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Stakeholders' requirements regarding wave energy technology

Wello Ltd

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Abstract

Wello Ltd has recently changed their business strategy from selling and constructing the Penguin wave energy converter to selling their digital product, Penguin Core. Thus, the objective of the thesis was to examine what their stakeholders' requirements, needs and concerns were regarding Wello's wave energy technology products and services.

Renewable energy technologies, such as wave power and other low-CO_2 technologies, are great ways to impact positively on the climate change. When operating in a new market area with a new technology, such as wave power, understanding the stakeholders' needs is necessary. Wave energy has globally a massive potential, and with Wello's wave energy technology, this potential could be tapped.

The data for the study was collected with an electronic stakeholder survey. The stakeholders included site developers, off-shore operators, shipyards, utility companies and consultation companies. The survey questions were created in cooperation with Wello's staff, and they focused on the stakeholders' requirements, needs and concerns. The stakeholder survey was sent via email because the stakeholders were geographically dispersed. The research data was analysed with qualitative methods with some quantitative aspects.

According to the results, changing Wello's business strategy was a correct solution. Increasing cooperation with local business partners would make the sales process more convenient for the stakeholders. In marketing, Wello should promote the possibility to affect the climate change through positive actions and long-term business opportunities.

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Tiivistelmä

Wello Oy on äskettäin muuttanut liiketoimintamalliansa valmiiksi rakennetun Penguin-aaltovoimalaitteensa myymisestä heidän nykyisen digitaalisen tuotteensa, Penguin Coren, myymiseen. Opinnäytetyön tavoitteena oli selvittää yrityksen sidosryhmien vaatimukset, tarpeet ja huolenaiheet koskien Wellon aaltovoimateknologiaa ja -palveluita.

Uusiutuvan energian tekniikat, kuten aaltovoima sekä muut vähäpäästöiset tekniikat, ovat toimiva tapa vaikuttaa positiivisesti ilmastonmuutokseen. Kun toimitaan täysin uudella markkina-alueella sekä uuden tekniikan, kuten aaltovoiman, kanssa, on sidosryhmien ymmärtäminen erittäin tärkeää. Maailmanlaajuisesti aaltoenergialla on valtava potentiaali, ja Wellon aaltovoimateknologialla tätä potentiaalia voitaisiin hyödyntää.

Tutkimusaineisto kerättiin sähköisellä kyselyllä, joka lähetettiin sähköpostitse sidosryhmien jäsenille. Sidosryhmiä ovat muun muassa erilaiset aluekehittäjät, avomeritoimijat, telakat, sähköyhtiöt sekä konsultointiyritykset. Kysely luotiin yhteistyössä Wellon työntekijöiden kanssa ja siinä kartoitettiin sidosryhmien tarpeita, vaatimuksia ja huolenaiheita. Kysely lähetettiin sähköpostitse, sillä sidosryhmän jäsenet ovat jakautuneet ympäri maapalloa. Aineisto analysoitiin käyttämällä laadullisia sekä määrällisiä menetelmiä.

Tutkimuksen tuloksena voidaan todeta, että Wellon liiketoimintamallin muutos oli toimiva ratkaisu. Helpottaakseen myyntiprosessia sekä toimintaa paikallisilla markkinoilla, yhteistyötä kannattaisi lisätä paikallisten yritysten kanssa. Markkinoinnissa tulisi hyödyntää ainakin ilmastonmuutokseen vaikuttamisen mahdollisuuksia sekä mahdollisuutta pitkäaikaiseen liiketoimintaan.

Avainsanat (asiasanat)

Aaltoenergia, uusiutuva energia

Muut tiedot (salassa pidettävät liitteet)

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1 Introduction

The assignor of this bachelor's thesis, Wello Ltd, wanted to gain more information about what their stakeholders were expecting when associating with Wello and when choosing the Penguin Core, Wello's wave energy conversion technology product. Wello has recently changed business strategy from constructing and selling the Penguin wave energy converters to selling their digital product, Penguin Core, and they need to know better what their stakeholders needs, concerns and requirements are concerning the Penguin Core, and other Wello's services. The gained information will help them to complete the projects, serve their current customers and stakeholders better, and help them in the future in marketing when they are acquiring new customers.

1.1 Research methods, objectives and information gathering

The research method used in this study was chosen to be a structured survey via email. The survey via email based approach for this research was a reasonable way for obtaining information from the stakeholders, because the stakeholders are geographically dispersed. Even though the survey is often used in a quantitative studies, the aim of this research was to understand individual stakeholders' needs, concerns and requirements, not to make quantitative statistical generalisations (Saaranen-Kauppinen & Puusniekka 2006a). The data gathered with the stakeholder survey was analysed by categorizing the answers into themes. The themes were stakeholders' concerns, stakeholders' requirements, stakeholders' needs and information for marketing.

The respondents of the study were 19 different stakeholders who were defined before this thesis by Wello. The stakeholders included site developers, off-shore operators, shipyards, utility companies and consultation companies. The main research objective was to gain information about stakeholders' requirements, needs and concerns when they are associating with Wello and Wello's wave energy technology. These findings can be used to improve Wello's product and services, and to understand how Wello could support the stakeholders' own businesses better. Understanding what requirements certain stakeholders have, helps Wello to individualize their marketing and services.

The assumptions for this research were that Wello has a working wave energy conversion technology and a ready product for the market. The focus was on the business aspects and on finding the stakeholders' requirements, concerns and needs. Currently, Wello is just assuming what the stakeholders would want from the product, but since the customers are operating in many fields and their preferences might vary, information collected from this research helps Wello to enhance their understanding what stakeholders' really need.

2 Literature review

One of the biggest threats in human history is the climate change (Renewable Energy Sources and Climate Change Mitigation 2012, 1). The climate change is mainly caused by heat-trapping greenhouse gases, especially carbon dioxide (CO_2), and the global warming of the last 50 years is very likely due to anthropogenic actions (Hegerl, Zwiers, Braconnot, Gillett, Luo, Marengo Orsini, Nicholls, Penner & Stott 2007, 665). The worst impacts of the climate change can still be avoided, if we change our current polluting energy producing methods to low CO_2 emission technologies (Edenhofer, Pichs-Madruga, Sokona, Seyboth, Matschoss, Kadner, Zwickel, Eickemeier & Hansen 2011, 7). In 2017, the world used fossil fuels to produce over 85 % of the global primary energy consumption, and fossil fuels were causing majority of all anthropogenic greenhouse gas emissions (Ritchie & Roser 2018; Edenhofer et al. 2011, 7). The United States Energy Information Administration (EIA) estimates that the global primary energy consumption will grow roughly by 50 percent between 2010 and 2050. This leads to a situation where the energy sector needs to reduce carbon dioxide emissions in order to mitigate the climate change, but at the same time, it also needs to produce increasing amounts of energy. This creates a great opportunity for low CO_2 emission technologies – such as, for instance, nuclear, hydropower, wave energy and other renewable energy technologies. (Moomaw, Yamba, Kamimoto, Maurice, Nyboer, Urama & Weir 2011, 164; International Energy Outlook 2019 with projections to 2050 2019, 25.) Furthermore, implementing renewable energies can improve social and economic development by creating jobs, enabling energy access for remote locations, securing the energy supply and reducing the negative impacts for the health and environment (Edenhofer et al. 2011, 7).

2.1 Wave energy

Waves are generated by wind, and wind is created by solar radiation. Wind is a result of uneven solar radiation on the earth, which causes to air to moving from a lower temperature, higher pressure area to a warmer temperature and lower pressure area. (Multon 2012, 323-324.) Wave energy is energy that wind has transferred to the ocean. When wind blows over the water, friction between the water and air transfers some of the wind's energy into the water and creates waves. This energy is stored in waves as potential and kinetic energy. (Lynn 2014, 41-42.) Figure 1 below shows how the wave (the blue graph) holds the energy and does not go to zero, even when the wind (the red graph) does. Wave is acting as a storage that slowly releases energy (Wello Oy 2020).

