UNIVERSITI TEKNOLOGI MARA

AkerSolutions

INDUSTRIAL TRAINING FINAL REPORT SESSION:

MARCH 2022- AUGUST 2022

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Department During Attachment	PM 300 HSSE Support Team
Duration (Date):	21/2/2022-4/8/2022
Lecturer Evaluation	Dr Farhana Mohd Yusof

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Acknowledgement

First and foremost, I want to thank God for His love and the strength He has given me to complete this internship programme.

I must express my deepest gratitude to Dr. Farhana Mohd Yusof, my assigned lecturer, Mr. Haikal Mustafa, and Ms. Noor Hidayu Abdul Rani, Industrial Training Coordinators, Faculty of Chemical Engineering, UITM Johor, Campus Pasir Gudang, for providing the necessary resources for the industrial training programme and the placements as well as for organizing the entire internship programme and their efforts to ensure that the entire internship programme will achieve its goals.

I am appreciative of the internship opportunity provided by Aker Solutions (M). I want to extend a special thank you to Ms. Regina Anita, Senior Manager, for taking time out of her busy schedule to oversee me and provide me several tasks to complete over the course of my 24-week internship. Next, I would want to thank my teammates as well as interim supervisor Adlina Mohammad Jaafar, Senior Environmental Specialist and Stephanie Lourdes, Senior Specialist HSSE. They all offered me opportunities that not everyone can have and taught me a lot of valuable lessons.

Lastly, I would like to give appreciation to my family members and friends for supporting me and offering me wise counsel that helped me maintain my commitment till the end of this internship programme.

Abstract / Executive Summary

This is a report for Muhammad Alif Haziq Bin Zulkarnaen, who underwent a 24-week, five-month industrial training programme before earning his diploma in chemical engineering. The instruction took place at Aker Solutions. beginning on February 21, 2022, and lasting until August 4, 2022, under Regina Anita's supervision

Industrial training's objective is to provide students with real-world exposure to the workplace so they can learn skills and acquire experience in preparation for future demands. The training is connected to the theoretical knowledge acquired throughout semesters 1 through 5. The overview and purpose of industrial training were briefly discussed in the first chapter of this study. This chapter also contains details on the supervisor, job schedule, and training location. The history, products, and services of the company are covered in the second chapter.

The following chapter provides a clear explanation of the tasks and responsibilities given during the training as well as the weekly activities carried out. The difficulties faced while performing the activities and the steps required to ensure that the jobs are done are explained in depth in chapter 4 with the help of certain visuals. Few topics on professional and ethical experienced also explained in this chapter and not to neglect the explanations on health and environmental sustainability components gained throughout jobs execution.

The final chapter concludes this 24-week industrial training programme and offers a few suggestions and recommendations that can be implemented for a better future. Overall, this training provides a comprehensive view of the working world in industry and is sufficient to prepare students to begin employment in any linked firm in the future. Finally, the trainee has gained a greater understanding of the workings of the health, safety, and environment profession as a result of all the assignments provided

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Chapter 1 – Introduction of Industrial Training

1.1 Overview

Industrial training is a required programme for chemical engineering students at Universiti Teknologi MARA (UiTM). Industrial Training (IT) refers to exposing students to real-world engineering experiences and getting them involved in Chemical Engineering projects before graduation. One of the conditions for the issuance of a Diploma in Chemical Engineering is that the student complete at least twenty-four (24) weeks of Industrial Training with 12 credit hours during semester six (6) OR after passing all the courses studied from semester one to semester five. It is an excellent platform for introducing all pupils to the real working world before they must confront it in the near future. Industrial Manship aims to familiarize UiTM students to industrial culture and working environments while also increasing students' employability by strengthening their industrial skills. They will also go through various briefings as instruction for the learner. This internship will last 24 weeks, beginning on 21st February 2022 and ending in 4th August 2022. The student must report to the firm at the time and date specified during the Industrial Training briefing. During the internship period, each student will be assigned one (1) Lecturer Evaluation to evaluate their performance. The logbook and finalized report are due to the college two (2) weeks after the internship ends, both online and in hardcopy.

Moreover, the training will provide students with first-hand experience in solving a variety of challenges, since we will confront a variety of problems in the sector, each of which may be unique. The environment is extremely advantageous to students since it can help them develop critical thinking and problem-solving skills. Furthermore, industrial training may help students choose a career path by broadening our viewpoint on engineer tasks and employment chances while also focusing our emphasis to a certain subject of interest. Theories learned in both core and non-core courses can be utilized by students in industrial training, thus it is expected that students would be able to address the problem or project presented by supervisors in a creative and inventive manner. Furthermore, industrial training helps students gain confidence, develop communication, and teamwork abilities. In addition, students are required to exhibit a high level of integrity, ethics, and accountability in their engineering profession.

1.2 Objective of Industrial Training

The purpose of the industrial training programme is to explicitly boost graduates' capacity to work and to strengthen the abilities required. This programme provides students with opportunities to learn in the workplace and get practical experience to improve the market reliability. This also helps to expose students to real-life engineering experiences and get them involved in any Chemical Engineering or Engineering projects before graduation. During industrial training, students can also display appropriate social skills and responsibilities while performing technical skills learned in the discipline of chemical engineering. Furthermore, by interacting with colleagues and clients during the training session, students can improve their social skills. Other goals of industrial training include:

1. To gain knowledge of technical documents in a project connected to the field of chemical engineering.
2. To comprehend how the processes work in practice.
3. To identify an organization's social, economic, and administrative circumstances.
4. To become acquainted with unanticipated difficulties and methods of troubleshooting and problem solving.

1.3 Industrial Training Placement

- **Address**: Level 16, Integra Tower, The Intermark, 348, Jln Tun Razak, 50400 Kuala Lumpur
- **Tel**:
- **Website**: www.akersolutions.com
- **Business segment**: - Engineering,
  - Subsea
  - Topsides&Facility
  - Renewables
  - Electrification, Maintenance, Modification

1.3.1 Industrial Schedule

Table 1.1: Industrial Schedule

Duration of Training	21/2/2022 – 4/8/2022 (5 Months 15 Days)
Working hours	40 hours a week 8am-6pm (Monday to Thursday) 8am-12pm (Friday)
Working Days	Monday-Friday (5 Days)
Break Hours	12pm-2pm (1 hour break anywhere in between)

1.3.2 Company Supervisor Information

Table 1.2: Company supervisor information

Name	
Position	Head of Global Environment (Senior Manager)
Department	PM300 HSSE Support Team
Email Address	

Chapter 2 – Company Profile

2.1 Company Background

Aker Solutions is an oil and gas company that is based in Oslo, Norway. It serves the worldwide energy business with integrated solutions, products, and services. They enable low-carbon oil and gas extraction, as well as the development of renewable energy options to fulfil future energy demands. Aker Solutions has played a key part in the construction of some of the world's most complicated and strategically vital energy projects for nearly 200 years. Their products vary from massive platforms and subsea systems for oil and gas production to offshore wind projects and carbon capture, utilization, and storage facilities.

The aim of Aker Solutions is to address global energy concerns for future generations by utilizing our considerable experience and skills to meet the world's growing demand for sustainable, dependable, and affordable power. Aker Solutions has five business segments which are, Engineering, Subsea, Topside and facility, Renewables and Electrification, Maintenance, and Modifications. Aker Solutions has over 50 offices and sites in 20 countries, ranging from Angola, South Africa to Australia. Each location has a distinct business division. Aker Solutions, for instance, has three offices in Malaysia: one in Port Klang Free Zone and Labuan, which is in the subsea sector, and one in Kuala Lumpur, which is in the engineering business.

Table 2.1: Operating schedule of Aker Solutions (M)

Days	Working Time	Operating Period
Monday to Friday	8.00 a.m. – 12.00 p.m. 12.00 p.m. – 1.00 p.m. (lunch hour) 1.00 p.m. – 6. 00p.m	4 hours 1 hour (not include) 5 hours (Total : 9 Hours)
Saturday & Sunday	Weekend Holiday	-

2.2 Company History

Aker Solutions originated from a small mechanical workshop, named Akers Mekaniske Verksted, founded on the Aker River in Oslo, Norway in 1841. It developed steadily and took numerous forms as a shipbuilding and engineering company. Kvaerner Brug, a competitor, was founded nearby in 1853, and the two companies flourished in tandem with the industrial revolution over the next several decades.

Initially the main activities included shipbuilding, manufacturing components for machinery and equipment for clients in the iron and non-ferrous metals industries and shipping. Mechanical and marine engineering quickly became the company's major activity, and during the era of the steam engine, it was involved in a wide range of industries such as lumber, wood and pulp, coal, hydropower, fisheries, and shipping.

When oil companies discovered oil and gas in the North Sea in the 1960s, Aker altered its focus. To begin, we converted and prepared existing offshore rigs for service in the tough North Sea environments. Soon, Aker was designing their own rigs, such as the Aker H-3, which is still one of the industry's most recognized designs 40 years later. Aker also supplied the "Ocean Viking" offshore drilling rig in 1967, which was used to discover Norway's first oil field, Ekofisk, in 1969, which was also the world's largest offshore oil field at the time.

Faced with the North Sea's challenges, the oil industry needed to find good, safe, and dependable solutions for the construction and operation of deep-water fields and problematic reservoirs. To name a few sectors, Aker became a driving force in the development of subsea fields, floating production models, horizontal wells, and enhanced oil recovery.

Aker completed the world's first undersea gas compression system in 2015 for Statoil's Asgard field in the Norwegian Sea, approximately 200 kilometers off the coast. The system, which was approximately the size of a football field, revolutionized offshore natural gas production by lowering costs and increasing safety with full-fledged oil and gas production and processing equipment on the ocean floor.

Aker began a new era in 2002 when they acquired a major engineering, construction, and shipbuilding rival Kvaerner and changed their name to Aker Kvaerner. The merger of the two firms resulted in a financially and technically robust company with interests ranging from oil and gas to paper and pulp to shipbuilding.

By 2007, Aker had begun to streamline in order to focus on the core tasks. Aker sold their pulp and paper and shipbuilding operations to focus on the oil and gas industries, as well as process and construction services for the downstream, chemicals, and mining industries. Aker announced their new name, Aker Solutions, in April 2008. In 2011, Aker Solutions sold the process and construction businesses. In the same year, they broke off their engineering, procurement, and construction (EPC) businesses and resurrected the prestigious Kvaerner ASA brand for a listing on the Oslo Stock Exchange.

