beta using the bottom-up method. Data on Vow and peers is obtained from Yahoo finance.

		ESG-peers (MNOK)			Waste management peers (MUSD)		
	Vow (MNOK)	Scatec Solar	Tomra	Hexagon	Casella Waste Systems	Evoqua Water Tech.	Clean Harbors
Regression beta	**1,15**	**0,87**	**0,46**	**0,58**	**0,79**	**1,73**	**1,60**
Shares 31.12.2019	106,56	125,13	148,02	183,29	47,32	114,70	55,58
Stock price 31.12.2019	30,00	123,23	276,09	36,35	46,03	18,95	86,05
Market cap	3196,91	15419,61	40866,86	6662,61	2178,14	2173,57	4782,66
Financing assets	71,00	2777,90	427,14	55,43	2,70	107,66	328,46
Financing liabilities	194,80	12973,00	1880,00	1300,92	513,32	965,02	1561,65
Net financing debt	123,80	10195,10	1452,86	1245,49	510,62	857,35	1233,19
Leverage ratio	**3,9 %**	**66,1 %**	**3,6 %**	**18,7 %**	**23,4 %**	**39,4 %**	**25,8 %**
Tax rate	22 %	22 %	22 %	22 %	21 %	21 %	21 %
Average regression beta		0,64			1,37		
Average leverage ratio		29,5 %			29,6 %		
Average unlevered beta		**0,52**			**1,11**		
Weighting		20,0 %			80,0 %		
Peers unlevered beta	0,99						
Vow levered beta	**1,02**						

Source: Yahoo finance

As mentioned in the section on Historical market beta, Vow is listed with a beta higher than 1 in current fundamental analyses. ESG-peers have a much lower beta. Waste management peers seem to better reflect the market risk of Vow. Thus, we subjectively weigh the ESG-peers unlevered beta at 20% and the waste management peers at 80%. The computed unlevered business beta is 0.99. Finally, the levered beta of Vow is estimated by applying the Groups leverage ratio on the business beta. This yields a beta of 1.02.

However, the beta is computed with a mathematical formula, which may not reflect what it should be realistically. Due to the high growth prospects of Vow, most of the enterprise value will come from the terminal value. Thus, we believe the Group will have significantly more market risk than the average firm on the stock exchange. We choose to increase the mathematically adjusted measure and subjectively set the **beta to 1.15.** This is our final estimation on the beta which will be used in calculating the cost of equity.

9.1.3 Market risk premium

The market risk premium is the extra return added to the risk-free rate to compensate for an investment carrying average risk. Damodaran (2012) suggest two alternative methods for measuring the risk premium. Estimating historical risk premiums are commonly used by practitioners. It measures the actual return of stocks over a longer period and compare it to the actual return on a default-free security. The historical risk premium is then computed as the difference between the two on an annual basis. However, this method may yield divergent results although the estimates are

based on the same country. One shortcoming is the difference in length of historical periods. Using a shorter period will not reflect the changing risk aversion of the investor and cycles in the economy. Other complications relate to the choice of risk-free security and the varying results from choosing an arithmetic or geometric average. Kinserdal (2019) adds that the main problem with this approach is that it measures the differences in yield *ex post*, whereas analysts seek to discount expected future cash flows, and thus need a forward-looking risk premium.

The second approach looks at the implied risk premium, reflecting Kinserdal`s (2019) point of an ex ante risk premium. Assuming that the market is correctly priced, one can back out the implied required return on equity by obtaining key figures from an index. Damodaran (2012) calculates the required return by obtaining the value, expected dividends, and expected growth rate from the S&P 500. He then adjusts it for the risk-free T-bond rate to get the risk premium. He calculated a risk premium of 5.06% as of January 1st 2020 (Damodoran, 2020).

Kinserdal, (2019) adds market surveys as a complement to the two approaches. Asking market players what risk premium they use provides a forward-looking estimate of the risk premium. Referring to the discussion on suitable indexes for bottom-up betas, both the Norwegian and US market risk premiums are relevant. The previously mentioned survey conducted by PwC in 2019 found that the average risk premium used by Norwegian analysts and economists is 5% (PWC, 2019). A similar survey about market risk premium from April 2019 states that it averaged at 6% in Norway, and 5,6% in the US (Fernandez, Martinez, & Acín, 2019). Based on the collected information from the implied risk premium approach and surveys, we believe a **market risk premium of 5.5%** is suitable for this thesis.

9.1.4 Small firm premium and ESG factor

Damodaran (2012) refers to studies which show that smaller firms (in term of market cap) earn higher returns than larger firms of equivalent risk. Possible explanations are higher transaction costs relative to larger stocks, and that betas underestimate the risk of small stocks. Returning to the survey conducted by PwC, 84% of the respondents believe a small stock premium should be added to the cost of equity. Companies with a market cap between BNOK 2-5 **add 1%.** Vow are entitled to such a premium based on their market cap of BNOK 3.2 as of 31/12-2019

On the other side, an increasing number of respondents believe a premium should be added for firms with poor ESG-score. Vow on the other hand have a strong ESG-profile. Lian (2020) responds to this by subtracting an ESG factor of 100 bp from the cost of equity. Companies with high ESG scores experience lower costs of capital compared to companies with poor score (Lodh, 2020) We believe

Vow is entitled to this factor and choose to **subtract 1%** from the computation of the groups cost of equity. Note that the *added* small firm premium is offset by the *subtracted* ESG factor.

9.1.5 Calculating cost of equity

In conclusion, we choose the following input to calculate the cost of equity:

Table 9.3: Summary of the input used to calculate cost of equity.

Risk-free rate	Beta	Market Premium	Small Firm Premium	ESG Factor
1,55 %	1,15	5,50 %	1 %	-1 %

Source: (Norges Bank, n.d.), (PWC, 2019), (Lian, 2020) and own estimates

Using formula 9.2 yields the following cost of equity for Vow:

$$CAPM = 1.55\% + 1.15 * (5.50\%) + 1\% - 1\% = \mathbf{7.88\%}$$

9.2 Cost of debt

The cost of debt measures the cost to the firm of borrowing funds to finance projects, or alternatively, the required return of lenders. Like the cost of equity, it is determined by several components, namely the risk-free rate, the default/credit risk, and the tax advantage. Estimating a specific cost of debt for a firm mainly focus on estimating the default risk and converting that risk into a default spread. The tax advantage is estimated using the marginal tax rate, which can cause some complications. As we already analysed the risk-free rate in section *9.1.1*, only default risk and tax advantage will be discussed in the following.

Formula 9.5: Computation of the after-tax cost of debt. Cost of debt, r_D, consist of the risk-free rate, r_f, and the firms credit risk. Interest is tax deductible, so the groups marginal tax rate, τ_c, is subtracted to get the after-tax cost of debt.

$$After - tax\ cost\ of\ debt = (r_f + Credit\ risk) * (1 - \tau_c)$$

Damodaran (2012) refers to the yield on a firm's bond as the cost of debt. It is easiest to estimate for firms with long-term bonds outstanding that are widely traded. Even though a firm's bonds are traded less frequently, their credit rating and associated default spread tend to be available. However, many smaller firms are not rated, such as Vow. Without a rating to estimate the cost of debt, one must turn to alternative methods.