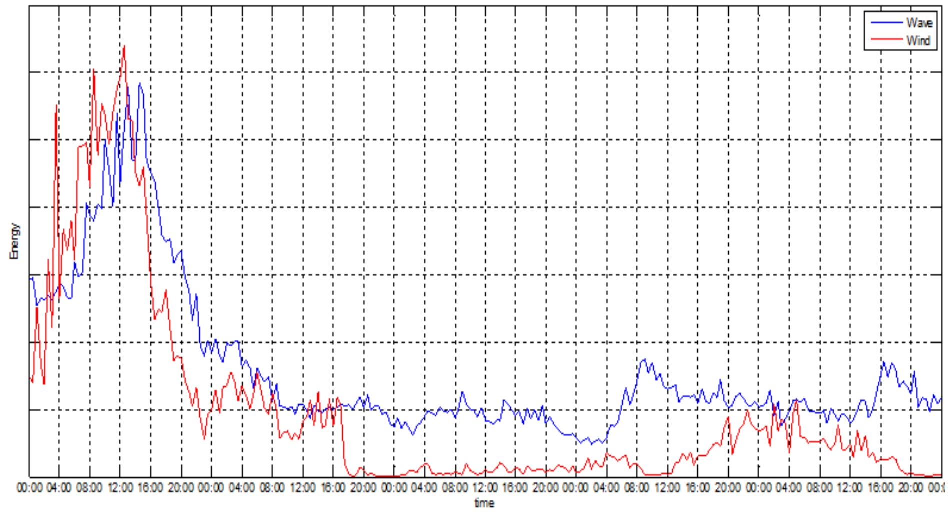

Figure 1. The phase difference comparison of wave and wind (Wello Oy 2020)

Potential energy is in the mass of the water that the waves move, and kinetic energy is in the movement of the water particles. This means that water particles are travelling across the ocean, not the water. (Lynn 2014, 41-42.)

There are two types of waves: the so-called storm waves and swell waves. When the waves are near the area they in which they are produced, they are called storm waves, and when the waves travel away from their place of origin, they are called swell waves. These clean swell waves transfer energy with great efficiency. (Lewis, Estefen, Huckerby, Lee, Musical, Pontes, Torres-Martinez, Bharathan, Hanson, Heath, Louis & Øystein 2011, 503.) Waves contain 95 % of their energy in a depth equal to half their wavelength, which is normally from 60 to 160 meters, and in deep water, waves can travel really long distances from their place of origin (Lewis et al. 2011, 503; Multon 2012, 325). Most of the wave energy converters use particularly these clean swell waves (2010 Survey of Energy Resources 2010, 563).

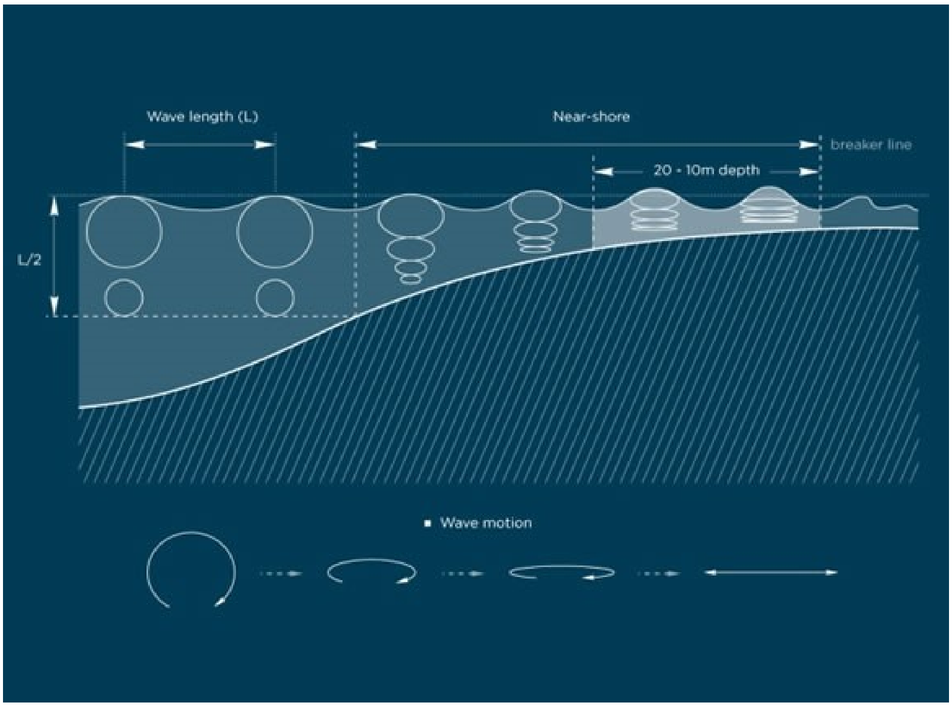

Figure 2. Wave particles in motion (Surge Phenomenon 2019)

As Figure 2 shows above, when waves approach the shore and the wave-breaking zone, the water particles' movement changes from circular to more eclipse, which leads to a decreasing wave-length and increasing wave height. When the height of the wave increases enough compared to water depth, the wave breaks. (Lynn 2014, 42.)

2.1.1 Wave energy resource and potential

The power of the ocean has been known for a long time by observing the sea when sailing or through natural disasters near the coastline. Oceans cover around 70 % of the Earth's surface, and as nearly 10 % of the world's population lives within 100 kilometres from the coast, harnessing wave energy in a commercial scale has a major potential. (Lynn 2014, 6; Factsheet: People and Oceans 2017, 1.)

The power of the wave is expressed in watts per a meter of the wave front (W/m), which means how many watts there are lengthwise in one metre of a wave (Multon 2012, 325). A simplified formula for wave energy in deep water is as follows:

$$J = T * H^2 \text{ kW/m}$$

In the above formula, J is wave energy, T is the period of waves and H is height of waves. For instance, if the period is 10 seconds and the height of the wave is 2 metres, wave energy is 40 kilowatt per metre (kW/m), which is quite common energy level as seen in Figure 4. This theory is suitable for understanding the linear clean swell waves, but in real life, the ocean is much more inconsistent when a clean swell is mixed with choppy local storm waves. (Lynn 2014, 43-44.) For the purpose of this thesis, it is not important to go more deeply into the wave theory.

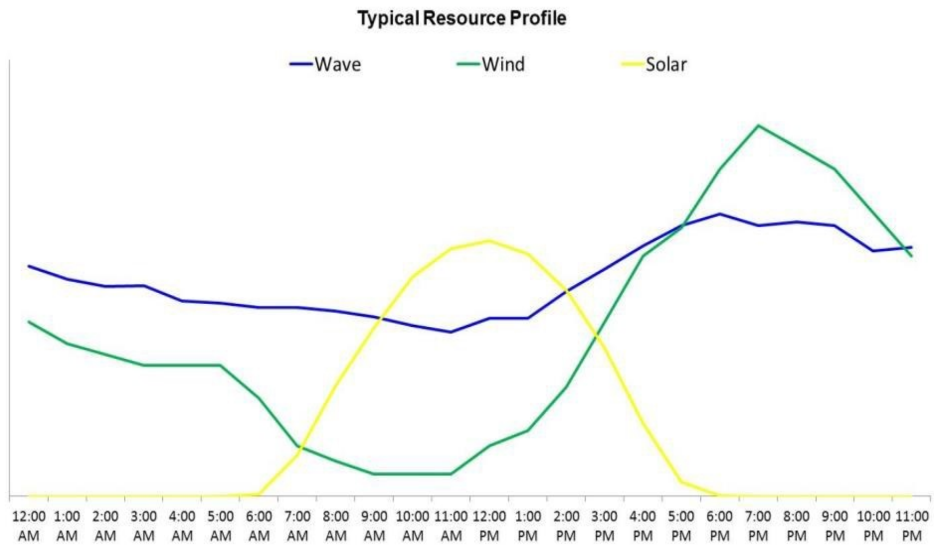

Figure 3. Wave, wind and solar comparison (Wello Oy 2020)

As Figure 3 shows above, wave energy is typically more constant than wind and solar energy. Solar energy always goes to zero at night, and wind can have many variations in energy production during the day. (Wello Oy 2020.)

Mørk, Barstow, Kabuth and Pontes (2010) conducted a very comprehensive study where they assessed that the theoretical global gross resource for wave power was about 3,7 terawatt (TW) and the net potential was around 3,0 TW. The main reducer between the gross and net values in the global scale is ice coverage. In Finland and around Baltic Sea, wave energy is difficult to harness because of a low wave power potential, as seen in Figure 4, and ice coverage. (Mørk et al. 2010, 3-7.) The total theoretical potential is estimated to be 32000 terawatt-hours (TWh) per year, and the economically accessible potential is estimated to be from 140 to 4000 TWh per year depending on the source. Multon (2012, 329) says that according to the World Energy Council, the economically accessible potential is between 140 and 750 TWh per year. Jacobson, Hagerman and Scott (2011, 5) again states that only on the coasts of the United States of America economically accessible potential is 1170 TWh per year. Marine Power Systems report (Making Wave Power Work 2017, 1) states that 10 % from worlds energy production, up to 4000 TWh, could be generated from waves by

