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Ensuring Customer Value through Comprehensive Reporting

Wärtsilä Finland Oy

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BACHELOR'S THESIS

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Abstract

This thesis, commissioned by Agreement Management, Performance Services at Wärtsilä Marine, examines how reporting within Wärtsilä's Lifecycle Agreements (LCA) can be developed to better meet customer needs and thereby create increased customer value. The aim of the study is to identify which parts of the reporting are valuable to customers, how reporting can be improved within lifecycle agreements, and what future requirements may arise. The study covers lifecycle agreements in general but focuses especially on agreements involving hybrid systems and future fuels.

Using a qualitative research method, the study mapped how Wärtsilä's current reporting within lifecycle agreements is carried out. Data was collected through semi-structured interviews with eleven employees at Wärtsilä Marine, complemented by document research and analysis of material from both internal and external sources. The method made it possible to identify where Wärtsilä's reporting currently stands, areas with development potential, and to gain a deeper understanding of future needs within reporting.

The results show that customers want clear, visual, and role-centred reporting that supports their operations. Furthermore, quick access to information, flexibility, and tailored content are also highlighted as particularly important features. Reporting is expected to support both daily operations and long-term planning. There is also a growing need for better insight into battery performance and more relevant information related to the use of future fuels.

Based on the results, the study presents proposals for improvements that Wärtsilä Finland Oy can further develop to enhance reporting and meet future requirements within lifecycle agreements.

Language: English
Key words: lifecycle agreement, reporting, customer value

EXAMENSARBETE

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Abstrakt

Med uppdrag från Agreement Management, Performance Services vid Wärtsilä Marine, undersöker detta examensarbete hur rapportering inom Wärtsiläs Lifecycle Agreements (LCA) kan utvecklas för att bättre möta kunders behov och därmed skapa ökat kundvärde. Målet med studien var att identifiera vilka delar av rapporteringen som är värdefulla för kunden, hur rapporteringen kan förbättras inom livscykelsavtal, samt vilka framtida krav som kan uppstå. Studien omfattar livscykelsavtal i allmänhet, men fokuserar framför allt på avtal med hybridsystem och framtida bränslen.

Genom användning av en kvalitativ forskningsmetod kartlades hur Wärtsiläs nuvarande rapportering inom livscykelavtal utförs. Datainsamlingen bestod av semistrukturerade intervjuer med elva anställda inom Wärtsilä Marine, kompletterat med dokumentforskning och analys av material från både interna och externa källor. Metoden gjorde det möjligt att identifiera var Wärtsiläs rapportering står idag, områden med utvecklingspotential, samt att få en fördjupad förståelse för framtida behov inom rapporteringen.

Resultatet visar att kunder efterfrågar tydlig, visuell och rollanpassad rapportering som stöder den operativa verksamheten. Även snabb tillgång till information, flexibilitet och anpassat innehåll lyfts fram som särskilt viktiga egenskaper. Rapporteringen förväntas ge stöd både i den dagliga verksamheten och i den långsiktiga planeringen. Det framkommer också ett ökande behov av bättre insyn i batteriprestanda samt mer relevant information kopplat till användning av framtida bränslen.

Utifrån resultatet presenteras förslag på förbättringar som Wärtsilä Finland Oy kan arbeta vidare med för att utveckla rapporteringen och möta framtida krav inom livscykelavtal.

Språk: engelska
Nyckelord: livscykelavtal, rapportering, kundvärde

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Nimike: Asiakasarvon varmistaminen kattavalla raportoinnilla

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Tiivistelmä

Tämä opinnäytetyö, joka on toteutettu Wärtsilä Marinen Agreement Management, Performance Services -yksikön toimeksiannosta, tarkastelee, kuinka raportointia Wärtsilän Lifecycle Agreements (LCA) -sopimuksissa voidaan kehittää vastaamaan paremmin asiakkaiden tarpeita ja siten lisätä asiakasarvoa. Tavoitteena on tunnistaa, mitkä raportoinnin osa-alueet ovat asiakkaille arvokkaita, kuinka raportointia voidaan parantaa elinkaarisopimuksissa sekä millaisia tulevaisuuden vaatimuksia saattaa ilmetä. Tutkimus käsittelee elinkaarisopimuksia yleisellä tasolla, mutta keskittyy erityisesti hybridijärjestelmiin ja tulevaisuuden polttoaineisiin.

Laadullista tutkimusmenetelmää hyödyntäen selvitettiin, miten Wärtsilän nykyinen raportointi elinkaarisopimuksissa toteutuu. Aineisto kerättiin puolistrukturoiduilla haastatteluilla, joihin osallistui yksitoista Wärtsilä Marinen työntekijää. Näitä täydennettiin dokumenttitutkimuksella ja analysoimalla sekä sisäisiä että ulkoisia lähteitä. Menetelmän avulla voitiin tunnistaa Wärtsilän raportoinnin nykytilanne, mahdolliset kehitysalueet ja saada syvällisempi käsitys tulevista raportointitarpeista.

Tulokset osoittavat, että asiakkaat haluavat raportoinnin olevan selkeää, visuaalista, käyttäjän rooliin mukautettua ja että se tulee tukea operatiivista toimintaa. Myös nopea tiedonsaanti, joustavuus ja kohdennettu sisältö nousevat esiin erityisen tärkeinä ominaisuuksina. Raportoinnin odotetaan tukevan sekä päivittäistä työtä että pitkän aikavälin suunnittelua. Lisäksi ilmenee kasvava tarve akun suorituskyvyn paremmalle näkyvyydelle sekä ajankohtaisemmalle tiedolle liittyen tulevaisuuden polttoaineisiin.

Tulosten perusteella esitetään parannusehdotuksia, joita Wärtsilä Finland Oy voi hyödyntää edelleen kehittääkseen raportointia ja vastatakseen tuleviin vaatimuksiin elinkaarisopimusten osalta.

Kieli: englanti
Avainsanat: elinkaarisopimus, raportointi, asiakasarvo

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Abbreviations

CLM	Contract Lifecycle Management
DMP	Data-driven Dynamic Maintenance Planning
ECV	Expected Commercial Value
EMS	Energy Management System
ESA	Enhanced Support Agreement
ESS	Energy Storage System
GAP	Guarantee Asset Performance
GHG	Greenhouse Gases
IMO	International Maritime Organization
IPV	Integrated Present Value
LCA	Lifecycle Agreement
NPV	Net Present Value
OMA	Optimised Maintenance Agreement
TMA	Technical Maintenance Agreement
WDCU	Wärtsilä Data Collection Unit

1 Introduction

In order to build long-term and successful customer relationships, it is important that companies can demonstrate the value they deliver to customers. This is also true in the marine industry, where vessels operate in challenging environments and face increasing demands for efficiency, reliability, and sustainability. In the marine industry, service agreements have become a tool to ensure long-term operational reliability, typically offering technical support, maintenance services, and performance monitoring to help shipowners manage their assets efficiently. Part of these agreements is reporting, which enables customers to get a better overview of equipment performance, ensure regulatory compliance and make informed decisions on operations and maintenance. (Wärtsilä, 2024a)

As marine technology continues to evolve, for example with hybrid propulsion systems and future fuels, expectations for reporting are also changing. New demands are being placed on the content and format of the reports, this is to provide customers with actionable insights that support both operational activities and long-term strategic planning.

1.1 Background

To support customers' operations in the long term, Wärtsilä Marine offers different forms of Lifecycle Agreement (LCA). These agreements include, for instance continuous monitoring, technical support and maintenance services for customers' vessels, depending on the extent of the agreement. Part of the services delivered in these agreements is the reporting, which provides customers with an understanding of how their equipment is performing, helps them identify potential issues, and supports the maintaining of operational efficiency. (Wärtsilä, 2024a)

Today, reporting within LCAs covers a wide range of information, including both technical performance data and operational analyses. As maritime technology advances and customer demands shift towards greater efficiency, reliability and sustainability, expectations on reporting are evolving as well. Customers increasingly seek not only standard performance data, but also relevant insights that directly support their daily operations and long-term strategic planning. At the same time, emerging technologies such as hybrid propulsion, which combines traditional engines with battery systems, and future fuels introduce entirely new requirements. These developments create the need for more detailed, precise and

context-specific information, enabling customers to effectively navigate new technical challenges and regulatory environments. (Wärtsilä, 2024a)

Although reporting is at a good level, there is a need to better demonstrate how reporting delivers tangible value to the customer. Wärtsilä has therefore initiated this thesis to investigate internally how the reporting in the LCAs can be developed to more clearly demonstrate the value created for the customer and strengthen the overall value proposition of LCAs, especially in view of new technologies and future fuels.