Approach 1: Recent borrowing history

The first alternative approach is to look at the firms recent borrowing history. The interest on the *most recent* borrowings made by the firm will provide a sense of the default spreads being charged

the firm. Vow`s outstanding interest-bearing debt is divided into both short-term and long-term borrowings and lease liabilities, plus a bank overdraft facility. Note that lease liabilities are included here because they in fact are interest bearing. The concerns from section *7.2.2* don`t apply here.

Vow state the interest rate on two recently incurred debt items. The first was the loan of MNOK 85 used to finance the cash consideration in the purchase of ETIA, consisting mainly of long-term debt. The interest rate of the loan is 6.34% per 31.12.2019, made up by the NIBOR 3M and a spread of 4.5%. Secondly, the bank overdraft has an interest rate of NIBOR 1M + 2.2%, totalling 3.89% per 31.12.2019. Also, lease liabilities have an interest rate of 3.26%.

Table 9.4: Estimation of Vow`s cost of debt based on recent borrowing history.

Type of debt	NIBOR 3M/1M	Spread	Interest rate	Value	Weight	Weighted interest
Bank loans	1,84 %	4,50 %	**6,34 %**	85	69,27 %	4,39 %
Bank overdraft facility	1,69 %	2,20 %	**3,89 %**	16,3	13,28 %	0,52 %
Lease liabilities			**3,26 %**	21,4	17,44 %	0,57 %
Total				**122,7**	**100 %**	**5,48 %**

Source: (Vow ASA, 2020)

The debt items are weighed and presented in table 9.4. Vow`s cost of debt is 5.48% based on recent borrowing history. Note that this approach estimates the cost of debt directly, whereas the next approach will seek to find a spread which is added to the risk-free rate.

Approach 2: Synthetic rating

A second approach is to assign a synthetic rating to a firm based on financial ratios. (Damodaran, 2012) suggests comparing the firms interest coverage ratio against that of rated firms from an index. Due to Vow`s lack of credit rating, we will compare its interest coverage ratio for 2019 with a synthetic rating.

Formula 9.6: Computation of the interest coverage ratio.

$$Interest\ Coverage\ Ratio = \frac{EBIT}{Interest\ Expense}$$

Vow`s ratio is then compared to Damodaran`s table on interest coverage ratios with associated credit ratings. The table is based on the coverage of companies with a market cap less than BUSD 5 from the S&P 500 and can be found in *Appendix 3*. Vow is given an A rating, which translates to a spread of 1.08%. This is consistent with the rule of thumb presented by (Kinserdal, 2019), where he suggests that firms with low leverage ratios have a spread of 1% in “normal times”. To keep consistency with the cost of equity, and because most of Vow`s debt is long term, the 10-year

Norwegian government bond is used as the risk-free rate. Adding the spread of 1.08% yields a cost of debt of 2.63%.

Table 9.5: Computation of the cost of debt. A spread from Vow`s synthetic rating based on its coverage ratio is added to the risk-free rate.

Synthetic rating	**2019**
EBIT	15,8
Interest expense	3,4
Interest coverage ratio	4,65
Synthetic rating	A
Spread	1,08 %
10-year Norwegian Treasury Bond	1,55 %
Cost of Debt	**2,63 %**

Source: (Vow ASA, 2020) and (Norges Bank, n.d.)

Conclusion

The two approaches above yield very different estimates on cost of debt. Recent borrowing has a spread which is higher than the spread from Damodaran`s table. Also, this spread is added to NIBOR 1M/3M, which is higher than the risk-free rate. Considering the Group first this year took up substantial loan to finance the acquisition and future growth, and are expected to borrow more to finance future growth, we believe the weighted interest rate on recent borrowing of **5.48%** is the best estimate for the Group`s cost of debt.

9.2.1 Marginal tax rate

After concluding on the Group`s cost of debt, a final consideration is the advantage from tax-deductible interest payments. Damodaran, (2012) raises the question of what tax rate to use for the computation. Because interest expenses are deducted from the last Dollar, or Krone, of income, the right tax rate to use is the marginal tax rate. If a firm operates only in the country it is incorporated, the marginal tax rate would equal the corporate tax rate in the country. Vow, however, generates revenue from subsidiaries in several countries, see section *2.3* and operate in several more countries. They state that "The companies included in the consolidated financial statement are subject to income tax in the countries where they are domiciled." (Vow ASA, 2020)

Damodaran (2012) comes up with a couple different approaches of estimating marginal tax rates for multinational firms. One possibility is to simply use the tax rate in the country in which the company is incorporated, under the assumption that all generated income will eventually be repatriated to the country of origin. Based on this approach, Vow`s marginal tax rate will be equal to Norway's corporate tax rate of 22%.

The alternative approach is to weigh the income derived from each country, and then apply the country specific tax rate to these weights. Unfortunately, Vow do not divide their generated income between the subsidiaries. Only income generated from French subsidiary ETIA (land-based) are quantified. Referring to the discussion on the effective tax rate in section 8.5, their heavy influence on the Group`s results require adjusting for their national corporate tax rate. The French corporate tax rate is currently 31% but will gradually decline to 25% in 2022. Although this second method brings great uncertainty, we believe the French tax rate must be incorporated based on our forecasts. Therefore, a marginal tax rate between that of Norway and France of **24%** is applied in this thesis.

9.2.2 Calculating cost of debt

In conclusion, the following input is used to calculate the after-tax cost of debt, based on approach 1:

Table 9.6: Summary of the input used to calculate cost of debt.

Cost of Debt	Marginal tax rate
5,48 %	24 %

Using formula 9.5 yields the following after-tax cost of debt for Vow:

$$After - tax\ cost\ of\ debt = 5.48\% * (1 - 24\%) = \mathbf{4.16\%}$$

9.3 Target capital structure

The last step is to weight the estimated cost of equity and after-tax cost of debt to get the WACC. It is important to use the market values of equity and debt, as book values represents a sunk cost and is no longer relevant. Referring to the discussion on Bottom-up Betas in section *9.1.2*, the market value of equity is the firms market cap, and the market value of debt used in this thesis is net financial debt. Also, the calculation of cost of capital should rely on the firms target weights, as opposed to the current weights. The reason is that current capital structure may reflect a short-term swing in the stock price, whereas we need the expected level over the life of the business (Koller, Goedhart, & Wessels, 2015).