2050. There is a variations between these studies, but the outline is that the potential is massive.

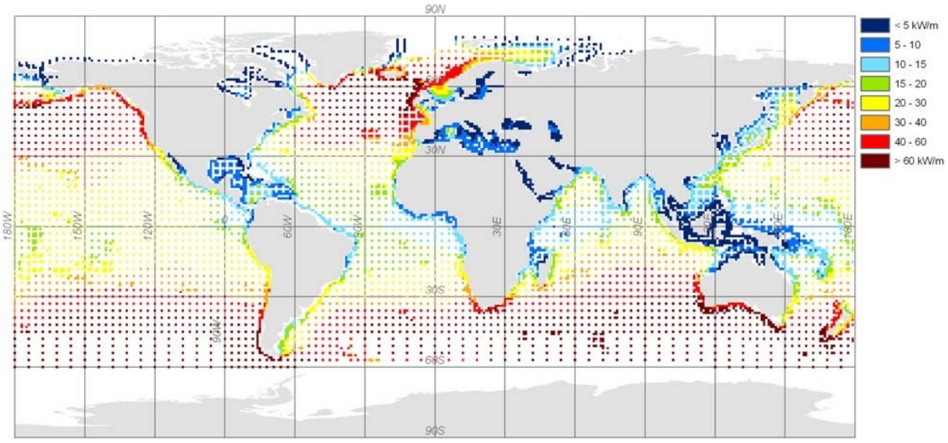

Figure 4. Annual global gross theoretical wave power potential in kW/m (Mørk etc. 2010, 4)

As Figure 4 shows above, the greatest potential locates on the western coast of the continents, and this is due to the Coriolis force (Mørk et al. 2010, 4). Most energetic waves are created by extra-tropical storms between 30° and 60° latitudes (Lewis et al. 2011, 503). Southern hemisphere has the advantage in wave resource stability which makes it possible to produce energy over a longer period of time, which ultimately makes the investment for wave energy more profitable (Mørk et al. 2010, 4). Global databases with long histories are used for estimating the yearly variations in the wave climate (Lewis etc. 2011, 503-504).

2.1.2 Techniques

The first written evidence about the desire to harness wave energy is a French patent from 1799. Nevertheless, only after the first oil crisis in 1973, Professor Salter from the University of Edinburgh invented the first wave energy converter known as

Salter's Duck. (Multon 2012, 323-324; Borthwick 2016, 73.) After that, at least 100 different wave energy converters have been developed, and they are in different stages of development, but the whole wave energy sector is still in research and development phase (Lewis et al. 2011, 503-510; 2010 Survey of Energy Resources 2010, 566).

Unlike wind turbines, where almost all the devices look the same, wave energy converters are in many different development stages, and the converters come in different shapes and sizes (Falcão 2009, 915). Many articles and books regarding wave power suggest various ways for categorising wave energy converters, for instance Multon (2012, 329-330), Lynn (2014, 59), Falcão (2009, 904-911) and Borthwick (2016, 73). The main differences between wave energy converters are the orientation to the upcoming wave, deployment depth and distance from the coast (Weber 2018, 2). Falcão (2009, 904) categorises wave energy converters by dividing them into three main sections: oscillating water columns, oscillating bodies and overtopping devices. As seen in Figure 5, after the main genus column, wave energy converters are divided by location and fixation, and the final subcategory is divided by the mode of operation. The categories and differences between wave energy converters are not vital for this thesis, so they are just covered only briefly.

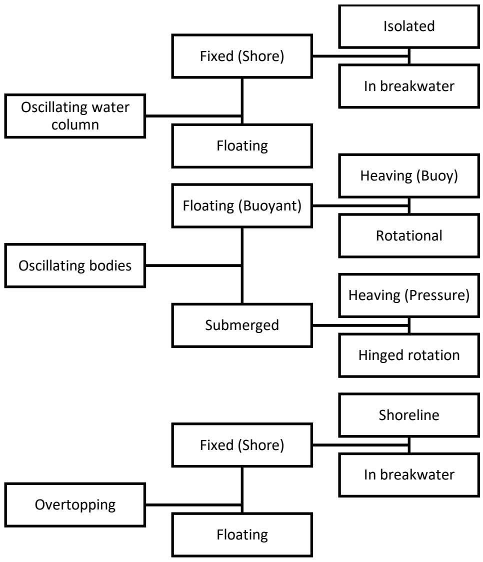

Figure 5. Categorising wave energy converters (Falcão 2009, 904, modified)

The oscillating water columns are generally fixed to a seabed or a rocky cliff. The working principle is based on trapping air into the channel where one end is submerged, and in the other end there is a turbine (See Figure 6). When the water oscillates, the trapped air moves through the turbine, which generates electricity. (Falcäo 2009, 904-905.)

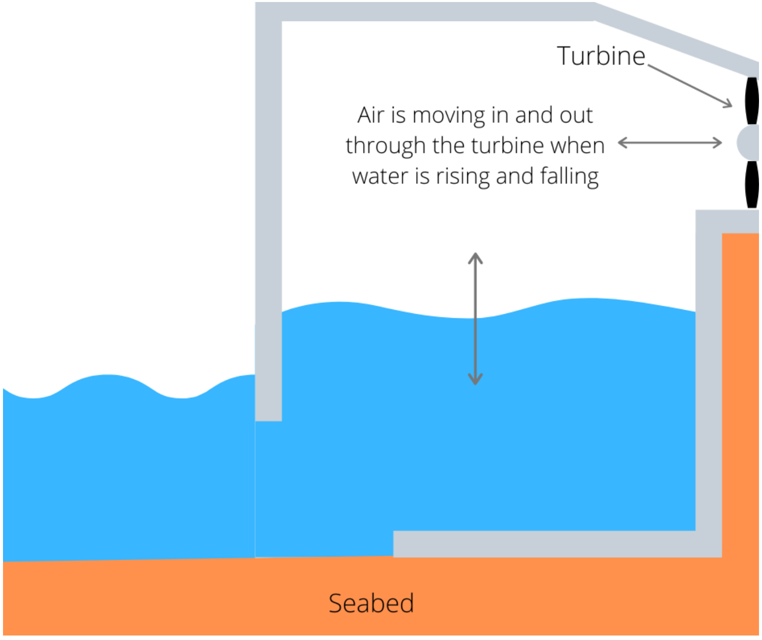

Figure 6. Oscillating water column

The oscillating bodies can be floating or submerged (See Figure 7). A good example of a oscillating body is a heaving buoy, or a point absorber, that creates electricity with a linear generator from the up-and-down movement of the wave. (Falcäo 2009, 904-905.)

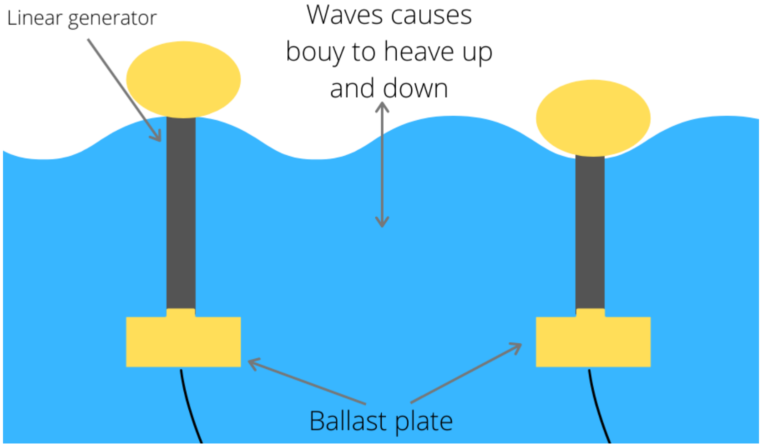

Figure 7. Oscillating body

The overtopping devices are floating structures where the wave forces the water over the device's edge (See Figure 8). The water that comes over the edge is stored higher than the surface of the ocean, and electricity is produced with a low-head water turbine when the water flows back to the ocean. (Falcäo 2009, 904-905.)

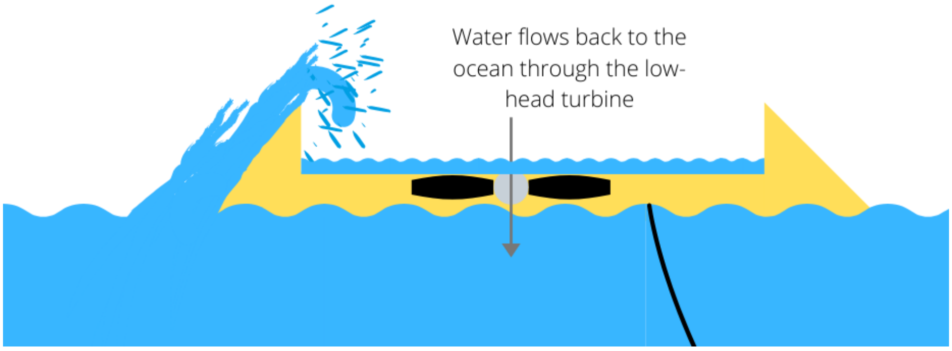

Figure 8. Overtopping device

The wave energy can be seen as a very environmentally friendly way of producing energy, as average lifecycle greenhouse gas emissions for the wave energy is around 8 grams of carbon dioxide equivalent per kilowatt-hour of electricity generated (gCO_2eq/kWh) (Arvizu etc. 2011, 92). For the comparison: average greenhouse gas emissions for the wind energy are approximately between 9 to 12 gCO_2eq/kWh, depending how windy the site is, approximately 14 gCO_2eq/kWh for off-shore wind, approximately 12 gCO_2eq/kWh for nuclear energy, approximately 27 to 76 gCO_2eq/kWh for photovoltaic systems, depending from which material the solar panel is manufactured, approximately 488 gCO_2eq/kWh for combined cycle natural gas and 965 gCO_2eq/kWh for supercritical pulverized coal (Miller, Gençer & O'Sullivan 2018, 445; Schlömer, Bruckner, Fulton, Hertwich, McKinnon, Perczyk, Roy, Schaeffer, Sims, Smith & Wiser 2014, 1335).