1.2 Employer

Wärtsilä was established in 1834 in Tohmajärvi, Karelia, initially as a sawmill. Throughout the years Wärtsilä has diversified into various industries and businesses, eventually growing into a multinational company (Wärtsilä, n.d.b). Wärtsilä operates in 79 different countries, more than 280 locations and has approximately 17 800 employees across the globe. Today, Wärtsilä is a global leader in smart technologies and complete lifecycle solutions for the marine and energy markets, with a focus on enabling sustainable societies through innovation in technology and services (Wärtsilä, n.d.a).

Wärtsilä is divided into two main business areas, Wärtsilä Marine and Wärtsilä Energy. Wärtsilä Marine provides solutions for the global marine industry, with a portfolio that includes engines, propulsion systems, hybrid technologies, exhaust gas cleaning, shafting solutions, and digital technologies. By integrating these into complete power transmission systems, Wärtsilä Marine aims to deliver efficiency, reliability, safety, and reduced environmental impact. Wärtsilä Marine also offers services such as performance-based agreements, upgrades, lifecycle solutions, and support for customers' decarbonisation journeys. (Wärtsilä, n.d.a)

Wärtsilä Energy helps customers and the energy sector to accelerate the transition to low carbon energy production. Solutions include flexible power plants with engines, energy storage and optimisation technologies, and service throughout the installation lifecycle. The engines are designed for the long term and prepared to run on sustainable fuels. (Wärtsilä, n.d.a)

1.3 Purpose

The purpose of this thesis is to investigate and propose improvements to Wärtsilä's reporting within LCAs, to ensure and to better demonstrate the value delivered to customers. The study aims to gain a deeper understanding of which aspects of current reporting customers perceive as most valuable, and to identify new reporting requirements, especially associated with hybrid systems and future fuels.

The thesis will present concrete improvement proposals that Wärtsilä Marine can use as input for future development efforts. These proposals are not intended for immediate implementation, but rather to serve as internal guidelines for further refinement. In addition, the thesis will explore how the commercial value of reporting can be assessed, to ensure that future reporting strategies both enhance customer value and remain commercially sustainable.

1.4 Disposition

This thesis is structured in seven different main chapters which are as following.

1. **Introduction**
    - Presents the background, purpose and scope
2. **Theoretical Framework**
    - Introduces key concepts and relevant literature
3. **Method**
    - Describes the research approach and data collection
4. **Result**
    - Summarises key findings from interviews and analysis
5. **Discussion & Proposal for Improvements**
    - Interprets results and suggests improvements
6. **Conclusion**
    - Highlights main conclusions and final thoughts
7. **References**
    - Lists all sources used in the thesis

1.5 Scope and Delimitations

This thesis examines the reporting provided within LCA, with a focus on how reports can be developed to more clearly communicate the value delivered to the customer. The thesis covers various types of reporting offered by Wärtsilä, specifically highlighting new reporting needs emerging from hybrid propulsion systems and future fuels.

The research adopts a qualitative approach, relying exclusively on internal interviews with Wärtsilä employees across various global locations. No external interviews with customers or other stakeholders were conducted. However, the thesis incorporates external sources such as publicly available Wärtsilä documents, industry reports, regulatory publications, and relevant literature. Document analysis has been used as a complementary method to provide broader insights and identify areas for potential improvement.

The thesis does not include analyses of customer contracts, direct customer feedback, or implementation plans. Instead, it aims to provide concrete proposals that Wärtsilä can use internally to further develop their future reporting. Economic analyses or quantitative calculations of the commercial value of the proposals are not included. The thesis will only address the commercial aspects qualitatively. The study focuses exclusively on Wärtsilä's marine business and does not include the company's energy segment.

2 Theoretical Framework

This chapter will present the central theoretical concepts that form the foundation of this thesis and are used to analyse the findings. The aim is to provide the reader with a deeper understanding of the thesis topic and a background that supports the interpretation of the final conclusions. This chapter will cover the concept of customer value, financial aspects, future regulations and propulsion systems in the marine industry, as well as the LCAs offered by Wärtsilä and the services delivered within these frameworks.

2.1 Customer Value

Customer value is a core marketing concept that helps companies recognise what their customers value and develop strategies that meet their needs. It is an essential concept to understand for building a competitive advantage in both Business-To-Business (B2B) and Business-To-Consumer (B2C) markets (Graf & Maas, 2008). Customer value is about the balance between what customers get from a product or service and what they must give up in terms of money, time or effort (Zeithaml, 1988; Anderson & Narus, 1998). According to Zeithaml (1988), customer value is a personal experience that differs from customer to customer depending on their goals, preferences and situations.

Customer value can be described as multidimensional. It is not only about practical aspects such as product quality or the service itself, but also about how a product or service can generate positive emotions and provide meaning. It captures various tangible and intangible elements that contribute to the overall customer experience and includes aspects such as customer interactions, delivery processes, and post-sale support. This broader perspective highlights the dynamic nature of customer value and its role in shaping customer perceptions and behaviours. (Smith & Colgate, 2007; Zeithaml, Verleye, Hatak, Koller, & Zauner, 2020)

2.1.1 Perceived Customer Value and Desired Customer Value

Customer value can be understood through two primary categories, Perceived Customer Value (PCV) and Desired Customer Value (DCV). These categories provide complementary perspectives on how customers evaluate and derive value from products and services. (Zeithaml et al., 2020)

PCV is about how customers perceive and evaluate the value of a product or service, either during or after using it. It is a balance between the benefits they perceive, such as quality

and brand status, and the sacrifices they make, such as price and effort (Zeithaml, 1988; Monroe & Chapman, 1987; Zeithaml et al., 2020). Traditionally, PCV has been focused on the product itself, such as its price, brand and quality, however, other research has also included aspects based on relationships and processes, such as trust and post-purchase support (Woodside, Golfetto, & Gibbert, 2008).

DCV is about the customer's long-term goals and aspirations. It describes what the customer wants to achieve from a product or service, rather than how they experience it at a specific moment in time. Unlike PCV, DCV is about more abstract values that reflect the deeper needs and goals of the customer (Graf & Maas, 2008). To understand DCV, theories are often used that link the characteristics of the product to the outcomes and personal goals that the customer pursues (Holbrook, 1994; Zeithaml et al., 2020). Although PCV and DCV are different, they are interrelated. PCV, which focuses on quality and price, helps to fulfil the larger goals associated with DCV (Smith & Colgate, 2007)

2.1.2 Framework for Customer Value

For companies to improve customer satisfaction and strengthen their customer-centric strategy, they need theoretical and practical knowledge of customer value. Essentially, it is about understanding four main values that influence how customers experience products and services. These are functional-, symbolic-, experiential- and cost-related values. (Zeithaml et al., 2020)

Functional value focuses on the practical usefulness and effectiveness of a product or service. Attributes such as reliability, quality and performance are central as they directly affect the customer's ability to achieve their goals (Smith & Colgate, 2007; Woodside et al., 2008). Experiential value highlights the experiential and emotional aspects of consumption, such as joy, excitement and pleasure. These aspects are close to the emotional and positive experiences to which value creation contributes (Holbrook, 1994; Graf & Maas, 2008). Symbolic value represents the social and psychological meanings that customers attach to their purchases. Products and services often serve as an expression of the customer's identity, status or values, this is particularly relevant in markets where branding and image play a crucial role (Smith & Colgate, 2007; Zeithaml et al., 2020). Finally, cost-related value encompasses the effort, time and financial resources that customers put into buying and using a product or service. By reducing these sacrifices, the perceived value of an offering can be significantly increased (Zeithaml, 1988; Woodside et al., 2008).