Whether Vow are already near their target capital structure requires further discussion. Going back a year in time, their market value was MNOK 438[9]. Although their market cap has increased by 630% in a year, they held essentially no debt, meaning that their leverage ratio increased from 2018 to 2019. As they expand to new verticals, additional loans to finance R&D and potential acquisition might occur, but so might their share price. Koller et al (2015) suggests comparing the capital structure with

[9] 95.6 million stocks outstanding at NOK 4.58 each, per 31.12.2018

that of peer companies. Table 9.2 show that the average leverage ratio for both ESG- and industry peers was 30%. However, some of these companies have substantial investments in tangible assets, while Vow invest primarily in *intangible* assets. Companies with such investments tend to use very little debt. Conclusively, we believe the Group will take on more debt and thus change the capital structure in the future, but not to the extent of the peer companies. Thus, we choose a middle way where the target capital structure consists of **90% equity** and **10% debt**.

9.4 Results

Finally, all input used to calculate the cost of capital is presented in table 9.7.

Table 9.7: Summary of input from chapter 9.

Cost of Equity		**WACC**	
Risk-free rate	1,55 %	Cost of Equity	7,88 %
Beta	1,15	Cost of Debt	5,48 %
Market Premium	5,50 %	Tax Rate	24 %
Small Firm Premium	1 %	Target Equity Ratio	90 %
ESG Factor	-1 %	Target Debt Ratio	10 %
CAPM	**7,88 %**	**WACC**	**7,50 %**

Source: Own estimates

The weighted average cost of capital is calculated using formula 9.1:

$$r_{WACC} = 90\% * 7.88\% + 10\% * 5.48\% * (1 - 24\%) = \mathbf{7.50}\%$$

10. Valuation

In this chapter we are going to present the result of our DCF-analysis before the different scenarios are weighted to provide our final price target. Then we perform a sensitivity analysis based on changes in cost of capital (WACC) and terminal growth rate. A relative valuation to peer-companies is carried out before summing up our results from the different sections of this chapter.

10.1 DCF-analysis

The results of the prognosis in section *8.6* provide all the required input for calculating the free cash flows to firm (FCFF). The FCFF will be computed as described in formula 3.4:

$$FCFF = \text{EBIT} * (1 - \tau_c) + \text{Depreciation} - \text{CAPEX} - \text{Increase in NWC}$$

The FCFF for the first two phases of our base case are illustrated in table 10.1. Vow are expected to grow tremendously in the first phase as they set to engage in a new market. With rapid growth comes the need for investment in CAPEX and operating working capital, especially considering the newly acquired subsidiary (ETIA) will invest in PPE. This results in negative FCFF for most of the first phase, before the growth in investments slows down in the second phase and the Group deliver more solid cash flows.

Table 10.1: Calculation of FCFF for the first two phases of the DCF-model.

	Phase 1					Phase 2				
MNOK	**2020e**	**2021e**	**2022e**	**2023e**	**2024e**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**
EBIT	30	61	109	158	185	211	231	242	264	274
Tax	7	13	24	35	41	46	51	53	58	60
Depreciation	17	29	41	50	58	65	71	91	98	122
Gross Cash Flow	40	77	126	173	202	230	251	279	304	336
CAPEX	-29	-59	-81	-101	-116	-109	-118	-130	-112	-122
Change in operating NWC	-28	-109	-104	-88	-69	-69	-50	-62	-60	-68
Free Cash Flow to Firm	**-16**	**-91**	**-60**	**-15**	**17**	**52**	**82**	**88**	**132**	**146**

Source: Own estimates

The next step in obtaining the value of Vow will be to estimate the terminal value for the third phase of the model. Assuming the Group reaches steady state right after our explicit prognosis period, the terminal value represents the market value of FCFF from all future dates (Berk & Demarzo, 2014). The terminal growth rate should not exceed the expected real growth in the economy (Kinserdal, 2019). According to the previously mentioned survey conducted by PwC, the vast majority of respondents believe the terminal growth rate should reflect the expected inflation in Norway of 2%. They also state that the rate will depend on both the industry and the individual firm (PWC, 2019) Addressing the strategic analysis and market outlook, we believe the growth in FCFF will exceed inflation after our explicit prognosis period since the land-based markets still grows at a significant pace, probably until 2035. Because this market is yet to reach steady state, we believe the terminal growth rate should be higher than the consensus among Norwegian analysts. Hence, we choose a firm-specific terminal growth rate of **3%**. Although no firm can grow at a terminal rate higher than the expected real growth of the economy, implementing such a rate will better reflect the growth in land-based market before it reaches steady state around 2035.

Table 10.2 presents the results from the final step in the DCF-model. The estimated FCFF and terminal value are discounted by our estimated WACC of 7.5% to provide the Groups Enterprise (EV) value. Next, the net financing debt computed in section *7.2.2* is subtracted to get the shareholders

equity value. Finally, this measure is subtracted by the number of outstanding shares to reveal the estimated share price.

Table 10.2: Calculation of share price for our base case.

MNOK	2020e	2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e
Free Cash Flow to Firm	-16	-91	-60	-15	17	52	82	88	132	146
Terminal Value (TV)										3334
Total	-16	-91	-60	-15	17	52	82	88	132	3480
Discount factor (WACC)	*0,930*	*0,865*	*0,805*	*0,749*	*0,697*	*0,648*	*0,603*	*0,561*	*0,522*	*0,485*
Enterpise Value	**1749**									
Net financing assets/debt	-124									
Equity Value	**1625**									
Outstanding shares	107									
Share price	**15,2**									

Source: Own estimates

After conducting a three-stage DCF analysis we are left with a price per share of **NOK 15.2** from our base case. Our result is lower than the target price of NOK 20.25 according to Bloomberg consensus, but in line with the conclusion from the consensus: compared to the quoted share price per 31.12.2019 of NOK 30, the Group seems overvalued.

However, the value from the base case may not be the best estimated value of the Group. The following discussion will point to some important aspects from our result before a closer investigation of the value is conducted in section *10.1.1*.

We mentioned earlier that the individual markets are in very different stages of their cycles, proving a great challenge in the valuation of Vow. The land-based market will presumably continue to grow at a higher rate after the explicit prognosis period, leading to more positive cash flows. However, longer forecasts lead to more uncertainty in the model and subsequently the final value. Table 10.2 illustrates that basically all the enterprise value comes from the last two phases, mainly due to ETIA`s initial negative impact on margins and predicted investment in PPE. More specifically, over 90% of the enterprise value comes from the perpetual FCFF`s after the explicit prognosis period. Hence, small adjustments to the terminal growth rate and cost of capital will have a massive impact on the enterprise value. Section *10.2* will address the great uncertainty in our results through a sensitivity analysis.

10.1.1 Weighted scenario analysis

Chapter 8 provided a thorough description of plausible scenarios for all three markets. A set of assumptions on key value drivers were allocated to each scenario, leading to vastly different results. Whereas an absolute bear scenario yields a value of NOK 2.5 per share, the absolute bull scenario

estimates the value to NOK 35.1 per share. The different scenarios need to be further addressed to reflect the intrinsic value.