2.1.3 Challenges

The disadvantage of the wave power is its large variability that comes from wave-to-wave differences, seasonal variation and changes in ocean conditions (Falcão 2009, 901). Seasonal variation is normally greater in the northern hemisphere (Arvizu, Bruckner, Chum, Edenhofer, Estefen, Faaij, Fischedick, Hansen, Hiriart, Hohmeyer, Hollands, Huckerby, Kadner, Killingtveit, Kumar, Lewis, Lucon, Matchoss, Maurice, Mirza, Mitchell, Moomaw, Moreira, Nilsson, Nyboer, Pichs-Madruga, Sathaye, Sawin, Schaeffer, Schei, Shlömer, Seyboth, Sims, Sinden, Sokona, von Stechow, Steckel, Verbruggen, Wiser Yamba & Zwickel 2011, 88).

The ocean environment is extremely harsh because of saltwater and storms. The wave energy converters must resist corrosion and withstand big storms without breaking, and it would be even better if they could operate during these energy intensive storms. (Guiberteau, Kozman, Lee & Liu 2014.) Moreover, maintenance and repairing at sea can be very expensive (2010 Survey of Energy Resources 2010, 566). One challenge is designing wave energy converters suitable for many kinds of waves. Normally, waves contain, for example in the United Kingdom, somewhere between 30 to 70 kW/m, but during storms the wave power levels can go up to 2000 kW/m, which causes issues with the stability of produced electricity and durability of the devices (2010 Survey of Energy Resources 2010, 563).

The wave direction varies, which makes the orientating of the device difficult. Possible solution for this is to bring the device near the shoreline where the waves typically come from the same direction. One challenge has been transforming slow wave movement, typically 0,1 Hz, to a local grid frequency which is normally 50-60 Hz (2010 Survey of Energy Resources 2010, 563). Now with the new computer and software technology, this problem can be solved (Wello Oy 2020).

Due to the fact that the wave energy sector is still in a research and development phase, price per watt for wave energy is still expensive compared to other renewables (Lewis et al. 2011, 503). The wave energy sector is expecting that the costs will cumulatively decrease as it has happened before, by example, for wind energy (See Figure 9).

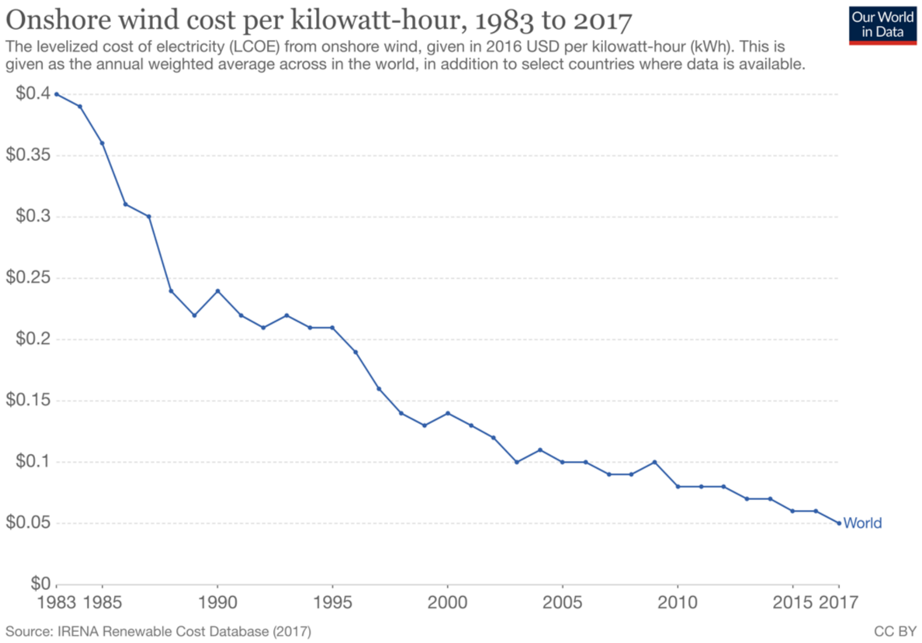

Figure 9. Onshore wind cost per kilowatt-hour development (Ritchie & Roser 2020)

The levelized cost of energy (LCOE) for onshore wind energy has decreased almost 90 % from 1983 to 2017. The LCOE means lifetime costs divided by energy production (Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2020, 1).

2.2 Wello Ltd

Wello Ltd is a Finnish wave energy technology provider founded in 2008. Wello's CEO founded Wello Ltd to develop his innovation, the wave energy conversion device called the Penguin wave energy converter (WEC). Wello's funding comes from founders, private equity funds, partners, state loans and grants, EU grants and from crowd-funding. Wello aims to enable 10 % of the clean energy production with wave power by 2050 (Wello Oy 2020). Wello has over ten worldwide patents covering the methods and solutions to this kind of wave energy conversion (Patents Assigned to Wello Oy).

Currently, Wello focuses to selling their digital product, Penguin Core, instead of the physical device, which was their original business strategy. This new way of operating allows the stakeholders and customers to be, for example, site developers, consulting companies, off-grid solutions, off-shore platforms, shipyards and utility companies. (Wello Oy 2020.)

2.3 The Penguin

Wello’s wave energy converter is called the Penguin. The Penguin does not directly fit in any category that Falcao (2009, 904) has proposed. The Penguin is categorized as a rotating mass wave energy converter (Prodohl 2018, 3). The first device, Penguin WEC1, was deployed in Orkney, Scotland in 2012, and was tested for several years. After learning from testing, Wello developed Penguin WEC2 by improving the mooring system, hull shape and software. Due to these changes, WEC2 has a 380 % better power production than WEC1. (Wello's WEC2 Penguin ready to depart Tallinn shipyard towards Orkney, Scotland; Wello Oy 2020.)

The Penguin WEC2 (The Basque country welcomes the Wello Penguin wave energy converter to its shores 2019)

The Penguin WEC is a floating closed body with an asymmetrical hull. Energy generation is based on capturing the kinetic energy of the waves with a rotating mass. A closed hull brings durability against the harsh ocean environment because all the moving components are protected from the corrosive salt water. The Penguin has survived 18-metre-high waves during storms in Orkney, Scotland and continued producing energy. Unlike many other wave energy converters which are based on a back and forth movement, this rotating mass technology creates more durable and efficient electricity production. Rotation also creates smoother and more continuous energy production without destructive peak loads. The Penguin can be used as on its own, in arrays or by operating alongside with other technologies. The Penguin is always designed and scaled specifically for the site. It can also be manufactured by any shipyard from standard off-the-shelf components and then towed to the site. The Penguin WEC's estimated lifetime is 30 years. (Wello Oy 2020).

2.3.1 Penguin's technology

Due to its asymmetrical shape (see Figure 10), the device rotationally pitches and rocks, gyrates, in waves, and the movement makes the eccentric mass inside rotate around a vertical generator shaft and produce energy. The generator can utilize parts from wind turbines, which lowers the costs because supply chain already exists. Inside of the Penguin, there is a programmable logic controller (PLC) software, which controls autonomously the energy generation and allows direct conversion to the grid. The software calculates the optimal position of the rotating mass against the Penguin's own position and optimizes it by adjusting the resistant force of the rotation of the mass. The controller software also solves the problem of the slow frequency of the waves. (Wello Oy 2020.) Penguin can be monitored and operated remotely (Technology).