2.1.3 Creating and Delivering Customer Value

To create and deliver customer value, companies can use several strategic interventions. Information plays a central role in guiding customers through the decision-making process and increasing their trust by providing clear and useful information about the product's features, benefits and uses (Smith & Colgate, 2007). Product design and functionality are also important source of value creation, as innovative and high-quality solutions that exceed customer expectations create both trust and loyalty (Zeithaml et al., 2020).

The interaction between the company and the customer is of utmost importance. Reliable customer service and good relationship management help to build stronger bonds and create a positive overall experience (Woodside et al., 2008). The environment in which products and services are consumed, whether physical or digital, enhances the customer experience by creating an inviting and engaging atmosphere (Holbrook, 1994). Finally, smooth and convenient processes for purchase, delivery and post-sale support can reduce friction and make it easier for the customer to use the product or service. This creates added value and adds to the customer's positive experience (Smith & Colgate, 2007).

2.2 Cash Flow

Cash flow refers to the movement of cash into and out of a company over a defined period. Unlike profits, which measures financial performance from an accounting perspective, cash flow shows a company's liquidity and financial health. Understanding cash flow is important because a company can show a profit on paper but still have liquidity problems if cash outflows exceed cash inflows. Effective cash flow management ensures sufficient liquidity for operational stability, strategic investments and sustainable growth. (Jury, 2012; Schoenmaker & Schramade, 2023)

In the cash flow statement, activities are divided into three main parts: operating activities, investing activities and financing activities. Operating activities comprise the core business of producing and selling goods or services, and consist of revenues less operating expenses, such as raw materials, labour and general costs. Changes in working capital, such as inventory levels, accounts receivable and accounts payable, are critical because they directly affect a company's cash position. This flow of cash around operational functions is commonly referred to as the working capital cycle, presented in Figure 1. The investing activities cash flow covers expenditure related to long-term assets, this includes the purchase and sale of fixed assets, such as equipment, machinery, buildings or intellectual property,

which are necessary to maintain and develop the business. Investment decisions are strategic and have a significant impact on the company. Therefore, they should be thoroughly considered before being carried out but are inevitable to ensure companies' future efficiency and competitiveness in the market. The financing activities refer to the movement of cash linked to debt and equity. These activities include raising capital through loans or share issues, repaying debt obligations, making interest payments and paying dividends to shareholders. The effective management of financing activities balances the company's capital structure and affects both financial risk and returns to stakeholders. (Jury, 2012; Schoenmaker & Schramade, 2023)

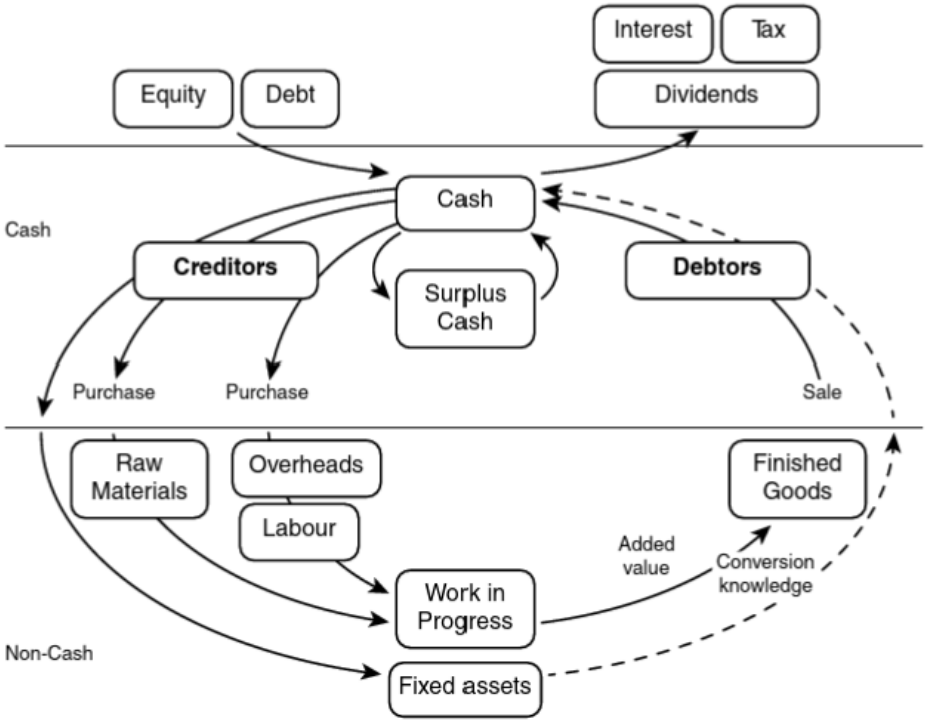

Figure 1: Diagram over cash flow in a manufacturing company (Jury, 2012).

Effective cash flow management increases liquidity, reduces the need for external financing, improves financial resilience and helps companies detect early signs of financial problems, allowing corrective action to be taken in time before a financial crisis occurs. It involves careful timing of accounts payable and receivable, inventory optimisation and careful investment decisions. Companies that successfully manage their cash flows can quickly reinvest in operations and growth, providing a competitive advantage over less efficient competitors. Equally, poor cash flow management can lead to bankruptcy when cash inflows

lag behind, as companies risk being unable to fulfil their obligations to creditors and suppliers. Therefore, it is important to manage the working capital cycle, speeding up the collection of debts from customers, optimising inventory levels and negotiating favourable payment terms with suppliers. (Jury, 2012; Schoenmaker & Schramade, 2023)

2.3 Commercial Value

Commercial value refers to the market value of goods or services generated through business operations, investments, and projects. It is essential for understanding price strategies, to ensure profitability and be able to set competitive prices. To calculate commercial value, it needs to be systematically approached to be accurate and involves cost analysis, market research, demand forecasting, price setting and regular review (Shipthis, n.d.).

The Net Present Value (NPV) is used to calculate commercial value, which is a popular method for the economic evaluation of new products and the calculation of the profitability of investments. NPV is the sum of the discounted cash flows associated with a particular investment, where a positive NPV indicates good profitability of the investment and a negative NPV indicates the opposite, and therefore should not be done. See Equation 1 on how to calculate NPV. (Schoenmaker & Schramade, 2023)

$$NPV = \sum_{n=0}^{N} \frac{CF_n}{(1+r)^n} \quad (1)$$

Where:

CF_n = Cash flow at time n

r = Discount rate

n = time period

N = Total number of periods

Although NPV is a popular method for investment calculation, it does not consider factors such as uncertainties and the probability of success, just assumes that the project is certain as many other traditional methods. These aspects are important, especially for new ambitious projects where there is a lot of risk. Robert Cooper, among others, highlights the concept of

Expected Commercial Value (ECV) as an alternative for calculating more demanding investment estimates. ECV calculates the expected economic value of new product projects in situations of high uncertainty. It is built on a stage-gate process and the model is a structured approach that divides new product development into distinct phases (stages), each separated by decision points (gates), which can be seen in Figure 2. (Cooper, 2023)

In this method the project's viability is evaluated at each gate, and the decision is made about continuing (Go), stopping (Kill), or reworking the project based on updated information and analysis. Each stage involves specific tasks, from initial idea evaluation and feasibility studies to development, testing, and commercialisation. By gradually investing in each phase, companies effectively manage risks and resources allowing for informed decision-making and the ability to halt a project before significant resources are committed, if the project does not meet required criteria. ECV explicitly takes into account the probability of technical and commercial success at different stages of product development. In Appendix 1 the calculation process of EVC is visually presented, resulting in Equation 2. (Cooper, 2023)