The development in the cruise market will mainly rely on the outlook for newbuilds. The bear scenario pointed to the consequences on underbidding in the market, whereas the bull scenario predicted successful commercialisation and temporary monopoly on MAP. The level of penetration in the Chinese shipbuilding market was another factor. So, what scenario seem more likely to happen?

There are mainly two factors that point towards the bear scenario. Underbidding has occurred once before in 2016. The underbidding was a success for Evac who increased their market share substantially. Secondly, the rivalry among the *existing* competitors is fierce and the products are quite undifferentiated, which can ultimately lead to a price war. However, Vow has a good reputation among the largest shipyards and cruise owners. We believe that satisfied customers will stay loyal even if a price war occurs, due to the relatively low cost and massive importance of cruise solutions. According to the market outlook and strategic analysis, we believe it should be more likely that the bull scenario plays out. Vow have already commercialised the MAP technology. Even though it is more expensive, we believe some cruise owners will use it to "greenwash" their image.

The outlook for the closed-cage and land-based aquaculture industries are very positive, proving an attractive alternative to traditional farming with increasing license fees. The alternative bear- and bull scenarios pointed to the outcome of the land-based farming contract with Atlantic Sapphire. Because the project seems to have been delayed, it is difficult to determine whether it will prove successful or not.

Our expectations on the land-based market will prove to be the main value driver in this thesis, considering the enormous potential of the market. The scenarios vary tremendously in term of expected growth. This will be further addressed in section *10.2.* The outcome will rely mostly on whether the entrance to land-based industries is successful, and they manage to receive additional orders on high-revenue systems to large customers. Other external factors such as the price of carbon emissions will further determine the market demand for the Group`s solutions. Addressing the strategic analysis, we believe it is more likely that the bull scenario plays out. ETIA has long experience from various land-based industries and we would therefore consider the risk of failure and no orders for additional systems to be rather low. Also, the two subsidiaries can exchange knowledge, and hence apply existing solutions (MAP) in new verticals.

Based on the arguments, we subjectively weigh the outcome in each market accordingly to our expectations.

Table 10.3: Applying subjective weights to scenarios in each market.

Weights	Bear	Base	Bull
Cruise	15 %	60 %	25 %
Aquaculture	20 %	60 %	20 %
Landbased	10 %	60 %	30 %

Source: Own estimates

Our bullish expectation on land-based markets will prove to be the main contributor to the estimated enterprise value. This is reflected in the realistic weights we applied to each scenario.

Table 10.4. Price target from subjectively weighted scenarios.

Weights (MNOK)	Bear	Base	Bull
EV	385	1749	3868
Realistic weight	11 %	60 %	29 %
Weighted EV	42	1049	1122
Sum EV	**2213**		
Net financing debt	-124		
Equity value	**2090**		
Number of shares	107		
Share price	**19,6**		

Source: Own estimates

Applying the realistic weights in table 10.4 to *each scenario* yields an enterprise value of **BNOK 2.21** – equivalent to a weighted share price of **NOK 19.6**. This share price is the best estimate from our fundamental analysis. The value is slightly lower than the consensus estimates from Bloomberg and represents a **downside of 35%** compared to the quoted share price of **NOK 30** per 31.12.2019.

10.1.2 Vow: A potential acquisition target?

The final weighted enterprise value of Vow is our estimated value of the Group "as is", i.e. the present value of expected future cash flows. One final consideration for our investment case is to analyse Vow as a potential acquisition target. The actual price paid for a company tends to be higher than the market value of equity to reflect the potential synergies in a merger.

Vow might prove an attractive target due to its high growth prospects, proprietary technology, and solid position in the markets. As they set to enter land-based markets and convert waste into clean energy, the potential buyers may come from a wide range of industries. A potential buyer could be

Equinor. Recently changing their focus away from petroleum to renewable energy, they have acquired a significant share in Scatec Solar, one of the ESG-peers (Equinor, 2019)

Other potential buyers might be Vow`s competitors. We mentioned earlier that both Wärtsilä and EVAC acquire company`s on a yearly basis. Wärtsilä deliver solutions for renewable industry to land-based industries, in addition to being one of the big players in the cruise market. If they were to acquire Vow, it could possibly lead to synergies. Wärtsilä would acquire Vow`s well-developed customer relations and (some of) their market share, thereby reducing the competition in the market for cruise solutions. More importantly, they would get access to Vow`s proprietary technology, both to MAP and to land-based solutions through ETIA. The two groups could utilize each other's technology, instead of both having to invest heavily to catch up on the other (Kaldestad & Møller, 2016)

In conclusion, we believe Vow pose an attractive target for relatively larger company`s operating in the same industries. There is little doubt that an acquisition premium should be added to our value "as is", but we will not speculate in an exact figure. Also, this discussion is *not* meant to justify the current share price of NOK 30, but rather as an explanation to why a buyer will pay a higher price per share for the company than what we estimated in section *10.1.1.*

10.2 Sensitivity analysis

The estimation of a company`s values do require several assumptions regarding the industry as well as the future performance and development of the company. To assess how these assumptions, impact the estimated share price of Vow we will conduct two sensitivity analysis. The first will illustrate the massive impact our expectations on the land-based market will have on revenue growth in the first phase. We are using the estimated revenues for 2020-2024 because of this is the period with the highest growth. The second model estimates the stock price given different levels of two key variables: the discount rate and terminal growth rate.

The bull and bear cases for revenues in both the cruise and land-based markets gives us nine possible scenarios for revenue CAGR from 2020 to 2024. Our scenarios range from 11% in the ultimate bear case, up to 49% in the ultimate bull case and with a base case of 35%. As table 10.5 shows the largest uncertainty in the estimates is connected to land-based growth, adding 36pp at the most from bear to bull. Scenarios in the cruise market on the other hand the differ by only 6pp. Aquaculture is excluded from the table below due to the low impact on revenues and that we do not have a clear opinion on whether it will be a bear or bull scenario.

Table 10.5: Revenue CAGR from 2020-2024 based on different scenarios in cruise and land-based markets. Note that aquaculture is not included due to the limited impact on CAGR.

		Land-based Scenarios		
Revenue CAGR 2020-2024		Bear	Base	Bull
Cruise scenarios	Bear	11 %	34 %	47 %
	Base	14 %	35 %	48 %
	Bull	17 %	36 %	49 %

Source: Own estimates

We will now present the extremes (Bear-Bear and Bull-Bull) to illustrate the sensitivity in our estimates. In our bull case the revenues for the Group is set to reach BNOK 3,1 in revenues by 2024. The land-based revenues will make up 72% of total revenue while aquaculture makes up 5% and cruise the remaining 23%.

In our bear case the revenues for the Group is set to be MNOK 732 in 2024. In this case then land-based revenues will only make up about 32% of total revenues while aquaculture makes up 10% and cruise the remaining 58%.

These two scenarios show the land-based growth strongly impacts the future CAGR.

Earlier we highlighted that almost all of the estimated enterprise value comes from the terminal value. Since the estimated stock price is so dependent on the terminal value, we have measured it sensitivity to changes in WACC and growth rate. This is presented in table 10.6. with the share price from our base case.