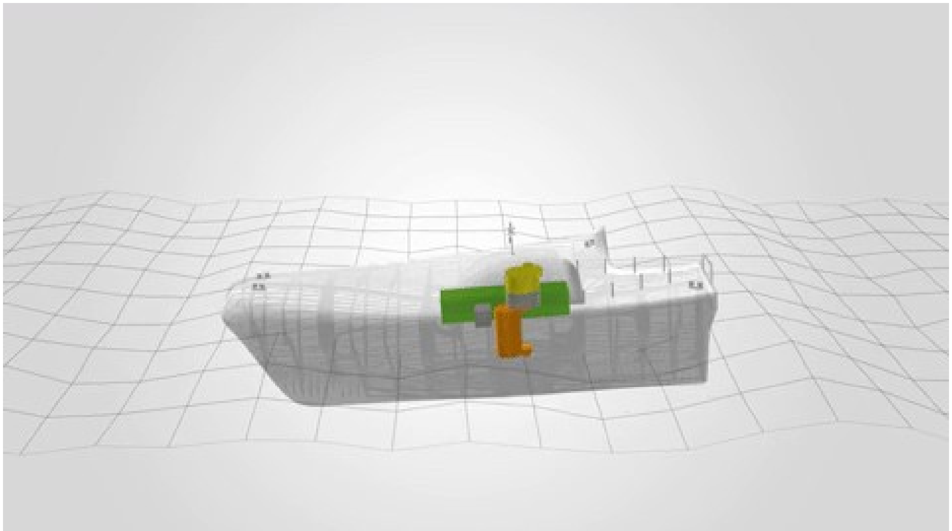

Figure 10. Visualization of the inside of Penguin WEC2 (Technology)

The Penguin is deployed away from the wave-breaking zone, ideally two to three kilometres from the coast. The water depth defines the necessary distance. The Penguin allows waves to approach in approximately 30 degree sector still generating close to maximum power. (Wello Oy 2020.) Connection is achieved with a sea cable, and slack-mooring is created with six catenary cables which are attached to the seabed by anchors. The Penguin WEC2 designed for the Orkney, Scotland site can be seen in numbers in Table 1.

Table 1. Penguin WEC2 for Orkney, Scotland site (Wello Oy 2020).

Penguin WEC2	Built during 2018-2019
Length	43 m
Width	23 m
Height	9 m (In water approx. 2 m exposed)
Weight	2000 ton
Nominal power	600 kW / 11 kV
Mooring	6 catenary cables
Connection	Sea cable
Energy production	0,5-1,0 GWh/year (Depending on the site)

The location for the Penguin is important, because Wello is creating a totally new market, and the first results needs to be convincing. The best location for a wave energy converter is a place that has high wave energy potential and where locally produced energy is expensive (Wello Oy 2020). Good examples of such locations are Portugal, the United Kingdom and Japan. Electricity prices in these locations were 0,24-20 €/kWh in 2018 (Electricity prices in selected countries 2018). As Figure 11 shows below, with the Penguin, the levelized cost of energy in these locations would be between 0,17-0,08 €/kWh.

Figure 11. Global Cost of Energy for Wello Penguin Wave Energy Converter, €/kWh (Technology)

In addition to stability of the wave energy, electricity generated with Wello's Penguin WEC is also price competitive to off-shore wind in many locations (see Figure 11). Global average price for electricity generated by off-shore wind was 0,12 €/kWh in 2018 (Renewable Power Generation Costs in 2018). The off-shore wind is good base-line for the Penguin WEC, because the deployment locations are similar, and both technologies use similar components (Wello Oy 2020).

2.3.2 Penguin Core

The Penguin Core is Wello's main product. The Penguin Core is a fully digital package that includes design, component specifications, licensing, control software, intellectual property (IP) rights restricted for each site and Wello's consultation for the construction and operating of the Penguin WEC. The control software is a key part of the Penguin WEC, and it enables the electricity generation. Wello also provides automated remote service and maintenance for the Penguin WEC. The Penguin Core is targeted to site developers and the offshore technology providers for constructing wave energy parks. The Penguin Core is always designed and scaled for the specific site. (Wello Oy 2020.)

2.4 Stakeholder survey

A survey is one method for collecting data, and it is the main part of survey research. A survey means any questionnaires, surveys or interviews which are standardised. The standardisation means that all the questions are asked in the same way from every respondent. Usually the data collected with a survey is analysed with quantitative methods, but as Taanila (2019, 2) says, there is no need to focus too much on dividing quantitative and qualitative methods. It is acceptable to use both methods in the same context. (Hirsjärvi, Remes & Sajavaara 2007, 188-189.) Qualitative studies often have quantitative aspects and vice versa (Saaranen-Kauppinen & Puusniekka 2006b).

A stakeholder analysis is a management tool for companies for organizing and understanding stakeholders better (Eskerod & Jepsen 2016, 27-28). Hautanen (2018) suggest that a stakeholder analysis can be categorized into 5 steps:

1. First, a company has to clarify their stakeholders. In this context, a stakeholder means all individuals or companies outside of the Wello who affects or is affected by Wello and its actions.
2. The second step is classifying stakeholders by ranking them based on their influence and interests. This contains determining the importance of each stakeholder. The tool for this step is to divide stakeholders into a four-piece chart where one section is 'keep close' – these companies have a high influence on the company or they are really interested in the company or a project. The second section is 'keep happy' – these companies have influence, but they are not that interested in the company or a specific project. The third section is 'keep informed' – these stakeholders are interested in a project but they do not have high influence on the company's actions. The fourth section is 'keep an eye on' – these stakeholders are the least interested in the company's project and they do not have very much influence.
3. The third step is to find out the stakeholders' requirements, concerns and needs. This is where the analysis starts. This part can be, and was in this thesis, done by asking directly from stakeholders. The questions needed to clarify how the stakeholders were reacting to Wello and to Wello's products.
4. The fourth step is communication between the company and its stakeholders.
5. The last step is to keep the stakeholders analysis updated.

Step number three, finding out the stakeholders' needs, concerns and requirements, was the main point of this study. Wello had done the steps one and two, stakeholder identification and classification, before this thesis.

A stakeholder survey is a tool for gaining information about the stakeholders' requirements, needs, preferences, wishes, experiences and interests with a questionnaire. A stakeholder survey differs from a customer satisfaction survey in that the respondents are not restricted to only customers, they also include different individuals and companies known as stakeholders. (Sadashiva n.d., 1.)

The downsides of a survey can be seen in the shallowness of the answers compared to the face-to-face interviews and the lack of knowledge of the respondents' circumstances when they are answering the survey. It is difficult to know if the environment for answering the survey is calm and supportive. One downside can be the lack of communication between the respondent and researcher, and as a result of this, unawareness of whether the respondent understood the questions or the answer possibilities correctly. Furthermore, the researcher cannot be sure how well the respondent is familiar with the topic of the survey. (Hirsjärvi et al. 2007, 190.)

3 Questionnaire

This thesis was created and conducted as a survey research, and the aim of this thesis was to understand individual stakeholders' requirements, concerns and needs, not to make quantitative statistical generalisations. When companies are trying to create totally new markets, as such as Wello with wave power, a good dialogue between the company and the stakeholders is an important factor.

This survey was conducted as a structured survey, which meant that every question was asked in the same way from every respondent (Hirsjärvi et al. 2007, 203). The survey was sent via email to the respondents with a covering note which told that these answers would help Wello to improve their products and services. The assumption was that this would motivate the receivers of the email to respond to the survey because good services and products would eventually also help the customers. The cover in beginning of the survey also stated that these answers would only be used anonymously and that the answers were also used for a thesis.

3.1 Creating the questionnaire

The survey was created with Google Forms, and the questionnaire document was sent for every respondent via email, which ensured that every question was asked in the same way from every respondent. There were also a few open questions in the survey, and it brought semi-structured aspects to this study. Tuomi and Sarajärvi (2018, 87-88) state that a semi-structured interview process follows a structure, but that there is still space to probe some additional information from the respondent.

The respondents were Wello's stakeholders and they were defined by Wello before this thesis. The questions were created in cooperation with Wello's staff, and the main objective in the whole process was to ask questions that would provide information about what the stakeholders were expecting from Wello and its services. The survey needed to be clear, informative for Wello and for the stakeholders as well as short enough so everybody had time and energy to fill it. This survey was sent by email because Wello's stakeholders are geographically dispersed. The survey was created by using Google Forms, because it was free of charge and the survey worked automatically in the respondents' own languages. The respondents did not have to register or sign in to answer, which made the questionnaire easier to fill.

The survey was designed to be thought-provoking. Questions three, four, five, six, seven and ten were multiple-choice questions with an open-ended possibility to answer "Other" and write their own answer. Questions one, two, eight, twelve and thirteen were open-ended questions.

The first and second questions, *What company do you represent?* and *What is your position in this company?,* were open-ended questions and they were created to give information about the respondents' decision making capabilities. This information gave great deal of value the the later answers. It was important to know if the respondent was high in rank and if they had the authority to make the important decisions. This information helped later when analysing how reliable the answers were.

The third question, *How did you hear about Wello?,* was a multiple-choice question with an open-answer possibility, and it was created to give information about how the respondents originally found the company. It is valuable information for Wello to know how does the most customers find them. For instance, if no one hears about Wello at a conference, it implies that perhaps Wello should be more active in the conference field.

The fourth question, *"How would you identify your company within the wave energy project?",* was a multiple-choice question with an open-answer possibility and it was created to give information about the stakeholders' own businesses. When Wello knows better what their stakeholders are doing for business, it helps them to serve their needs better.

The fifth question, *"What attracted you to do business with wave energy technology?"* was a multiple-choice question with an open-answer possibility and it is generated to give information about the stakeholders' own interests when associating with wave energy technology, and what possible outcomes stakeholders were expecting. For marketing purposes, it was important to know if the customers were more interested in reducing the effects of the climate change through positive actions or if they were seeking long-term business opportunities.