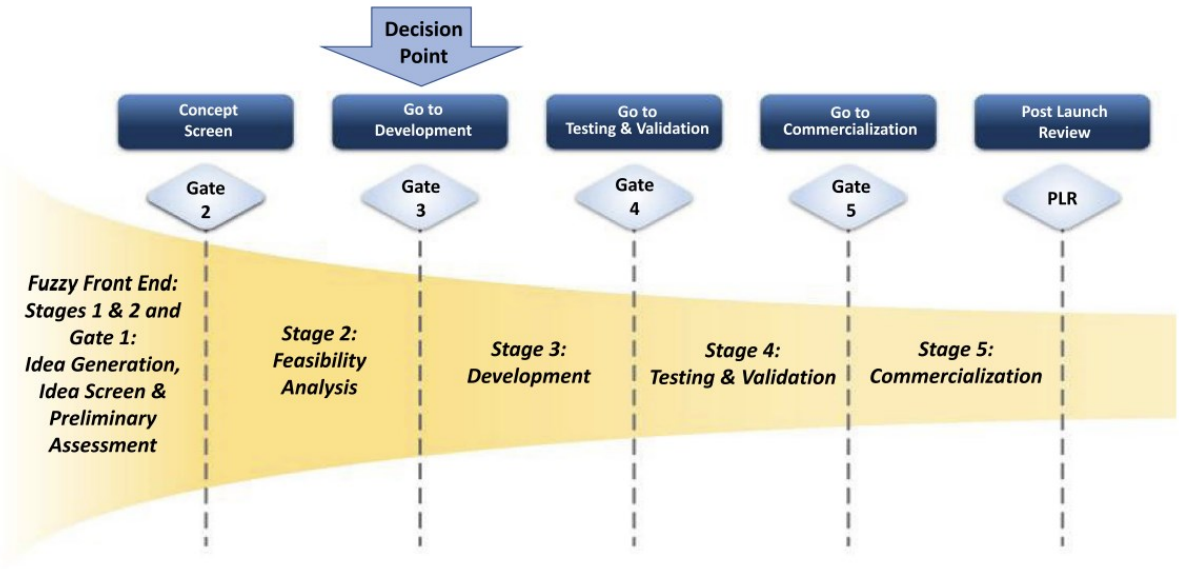

Figure 2:. The different Stage-Gates in the process of a new product (Cooper, 2023).

$$ECV = S * P_s - C * P_{t-} - V * P_d - \mathrm{D} \qquad (2)$$

Where:

D = Development cost

V = Testing & Validation cost

C = Commercialization cost

P_d = Probability of development success

P_v = Probability of validation success (product passes tests & trials)

P_c =Probability of commercial success, given product is a technical success

P_t = Probability of technical success = $P_d * P_v$

P_s = Overall probability of product success = $P_c * P_t$

S = Success Payoff, the present value of future income stream, discounted at the risk-free rate

Schoenmaker and Schramade (2023) on the other hand highlight that the concept of commercial value as extends beyond just economic factors and should include social and environmental considerations in corporate finance decisions. They state that companies that proactively incorporate sustainability into their strategies are more likely to strengthen their long-term competitive advantage, which help companies to better position themselves for future market conditions characterised by increased consideration of environmental and social indirect impacts. Consequently, it enhances their commercial value. The Integrated Present Value (IPV) method expands traditional financial valuation by including social and environmental factors alongside financial considerations, instead of focusing solely on financial returns, as in standard NPV. IPV calculates a project's total value by quantifying and pricing social and environmental impacts, thereby integrating these additional dimensions into the investment decision. This approach is designed to guide companies toward decisions that maximise long-term sustainable value creation by accounting for the full range of a company's impact on stakeholders and the environment. (Schoenmaker & Schramade, 2023)

$$IPV = FV + SV + EV > 0 \quad (3)$$

Where:

IPV = represents the integrated present value.

FV = represents the financial value (standard NPV based on financial cash flows).

SV = represents the value of social value flows.

EV = represents the value of environmental value streams. (Schoenmaker & Schramade, 2023)

2.4 Future Fuels and Regulations

The global shipping industry transports more than 80% of the global trade, which leads to a significant environmental footprint each year. As a result, the shipping industry faces major challenges in making the industry more environmentally friendly and more sustainable. Over the past decade there has been an increasing focus on making this happen, and now there are policies, roadmaps and legislation in place to address these issues, along with an all-increasing investment from companies into research and innovation. All to drive change by bringing forward new technologies, fuels, powertrains and solutions. (Wärtsilä, 2024b)

The International Maritime Organization (IMO) has set targets to reduce Greenhouse Gas (GHG) emissions from international shipping, with the aim of achieving net-zero emissions by 2050. The Marine Environment Protection Committee (MEPC), part of IMO, published in 2023 their report that covers the IMO strategy for reduction of GHG emission in the shipping sector, to reach this target. The report, MEPC 80, emphasises the importance of technological innovation and the development of zero or near-zero emission fuels and energy sources. It especially highlights the necessity of including “well-to-wake” emissions in the calculations, meaning that the entire life cycle of the energy source in the fuel tank is taken into account, from extraction of raw materials to propulsion of the vessel, as demonstrated in Figure 3. (International Maritime Organization [IMO], 2023)

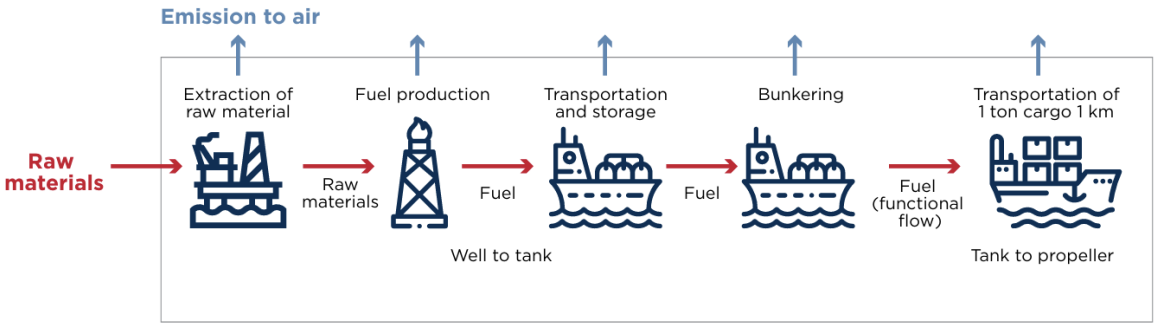

Figure 3: Life cycle of marine fuels, well-to-wake (American Bureau of Shipping [ABS], 2021).

The European Union (EU) has also developed its own directive to reduce emissions in the euro area, called FuelEU Maritime. It is part of the EU's Fit for 55 package, which commits the EU to reducing overall greenhouse gas emissions by at least 55% by 2030 (European Commission, n.d.a.). The aim of FuelEU Maritime is to reduce greenhouse gas emissions by promoting the use of cleaner fuels and energy sources. This will be implemented through regulations that gradually reduce the annual emission limits for the GHG intensity of the energy source used by the vessel. The basis for the calculation is the vessel's average GHG intensity of that energy source, calculated as GHG emissions per unit of energy (gCO2e/MJ). This comprehensive calculation also considers the well to wake emission, as in the MEPC 80 report (European Commission, n.d.b).

These regulations entered into force on 1 January 2025, starting with a 2% reduction target, increasing to 6% in 2030, and continuing until an 80% reduction is reached in 2050. The reference value is taken as the average of the GHG intensity calculations for the vessel in 2020. These fuel regulations would apply to ships of 5,000 gross tonnage calling at European ports (European Commission, n.d.b). Failure to comply with these regulations will result in emissions fees that increase over time to ensure compliance. These penalties, together with EU Emission Trading System (ETS) costs, will radically increase the annual fuel costs and will mean a doubling in fuel costs from 2023 to 2030, as can be seen in Figure 4. It will also close the gap between the cost of sustainable and fossil fuels. This way the EU believes it can reach the net-zero target by 2050 (European Commission, n.d.b; Wärtsilä, 2024b).