Table 10.6: Stock price sensitivity to WACC and long-term growth rate.

		Terminal growth value				
	DCF share value	1,0 %	2,0 %	3,0 %	4,0 %	5,0 %
WACC versus base case	-2,0 %	18	24	33	56	168
	-1 %	14	17	22	31	51
	0 %	10	12	**15,2**	20	28
	1 %	8	9	11	14	18
	2,0 %	6	7	8	10	13

Source: Own estimates

As the terminal value accounts for about 90% of the enterprise value, table 10.6 shows how sensitive the stock price is to small changes in both WACC and growth rate. We would explain this by the expected rapid growth for the Group.

Table 10.6 shows how important the terminal growth rate is to the final stock price, with prices ranging from NOK 10 to above NOK 28 per share. A reduction or increase by 1pp in this measure would still yield a stock price under the current quoted stock price.

Our sensitivity analysis shows that adjustments to WACC would change the estimated share price from our base case more than adjustments to the terminal growth rate. Given the high growth prospects of the Group, they potentially have much more market risk than the average firm on the stock exchange. The beta we estimated to 1.15 might be even higher to reflect the market risk, which would give us a higher cost of capital. Table 10.6 illustrates that a small adjustment to the beta and a subsequent higher WACC would yield a much lower estimated share price.

10.3 Relative valuation

Having estimated the intrinsic value of Vow through a fundamental analysis, the following section seeks to value the Group based on the pricing of comparable firms. Section *3.2* pointed to the assumption in this method that the market is "right" in the way it prices stocks on average, so that one can address whether the firm potentially is under- or overvalued. To compute a relative valuation, comparable firms must be identified, and prices must be standardized into multiples.

We identified two sets of peers in section *9.1.2*: one with companies from the waste management industry and one containing companies with a similar ESG-profile. Although the core operations will vary between the sets and between the individual firms in each set, we believe these peers will have some of the same exposure to market risk as Vow.

The most common valuation metrics are price (P) and enterprise value (EV). Considering the EV reflect the total value of the underlying business of a firm, the metric is more suitable for comparing firms with different leverage ratios. Referring to the mentioned section, the identified peers have very different levels of financial leverage. The price only reflects the market value of equity, i.e. market capitalization.

The most common multiple for prices is Price/Earnings (P/E). Since multiples cannot be estimated with a negative metric, and some firms have negative earnings, we choose to implement the Price/Sales (P/S) multiple to obtain values from a broader set of peers. Next, the EV metric is paired with EBITDA in an EV/EBITDA multiple. Most firms will have positive EBITDA. We will start by assessing the latter multiple.

10.3.1 EV/EBITDA

The relative valuation starts by calculating the enterprise value based on the figures in table 9.2. Next, consensus estimates on EBITDA in 2020 are obtained from Bloomberg. With both metrics in place, the average multiple of peers is calculated then multiplied with the estimated EBITDA from our *base case* to get an implied enterprise value. Finally, the net financing debt is subtracted to reveal the estimated share price.

Table 10.7: Relative valuation of Vow using EV/EBITDA multiples from peers. The consensus is retrieved from Bloomberg

		ESG peers (MNOK)			Waste management peers (MUSD)		
Relative Valuation	**Vow (MNOK)**	**Scatec Solar**	**Tomra**	**Hexagon**	**Casella Waste Systems**	**Evoqua Water Tech.**	**Clean Harbors**
Market cap	3197	15420	40867	6663	2178	2174	4783
Net financing debt	124	10195	1453	1245	511	857	1233
Enterprise value 31.12.2019	3321	25615	42320	7908	2689	3031	6016
EBITDA consensus 2020	60	2496	1919	218	153	215	446
EV/EBITDA	**55**	**10**	**22**	**36**	**18**	**14**	**13**
Average	**19**		**23**			**15**	
Median	16		22			14	
Vow EBITDA 2020 (base case	47						
Implied EV	**889**						
Implied EV (ESG-peers)	**1072**						
Net financing debt	-124						
Equity value	**765**						
Equity value (ESG-peers)	**949**						
Oustanding shares	107						
Share price	**7,2**						
Share price (ESG-peers)	**8,9**						

Source: Bloomberg

The share trade way above all peers on 2020e multiples, especially the waste management peers. This is expected due to Vow`s higher growth expectations. Multiplying the average multiple from the entire set of peers with our estimated base case EBITDA yields a share price of just NOK 7.2, and the set of ESG-peers a price of NOK 8.9. The reason is that most peers have lower growth expectations.

Performing a similar valuation based on 2021e multiples place Vow`s EV/EBITDA at 35, whereas all peers (except Hexagon) remain at virtually the same level. Considering the EBITDA-estimates from our base case in 2021 are more in line with consensus, the average ESG-peers multiple yields a share price of NOK 11.76. Considering Vow as a growth case with 90% of the value attached to the terminal value, they would likely trade a higher multiple than peers for years.

10.3.2 Price/Sales

The market cap is retrieved from table 9.2, and consensus estimates on revenues in 2020 are obtained from Bloomberg. Using as a similar approach as before, the average P/S multiple of peers is calculated. Next, we multiply this figure with the estimated revenues from our *base case* to get the implied market cap, or equity value.

Table 10.8: Relative valuation of Vow using Prices/Sales multiples from peers. The consensus is retrieved from Bloomberg

		ESG peers (MNOK)			Waste management peers (MUSD)		
Relative Valuation	**Vow (MNOK)**	**Scatec Solar**	**Tomra**	**Hexagon**	**Casella Waste Systems**	**Evoqua Water Tech.**	**Clean Harbors**
Market cap	3197	15420	40867	6663	2178	2174	4783
Revenues consensus 2020	537	3051	9896	3346	759	1387	3108
P/S	**6,0**	**5,1**	**4,1**	**2,0**	**2,9**	**1,6**	**1,5**
Average	**2,9**		**3,7**			**2,0**	
Median	2,4		4,1			1,6	
Vow revenues (base case)	576						
Implied equity value	**1646**						
Implied equity value (ESG peers)	**2146**						
Oustanding shares	106,56						
Share price	**15,5**						
Share price (ESG-peers)	**20,1**						

Source: Bloomberg

This approach yields very different results than the EV/EBITDA multiple. Vow still trade above all peers on 2020e multiples, which is expected due to the higher growth expectations, but are more in line with ESG peers. The main reasons is that the Price metric do not take leverage into account. Considering most peers have far more financial leverage than Vow, this approach may seem less suitable.

The share price is computed to NOK 15.5 based on the entire set of peers, and NOK 20.1 on the ESG peers. These estimates are more in line with the value we got from our base case and the final scenario-weighted estimate of NOK 19.6. Moreover, Vow trade broadly in line with ESG-peers on 2021e multiples, and the share price is moving up to the quoted price of NOK 30. One reason for this big gap in price comes from our estimates relative to the consensus estimates. Note that we are above consensus in terms of revenue in 2020 (table 10.8) but below consensus on EBITDA in 2020 (table 10.7). This is because of assumption we made that ETIA will have an immediate *negative* effect on EBITDA-margins.