The sixth question, *"In what areas of Wello you are most interested to do business with?",* was a multiple-choice question with an open-answer possibility and it was created to gain information about whether Wello's current business model, focusing on selling the digital product Penguin Core, was what the stakeholders wanted, or are whether they were more interested in something else that Wello could possibly offer. The stakeholders could be interested, for instance, in providing some technology or parts for Wello, or they could be interested only in investing. They might have different preferences for the device and for the services they would need.

The seventh question, *"If you have been in contact with Wello, exchanging emails and planning possible projects: What do you consider as the main challenges that would cause a delay for the completing of wave energy projects?"*, was a multiple-choice question with an open-answer possibility and it was created to obtain answers about the challenges that Wello was currently facing. There had been many contacts from possible customers, but no real success yet on the market. Wello wanted to know the possible reasons for holding the progress of a project, and if there was something that Wello could do to help the customer. Currently, first steps in Wello's sales process involve exchanging emails, and that is why it was mentioned in the question. It was meant to be thought-provoking and help the respondent to remember how the process had been going in the past.

The eighth question, *"How could Wello help you with the possible challenges mentioned above?"*, was an open-ended question and it gave a possibility to the respondent to open up their answer from the eighth question. This, and other open-ended answer possibilities, brought the possibility to obtain qualitative data and a chance to learn something new that did not arise in multiple choice questions.

The ninth question, *"In case you are planning to establish a wave energy project, which size of a wave energy project are you interested in?"*, was a multiple-choice question and it was created to give information about project sizes Wello should be mostly prepared for. This was vital information when, for example, applying for financing from different parties. This also prepared Wello for knowing what to expect if most of the stakeholders' were interested in having only one pilot device or if they wanted more than ten Penguin WEC's for a the full-size wave energy farm.

The tenth question, *"What is your vision for the end use of the Penguin?"*, was a multiple-choice question with an open-answer possibility, and it was created to understand the stakeholders' own concepts better, because currently Wello could only assume what the stakeholders were planning and how they would use wave energy in the future. This question gave exact information about how the customers saw the future of the wave energy, and whether they were using wave energy converters alone or whether they were possibly combining the Penguin WEC's with some other technologies, such as other renewables, on the same location.

The eleventh question, *"Within what time frame could you foresee your wave energy project happening?"*, was a multiple-choice question and it was created for obtaining information about how quickly the stakeholders were planning to establish their wave energy projects. This information was vital from Wello's funding perspective as well from that of the quantity of the personnel, depending on if most of the projects would happen in two years or over 5 years. There was also a possibility to answer that the respondent did not have a plan for a wave energy project.

The twelfth question, *"How Wello could make the sales process more convenient for you?"*, was an open-ended question and it was a possibility for the respondent to give a feedback concerning the current sales process, or give new ideas on how Wello could help the sales process to be more convenient for them.

The final question, *“Do you have any other feedback for Wello?”*, was an open-ended question and possibility for the respondent to tell anything they wanted to say to Wello. The survey was designed to be a thought-provoking, and this was a possibility to express those thoughts.

4 Analysis

The content analysis is created with classifying and making themes from the answers. The gathered information contains both, multiple choice and open-ended answers. The amount of the answers remained low and the survey gained three answers. At first time when the survey was sent out, the survey got one answer. The survey was sent once more with a polite reminder note, and two more answers arrived. The complete response rate was 15,8 percent. The reasons for this low response rate is analysed more on chapter 6. Two out of three respondents were identifying as a consultant in a wave energy project, and they are operating in the Caribbean and Southeast Asia area. Third answer is also from Southeast Asia area and they are identifying as a consultant for local networks and as a contractor for off-shore installations. The answers can be taken seriously, because the respondents positions in their companies were high in rank and the respondent has potentially influence on company's decisions.

After collecting the data, the analysing started by classifying the answers by respondents company and position. After that, as Tuomi and Sarajärvi (2018, 104) suggests, answers were divided into themes. Themes used to categorize the answers from the survey were stakeholders' concerns, stakeholders' requirements, stakeholders' needs and information for marketing.

4.1 Stakeholders' concerns

The stakeholders concerns are revealed in the question number seven, *If you have been in contact with Wello, exchanging emails and planning possible projects: What do you consider as the main challenges that would cause a delay for the completing of wave energy projects?*.

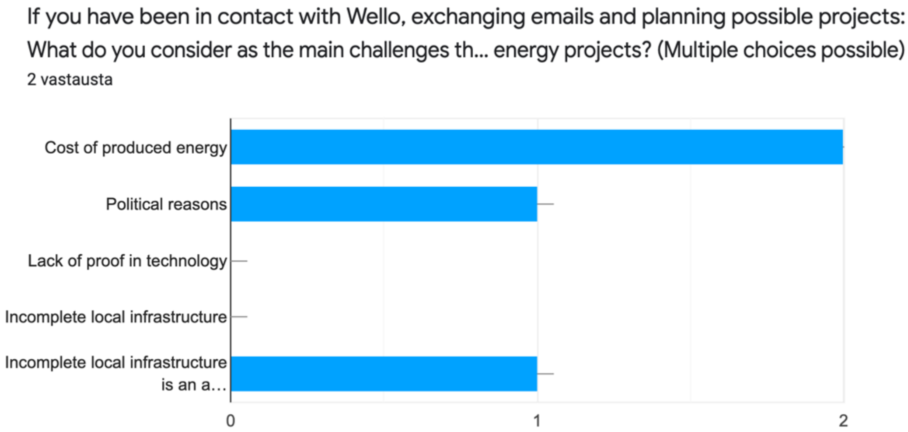

Figure 12. Stakeholders concerns

The respondents are seeing the cost of produced energy as major challenge to completing the wave energy projects (See Figure 12). The cost of produced energy can also be understood as a levelized cost of energy (LCOE), which means lifetime costs divided by energy production. The LCOE for the Penguin WEC is calculated for 30 years of lifetime (See Figure 11). The LCOE can be used as a measuring the overall competiveness of the technology (Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2020, 1). Wello was already aware of this challenge, and this challenge is important to overcome for the new technology like wave power. The serial production in the future would lower the production costs of the Penguin WEC in the same way it has happened to, by example, wind power (See Figure 9). Wello has already a plan to get the LCOE decreasing in following years (Wello 2020).

One respondent from the Southeast Asia also says that their company is seeing the political reasons as a challenge as well. The political reasons are problematic, because the companies like Wello cannot affect much on the political decisions. Companies just must react whenever there are hinders that affects to company’s operations. In the wave energy markets, when business can be running almost anywhere in the world, political climate can vary a lot between the countries. Still, it is good to be aware of this challenge and try to react as well as possible.

4.2 Stakeholders' requirements

The stakeholders' requirements are revealed in the questions number eight, *How could Wello help you with the possible challenges mentioned above?,* which refers to the question number seven about concerns, question number nine, *In case you are planning to establish a wave energy project, which size of a wave energy project are you interested in?,* question number eleven, *Within what time frame could you foresee your wave energy project happening?,* and question number thirteen, *Do you have any other feedback for Wello?*.

The question number eight was open-ended question and the respondent from the Caribbean area answered that to overcome the challenges mentioned in the question seven, *If you have been in contact with Wello, exchanging emails and planning possible projects: What do you consider as the main challenges that would cause a delay for the completing of wave energy projects?*, Wello should fund more the development of the wave energy. The downside of the survey research, lack of possibility to ask follow-up questions, is disclosing on this answer. This answer can be understood that Wello should put more money on developing their own wave energy technology, but the respondents opinion to how Wello should develop it so it would decrease the costs of produced energy, is not clear. The best option for decreasing the costs is to gain customers and that way gain more capital, and then move towards serial production which eventually lowers the costs (Greaves & Iglesias 2018, 521).

One respondent from the Southeast Asia area is proposing that to overcome the challenges mentioned in the question seven, Wello should be more present in Southeast Asia area and work together with other local partners and off-shore operators. The respondents company is willing to support Wello to achieve these partnerships.

The question number nine concerning the sizes of a wave energy projects, the respondents chose every possibility at least once (See Figure 13). The answer possibilities were: *A pilot project with one Penguin WEC*, *Array of several Penguin WEC's* and *Wave energy farm with 10+ Penguin WEC's*.