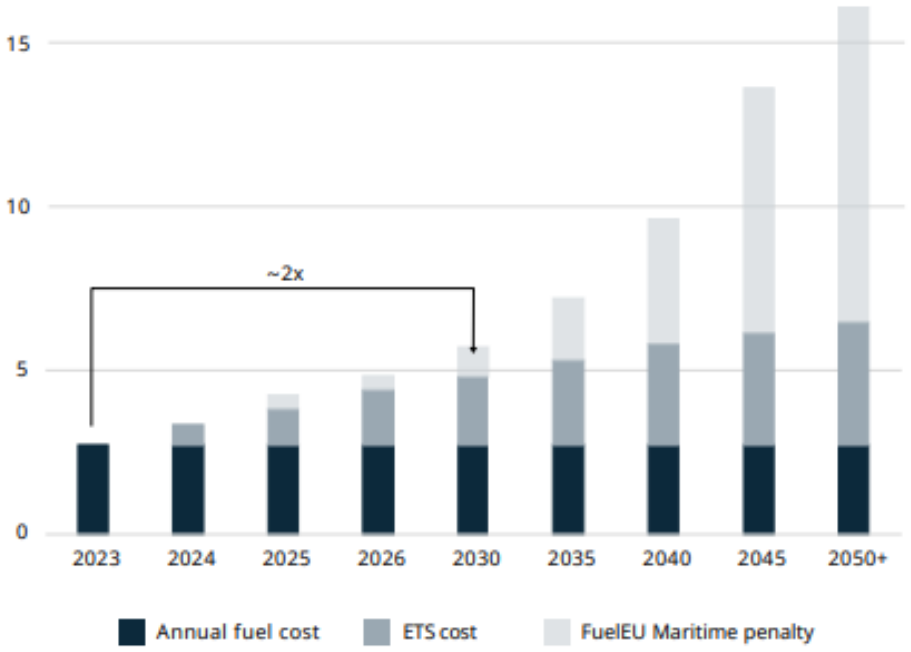

Figure 4: Fuel cost will increase due to emission fees, according to Wärtsilä's prognose (Wärtsilä, 2024b).

Reaching these targets will require a shift to alternative, greener fuels and solutions. The future fuels forecast presented in the Wärtsilä report defines a three-step path to achieve this. Firstly, the industry is expected to increase the use of biofuels, especially in the 2030s. These fuels are derived from non-edible organic sources such as agricultural residues, waste fats or forestry by-products, and include options such as biomethanol, biodiesel and bioethanol. Among these, green methanol is recognised for its compatibility with existing engine technologies, making it a practical short-term solution to reduce emissions. (Wärtsilä, 2024b)

As a transitional step, so-called blue fuels are expected to become more common in the mid-2030s. These include fuels such as blue ammonia, which is produced using fossil fuels with integrated carbon capture and storage. Blue fuels are not carbon-free, but they are seen as an intermediate solution that utilises existing oil and gas infrastructure, lowering the thresholds for initial adoption. (Wärtsilä, 2024b)

By the end of the 2030s and into the 2040s, a wider use of green synthetic fuels is estimated, such as green ammonia and electromethanol (e-methanol). They are produced from renewable electricity through electrolysis, making their production carbon-neutral from a production point of view. However, they are still significantly more expensive than fossil

fuels and their large-scale deployment will depend on the availability of new infrastructure, legal and economic conditions. (Wärtsilä, 2024b)

2.4.1 Ammonia

Ammonia (NH_3) is a widely produced chemical and used in several sectors, such as industry, agriculture and environmental applications. Due to ammonia's carbon-free combustion and relatively good energy density at 18.6 MJ/kg, still significantly lower than traditional fuels, this colourless gas is gaining attention in the marine sector as an alternative fuel, when the industry seeks to find solutions to meet IMO and EU emission targets. Especially ammonia that is produced from renewable energy sources, often referred to as "green ammonia", is an attractive alternative. (Kobayashi, Hayakawa, Somarathne, & Okafor, 2018)

Advantages of ammonia as a fuel, are that it does not emit carbon dioxide (CO_2) when burned, unlike traditional marine fuels, but the combustion of ammonia leads to the formation of nitrogen oxides (NOx) which are harmful pollutants. To counteract this, modified engines and after-treatment systems are required to effectively manage NOx emissions (Hansson, Brynolf, Fridell & Lehtveer, 2020; International Energy Agency [IEA], 2023). Furthermore, handling and storing ammonia brings their own challenges as its toxicity and corrosive properties require specialised materials and safety measures to prevent leakage and ensure safety (Hansson et al., 2018).

For green ammonia, the main drawback today, apart from handling and storage, is the cost associated with production from renewable energy sources, as it is currently significantly more expensive than conventional marine fuels. However, Hansson et al. (2018) highlight that this is likely to change as production technologies are developed and scaled up, the costs are expected to come down, which would be important for ammonia to be competitive and help with wider adaptation of ammonia as a marine fuel. From an infrastructure perspective, ammonia benefits from an existing global supply chain mainly used to produce fertilisers, the existing infrastructure can be leveraged for marine applications, which would potentially reduce the need for significant new investments in this area (Hansson et al., 2018).

Regulatory considerations are important for the adoption of ammonia as a marine fuel. IMO is developing guidelines to ensure the safe use of ammonia and will address safety concerns related to toxicity and environmental impacts, providing a framework for safer implementation. (Wang, Zhang, Huang, & Zhang, 2023)

2.4.2 Methanol

Methanol (CH_3OH) has been used for many years in different applications and is accessible worldwide. Methanol burns cleaner than conventional fuels and at a lower adiabatic flame temperature. This contributes to lower levels of NO_x, sulfur oxides (SO_x) and particulate matter, but, unlike ammonia, methanol combustion produces CO_2 emissions, though at a lower level than conventional fossil fuels. Still, after treatment systems, like EGR and SCR, are needed (ABS, 2021).

Methanol can be produced from a variety of feedstocks, including biomass and renewable energy sources but is more commonly produced from natural gas, offering flexibility in production methods. However, when discussing methanol as a future fuel, it is important to bear in mind that its environmental impact and GHG emissions vary significantly depending on the production process, as methanol produced from natural gas has the same potential of global warming as heavy diesel oils when considered on a well-to-wake basis. Therefore, when it comes to using it as fuel, the production of methanol from renewable energy sources, known as e-methanol or bio-methanol, is the preferred option as it significantly reduces life cycle GHG emissions. Unfortunately, the availability of so-called green methanol is currently limited, and production costs are higher than for conventional fuels. As demand increases and production processes become more efficient, costs are expected to decrease, and availability to improve. Companies have already made significant investments in the research and implementation of methanol-powered vessels, demonstrating the industry's confidence in this alternative fuel. (ABS, 2021; Wang et al., 2023)

At ambient temperature methanol is in a liquid format, which makes storage and handling easier, compared to ammonia, Liquefied Natural Gas (LNG) and hydrogen fuels (ABS, 2021; Wang et al., 2023). Methanol has a slightly higher energy density than ammonia, 19,7 MJ/kg, but still lower than traditional marine fuels. Due to its lower energy density methanol requires about 2,5 times the storage volume to match the energy content of conventional fuels, which means that larger storage is needed (ABS, 2021; Wang et al., 2023). Existing marine engines can be adapted to run on methanol with relatively minor modifications, this type of retrofits has been made by Wärtsilä for several installations and the engine modifications mainly include changing of cylinder heads and injectors (ABS, 2021). Additionally, methanol is biodegradable and has a lower toxicity level compared to other alternative fuels, but this does not mean that it is without safety concerns. IMO has provided guidelines for the use of methanol, addressing these safety and environmental considerations

These regulations facilitate the integration of methanol into the maritime sector, providing clear standards for its use (Wang et al., 2023; ABS, 2021).

2.5 Hybrid Solutions in Marine Applications

Hybrid systems have become an attractive option in the marine industry due to their potential to reduce emissions and improve energy efficiency, especially in the short term. This transformation into more sustainable propulsion is driven by regulations and the consequences they bring in terms of financial penalties if they are not met. Integrating conventional combustion engines with electric power and Energy Storage Systems (ESS) (see Figure 5), allows vessels to operate with different power sources independently or by integrating them, depending on operational requirements (Wärtsilä, 2024c; MAN Energy Solutions, n.d.). For example, using electric propulsion at low speeds and conventional engines for long-distance voyages, or a combination of these. This approach contributes to vessel operational profitability, as it reduces fuel consumption and emissions, gives more operational flexibility and longer engine life, as well as helping to meet increasingly stringent environmental regulations (Damian et al., 2022; Wärtsilä, 2024.c).