Aker Solutions sold its well intervention services and mooring and loading systems operations in 2013. Aker Solutions restructured their operations in 2014 to focus on two key segments: subsea and field design.

Aker Solutions and Kvaerner merged in November 2020, creating a premier provider of project execution, engineering, construction (EPC), and technical services to the worldwide oil and gas and renewable energy industries. The merged entity has the expertise, competencies, and technological offerings for decarbonizing oil and gas operations and developing new and integrated solutions for renewable energy industries, with a strong focus on increasing recovery while minimizing environmental impact.

2.3 Vision and Mission

Aker Solutions's **mission** is to tackle global energy concerns for future generations by utilizing their considerable experience and skills to meet the world's growing demand for reliable, sustainable, and cheap power.

Aker is guided by a sustainability philosophy in whatever they do. Aker Solutions will ensure safe operations for their employees and the environment, and they have robust social and governance procedures in place. Aker's climate action plan lays out a strategy for meeting emissions objectives, assisting clients with their goals, and developing low-carbon solutions.

While Aker Solutions mission is to tackle global energy concerns, their **vision** however is set out as ambitious energy transition targets. The company's goal is for one-third of its revenue to originate from low-carbon oil and gas projects or renewable energy businesses by 2025. The goal is for this to account for two-thirds of revenue by 2030.

It is also critical that the company's business and value chain, which includes thousands of suppliers, are sustainable. Based on existing 2019 emissions, the goal is to reduce CO2 emissions from their own operations by half by 2030. Aker's goal is to become a net-zero company by 2050.

2.4 Organization Chart

2.4.1 Executive Management Team

Figure 2.1: Organization chart of management team

2.4.2 PM300 HSSE Support Team

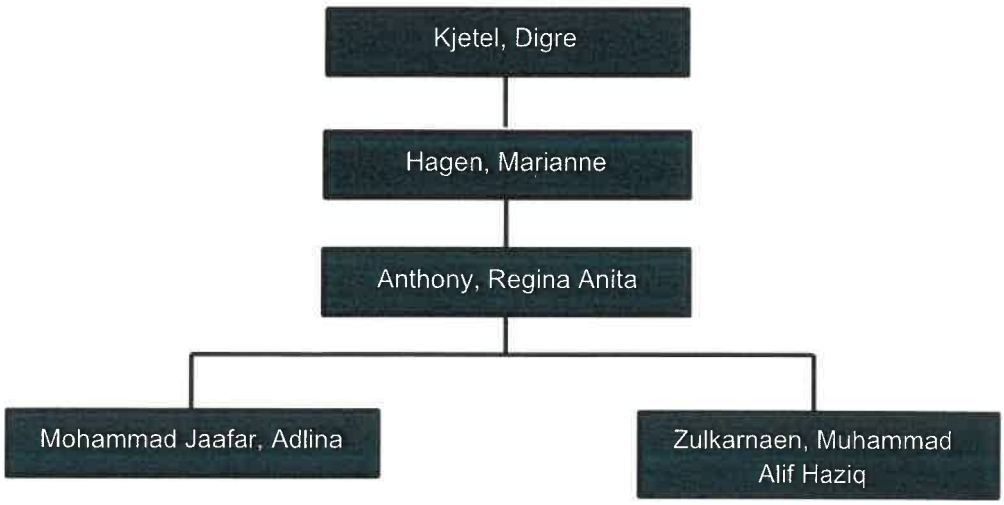


Figure 2.2: Organization chart of PM300 HSSE Support team

2.5 Main Products / Services

Aker Solutions provide variety of businesses depending on their locations because each location carries out different business segments. As for example, in Aker solutions Kuala Lumpur, we offer front-end engineering, engineering management, system capability and technical competences. In addition, we offer a range of methods and digital solutions enabling an efficient engineering process.

Differ from Aker solutions KL, Aker Solutions Port Klang and Labuan offer a vast portfolio of subsea production systems and products with technical capabilities to maximize their clients' field life and production profile. A subsea production system allows for the extraction of hydrocarbons from places that would not be economically or conveniently developed using an offshore platform. The system employs a variety of seabed building blocks that are linked to subsea pipeline networks and riser systems to produce the reservoir safely and effectively to a host plant.

Aker Solutions has created a broad variety of equipment and solutions based on its more than 50 years of experience in developing and building cost-effective subsea production systems. Aker comprehend the inner workings and criticality of our entire product line, including trees, manifolds, wellheads, umbilicals, workover, and tie-in systems, as well as the tools and control systems that run them.

The goal is to install the equipment securely and effectively while maintaining high production availability and ensuring the system's safety and integrity. Aker Solutions have the knowledge and experience to best prepare a subsea production system for installation and production, as well as ensuring that all products work together as one cohesive system. Aker Solutions offer basic modules and components to save money and time but can also customize them to match the needs of individual clients.

1. Field Planning, Feasibility and Concept Studies

Figure 2.3: Field Planning, Feasibility and Concept Studies

The feasibility and concept studies conducted by Aker Solutions concentrate on individual building blocks and detail them to the needed level. They demonstrate the feasibility of a project by identifying potential technological gaps and specifying fabrication and installation needs. They assist their clients in minimizing commercial uncertainty and providing a credible basis for decision making with consistency and realism in cost, time, and design by using their skill, experience, and continually updated in-house databases.

Aker Solutions offers comprehensive consulting services in the areas of flow assurance, mooring system analysis, riser analysis, high-voltage power transfer analysis, risk analysis, value enhancement, layout assessments, cost and weight calculation, and technological readiness evaluations.

2. Specialist Engineering, Project Management and Procurement Services

Figure 2.4: Specialist Engineering, Project Management and Procurement Services

Aker Solutions provides value-added services to customers through its deep specialty engineering and procurement expertise, as well as its extensive experience managing complicated projects. The established Project Execution Model (PEM) of Aker Solutions ensures that projects are completed on time and under budget. Their people have produced complicated projects coordinating various stakeholders over several years till project completion, and they have the most experienced project management teams and project directors for significant capital projects in the business.

3. Design and Construction of Offshore Oil and Gas Production Facilities

Figure 2.5: Design and Construction of Offshore Oil and Gas Production Facilities

Oil and gas production facilities are erected on a field to allow for the transportation of the primary products. Stabilized oil is delivered via pipelines or shuttle tankers, whereas dry gas is transported via gas pipes. In some circumstances, the gas is processed to meet the needs of the end customer and distributed straight to national gas distribution systems. Topsides are production facilities that consist of deck structures erected on fixed or floating substructures. Topside facilities range from simple wellhead platforms with minimal equipment to major production and processing facilities.

4. Floater Designs

Figure 2.6: Floater designs

Aker Solutions creates some of the most modern semisubmersible drilling and production platforms, floating production storage and offloading vessels, and tension-leg platforms for use in deep (1,500 metres) or medium (300 metres) sea depths. Aker Solutions played a vital part in the completion of 15 of the world's most recognizable floating platform projects.

5. Design and Delivery of Deepwater Risers

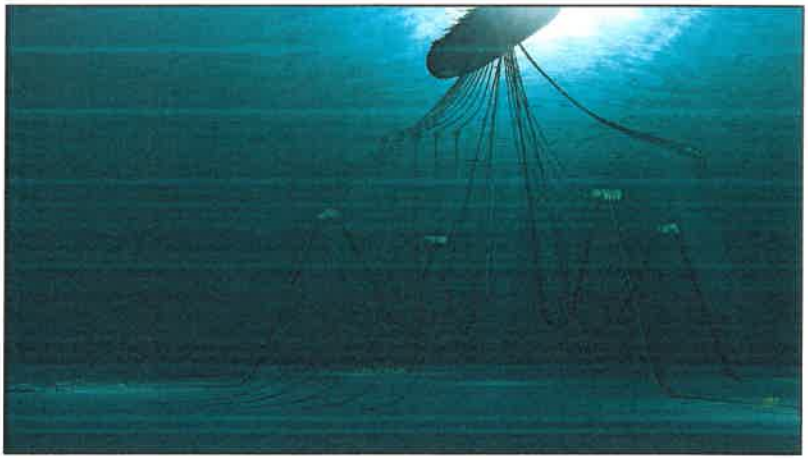


Figure 2.7: Design and delivery Deepwater risers

Subsea risers are designed to transport materials from the seafloor to production and drilling or import-export, are the link between subsea field developments and drilling and production facilities. Risers can be stiff, flexible, or a hybrid of the two, referred to as a hybrid riser system.

6. Design and Construction of Onshore Receiving and Processing Facilities

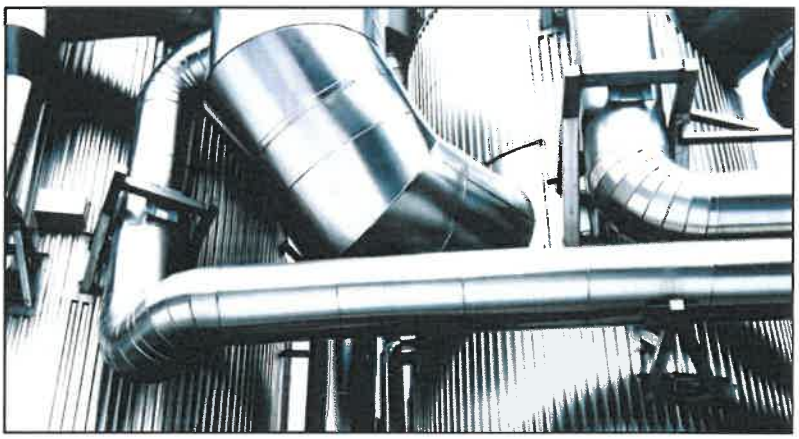


Figure 2.8: Design and Construction of Onshore Receiving and Processing Facilities

Oil and natural gas are imported, stored, processed, and exported in onshore receiving and processing facilities. Aker Solutions designs new onshore facilities as well as renovations, expanded capacity, and the phasing in of additional fields for existing ones. We also assist our customers in determining operating windows, improving operational performance, and lowering maintenance

Subsea main products/ services

1. Wellheads

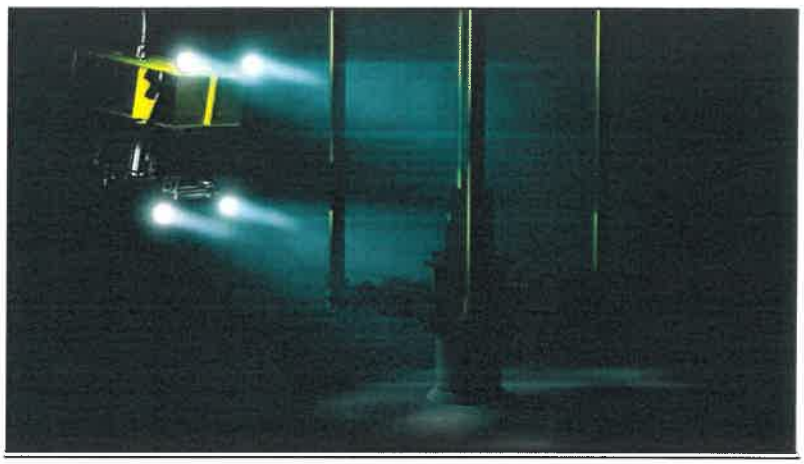


Figure 2.9: Wellheads

The principal pressure barrier for a subsea well is the wellhead. They are the anchor and suspension point, as well as the seal element, for casing strings in exploration or production, and are critical to the safe and reliable production of oil and gas. They act as a safety barrier in conjunction with Blowout Preventers (BOPs) and subsea trees to regulate the flow of drilling, production, or injecting fluids like gas and water. They also serve as a support for the passage of control lines for controlling downhole equipment such as subsurface safety valves.