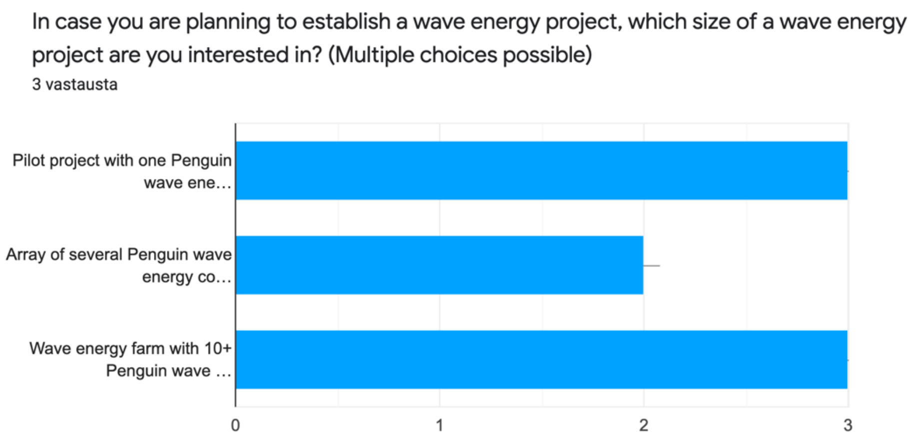

Figure 13. Requirements concerning the size

For Wello and their new business strategy this can be considered as a good thing, because the Penguin Core is a fully digital package which makes it really scalable. Simplistically said, the bigger the project, the better for the Wello, because scaling up is quite easy. Since the respondents chose all three, or at least pilot project and wave energy farm option, logically thinking it means that first they would want to try a pilot project, then scale it up to array of several Penguin WEC's and finally if everything works and customer is pleased, they would want to acquire wave energy farm with ten or more Penguin WEC's. This emphasizes the importance of the pilot project.

The question number eleven, question regarding the time frame for the wave energy projects can also be seen positively from Wello's perspective. Two out of three respondents chose the option where the respondent can foresee the wave energy projects happening within two years' time. Now Wello knows that they are thinking alike with at least some of the stakeholders about the time frame of wave energy projects happening.

The last question was open-ended question asking if the respondent has any other feedback for Wello. The respondent from the Caribbean area answered that Wello should update their social media more. Perhaps the respondent wants to use Wello's social media on their own marketing to acquire possible customers for themselves. In today's world, the social media is important place for the companies to be active and promote their business. It is also a great and easy way to keep stakeholders updated where the company is, and what they are currently doing.

4.3 Stakeholders' needs

The stakeholders' needs are revealed in the questions number six, *In what areas of Wello you are most interested to do business with?*, question number ten, *What is your vision for the end use of the Penguin?*, and question number twelve, *How Wello could make the sales process more convenient for you?*

For the question number six, the respondents from the Caribbean area and one from the Southeast Asia area answered that they are most interested on doing business with the Penguin Core. This expresses, that Wello's decision to quit constructing the Penguin WEC's and focus to offering the Penguin Core was a correct thing to do. One of these respondents were purely identifying as a consultant, and other was consultant and off-shore contractor. This states that this digital product does not only suit for consultation companies, it suits for off-shore operators as well. The second respondent from the Southeast Asia area chose the "Other" option and wrote that they are most interested in doing business with Wello by introducing them to local markets and doing consultancy services for local operators.

The question number ten about the end use of the Penguin is giving information about the respondents' own vision. The respondent from the Caribbean area answered that their company would use the Penguin on its own to provide direct-to-grid electricity, and that they would combine it with storage systems (See Figure 14).

The respondent from the Southeast Asia area responded that their company would combine other renewables with the Penguin. Wello does not currently provide storage systems, and good follow-up question for this would be that would the respondent want Wello to provide the storage systems, or would the respondent acquire the storage system from some other company. Inside the Penguin WEC there is ballast, which could be replaced by batteries. Another possibility is that the storage systems would be on the coast. The storage systems of course will increase the costs, and if some other company provides the storage system, Wello cannot influence on costs of that system.

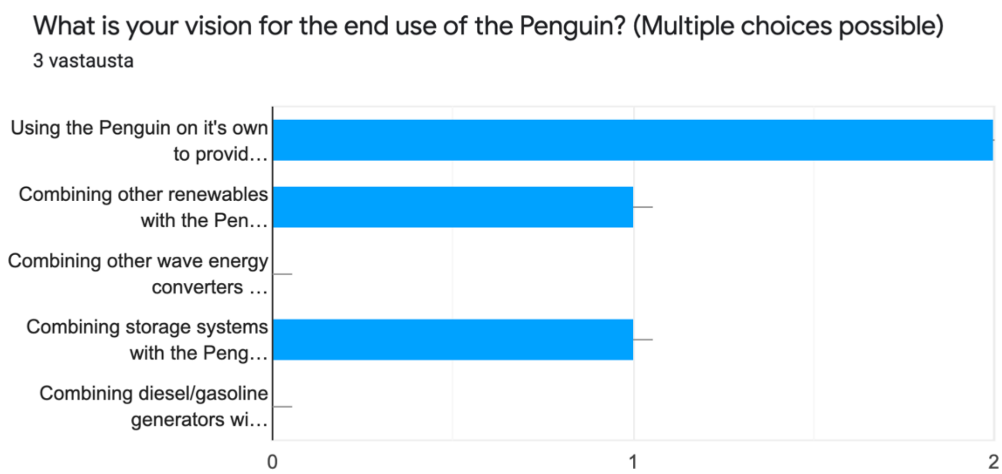

Figure 14. Stakeholders vision for the end use of the Penguin

The respondent from the Caribbean and one from the Southeast Asia area suggests, that to make the sales process more convenient for them, Wello should grow their network, and get new partners from the Caribbean and Southeast Asia area. These answers would need follow-up questions. It would be good to know if the respondents meant that Wello should try to partner up, by example, with a shipyard for constructing the Penguin WEC's or more like site developer partners.

4.4 Information for marketing

Information for marketing can be revealed from the question three, *How did you hear about Wello?,* and from the question number five, *What attracted you to do business with wave energy technology?.* This information helps Wello to understand that what things are important for the respondent, and what they should use for marketing.

The respondent from the Caribbean area answered to the question number three that they have heard about Wello in the conference. The assumption can be made that going into the conferences are great way to make new connections around the world. The respondents from the Southeast Asia area answered that they have heard about Wello from Wello's website and from the research paper. These answers state that giving information to researches and updating the websites regularly is good way for obtaining new stakeholders.

The respondent from the Caribbean area chose that they are doing business with wave energy technology because it has unexplored market potential, it reduces climate change through positive action and because it has a long-term business opportunity. One respondent from the Southeast Asia area chose the possibility to bring electricity to remote locations, reducing climate change through positive action, more continuous and predictable energy source compared to other renewables and long-term business opportunity. The second respondent from the Southeast Asia chose reducing climate change through positive action, long-term business opportunity and possibility to bring electricity to remote locations in Southeast Asia (See Figure 15).

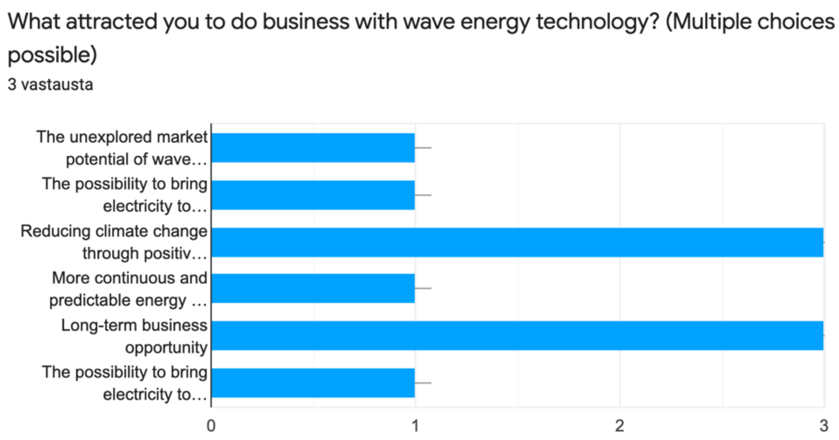

Figure 15. Reasons to do business with wave energy technology

In the future when cooperating with similar companies like the respondents, all of these things that came up from the answers could be implemented in the marketing. Since the LCOE of the wave energy is not yet on the same level with, by example, solar energy or the fossil fuels, the competing only with the price is not worthwhile. Instead Wello should emphasize the things that came up from the answers. Regarding the responses, two main reasons to do business with wave energy are possibility to affect positively to climate change and long-term business opportunity.

5 Conclusions

The main research objective was to find answers to questions: What are stakeholders' requirements, concerns and needs? This study provides answers to all of these questions, but these answers cannot be generalized too much because of the loss in the responses was so substantial and comprehensive analysis was not possible to create. The response rate remained low, and that is why this thesis can be used as an example of the stakeholder survey for Wello. These answers can be utilized as a guideline only if the stakeholder is operating on similar field as a respondents, and even then it is good to keep in mind that these are answers from just three companies.