Despite these benefits, hybrid is not without its challenges. The costs of ESS and Energy Management Systems (EMS) are significant and require investment, which is one of the reasons for shipowners to question whether it is profitable to invest in this technology. With benefits compensating for the initial costs over time, it is sometimes hard to see the return on investment. Another challenge, highlighted by Damian et al., (2022) is the space and weight implications of ESS, which can be particularly challenging for smaller vessels and retrofit projects. Furthermore, there is still limited shore-based charging infrastructure, which poses difficulties, as not all ports are equipped to handle hybrid vessels efficiently. According to the IEA report, the deployment of infrastructure for battery charging and hybrid technology will be crucial for the wider adoption of the technology (IEA, 2023). Technical complexity also poses a challenge, as hybrid systems require sophisticated EMS to optimise battery charging and discharging cycles, and to ensure seamless transitions between propulsion modes and battery health, as well as battery degradation which poses long-term challenges. (Damian et al., 2022; MAN Energy Solutions, n.d.). Crew training and adaptation to hybrid technology present operational challenges, as personnel must be

equipped with the necessary skills to manage and maintain these systems. (Damian, et al., 2022).

Regardless of the challenges the future of this technology looks promising as it continues to evolve. Advances in battery chemistry and energy storage solutions are expected to improve efficiency, reduce costs, and extend battery lifespans. According to the IEA report (2023), the deployment of shore power infrastructure will be crucial to support hybrid vessels, enabling efficient battery charging and reducing dependence on on-board generators. Regulatory incentives and emissions-based policies are likely to drive further investment in hybrid technology, positioning it as a key component of the maritime industry's transition to more sustainable practices (IMO, 2023; Damian, et al., 2022).

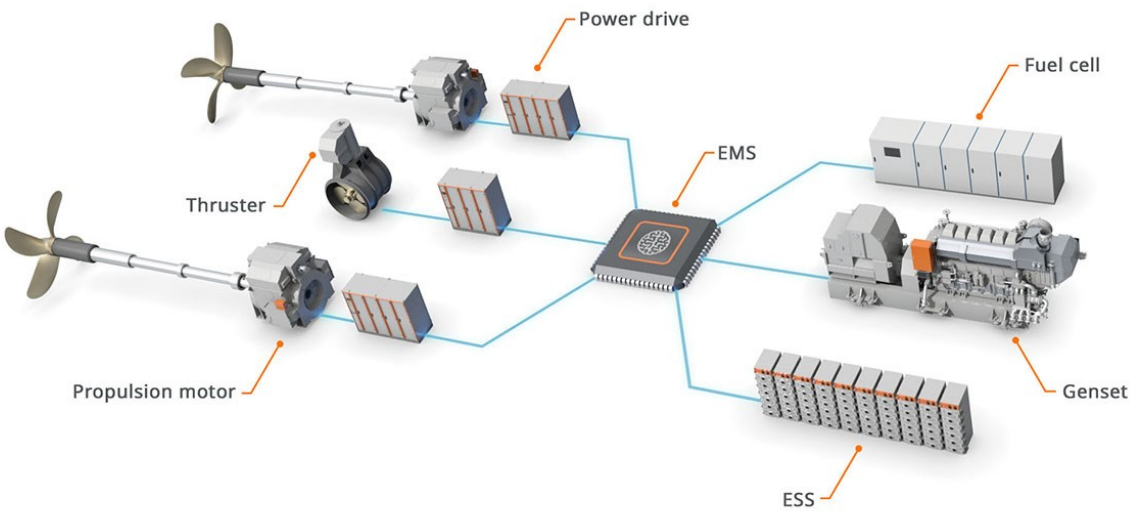

Figure 5: Visual representation of a hybrid system (Wärtsilä, n.d.c).

2.5.1 ESS suppliers for Wärtsilä

There are a few suppliers of ESS for Wärtsilä. In Table 1 the main three suppliers are presented, from where the company are based and the type of battery chemistry used.

Table 1: Main ESS suppliers for Wärtsilä (AYK Energy, n.d.; Corvus Energy, n.d.; Echandia, n.d.)

Company	Based in	Battery chemistry
Corvus Energy	USA/Norway	Lithium ion NMC / Graphite/ NCA, Lithium iron phosphate
Echandia Battery	Sweden	Lithium-ion
AYK Energy	China	Lithium iron phosphate

2.6 Contract Lifecycle Management

Contract Lifecycle Management (CLM) refers to the management of contracts throughout their entire lifecycle, from preparation to closure. The purpose is to ensure compliance with contract terms, set clear responsibilities, and address potential risks in time. It also helps reduce misunderstandings and strengthen business relationships. (Macbeth, 2012.; Thomson Reuters, 2024)

The benefits of a CLM system are many. It increases control and efficiency, reduces business risk, and helps organisations comply with both internal guidelines and external requirements. In addition, CLM improves data visibility, which in turn improves decision making and supports long-term planning. It also contributes to optimising contract value and reducing the risk of conflict, two key factors in building lasting business relationships. (Thomson Reuters, 2024)

A well-functioning CLM system is especially valuable in organisations where multiple departments are involved in contract management, such as legal, engineering, sales, and finance. According to Thomson Reuters (2024), CLM facilitates collaboration between these functions and enables a more unified and efficient way of working. Macbeth (2012) also

highlights that CLM can be used to identify areas for improvement by analysing contract data. These insights can support business development and operational efficiency.

A typical CLM process involves several phases: preparation, negotiation, approval, implementation, monitoring, renewal, and final closure. In the initial stages, objectives and expectations are identified, forming the basis for negotiations where the contract terms are defined. Once approved, the contract moves into the implementation phase, where clear responsibility allocation and effective communication are key. Throughout the duration of the contract, continuous monitoring allows for the timely management of any deviations. In the later stages, a review of the contract's relevance is conducted, which may result in renewal, renegotiation, or termination. Finally, the contract is archived, taking into account any remaining obligations. (Macbeth, 2012)

2.6.1 Lifecycle Agreements offered by Wärtsilä Marine

Wärtsilä Marine primarily offers four types of LCAs. The main purposes of an LCA are to reduce downtime by decreasing the risk of unplanned maintenance, which can be costly for customers. Additionally, LCAs aims to lower fuel consumption and the operating expenses by planning the maintenance costs for upcoming years. They also contribute to reducing emissions and help customers comply with decarbonisation regulations. As of April 2024, more than 700 vessels worldwide utilise Wärtsilä LCAs. (Wärtsilä, 2024a)

The agreements that Wärtsilä offers, range from less extensive agreements, such as the Enhanced Support Agreement (ESA) and Technical Maintenance Agreement (TMA), to more extensive Optimised Maintenance Agreement (OMA) and Guaranteed Asset Performance (GAP) agreements, as can be seen in Figure 6. With a more extensive LCA, Wärtsilä's commitment to the customer increases as more support functions are included in the agreement. This reduces the customers' operational risk, as they have access to more resources and support from Wärtsilä. Figure 7 shows this relationship between contracts, operational risks and commitment. (Wärtsilä, 2022)

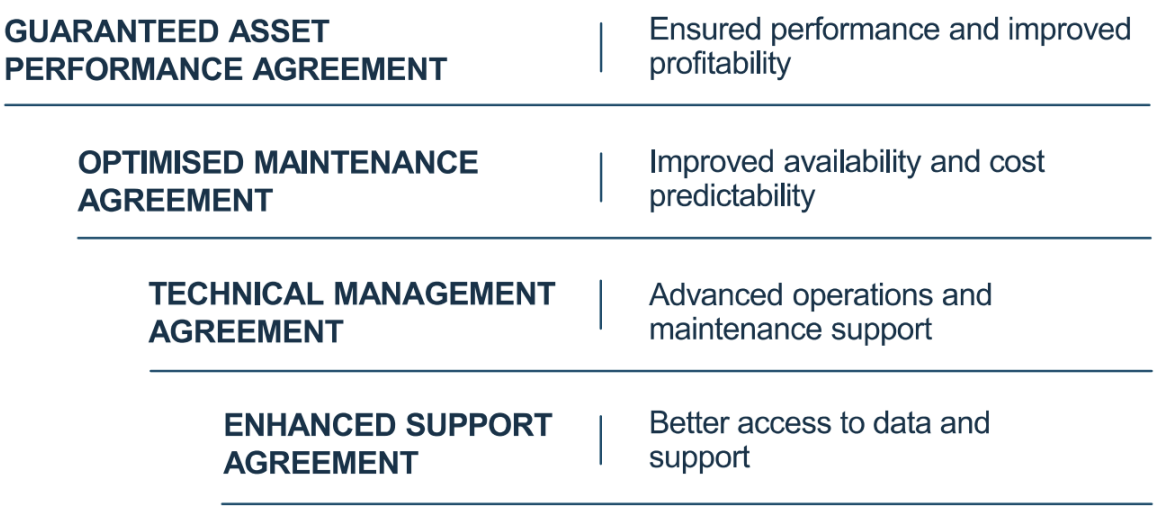

Figure 6: Main LCAs in Wärtsilä Marine (Wärtsilä, 2022).