2. Subsea Trees

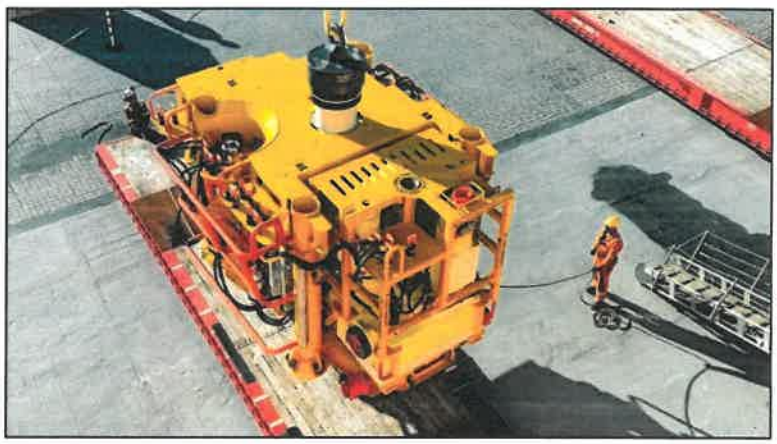


Figure 2.10: Subsea trees

Subsea trees have become crucial building components of offshore projects, guaranteeing safe and dependable drilling and production. The trees work in conjunction with the wellhead to

control the flow of production or injection fluids, as well as to connect tubing and other equipment in the well to the seafloor and above-water facilities

3. Subsea Structures

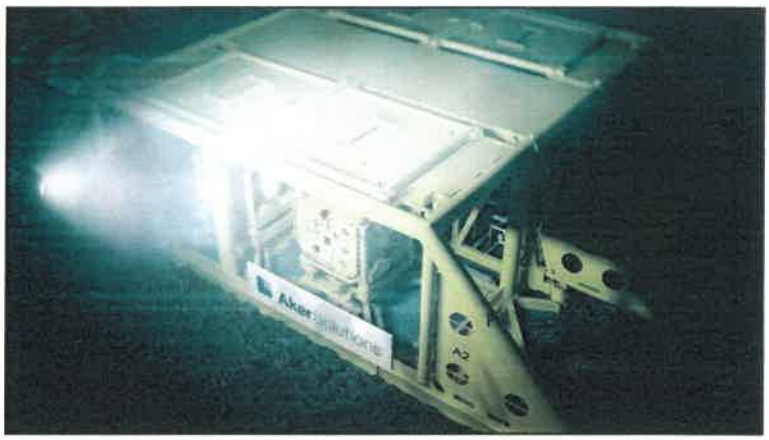


Figure 2.11: Subsea structures

Subsea structures are important to the development of any subsea oil or gas project. They encircle the numerous subsea components required for peak performance, ensuring effective functioning both during installation and throughout the life of a field. They not only collect or distribute subsea infrastructure such as flowlines and umbilicals, but they also shield sensitive equipment from the outside environment, such as trawler fishing nets.

4. Tie-In-Systems

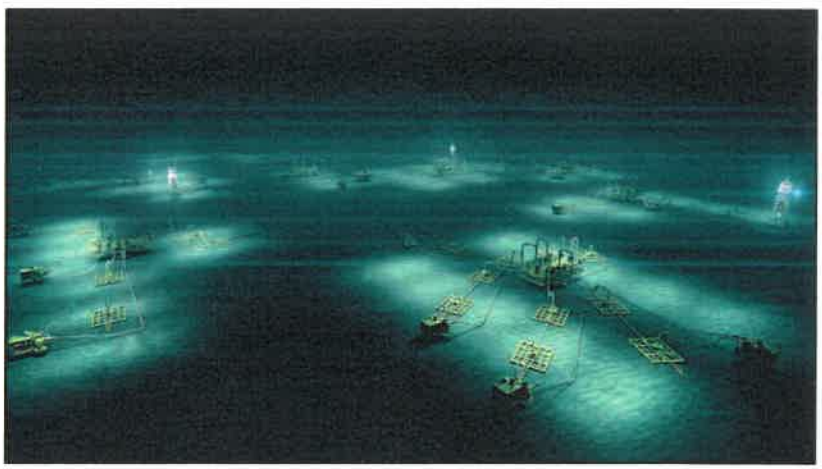


Figure 2.12: Tie-In-Systems

Tie in systems are critical components of subsea projects. They enable secure and leak-proof connections between subsea infrastructure and flowlines, umbilicals, modules, and pipelines for oil and gas import and export.

5. Intervention and Workover system.

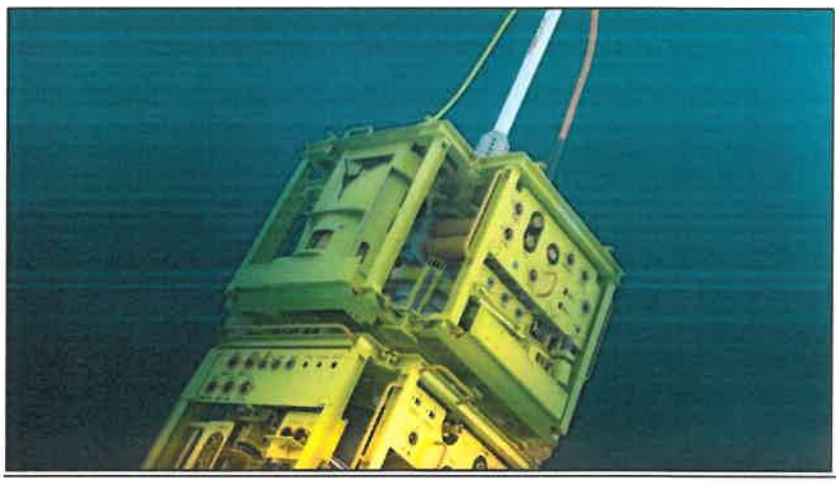


Figure 2.13: Intervention and Workover System

Workover systems are a vital instrument for the duration of a subsea well's life. The solutions enable safe subsea well installation and completion, diagnostics, maintenance, repairs, increased production, and finally plugging and abandonment.

6. Umbilicals

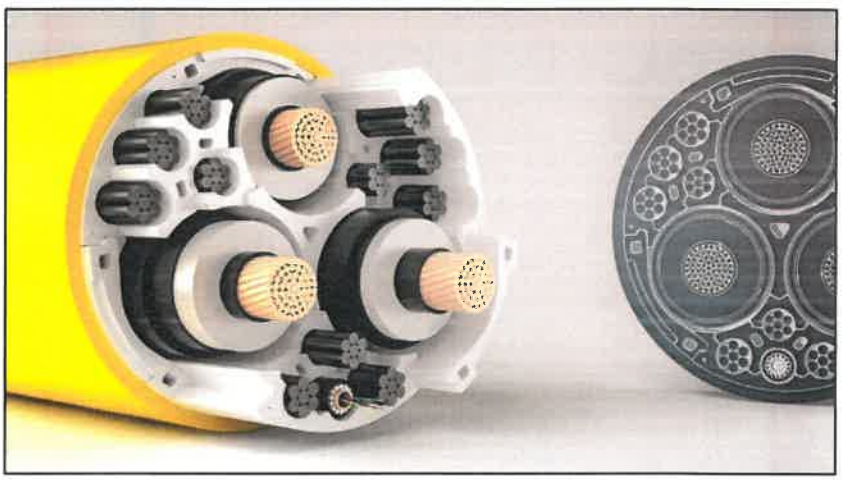


Figure 2.14: Umblilicals

Umbilicals are cables that connect surface and seafloor oil and gas equipment for control, power, or heat. They supply the subsea unit with electric and fiber-optic signals, as well as electrical power and hydraulic and chemical injection fluids. They can also power subsea boosting and compression, as well as offer flow-line heating to avoid wax and hydrate formation, which can delay oil production.

7. Control Systems

Figure 2.15: Control Systems

The fully integrated subsea control systems developed by Aker Solutions are dependable, resilient, and based on commercially available building blocks. The systems integrate topside controls, hydraulic and electrical power units, and subsea control modules to enable control of systems on the seafloor from the surface.

Chapter 3 – Overview of the training

3.1 Introduction

The training began on February 21, 2022 and ended on August 4, 2022. PM300 HSSE (Health, Safety, Security, Environment) Support team was the position assigned. Throughout the training, a lot of valuable information and experiences were gathered. Aker Solutions staff were all nice and helpful to each other. The HSSE team consists of four personnel in the department. The teammates were all supportive and helpful to one another. They helped me throughout my internship and taught me a lot of stuff. Some mini projects were assigned, such as developing training materials for the Greenhouse Gas Protocol. The training materials were designed to provide all Aker Solutions employees with exposure and knowledge. Working as an intern at Aker Solutions has been an amazing experience because I have learned so much in this field of work. After 5 months undergo this internship, I got the exposure of the importance of controlling our emissions to make sure all the companies can reduce their carbon emissions by half in the year 2030 and zero net carbon in the year 2050.