Conclusively, the share prices from our relative valuation support the fundamental valuation stating that the group is overvalued. However, due to the arguments made in this section, we do not believe the implicit share prices should be added to much significance.

10.4 Valuation summary

The conclusion from both valuation approaches is the same: the intrinsic value and market prices indicate that the Vow share is **overvalued**. However, there is great uncertainty attached to both approaches.

Because the land-based market is yet to reach steady state in 2029, it would likely grow at a significant pace for another five years. Hence, the explicit prognosis period should ideally have been longer to reflect this fact. This would have brought our base case estimate closer to consensus, and our scenario-weighted estimate closer to the quoted price. Considering Vow as a growth-case with over 90% of the value attached to terminal value, minor changes to WACC and the terminal growth rate would have a major effect on the share price.

The result from the relative valuation suffer from the lack of directly comparable firms. Most peers, both ESG and waste management, differ from Vow in term of core operations. Considering the varying financial leverage between the firms, we announced the EV metric as a better measure. The resulting share prices from the EV/EBITDA multiple were low because the peers do not share the same growth prospects. The relative valuation supports our assessment of Vow from the fundamental value, but the set of peers are not likely to reflect the market perception of Vow. Thus, we will emphasize the share price from the fundamental analysis more than the relative valuation in the conclusion of the results.

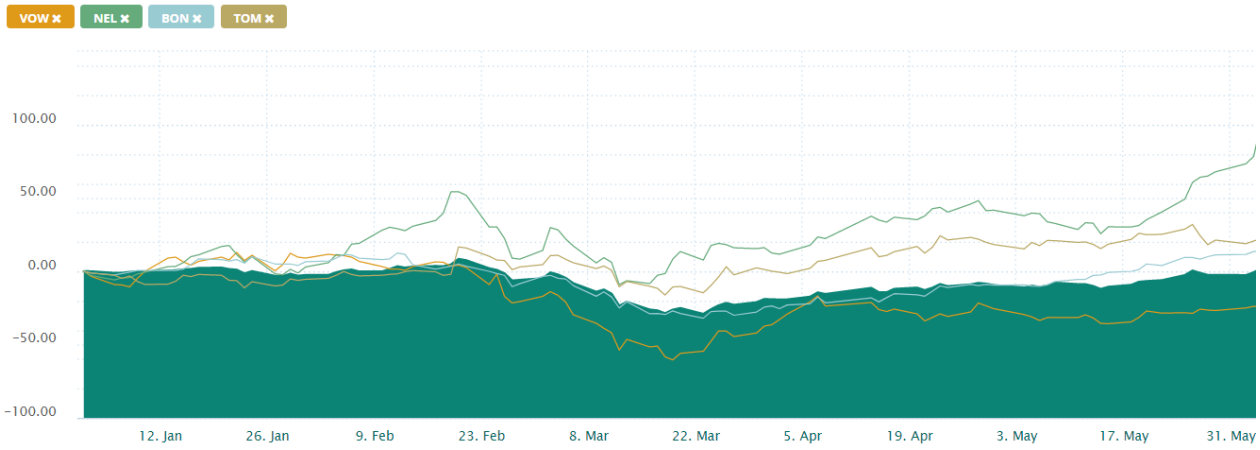
11. Events after the time of valuation

This chapter will present events that happened after the time of valuation. The chapter will start with the impact the Covid-19 virus had on the stock market and hereby the market value of the company. The next part is comments from the Group on how the Covid-19 virus impacted the operations of the company and finally contracts awarded and new partnerships for the Group from 01/01-2020 to 31/05-2020 will be presented.

Stock market

Going back to the PESTEL analysis, section *6.3.2* we highlighted that Vow is a part of the ESG-trend in the stock market in recent years. We also pointed out that Vow outperformed the peer companies Nel, Bonheur and Tomra over the last 5 years by quite a substantial amount as shown in figure 6.5. As the Covid-19 virus outbreak spread around the world, the stock market plummeted. From the start of the year and until the stock market "flattened out" in end of March, the OSE20GI index had fallen approximately 29%. The reason we use the OSE20GI and not the main index OSEBX is because the main index is very dependent on the oil industry as mentioned earlier in 9.1.2 beta. This also gives us the possibility to compare the historical development in figure 6.5 to the recent development in figure 11.1.

Figure 11.1: Development in Vow`s price compared to OSE20GI index, Nel, Bonheur and Tomra in the period 01/01/2020 to 31/05/2020. Vow is the yellow line, Nel is the brown line, Bonheur is the light grey line and Tomra is the beige line. The OSE20GI is the green area. Note that Nel had a substantial development prior to the outbreak of the Covid-19 virus and from the middle of May.



Source: (Oslo Børs, 2020b)

As the OSE20GI index fell both Vow and the peer ESG-companies where expected to follow. However, Vow fell unproportionally compared to the peers and the OSE20GI index. When Vow

reached their lowest value of 2020, the stock had decrease approximately 60%. The peer companies, Nel, Bonheur and Tomra had at the same time increased by 8% and decreased by 27% and 11%, respectively. Note that Nel had a substantial growth prior to the Covid-19 virus, hence why the stock price had a positive development even after the drop.

We believe that the reason they fell unproportionally compared to their peers is due their exposure towards the cruise market. A general assumption is that when the market is declining investor are not willing to pay for future earnings, which many of the ESG-stocks are based on. The trend before the Covid-19 outbreak lead to the ESG-stocks having a high P/E ratio and Robert Næss classifies many ESG-stocks as "expensive companies". Næss highlights that two types of stocks do it worse when the market is uncertain, cyclic stocks and stocks with high value compared to underlying assets (Kvale, 2020). Cruise being their main source of income combined with the uncertainty regarding how the Covid-19 virus would influence cruise tourism in the future contributed to the plummeting of the stock. This could further be confirmed by seeing the stocks of Carnival Corporation and Royal Caribbean Cruises decreasing 63% and 80%, respectively (The Hustle, 2020). Since this year's "bottom" all the ESG-peers have regained and added value as of 31/05-2020. Nel has increased 70%, Tomra has increased 22,13% and Bonheur has increased by 10,55%, Vow however are still down 24,33% in total in 2020.

Comments from the Group

In the annual report for 2019 and in the operational update from Q1 2020 the Group commented how the Covid-19 outbreak influenced the company. The Groups stated that the business continued mostly uninterrupted. They confirmed that the supply chain is intact, and deliveries were according to plan. The Group stated that they do not except confirmation on any large cruise newbuild contracts as a result of the situation, however they received new orders in Aftersale. (Vow ASA, 2020)

Contracts

Despite the Covid-19 outbreak the Group got several contracts and new partnership, mostly in the land-based markets but also in the cruise market. Under we will present of the contracts awarded and highlight the partnerships in the period 01/01-2020 to 31/05-2020. The value of the contracts is given were they are available.