Starting with ESA, this type of agreement gives customers more access to data support, by having a better visibility into how their assets are performing and a direct line to Wärtsilä Expertise Centre where they are provided with technical support, troubleshooting and maintenance planning (Wärtsilä, n.d.d). TMA aims to provide customers with comprehensive support to maintain assets more effectively, by optimising maintenance intervals based on actual needs and the condition of the assets. This means that, by default, customers get the insightful information about their asset's performance and needs. From there, they can make informed decisions on how to move forward, as TMA does not bind customers to buy labour or spare parts from Wärtsilä. Customer also have the option to expand a TMA by including optional features, such as Data-driven Dynamic Maintenance Planning (DMP) or maintenance planning (Wärtsilä, n.d.e). These enhancements can be integrated into TMA, OMA, and GAP agreements, although the specific optional features available vary depending on the type of agreement, see Appendix 1(Wärtsilä, 2024a).

OMA focuses on aligning maintenance procedures with business operations, ensuring better long-term cost predictability and asset availability. By offering remote operational and technical advisory services as needed, this approach tailors maintenance intervals based on actual requirements rather than fixed schedules. As a result, customers benefit from a more comprehensive maintenance agreement, which includes everything from spare parts and operational support to labour in a long-term maintenance plan (Wärtsilä, n.d.f). GAP on the other hand, as the name suggests, guarantees the performance of customers assets. GAP is designed to optimise customer business through a performance-based model. It focuses on

key performance measurements and implements optimised maintenance strategies to ensure assets operate at peak efficiency. The solution includes remote advisory services and advanced support, providing expert guidance as needed. Additionally, it offers condition monitoring and audits to maintain the health of equipment. To further enhance performance, a tailored performance improvement plan is developed, ensuring continuous improvement and long-term success for business operations (Wärtsilä, n.d.g).

For further understanding of what the different agreements contain, see Appendix 2. Note that this is a general template, and exceptions may apply as every agreement can be set up differently to a certain extent, with each customer.

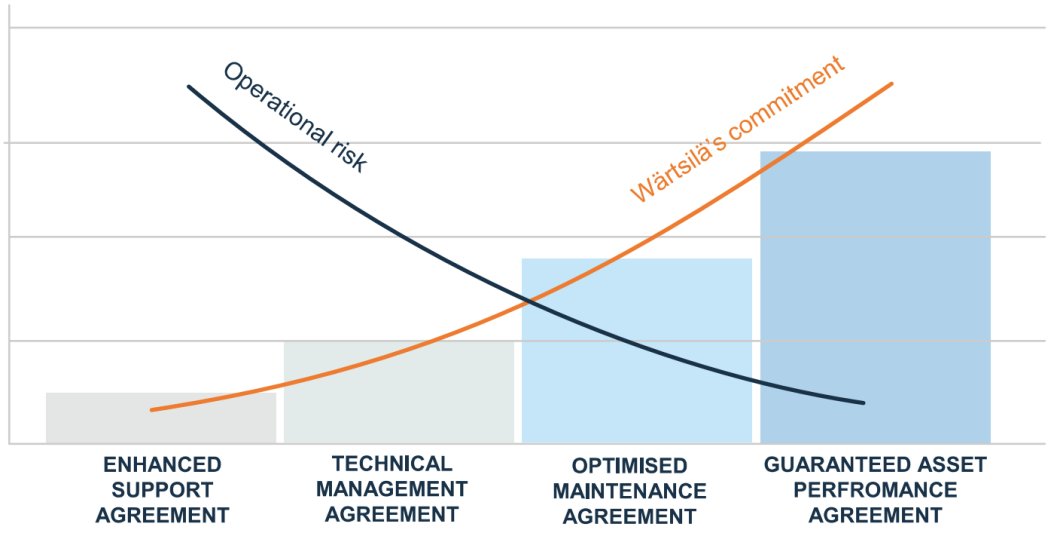

Figure 7: The relationship between operational risk and Wärtsilä's commitment in LCA (Wärtsilä, 2022).

3 Method

This chapter explains how the research for this thesis was conducted. It describes the methods used to collect information and how this data was analysed to shape the final findings. The aim is to provide a clear understanding of the research approach and how each step contributes to the overall conclusions.

3.1 Qualitative Research

In simple terms, research can be divided into quantitative research and qualitative research. The qualitative research method focuses on understanding the constructed reality of research participants and enables a detailed examination of their experiences through a specific set of research techniques, unlike quantitative research, which focuses on understanding patterns by collecting numerical data and analysing it. That means, qualitative research, seeks to understand how individuals interpret their environment and experiences, emphasising the thoughts, emotions, and social influences that shape their perceptions. The research methods involve analysing language and nonverbal expressions in observations and interviews, as well as analysing both current and historical documents, including self-analysis. (Vanderstoep & Johnston, 2009, p. 7, 179, 224; Hennink, Hutter, & Bailey, 2020)

The primary research method used in this thesis is qualitative research. Qualitative research method was considered the most suitable approach for data gathering in this thesis, as it highlights multiple perspectives on the subject. By analysing this data, conclusions could then be drawn regarding what customers perceive as value in the reporting provided by Wärtsilä and proposals of improvements could be made.

3.2 Data Gathering

The data gathering for this thesis was done during the period 20.1.2025 - 28.3.2025. For this, two methods have been used, semi-structured interviews and document research.

The focus of the data gathering was to capture interview participants' thoughts on the subject. This was done by having semi-structured interviews; the questions can be viewed in Appendix 3. Semi-structured interviews made it easier to obtain the relevant information and when questions arose or something needed to be clarified, the interviewer could ask more specific questions. This often led to deeper discussion and follow up questions

regarding the topic. This way new perspectives could be explored, which were valuable for the result. For a more practical understanding of the reports and how the information they contain is presented to the customer, document research was carried out. This involved going through the reporting methods currently used and the various report templates, to gain an understanding of how reporting is currently structured.

3.2.1 Semi-structured Interviews

Semi-structured interviews are one of the most common methods of data collection in qualitative research. A semi-structured interview is based on pre-selected themes and questions, which are then addressed in the order that best suits the interview. These questions and themes should not be too complicated or extensive but brief enough to guide the interview. The idea is that the more open-ended the questions and themes are, the easier it is to follow up with questions and discussions on new topics. Depending on the interviewee, this may be difficult, as some people are more willing to open up and talk about things than others. In the semi-structured method, it is important that the interviewer is curious and not afraid to ask questions, as this is the basis for successful data collection. It is also important to document the interviews to be able to go back and see what was said at a later stage. The most common methods of doing this today are through recording, in the form of tape recorders on mobile phones or recording during virtual meetings. (Blomkvist & Hallin, p. 70-73, 2014)

3.2.2 Document Research and Analysis

Document research and analysis is another method of gathering data, in which documents serve as data sources for understanding and interpreting research topics. The method involves the systematic review and evaluation of documents, both in print and electronic form, to generate meaning, create understanding and contribute to empirical knowledge. Documents can include meeting records, reports, policy documents, internal and external communications, and other relevant documents from organisations or institutions. Document analysis can be used both independently and in combination with other methods, such as interviews and observations, allowing for comparison and validation of findings, thereby strengthening the credibility of the research. Document analysis is therefore a suitable method in combination with semi-structured interviews in this thesis. (Bowen, 2009)

3.2.3 Execution of the Interviews

A total of 11 people participated in the interviews, which were conducted using the semi-structured method described in 3.2.1. The participants were selected with a focus on highlighting different perspectives and experiences. Therefore, interviewing several people in the same occupation but working in different parts of the world gave a broader perspective on the topic. The interview began with a brief introduction of the topic for the thesis and the participants were informed that the interview was anonymous and would be recorded. The interviews were conducted in English and Swedish, with an hour reserved for each occasion. This was a reasonable time frame, as the interviews themselves lasted on average 45 minutes, and the remaining time could be used for feedback and other reflections. Table 2 below presents a detailed presentation of the interviews with the occupation of the participants, the date of the interview, and the arrangement of the interview. Note that interview number 3 was conducted through written communication, where the participant was provided with the same questions as in Appendix 3. These questions were then answered and sent to the interviewer, who in turn would ask follow-up questions if needed.