3.2 Summary of The Training and Experience Gained

These are the duties and task that have been done throughout the training.

Task 1: *Developing the Greenhouse Gas (GHG) protocol training*

Greenhouse gas protocol is important to our society today since it provides guidance for organizations across the globe in managing their greenhouse emissions in order to meet the goals of the Paris Agreement. This activity has helped me to appreciate the necessity of protecting our environment for the sake of our children's future. The work also taught me a lot about pollution management. As now, the world temperature in 2021 is 1.11°C over pre-industrial (1850-1900) levels. Hence, 2022 will be the eighth consecutive year (2015-2022) in which our global temperature has risen by more than 1°C above pre-industrial levels. To maintain our environment, we must fully commit to and comply with the GHG protocol, whether as individuals or as organizations

Task 2: *Developing ISO 50001 training material*

ISO 50001 The International Organization for Standardization developed the International Standard Energy management systems - Requirements with Guidance for Use (ISO). The standard specifies the requirements for establishing, implementing, maintaining, and improving an energy management system, the goal of which is to enable an organization to take a systematic approach to continuously improving energy performance, such as energy efficiency, energy security, energy use, and consumption. The standard's goal is to assist organizations in continuously reducing their energy use, and thus their energy expenses and greenhouse gas emissions. The standard's major goal is to continuously enhance energy-related performance and efficiency, as well as to discover energy-saving options. This methodical approach will assist firms in establishing systems and procedures. They will save money while also making a big contribution to environmental and climate protection, such as by permanently reducing CO2 emissions. The standard should expose employees, particularly those in management, to the immediate and long-term energy management benefits. Potential savings and competitive benefits can be discovered by the organization. Furthermore, the organization's image can be greatly improved.

Task 3: *Calculating CO_2 emissions for all Aker Solutions site and offices*

Every action or operation emits pollutants into the environment. According to the Environmental Protection Agency (EPA), transportation accounts for 27 % of 2020 greenhouse gas emissions, followed by power production, which accounts for 25%. The next highest source of emissions is industry, which accounts for 24%. Commercial and residential emissions account for 13% of total emissions, while agricultural accounts for 11%. Finally, land use and forestry account for 13% of 2020 greenhouse gas emissions. So, this effort is important because calculating emissions across all Aker Solutions locations will eventually set a target for us to ensure we can reduce emissions as much as possible and attain net zero carbon by 2050.

Task 4: *Analysis Aker Solutions environmental data*

This task was assigned to ensure that we discover the issues causing data discrepancies in the Aker Solutions environment database. The data will be identified and discussed with each Aker Solutions location's HSSE representative. This is critical to avoid repeating problems in the near future. As a result, we can limit our emissions and reach our target of net zero carbon by 2050. It was a terrific opportunity to talk and discuss with foreign Aker Solutions employees because it can boost one's self-confidence and soft skills.

Task 5: *Exposure in a manufacturing plant*

I received a lot of experience over a two-day site visit to Aker Solutions Port Klang. There was a lot of activity and machines on the site. As part of their induction, the colleagues of the HSSE department in Port Klang gave me a warm welcome and introduced me to their safety laws and regulations. The two-day site visit was a fantastic opportunity for me to see the work that the engineers at Aker Solutions Port Klang do. I gained a lot of experience as I have interviewed some of the workers on what they are doing.

3.2.1 Weekly activity

Week1	Briefing with supervisor
Week2	Study and research regarding CCUS (Carbon, Capture, Utilization and Storage) / Start preparing training slides for GHG protocol training
Week3	Preparing slides for the progress presentation of the training to team members
Week4	Updated the slides with additional contents / made a video on scope 2 GHG protocol
Week5	Upload the content into the articulate / Gather information regarding IPCC 1 degree graph
Week6	(Infected with covid-19)
Week7	Received feedbacks from employee and higher management / Made some updates based on given feedbacks
Week8	Reviewed he status of Aspect Impact, Environment data verification and Compliance Obligation
Week9	Find and analysis data discrepancies for all location of Aker Solutions
Week10	Export the data and categorized it into 5 different business segments
Week11	Summarizing the data into slides form
Week12	Summarizing the balance data into slides form and was sent to each location for feedback
Week13	Feedback was received, and the data had been rechecked / Calculating CO2 emissions for all location of Aker solutions
Week14	Gather information regarding ISO 50001 / went to Aker Solutions Port Klang for 2 days
Week15	Preparing a summary slide of GHG protocol that will be presented during a talk
Week16	Inserting information for ISO 50001 slides
Week17	Discussion with supervisor regarding the ISO 50001 slides
Week18	Research and study Aker Solutions's climate action plan
Week19	Converting GHG training material into Malay language for an awareness session in Aker Port Klang
Week20	Added a net zero video to the GHG slides
Week21	Reviewing HSSE work instructions of fluorinated gas compliance
Week22	Reviewing HSSE of energy management system that is related to ISO 50001
Week23	Adding some new information into the ISO 50001 training
Week24	Insert the ISO 50001 training into articulate to be published to all employees.

Chapter 4 – Details of Experiences (Report on Jobs / Tasks / Projects)

4.1 Introduction

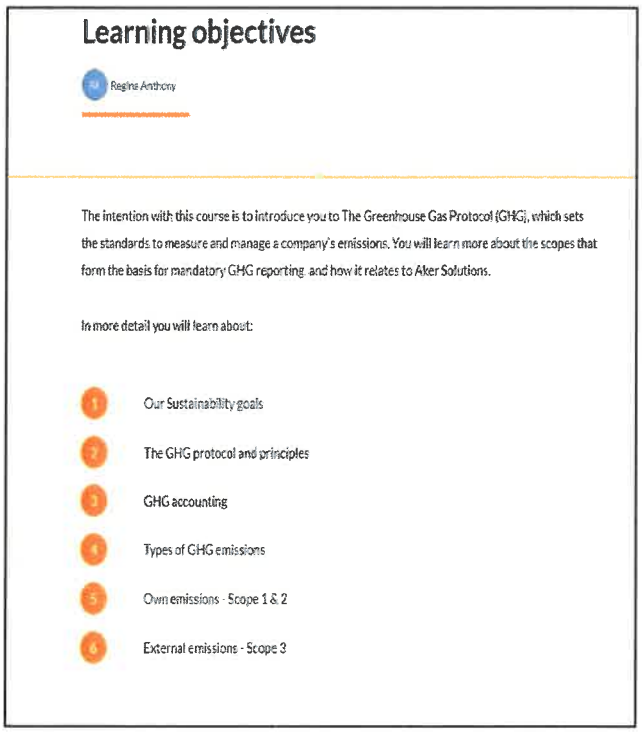
The HSSE department of Aker Solutions has assigned numerous duties to trainees. The HSSE team is in charge of keeping an eye on and evaluating dangerous and risky conditions. Creating policies to protect employee safety, addressing unsafe behavior or correct unsafe acts or conditions through the regular line of authority, ensuring that safety messages are included in each incident action plan, handling any environmental issues, creating training materials for workers, and a few other things. The duties given involved both physical task and paperwork, such as site visits, training material creation, and lab data analysis. A guideline document will be provided for the documentation task, which the designated supervisor will monitor and assess before presenting to the senior management for final assessment. Sometimes, a brief meeting with the team and the supervisor was arranged to consider what content should be included in the training. In the meantime, the person from the HSSE department at Aker Solutions Port Klang was in charge of helping with the induction and other small tasks during the site visit. The student experienced many highs and lows after doing all the tasks, but with the assistance and guidance of the relevant individuals, the tasks could be completed effectively.

4.2 Details of the Training and Experience Gained

4.2.1 Developing the Greenhouse Gas (GHG) protocol training

One of the tasks assigned was the Greenhouse Gas (GHG) protocol training. The GHG protocol training materials were intended to expose and educate all Aker Solutions personnel regarding the importance of the greenhouse gases A significant amount of knowledge was obtained while finishing the course material. The Greenhouse Gas Protocol (GHG) is a joint initiative of World Resources Institute and the World Business Council for Sustainable Development WBCSD, and a part of the Climate Program. The Paris Agreement commits countries to reducing greenhouse gas emissions to limit global temperature rise to less than 1.5 degrees Celsius and avert the worst effects of climate change. As a consequence of that, the GHG Protocol was developed from the need to assist nations and businesses in accounting for, reporting, and mitigating emissions based on a study that established a climate change action agenda that included the need for systematic measurement of GHG emissions.

The GHG training material took a long time to complete because it will be published to all Aker Solutions employees in Malaysia so it must be thorough. Initially, there was a task-related discussion with the supervisor to decide what information and content should be included in the training material. Aside from that, the purpose of the discussion was to determine the best content flow strategy to ensure that the audience could understand it. Following that, all relevant information was gathered and entered the slides form. The design and template of the slides must be professional because they will be distributed throughout the firm. Many meetings were held in the interim to discuss and monitor the progress of the material. The content was reviewed on a regular basis to ensure that it was appropriate. Following that, a video was developed on the Scope 2 of the GHG protocol. The subject was difficult to grasp because it covered the purchase of energy using both a location-based method and a market-based method. The video was made in such a way that the explanation of the issue is simple to grasp. Once all the training information in the PowerPoint slides has been completed and approved by the supervisor, all of the training materials will be transformed into an articulate using Articulate360. Finally, the training material was finalized and posted on the company's social website.