Land-based

The Group was awarded a contract on the January 15. to provide a Biogreen-system for biochar production to NSR`s facilities in Helsingborg. NSR is a leading recycling company in Sweden whose

objective is to handle and recycle waste in the best possible way regarding environmental, technical and financial aspects. The project demonstrates biochar as a carbon neutral and climate friendly commodity for the Scandinavian market, and is valued at MSEK 20.8 (Vow ASA, 2020).

On 25. February, the Group established a strategic partnership between ETIA and the Spanish company PICVISA. The purpose of the partnership was to jointly develop robotics solutions for waste sorting onboard cruise ships as well as land applications (Vow ASA, 2020).

On 9. March, the Group was awarded a contract to supply the Czech company Unipetrol Group with Biogreen process for plastic waste valorization technology. The technology will be used on Unipetrol's R&D project for plastics recycling (Vow ASA, 2020).

On 29. May, the Group was awarded a contract to supply the German company Circular Carbon with a Biomass energy system for processing of coco shells from the food industry. The Biomass Energy System is based ETIA's Biogreen carbonization unit producing biochar and steam. The system is scheduled to be delivered and commissioned 2021. The value of this first supply agreement is in the region of MEUR 2.4. (ETIA , 2020d)

Cruise

On 4 March, the indicated contract with CSSC mentioned in section *5.1.3* was awarded. The contracts are for a WMS-system on a ship set to enter services in 2022. (Vow ASA, 2020)

We choose to implement this chapter to show how the Group manages trough uncertain times. With no one knowing the impact the Covid-19 virus has on the world economic going forward this chapter highlights that the Groups solutions are sought after, even in uncertain times. The number of contracts and partnerships awarded does further confirm our outlook on the potential in the land-based markets as well as their position in the cruise market, having entered the Asian cruise building market.

12. Conclusion

The aim of this thesis is to obtain an unbiased target price of Vow ASA. Our calculations on the fundamental value is done by the weighted average cost of capital (WACC) method. To support the fundamental value of the WACC, a relative valuation based on multiples is conducted. As we believe the peer companies do not reflect Vow`s growth prospects and have different core operations, we choose to emphasize the intrinsic value from the DCF-approach. Our best estimate is the scenario weighted price per share.

To make the best possible assumptions we perform a thorough review of recent development and outlook in each market and analyse Vow`s current strategic position. Combined with normalized historical performance, it laid the foundation for expected future performance and share value. The different scenarios where based on the market outlook and our strategic analysis.

The development and outlook in the different markets where Vow operates are quite different. The cruise market is a quite stable and mature market while aquaculture- and land-based markets represents attractive aspects and new opportunities for the company. In the cruise market we pointed to fierce competition in the bear case, and commercialisation of their unique proprietary technology (MAP) in the bull case. The market outlook for closed-cage and land-based aquaculture is very positive, but the market will likely continue to make up a small part of Vow`s business. Much depends on the functionality in land-based farming and the counterparty risk to Atlantic Sapphire.

The land-based market has an enormous potential. Development will depend on whether they manage to receive orders on additional systems to customers, which we believe they will since ETIA has long experience and the two subsidiaries can exchange knowledge to improve current solutions. Also, the Group will use ETIA as an operational platform to gain access to the land-based market. We believe Scanship`s solid reputation from the cruise market will be noticed by other industries, leading to revenue synergies. The increased pricing of carbon is another contributing factor for our positive outlook on the land-based markets.

The conclusion from our strategic analysis is that the positive effects seems to out-weigh the negative effects. This is reflected in our overall more bullish expectations of the future performance of Vow, and the overweight of bull scenarios in the weighted estimate.

The Covid-19 virus affected our thesis and we chose to do the valuation as of 31/12-2019. The fact that Vow`s operations were solid despite the pandemic further strengthen our positive outlook. Having secured several land-based contracts during the pandemic we believe our assumptions on the strong growth in the future can be justified.

To sum up Vow has a strong position in the cruise and aquaculture markets and with good outlooks for growth in the land-based markets. Despite this our fundamental analysis yields a downside of about 35% to the share price of **NOK 30** as of 31/12-2019. This indicates that the financial markets might be too optimistic regarding the future value of the company. The relative valuation supports our intrinsic value but is less emphasized due to the limitations we mentioned. Our sensitivity analysis illustrates that small changes in key variables such as cost of capital and terminal growth rate have a substantial impact on the share price. The scenario-weighted share price of **NOK 19.6** is our final price target. This is in line with consensus from Bloomberg and we would conclude that the stock is overvalued and would therefore come with a **Sell** recommendation.

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14. Appendix

14.1 – Appendix 1

Consolidated financial statements for ETIA Ecotechnologies, 2014 – 2017

Income statement:

		In KEUR	In KEUR	In KEUR	In KEUR
French	**English translation**	**31.12.2014**	**31.12.2015**	**31.12.2016**	**31.12.2017**
Production vendue biens	Production sold goods	4769	6081	5061	4859
Production vendue services	Production sold services	49	52	404	91
Chiffre d'affaires net	**Net sales**	**4819**	**6133**	**5466**	**4952**
Total des produits d`exploration (I)	**Total products operating profit (operating income) (I)**	**5008**	**6493**	**5814**	**5754**
Achats mat prem et autres approvisionnements (compris douane)	Inventory item purchases, raw materials and other consumables (including customs)	2656	3013	2787	2768
Autres achats et charges externes	Other external services	1541	1868	2099	2328
Salaires et traitements	Personnel costs	320	457	551	608
Charges sociales	Social security contributions	114	175	220	243
Dotations d`exploitation sur immobilisations aux amortissements	Appropriations to depreciation on fixed assets	166	171	225	334
Dotations d`exploitation sur actif circulation aux provisions	Appropriations to provisions on current assets	0	0	0	36
Autres charges	Other current operating charges	130	0	6	0
Total des charges d`exploration (II)	**Total operational expenses (II)**	**4645**	**6037**	**5943**	**6348**
Resultat d`exploitation (I-II)	**Operating profit (I-II)**	**362**	**455**	**-129**	**-593**

Fixed assets:

French	English translation	In KEUR	In KEUR	In KEUR	In KEUR
Actif immobilise	**Fixed assets**	31.12.2014	31.12.2015	31.12.2016	31.12.2017
Frais de recherche et développement	Research and development costs	0	0	135	104
Concessions, brevets	Concessions, patents	2	1	10	9
Instal tech mat indus	Technical installation, industrial plant and equipment	509	416	1091	873
Autres immobilisés corporelles	Other tangible fixed assets	128	189	193	157
Immobilisation corporelles en cours	Tangible fixed assets in progress	0	0	0	493
Autres participations	Other financial investments	156	257	829	1299
Autres immobilisations financiere	Other financial fixed assets	0	13	45	45
Total (I)	**Total fixed assets (I)**	**797**	**877**	**2305**	**2983**