Table 2: Interview details

	Participant	Date of interview	Arrangement
1	Contract Manager, Agreement Management	6.2.2025	Face to face
2	General Manager, Agreement Management	7.2.2025	Teams
3	General Manager, Agreement Management	10.2.2025	In writing
4	Manager, Agreement Management	13.2.2025	Teams
5	General Manager, Agreement Management	17.2.2025	Face to face
6	Business Development Manager	19.2.2025	Teams
7	Senior Agreement Sales Manager	20.2.2025	Teams
8	General Manager, Agreement Sales	20.2.2025	Teams
9	General Manager, Agreement Sales	25.2.2025	Teams
10	Agreement Product Development Manager	27.2.2025	Teams
11	Manager, Asset Diagnostics	17.3.2025	Teams

4 Results

This chapter presents the findings obtained from the conducted interviews and document research. The results are presented in categories and form the foundation for proposed improvements. See Appendix 3 for the questions asked in the interviews for a better understanding of the information presented in this chapter.

4.1 Customer Value in Reporting

[Classified]

4.2 Understanding Customer Needs Across Roles

[Classified]

4.3 Areas to Improve and Future Reporting

[Classified]

4.4 Hybrid and Future Fuels

[Classified]

5 Discussion and Proposal for Improvements

This chapter discusses the findings in relation to the theoretical framework and the purpose of the thesis. The aim is to reflect on the key findings from the internal interviews and document review, and to analyse what these mean for Wärtsilä's reporting strategy. Concrete improvement proposals are presented and categorised to provide a clear overview of potential areas for development. The chapter concludes with a discussion of further research and the commercial value of improved reporting.

5.1 Discussion

[Classified]

5.2 Improvements for Future Reporting and Agreements

[Classified]

5.2.1 Hybrid

[Classified]

5.2.2 Future Fuels

[Classified]

5.3 Continued Research

[Classified]

5.4 Commercial Value

[Classified]

6 Conclusion

[Classified]

6.1 Methodology

Qualitative internal interviews proved appropriate for investigating how reporting is perceived within the Wärtsilä organisation, including in the areas of future fuels and hybrid. The semi-structured interview allowed for in-depth discussions and nuanced perspectives from different internal roles. However, the chosen method also had some limitations. As no external customer interviews were conducted, the conclusions are based entirely on internal perceptions of what creates customer value. This means that some assumptions could have been influenced by internal priorities or business logic rather than real customer needs. Future research should therefore complement these findings with customer interviews or joint workshops to further validate and develop understanding.

Despite this, the methodology was effective in answering the purpose of the study. It has identified concrete areas for improvement and shown how these can be linked to strategic value creation reporting in a changing maritime context.

6.2 Acknowledgements

Finally, I would like to express my sincere gratitude to my supervisors at Wärtsilä, Mats Hinders and Laura Derganz, for giving me the opportunity to write this thesis and for their generous support and time throughout the process. I would like to thank Leif Backlund from Novia University of Applied Sciences for his academic guidance and support. In addition, I would also like to thank everyone who volunteered to be interviewed or otherwise contributed by sharing their insights and participating in discussions related to this thesis.

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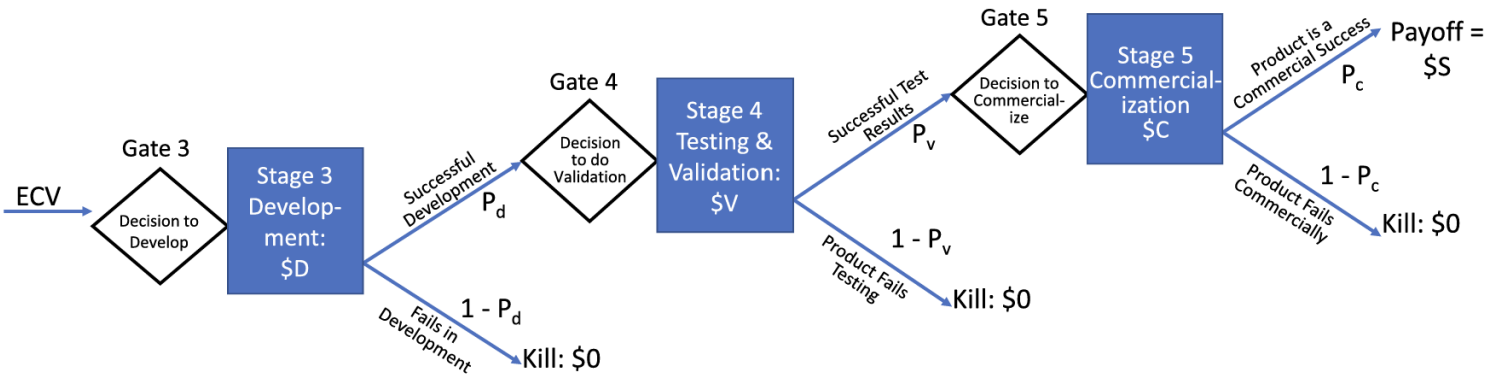
Appendix 1

Calculation process of EVC explained based on the new product model in Figure 1. (Cooper, 2023)



Appendix 2

Building blocks of agreements (Wärtsilä, 2022)

● by default
■ optional

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BUILDING BLOCKS	ENHANCED SUPPORT AGREEMENT	TECHNICAL MANAGEMENT AGREEMENT	OPTIMISED MAINTENANCE AGREEMENT	GUARANTEED ASSET PERFORMANCE AGREEMENT
Data Insight & Maintenance Forecast, On-demand Operational Support	●			
Connectivity Solution	●	●	●	●
Partnership Management		●	●	●
Maintenance planning		■	●	●
Exchange Set Management		■	■	■
Fluid Management		■	■	■
Expert Insight		■	●	●
Operational Support		■	■	■
Propulsion Condition Monitoring Service*		■	■	■
OPERIM*		■	■	■
Dynamic Maintenance Planning		■	■	■
Data-driven Dynamic Maintenance Planning			■	■
Fuel Efficiency Optimisation			■	■
Emissions Optimisation			■	■
Spare Parts			●	●
Labour			■	●
Performance Indicators			■	●
Performance Guarantees				■
Outcome-based Business Models				■

* Exceptions may apply.

Appendix 3

Questions for interviews

Questions

Customer Value in reporting

- In your view, what do customers generally perceive as the most valuable aspects of the reports we provide?
- What type of information or metrics do you think customers expect to see in reports?
- From your experience, what kind of data or insights have customers highlighted as particularly useful?
- Are there any specific areas where you think our reports currently fall short in delivering value to the customer?

Understanding customer needs across roles

- Based on your role, what feedback have you received from customers about the reports they receive?
- What aspects of reporting have received positive or negative feedback from customers?
- What do you think customers value most in reports (e.g., cost savings, operational efficiency, sustainability)?
- How do you believe our reports influence the customer's perception of our service agreements or products?
- In your opinion, are there differences in what decision-makers, such as technical teams versus financial teams, expect from these reports and what they find useful? If so, what?

Areas to improve

- What improvements would you suggest making the reports more valuable or impactful for customers?
- Are there specific types of data or visualisations (e.g., graphs, summaries) that customers find easier to understand or use?
- What challenges do you see in collecting or presenting the information that customers want in the reports (e.g., battery performance, hybrid solutions)?
- (How could technology, such as automation or AI, enhance the quality and relevance of the reports?)
- (Are there specific technologies or tools being used to improve the reporting process?)

For the future

- What future trends or innovations in reporting do you think could help better demonstrate value to customers?
- How can we better align our reports with customer sustainability goals or other strategic objectives?
- What kind of opportunities do you see for greater customisation of reports to meet individual customer needs?

Final reflections

- Is there anything else you believe we should consider improving our reporting for customers?
- Do you have any examples or insights from your own experience that could help us understand what customers value most in reports?