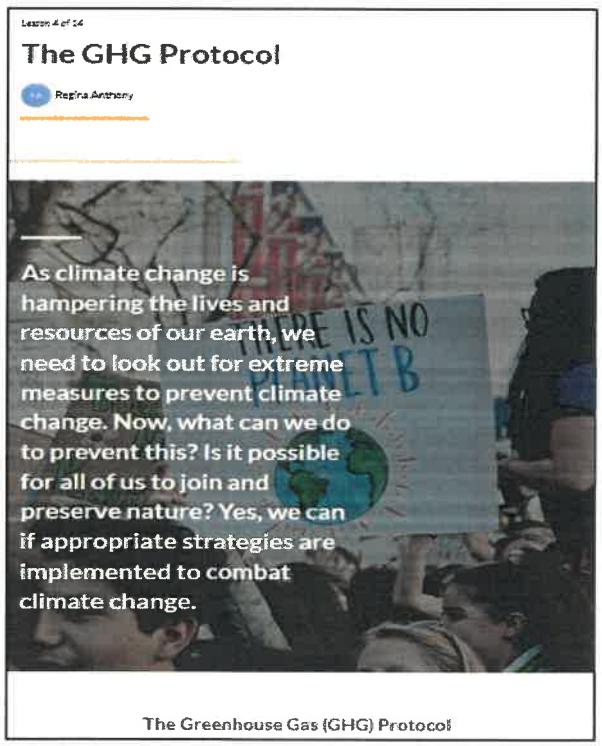


Figure 4.1& figure 4.2: The content of the GHG training material

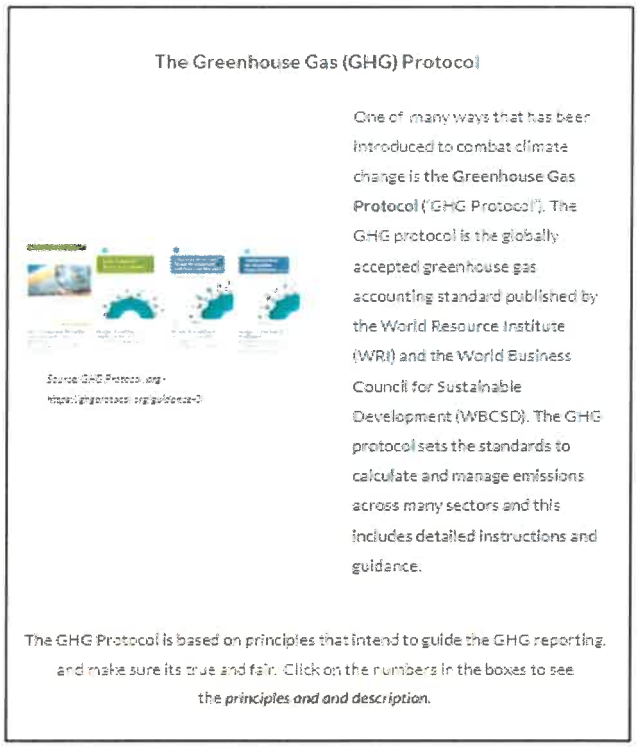


Figure 4.3 The content of the GHG training material

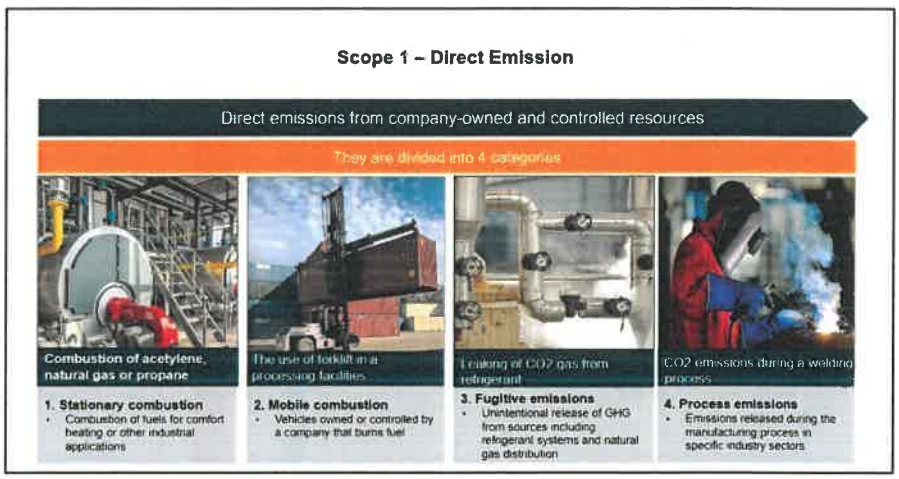


Figure 4.4: The content of Scope 1 GHG training material

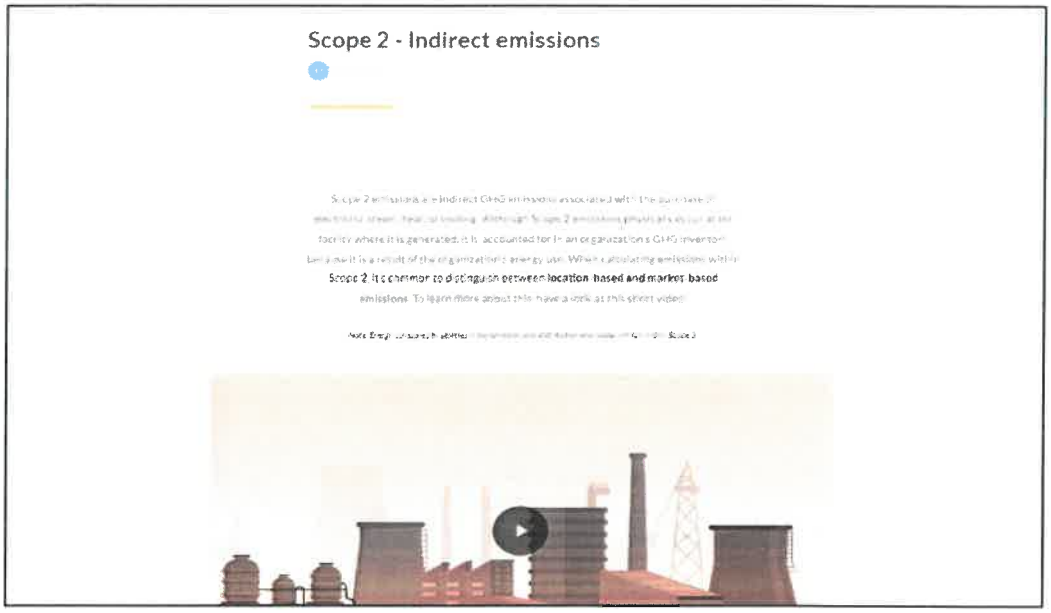


Figure 4.5: The content of Scope 2 GHG training material

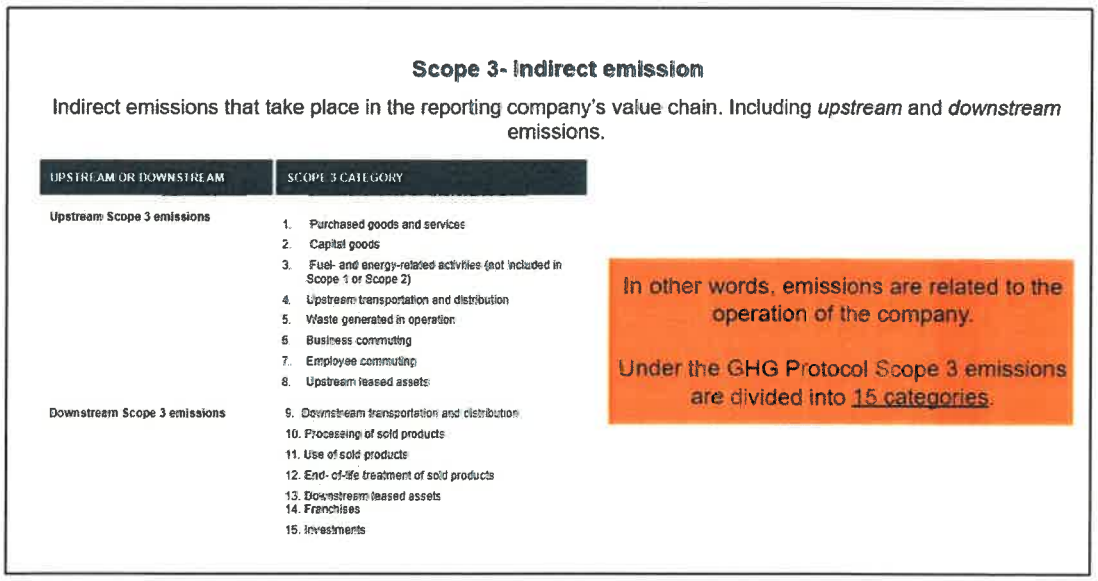


Figure 4.6: The content of Scope 3 GHG training material

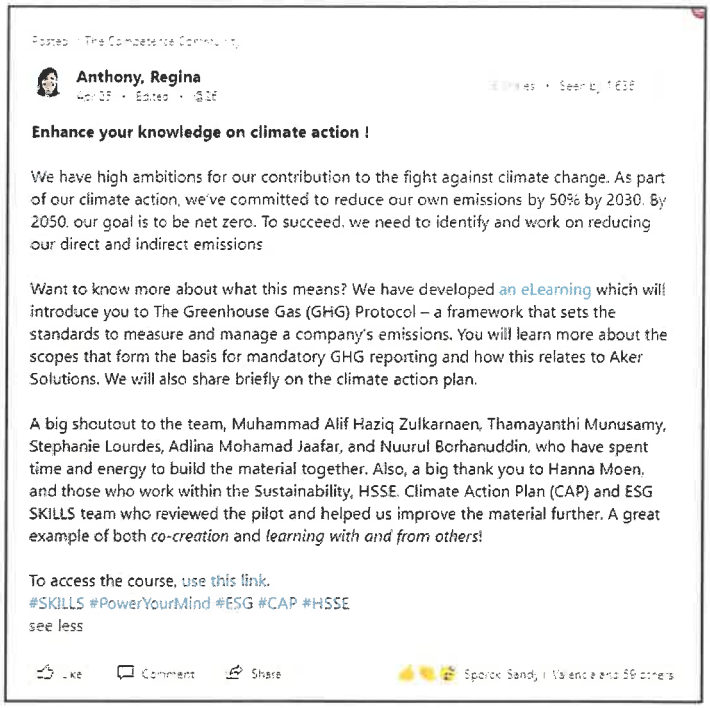
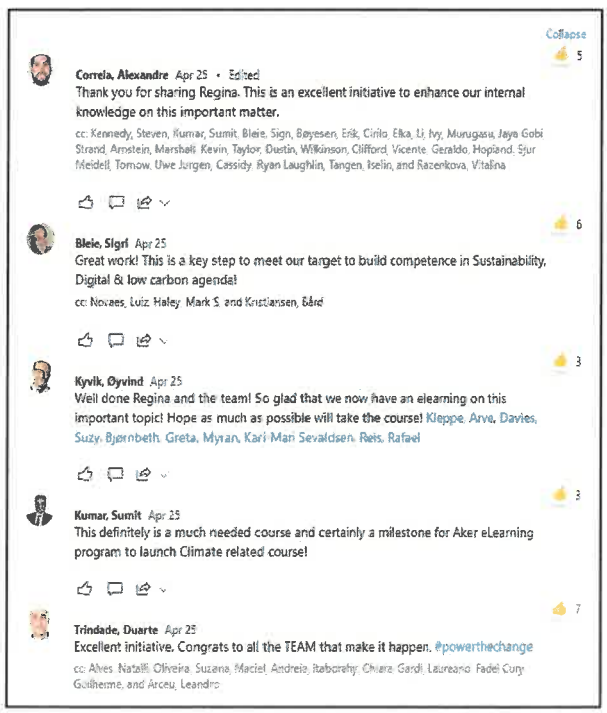