Current assets:

French	English translation	In KEUR	In KEUR	In KEUR	In KEUR
Actif circulant	**Current assets**	31.12.2014	31.12.2015	31.12.2016	31.12.2017
Matières premières	Raw materials (and supplies)	408	112	102	99
En cours production services	Services in progress	288	559	341	601
Avances et acomptes versés sur commandes	Payments on account on orders	98	0		132
Clients et comptes rattachés	Customers and related accounts/Trade accounts receivable	408	705	2099	3488
Autres créances	Other receivables	315	398	694	940
Valeurs mobilières de placement	Short term investment securities	1041	711	291	1291
Disponibilités	Liquid assets	1119	1406	691	2053
Charges constatées d'avance	Prepayments	76	128	32	14
Total (II)	**Total current assets (II)**	**3756**	**4024**	**4254**	**8621**
Total (I+II+III+IV+V)	**Total assets (I +II + III + IV + V)**	**4553**	**4901**	**6559**	**11604**

Equity and liabilities:

French	English translation	In KEUR	In KEUR	In KEUR	In KEUR
Bilan passif	**Equity and liabilities**	31.12.2014	31.12.2015	31.12.2016	31.12.2017
Capital sociales	Share capital	500	500	500	655
Primes d'émission, de fusion, d'apport	Premiums on shares issued, mergers, contributions	0	0	0	2561
Réserve légale	Legal reserve	15	15	15	57
Réserves réglementéesTax	Regulated Reserves	0	0	0	241
Autres reserves	Other reserves	573	953	1467	1491
Résultat de l'exercice	Profit or loss for the financial year	380	513	66	-372
Subventions d`investissment	Investment grants	181	133	0	0
Provisions réglementées	Tax regulated provisions	0	0	84	72
Total capitaux propres (I)	**Total capital and reserves (I)**	**1650**	**2115**	**2133**	**4707**
Emprunts et dettes auprès d'établissements de crédits	Loans and debts payable to credit institutions	284	456	1474	1623
Avances et acomptes recues sur commandes en cours	Payments on account received on orders in progress	34	0	0	0
Dettes fournisseurs et comptes rattachés	Trade creditors and related accounts	1248	1543	1545	1426
Dettes fiscales et sociales	Tax and social security debts payable	147	187	143	107
Autres dettes	Other debts payable	553	356	694	808
Produits constatés d'avance	Deferred income	635	241	568	2930
Total dettes (IV)	**Total liabilities (IV)**	**2903**	**2785**	**4425**	**6869**
Ecarts de conversion passif (V)	Realisable exchange gains (V)	0	0	0	1
Total	**Total equity and liabilities**	**4554**	**4901**	**6560**	**11604**

14.2 – Appendix 2

Prognosis, bull case

Prognosis Bull	Phase 1					Phase 2				
MNOK	**2020e**	**2021e**	**2022e**	**2023e**	**2024e**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**
Total operating revenues	658	1222	1927	2558	3099	3588	3919	4478	5128	5816
Revenue growth	***72,9 %***	***85,6 %***	***57,7 %***	***32,7 %***	***21,2 %***	***15,8 %***	***9,2 %***	***14,2 %***	***14,5 %***	***13,4 %***
COGS	-438	-784	-1216	-1608	-1942	-2242	-2434	-2777	-3176	-3596
Gross proft	220	438	712	950	1157	1346	1485	1701	1952	2219
Gross margin	***33,5 %***	***35,8 %***	***36,9 %***	***37,1 %***	***37,3 %***	***37,5 %***	***37,9 %***	***38,0 %***	***38,1 %***	***38,2 %***
Employee expenses	-96	-172	-244	-293	-352	-406	-441	-504	-578	-654
Other operating expenses	-50	-89	-137	-180	-217	-250	-271	-310	-355	-403
EBITDA	**74**	**177**	**331**	**477**	**588**	**690**	**773**	**887**	**1019**	**1162**
EBITDA-margin	**11,2 %**	**14,4 %**	**17,2 %**	**18,7 %**	**19,0 %**	**19,2 %**	**19,7 %**	**19,8 %**	**19,9 %**	**20,0 %**
CAPEX	33	73	116	153	186	179	196	224	205	233
Depreciation & Amortisation	20	37	58	77	93	108	118	157	179	233
Operating NWC	178	340	544	724	880	1020	1120	1280	1468	1667
Effective tax rate	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %

Prognosis, bear case

Prognosis Bear	Phase 1					Phase 2				
MNOK	**2020e**	**2021e**	**2022e**	**2023e**	**2024e**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**
Total operating revenues	475	587	680	743	732	715	764	847	874	843
Revenue growth	***24,8 %***	***23,6 %***	***15,8 %***	***9,2 %***	***-1,5 %***	***-2,3 %***	***6,8 %***	***10,9 %***	***3,2 %***	***-3,6 %***
COGS	-327	-402	-464	-507	-502	-492	-520	-573	-590	-567
Gross proft	148	185	217	236	230	223	243	274	285	276
Gross margin	***31,1 %***	***31,5 %***	***31,8 %***	***31,8 %***	***31,4 %***	***31,2 %***	***31,9 %***	***32,4 %***	***32,6 %***	***32,7 %***
Employee expenses	-70	-83	-93	-97	-97	-95	-100	-110	-114	-110
Other operating expenses	-38	-47	-54	-60	-60	-59	-62	-68	-70	-67
EBITDA	**40**	**55**	**70**	**79**	**73**	**69**	**81**	**96**	**101**	**99**
EBITDA-margin	**8,5 %**	**9,3 %**	**10,2 %**	**10,6 %**	**10,0 %**	**9,7 %**	**10,7 %**	**11,3 %**	**11,6 %**	**11,7 %**
CAPEX	24	35	41	45	44	36	38	42	35	34
Depreciation & Amortisation	14	18	20	22	22	21	23	30	31	34
Operating NWC	147	182	212	231	227	221	238	265	274	265
Effective tax rate	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %	22 %

14.3 – Appendix 3

For developed market firms with market cap > $5 billion			
If interest coverage ratio is			
>	≤ to	*Rating is*	*Spread is*
8.50	100000	Aaa/AAA	0.63%
6.5	8.499999	Aa2/AA	0.78%
5.5	6.499999	A1/A+	0.98%
4.25	5.499999	A2/A	1.08%
3	4.249999	A3/A-	1.22%
2.5	2.999999	Baa2/BBB	1.56%
2.25	2.249999	Ba1/BB+	2.00%
2	2.2499999	Ba2/BB	2.40%
1.75	1.999999	B1/B+	3.51%
1.5	1.749999	B2/B	4.21%
1.25	1.499999	B3/B-	5.15%
0.8	1.249999	Caa/CCC	8.20%
0.65	0.799999	Ca2/CC	8.64%
0.2	0.649999	C2/C	11.34%
-100000	0.199999	D2/D	15.12%