Following conclusions can be made from the study:

1. The business strategy swap from constructing and selling the Penguin WEC's to selling Penguin Core was correct thing to do based on the respondents opinion.
2. The consultation companies prefer to work with the Penguin Core, and it suits for off-shore contractor too.
3. Visiting conferences and updating Wello's website regularly are good way for obtaining new stakeholders. Also providing information for different researches can help new stakeholders to find Wello.
4. On marketing, Wello should concentrate to possibilities to affect to the climate change with positive actions and other positive environmental aspects, and promote the long term business opportunity of wave energy
5. Wello should be prepared for delivering all sizes of wave energy sites, from pilot projects to full size wave energy farms. Pilot projects are logically thinking the first steps, and to proceed from there the pilot phase results needs to be convincing.
6. Wello should concentrate on updating their social media more often and use it as a platform for new and old stakeholders to follow their development and keeping them updated about current situation.
7. To make the sales process more efficient, Wello should concentrate on getting new partnerships around the areas where they would want to deploy wave energy projects.

The information that the survey provided for the marketing purposes can be quite easily implemented into action. Updating social media does not require lot of work, but it can affect positively and provide surprising effects. The stakeholders' requirements considering the funding for the wave energy development is already taken into action, as Wello is continuously monitoring and trying to improve their product and services. Both of respondents from the Southeast Asia answered that one of the reasons why they are interested on doing business with wave energy is that it creates a possibility to bring electricity to remote locations. There is a lot of remote islands on Southeast Asia, and it is really positive to have a partners who also realize this business opportunity and who wants to help Wello with their connections.

With the survey's multiple possibilities to choose "Other", and write an open answer, few things came up. The respondents are eager to help Wello to get into the local markets by introducing them to local partners and promoting their wave energy technology by consultancy services. The respondent from Southeast Asia also told, that if Wello is facing problems with local infrastructure, or similar, they are willing to help. One thing that came up from several answers was that the stakeholders would want Wello to be more present in their area. As a developing company, Wello can still only be present in limited amount of areas, and regions where it is more likely to have a project, is a priority.

6 Discussion

The errors in a survey research are inevitable and in every survey there are some errors (Cowles & Nelson 2015, 35). In this survey research, error was the nonresponses. As Taanila (2019, 30) has stated, the reasons for loss in responses are hard to evaluate. There can be various reasons why the response rate remained so low, but one significant reason might be that currently COVID-19 pandemic is spreading around the world (Coronavirus disease (COVID-19) Pandemic 2020). It seems to be obvious that it affected to the response rate negatively. The survey receivers are geographically dispersed around the world, and they might have health care problems or lockdowns at their home country, which affects to behaviour of the people and companies. Their businesses might be closed down because of the economic depression, workers might be suspended without pay or at least pandemic is changing the way how people are working. In many countries those who are able to needs to work from home. This might affect to the desire of filling out the surveys, because such tasks are not vital for the companies to survive.

Some of the Wello's stakeholders has done a lot of research and work for planning a wave energy projects. They have been in contact with Wello, and it takes lot of hours to plan the wave energy projects. Also, the stakeholders and Wello already knew each other, and often in the researches if the receivers are familiar with the subject of the survey, the response rates normally grow (Hirsjärvi et al. 2007, 191). This is why the assumptions were made that the 19 stakeholders would be more cooperative and it would be possible to get enough data and make comprehensive analysis about stakeholders' requirements, needs and concerns. To get more comprehensive study, wider stakeholder list would be needed that the amount of the responses would grow, which would lead to more answers, even if the response rate would stay this low.

Wello can use this research as a guideline for next stakeholder surveys and with little caution use the answers for marketing, if the possible customers are working in a consultation or off-shore operating, or similar, business. It is important to remember, that politics and funding have a significant effect to Wello's own, as well as to stakeholders' businesses. The stakeholders' requirements, needs and concerns can change quickly, which should lead to repeating the stakeholder survey, by example, annually.

Follow-up research

For a follow-up research, to get more comprehensive analysis, the stakeholder list needs to be expanded or implement the research with some other method, by example, with the interview. The interview method with more stakeholders could be possible solution to obtain more information, because then the researcher could have better possibility to obtain at least one answer from every possible stakeholder group. Then these answers could be used better in marketing and for the improving the services, because then Wello would have answers from different fields of business.

Reliability and validity

The validity can be concerned good when the target group is correct, and the questions asked are suitable for the subject (Hiltunen 2009, 3). The target group for this were selected successfully, because it included stakeholders from different fields of business. The questions in the survey were effective for obtaining information for the research question and it states that the survey was designed successfully. The low response rate affects negatively to validity of this thesis, but still the survey as a method itself can be seen valid. Also, the survey reflected well to the literature review of the study. In the survey research where the survey is sent via email, it is difficult to know in what circumstances the respondent is filling the survey and how they understood the questions, which can affect negatively to the validity of the study. Lack of possibility to ask follow-up questions also impacts negatively to the validity, because some of the answers would need some clarifications.

The reliability is expressing how reliably the study is, and how well the study can be repeated (Hiltunen 2009, 9). The survey succeeds to be reliable because the answers obtained were answering to the research question. The structured survey is a reliable way for obtaining information, because if the researcher wants to repeat the survey, the questions are always asked the same way. The negative impact for reliability comes when analysing the answers, because there is no possibility for follow-up questions.

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Appendices

Appendix 1. Questionnaire

Wello Survey

By 2050 Wello aims to enable 10% of worldwide clean energy production from power in waves.

Wello is the leading technology provider in ocean-wave energy conversion.
Wello's patented device, the Penguin wave energy converter (WEC), is the most durable and most efficient solution for harnessing the power of the sea and converting it into direct-to-grid electricity.

Wello's product is the Penguin Core, a digital package including design, licensing, control software and knowledge base for the Penguin WEC. The package includes all materials for the development and construction of the Penguin, bringing wave energy directly to our customers. We offer energy providers, site developers, offshore technology providers, shipyards and more the construction of scalable wave parks around the globe.

Your answers to this survey would provide valuable insight and help us to develop Wello's services to better meet your needs and to our customers. All responses are confidential and will be used only anonymously. The responses to this survey will also be used for a Thesis.

The survey includes 13 short questions and will take approximately 5 minutes to fill. We want to thank you for your time!
*Pakollinen

1. What company do you represent? *

2. What is your position in this company? *

3. How did you hear about Wello? (Choose one) *

Merkitse vain yksi soikio.

- Wello's website
- Newspaper, public media etc.
- Conference
- Directed from another company
- From someone in the business
- Muu: ____________________

4. How would you identify your company within the wave energy project? (Choose one) *

Merkitse vain yksi soikio.

- Site developer
- Technology provider
- Off-shore operator
- Energy utility
- Shipbuilder
- Consultant
- Investor
- Muu: ____________________

5. What attracted you to do business with wave energy technology? (Multiple choices possible) *

Valitse kaikki sopivat vaihtoehdot.

- [ ] The unexplored market potential of wave energy
- [ ] The possibility to bring electricity to remote locations
- [ ] Reducing climate change through positive action
- [ ] More continuous and predictable energy source compared to other renewables
- [ ] Long-term business opportunity
- Muu: [ ] ____________________

6. In what areas of Wello you are most interested to do business with? (Choose one) *

Merkitse vain yksi soikio.

- Penguin Core (Digital package including design, licensing, control software and knowledge base)
- Wello's Penguin Wave Energy Converter (Ready-to-use device constructed by our partner)
- Providing some technology and/or parts for Wello
- Investing and shareholding
- Muu: ____________________

7. If you have been in contact with Wello, exchanging emails and planning possible projects: What do you consider as the main challenges that would cause a delay for the completing of wave energy projects? (Multiple choices possible)

Valitse kaikki sopivat vaihtoehdot.

- [ ] Cost of produced energy
- [ ] Political reasons
- [ ] Lack of proof in technology
- [ ] Incomplete local infrastructure
- Muu: [ ] ____________________

8. How could Wello help you with the possible challenges mentioned above?

9. In case you are planning to establish a wave energy project, which size of a wave energy project are you interested in? (Multiple choices possible)

Valitse kaikki sopivat vaihtoehdot.

- [ ] Pilot project with one Penguin wave energy converter
- [ ] Array of several Penguin wave energy converters
- [ ] Wave energy farm with 10+ Penguin wave energy converters

10. What is your vision for the end use of the Penguin? (Multiple choices possible)

Valitse kaikki sopivat vaihtoehdot.

- [ ] Using the Penguin on it's own to provide direct-to-grid energy
- [ ] Combining other renewables with the Penguin
- [ ] Combining other wave energy converters with the Penguin
- [ ] Combining storage systems with the Penguin
- [ ] Combining diesel/gasoline generators with the Penguin

Muu: [ ] ______________________

11. Within what time frame could you foresee your wave energy project happening?

Merkitse vain yksi soikio.

- ( ) 0-2 years
- ( ) 2-5 years
- ( ) 5+ years
- ( ) Our company does not have a plan for a wave energy project

12. How Wello could make the sales process more convenient for you?

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13. Do you have any other feedback for Wello?