Figure 4.7: Feedback of the GHG training material



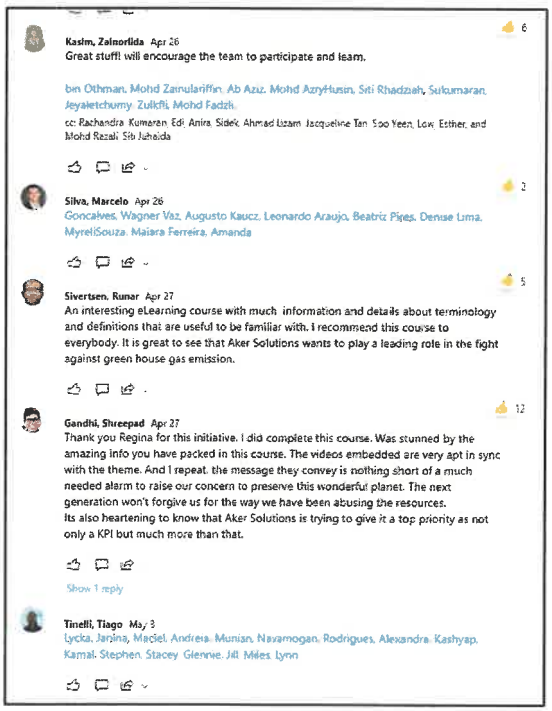


Figure 4.8 & Figure 4.9: Feedback of the GHG training material

4.2.2 *Developing ISO 50001 training material*

We are now living in a modern period where oil and gas companies are thriving to find new energy sources and building a variety of equipment that can pollute our environment. As a result, companies all around the world are being advised to implement the new ISO 50001 Energy Management Systems. ISO 50001 provides a framework for organizations of all sizes and sectors to implement best practices for energy management. This framework can assist organizations in managing, monitoring, and maintaining their energy performance by limiting energy use and improving operational efficiency. ISO 50001 stresses continuous development and can help a company reduce energy expenses and their environmental impact. We have created ISO 50001 training materials to raise awareness among all employees in Aker Solutions about the importance of energy management and enhancing process efficiency by using a minimal quantity of energy. Some advantages of implementing ISO 50001 include lower energy costs, proven business credentials, less environmental impact, improved reputation, and enhanced resilience. The development of ISO 50001 training started with the discussion with our senior environmental specialist to make sure all the necessary information was gathered. Once all the information was gathered, the content was being inserted into a PowerPoint slide. As with past training materials, an occasional meeting was held to ensure that all contents met standard requirements.

Figure 4.10: The content of the ISO 50001 training

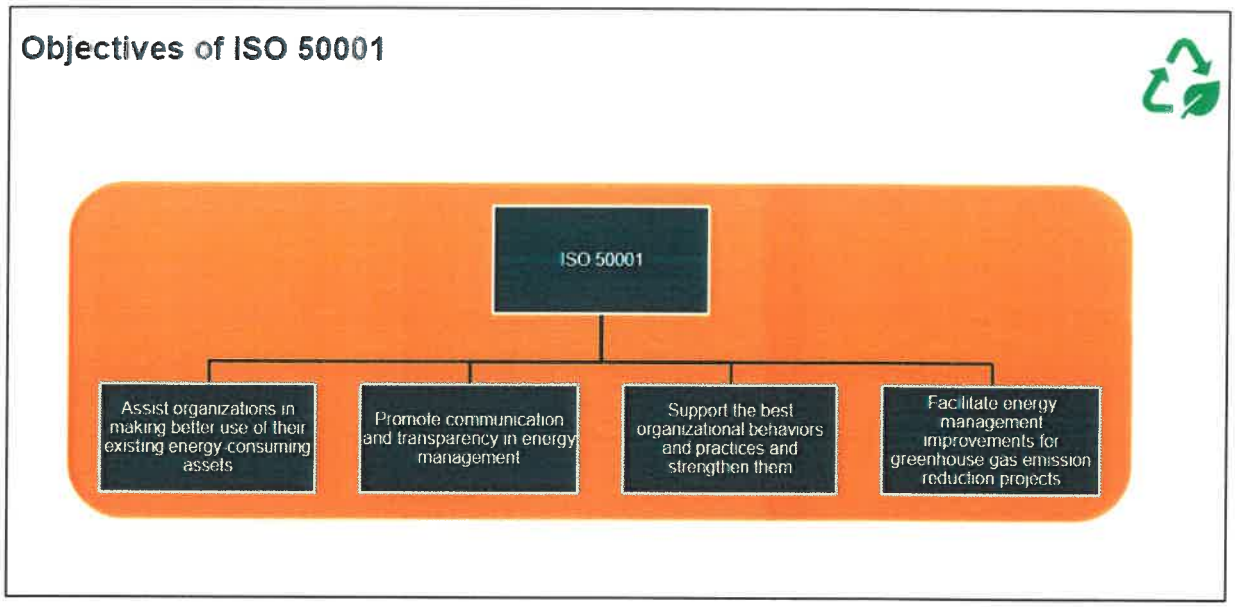


Figure 4.11: The objectives of ISO 50001

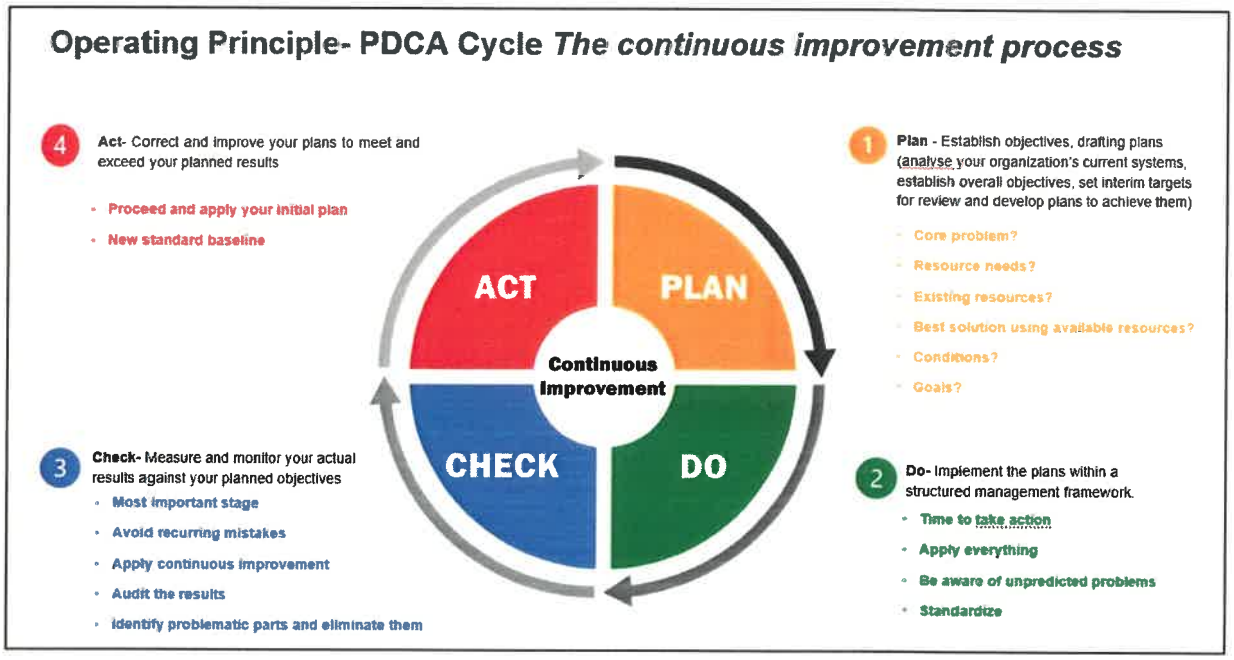


Figure 4.12: Operating principle of ISO 50001

4.2.3 *Calculating CO_2 emissions for all Aker Solutions site and offices*

Aker Solutions has over 50 offices and sites across the world. Each location or office is responsible for a separate business segment. Aker Solutions' entire operation will emit and release emissions into the environment. As a result, I was assigned a task in which I calculated CO2 emissions for all Aker Solutions locations worldwide. The task took some time because there were numerous sites and different types of waste that were accounted for as CO2 emissions. Initially, waste was classified into eight categories: composting, hazardous waste, incineration with energy recovery, incineration without energy recovery, landfill, reuse, recycling, and others. The total of each waste category will then be multiplied by each emission factor. Each category has a different emission factor. As a result, the formula will be:

$$Sum\ of\ Amount, Total\ \times Emission\ factor\ = Total\ CO2e$$

Row Labels	Sum of Amount, Total	Factors	Total CO2e
Aker Solutions locations - Angola - Luanda - Base da Sonils Rua 6, I.L Boavista (Manufacturing)	**46.505**		
Landfill	20.47	446.2415	9134.56351
Recycling	26.035	21.294	554.38929
Aker Solutions locations - Australia	**0**		
Landfill	0	446.2415	0
Recycling	0	21.294	0
Aker Solutions locations - Brazil	**73.447**		
Composting	10.476	8.951	93.770676
Incineration with energy recovery	6.366	21.294	135.557604
Incineration without energy recovery	4.845	21.294	103.16943
Landfill	6.3	446.2415	2811.32145
Recycling	39.573	21.294	842.667462
Reuse	5.887	0	0
Aker Solutions locations - Brazil - Rio das Ostras - Rodovia Amaral Peixoto, KM162-ZEN Mar do Norte (Manufacturing)	**743.436**		
Composting	13.714	8.951	122.754014
Hazardous waste	1.191	21.294	25.361154
Other	168.877	21.294	3596.06684
Recycling	536.414	21.294	11422.3997
Reuse	23.24	0	0
Aker Solutions locations - Brazil - São José dos Pinhais - Rua Antonio Singer 3411 (Manufacturing)	**265.423**		
Hazardous waste	14.73	21.294	313.66062
Incineration with energy recovery	32.88	21.294	700.14672
Landfill	7.296	446.2415	3255.77798
Other	23.657	21.294	503.752158
Recycling	186.86	21.294	3978.99684
Aker Solutions locations - Brunei - Kuala Belait	**0.6638**		
Recycling	0.6638	21.294	14.1349572
Aker Solutions locations - Canada - Edmonton	**0.012**		
Landfill	0.012	446.2415	5.354898
Recycling	0	21.294	0
Aker Solutions locations - Canada - St. John's - 2 Vanguard Court (Office)	**1.26929**		
Composting	0	8.951	0
Landfill	0.03723	446.2415	16.613571
Recycling	1.23206	21.294	26.2354856
Aker Solutions locations - Canada - St. John's - 215 Waterstreet, Atlantic Place (Office)	**11.08202**		
Landfill	0.87199	446.2415	389.118126
Recycling	10.21003	21.294	217.412379
Aker Solutions locations - China	**0.161**		
Incineration with energy recovery	0.06	21.294	1.27764

Figure 4.13: The calculation of CO2 emissions

4.2.4 *Analysis Aker Solutions environmental data*

The environment plays an important role in our lives. It completes the ecology, making our world a more pleasant place to live. Individuals and businesses must all take responsibilities for improving and sustaining our environment. Analyzing data in all locations is one approach for Aker Solutions to keep track of and reduce their emissions. To make things easier, the data has been divided into five main business segments. The data examined includes total waste, recycle waste, non-recycle waste, energy consumption, and water consumption. So, in the first three months of 2022, a total of 25 data sets were reviewed to find the discrepancies. Once the data discrepancies have been identified, the data will be summarized in a slide format and forwarded to the HSSE representative in each Aker Solutions site and office. Then a meeting was convened with them to discuss and determine the cause of the discrepancies. This activity is critical since it allows us to detect problems and avoid them in the future so that we can reduce our own emissions.

Amount, Total	(All)													
Sum of Amount, Total	Column Labels													
	Et												t Total	Grand Total
Row Labels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Aker Solutions locations - Angola - Luanda - Base da Sonils Rua 6, I.L Boavista (Manufacturing)	0.246278	2.497444	0.616278	1.515	2.135	2.485	1.685	1.685	0.525	3.465	0.29	0.35	17.495	17.495
2021				1.515	2.135	2.485	1.685	1.685	0.525	3.465	0.29	0.35	14.135	14.135
2022	0.246278	2.497444	0.616278										3.36	3.36
Aker Solutions locations - Australia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021				0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0										0	0
Aker Solutions locations - Brazil - Rio das Ostras - Rodovia Amaral Peixoto, KM162-ZEN Mar do Norte (Manufacturing)	33.98	62.658	18.181	15.663	15.132	7.682	15.393	11.437	13.126	30.952	12.698	16.869	253.771	253.771
2021				15.663	15.132	7.682	15.393	11.437	13.126	30.952	12.698	16.869	138.952	138.952
2022	33.98	62.658	18.181										114.819	114.819
Aker Solutions locations - Brazil - São José dos Pinhais - Rua Antonio Singer 3411 (Manufacturing)	8.398	13.41	13.01	2.75	2	12.167	2.95	9.32	5.13	7.54	21.5	8.686	106.861	106.861
2021				2.75	2	12.167	2.95	9.32	5.13	7.54	21.5	8.686	72.043	72.043
2022	8.398	13.41	13.01										34.818	34.818
Aker Solutions locations - China	0	0	0	0.04	0	0	0	0	0	0	0	0	0.04	0.04
2021				0.04	0	0	0	0	0	0	0	0	0.04	0.04
2022	0	0	0										0	0
Aker Solutions locations - India - Kakinada	0	0.24	0.07	0	0	0	0	0	0	0	0	0	0.31	0.31
2021				0	0	0	0	0	0	0	0	0	0	0
2022	0	0.24	0.07										0.31	0.31
Aker Solutions locations - Malaysia - Labuan	2.03	1.625	0.5	2.71	0	0.1	0.15	1.71	2.5	1.23	7.63	2	22.185	22.185
2021				2.71	0	0.1	0.15	1.71	2.5	1.23	7.63	2	18.03	18.03
2022	2.03	1.625	0.5										4.155	4.155
Aker Solutions locations - Malaysia - Port Klang	8	6	23.886	45.6	42	48.5	11.5	33.5	31	14.8	19.5	8	292.286	292.286
2021				45.6	42	48.5	11.5	33.5	31	14.8	19.5	8	254.4	254.4
2022	8	6	23.886										37.886	37.886
Aker Solutions locations - Norway - Ågotnes - Tranesvegen 1b	10.5	4	18.934	42.215	5.18	7.31	29.595	8.6	19.26	28.12	15.322	27.975	217.011	217.011
2021				42.215	5.18	7.31	29.595	8.6	19.26	28.12	15.322	27.975	183.577	183.577
2022	10.5	4	18.934										33.434	33.434
Aker Solutions locations - Norway - Moss	11.263	3.232	7.445	8.494	4.427	4.7	3.68	8.265	10.236	5.606	6.072	2.059	75.479	75.479
2021				8.494	4.427	4.7	3.68	8.265	10.236	5.606	6.072	2.059	53.539	53.539
2022	11.263	3.232	7.445										21.94	21.94

Figure 4.14: The analysis of data discrepancies

4.2.5 Site visit at Aker Solutions Port Klang Free Zone

Aker Solutions has three offices in Malaysia: the headquarters at Intermark Jalan Tun Razak, the subsea business segments in Port Klang Free Zone, and Labuan. The operation in the subsea business is primarily in fabrication, maintenance, and installation such as the construction of a subsea Christmas tree. Hence during the industrial training, I went for a site visit in Aker Solutions Port Klang. It was a very great experience as I got to see a lot of machinery and work that they do. The site visit lasted for two days. When I first arrived, I was met by a wonderful coworker who made me feel extremely welcome. All my coworkers were pleasant and encouraging. After I was assigned a workstation, an induction was held to ensure that I was aware of the company's policies and procedures.

Aker Solutions Port Klang has 5 different manufacturing department consist of Fabrication, Controls, Warehouse, Machine shop and Cladding, and Mechanical Assembly Testing. Each department's work will be done in the bay, which is a massive warehouse. Each department plays a different role yet is interconnected. On the first day, I was tasked with patrolling the fabrication yard and controls alongside one of my coworkers. This task was assigned to familiarize the work as a safety officer on how to examine and check worker safety measures, potential hazards in the workplace, and how to reduce hazards. On the second day, the identical tasks were being completed in the Warehouse, Machine Shop and Cladding, as well as Mechanical Assembly Testing. All the workers followed the safety procedures, although some risks were discovered, such as a bolt being placed in an inconvenient location. Following that, I was assigned to accompany one of my colleagues to inspect a contractor sky lift that was being used to repair the door at the fabrication bay. The inspection must be completed thoroughly because worker safety is at stake. During the skylift inspection, a risk analysis was also performed.

Figure 4.15: Fabrication Bay

Figure 4.16: Skylift Inspection

4.3 Problem encountered and approach adopted for problem solving

Training at a multinational company surely stimulates creativity and problem-solving skills because access to a variety of equipment or methods is limitless. Many issues develop while accomplishing tasks, and modifications are made to achieve the intended result.

One of the issues encountered during the preparation of GHG training material and ISO 5001 training material is the applicability of the contents. The content must be worthwhile in order to reach a large audience. Every training material must have a process flow to ensure that work quality is met. The problem has been solved by holding interim meetings after each stage in the process flow has been completed. This is to ensure that the contents and any further information are informed. Furthermore, to ensure that the content is appropriate, we use a legitimate website as a source, such as NASA, the United Nations, the International Organization for Standardization, and the GHG Protocol.

Following then, an issue emerged when calculating CO2 emissions. Some of the data used to calculate CO2 emissions has not been updated. Aker Solutions in Winnersh, United Kingdom, for instance, has several data discrepancies. This issue emerged when the total emissions from each location were not tallied up. This issue was resolved by arranging a meeting with Rafael, the HSSE Senior Manager in the United Kingdom. The meeting was scheduled to discuss and determine the actual statistics.

Finally, there was a problem that arose during the data analysis. The problem occurred when some Aker Solutions locations did not have any data for certain categories of waste in the database. The issue was resolved by arranging a meeting with each business segment at Aker Solutions to provide us with a report and update the data in the database before the deadline.

4.4 Professional and ethical issues

Aker Solutions is a well-known company that pursues energy, particularly in the oil and gas sector. Since the beginning of the company, a lot has been accomplished. The company's professionalism demonstrates why it should be considered a standard service required by the majority of oil and gas companies worldwide. Aker Solutions is a great organization with a great opening for either a fresh engineer or an experienced engineer.

First and foremost, Aker Solutions exhibits professionalism in all that they do, particularly with regard to the employees and the work. They believe that encouraging a healthy lifestyle at work can help people live healthier lives and, as a result, improve the quality of their productivity. Because of this, employees have the option of working under a flexible schedule as long as they put in 40 hours per week. This principle is frequently violated by many companies because the majority of workers did not have any confrontation with this action and still got the job done. Aside from that, professionalism and ethics can be seen when the company takes good care of their employees' health and safety. All employees must be committed to the strict rules and regulations established by the HSSE department. For example, any employee who works with machinery or electricity must follow safety precautions to avoid harm and risk in the workplace.

Not only that, but the company is concerned with the well-being of its employees, demonstrating their competence in both engineering and business. One sign is that all employees receive their payrolls on time. This action may benefit any employee more than the company realises, especially if the employee lives on a tight budget and needs the money for necessities or emergencies. Furthermore, the organisation ensures that all of its employees who must travel for work are provided with appropriate transportation as well as a convenient place to stay. Everyone is allowed to use the company vehicle for work purposes, and the company pays for all long-distance business trips.

Working as an intern for a company that values professionalism and ethics made it much easier for me to adjust to the work environment. It benefits both parties, employees and the company, to strive for more with such quality workers who contribute to the success of the company

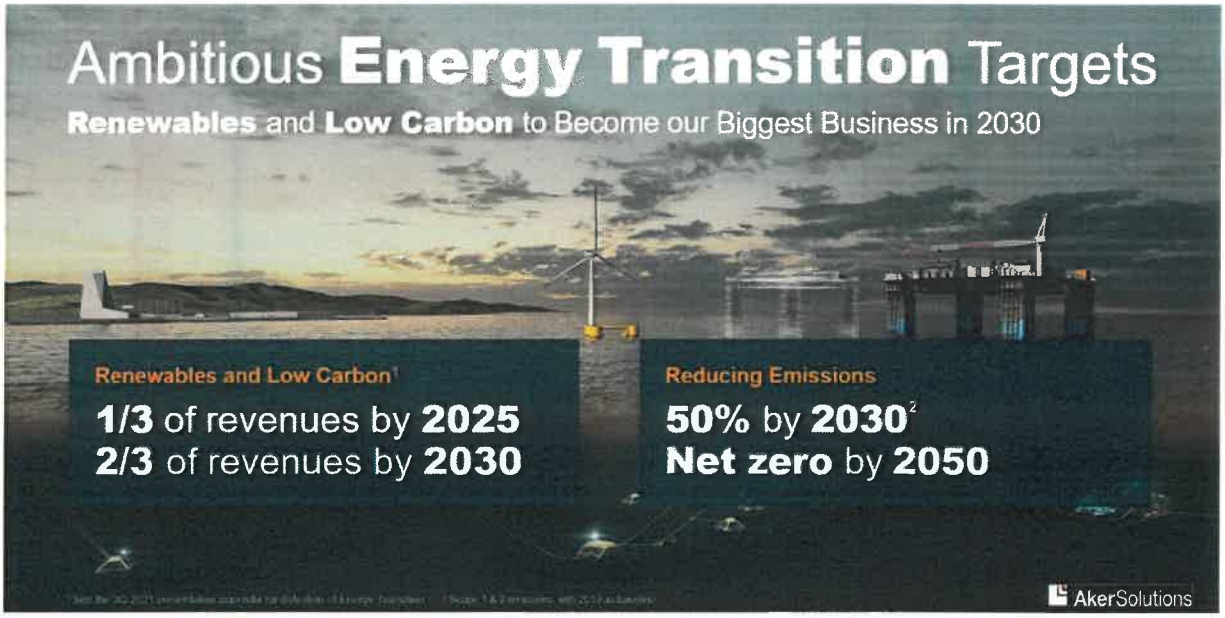
4.5 Health, environment, and sustainable aspects

The Rio Declaration and Agenda 21 concepts were accepted by world leaders as the foundation for sustainable development in the twenty-first century in 1992. As a result, investment in environmental and public health improvements was seen as a necessary condition for sustainable development at the highest decision-making levels. Sustainable development was emphasized as being fundamentally concerned with human health. Aker Solutions provided extensive exposure to the environment and sustainability throughout the training process. As part of Aker Solutions' commitment to sustainability, the GHG protocol was just one of many initiatives. Employees were to be made aware of the value of emission reduction for sustaining and improving the environment through the GHG protocol. In order to prevent exposure to people and reduce emissions to the environment, the training materials also cover how to control dangerous emissions. The ecological system's quality of health can therefore be enhanced.

The ISO 50001 job was the next initiative made by Aker Solutions as part of their sustainability objective. The energy management system is the main emphasis of ISO 50001. The environment could be greatly affected positively by the implementation of ISO 50001. The advantages of ISO 50001 include an increase in energy efficiency, a cost-saving effect, competitive advantage, increased effectiveness, to promote best energy practices, and an improvement in energy performance. Based on these advantages, it may encourage employees to lead healthier lifestyles and have a positive effect on the environment by reducing energy waste in the workplace.

The following task was to calculate CO2 emissions and analyze the data. These tasks promote and inspire employees to achieve Aker Solutions' targets in their sustainability action plan. The main goal of these tasks is to determine the overall CO2 emissions from Aker Solutions as well as the cause of data discrepancies. By doing so, we can propose a new action plan for the future in order to avoid and reduce more of our emissions in order to comply with the Paris Agreement.

Finally, Aker Solutions introduced their climate action plan (CAP) as the main mission for sustainability. The CAP was introduced in 2022 and its end target will be in 2050 and 2030 will be the indicator progress. Aker solutions aim to achieved zero carbon footprint by 2050, to achieved it, we must first reduce our carbon footprint by half in 2030. A lot of actions will be done accordingly to make sure Aker Solutions achieved their target.



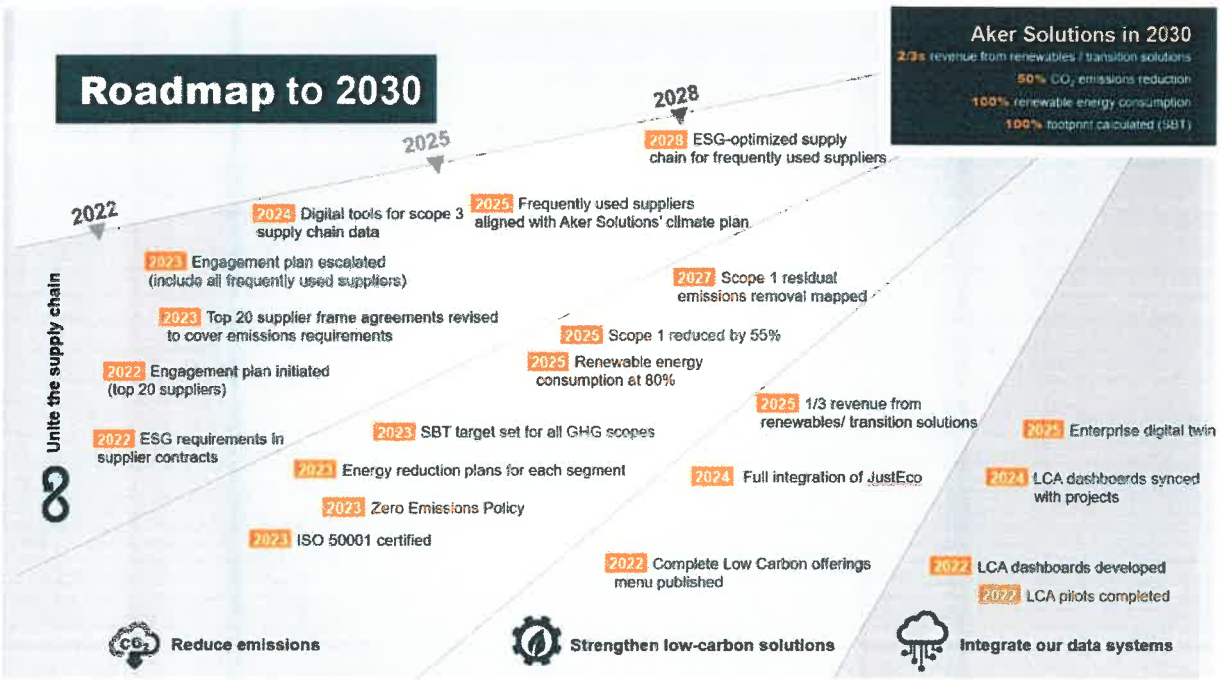


Figure 4.17 & 4.18: Aker Solution's climate action plan

Chapter 5- Conclusions and Recommendations

5.1 Conclusion

The experiences and knowledge received during my 24-week training at Aker Solutions were very unique and altered my outlook on environmental and sustainability issues. It also offered me a taste of what life will be like after college when I started working. Overall, following my training with Aker Solutions:

i. I got exposure the importance of the environment and sustainability in this era
ii. I can effectively develop training material that will benefit the company and workers
iii. I can handle the work pressure and adapt with the pattern of working in any organization I find myself in the future.

I was also able to exercise my social skills, and as a result of working with this organization, I was able to polish my work ethics and contribute to the resolution of any duties or tasks whenever feasible. Finally, this industry training has bridged the knowledge gap between my academic theory and actual skill.

5.2 Suggestions and recommendations

Given that Aker Solutions is a multinational corporation well renowned for its operations in the oil and gas industry, I would suggest it as a place for industrial training. Because every employee supports leading a healthy lifestyle at work, the workplace is excellent. Even though the workplace is in the heart of Kuala Lumpur, there are plenty of nearby food vendors and public transportation options.

Finally, I suggest the company to devote more attention to the activities of its employees, such as planning an annual dinner or engaging in joint celebrations. The relationship between the employer and the employees may improve as a result. As a consequence, teamwork on any project will be more effective because employees won't feel as disconnected from their employer and will be more willing to offer suggestions and solutions.

Reference

ghgprotocol.org, (2011), Corporate value chain

Carlos Corvalan (1999) Health, environment, and sustainable development: identifying links and indicators to promote action

Individual – Regina Anita (Senior Manager, Head of Global Environment)
Adlina Mohammad Jaafar (Senior Environmental Specialist)
Stephanie Lourdes (Senior Specialist HSSE

Appendix

Figure 4.19: Supervisor Regina Anita

Figure 4.2: Aker Solution access card

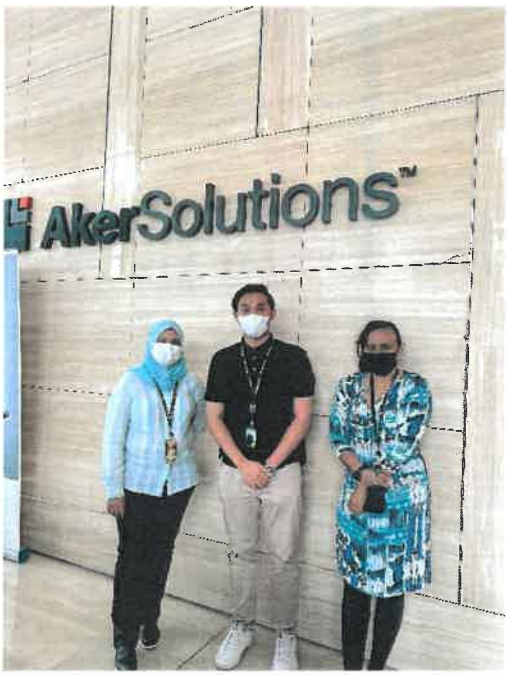


Figure 4.21: HSSE team