

UNIVERSITY OF AUCKLAND
DEPARTMENT OF ENGINEERING SCIENCE

ENGEN 403 Work Report

Name: Connor McDowall

Specialisation: Engineering Science

Company Name: ExxonMobil Australia

Company Address: Level 9/664 Collins Street, Docklands, Victoria, 3008

Work Period: 25/11/2019 - 14/02/2020

August 28, 2020



CERTIFICATE OF PRACTICAL WORK

Section to be completed by Student

Student Family Name	MCDOWALL	First Name	CONNOR
Student ID Number	530913386	Specialisation	ENGINEERING SCIENCE
Full Company Name	Exxon Mobil		
Company Physical Address	Level 9 / 664 Collins Street Docklands Victoria 3008		
Company Website Address	https://www.exxonmobil.com.au/		

Period Worked (Details Must be Exact)

Start Date (DD/MM/YYYY):	25 / 11 / 2019	End Date (DD/MM/YYYY):	14 / 02 / 2020
Are you in your final year of study or have already completed your academic requirements?		YES <input checked="" type="radio"/> NO	

Nature of Work (To be classified showing the hours for each classification)	Hours	
	General	Sub Prof
Built a forecasting model for Gas Available for Sale		100
Built a storage optimisation model		200
Visiting Refinery / Assets / Gas Plant		100
Training (Refined, Fire fighting, Offshore) etc		50
Total Hours Worked		

I understand that these details are a true and accurate description of my work placement, and agree that this work may be subject to validation by the Faculty of Engineering.

Signature: C.A. Mcke Date: 14 / 02 / 2020

Section to be completed by Supervisor

Comments Regarding Student Performance:

Connor showed excellent analytical and interpersonal skills at his time at Esso Australia. His work products were well considered and added considerable value to the business outcomes for the placement period.

Signature: <u>Ronnie Ling</u>	Date: <u>14 / 02 / 2020</u>
Name: <u>Ronnie Ling</u>	Position: <u>Commercial Manager</u>
Email Address: <u>ronnie.ling@exxonmobil.com</u>	Contact Number: <u>04 29 690 326</u>

Executive Summary

This report summarises my summer vacation experience in the Commercial team at ExxonMobil Australia for the period Monday 25th November 2019 to Friday 14th February 2020. I was supervised by Johanna Boothey, Nikita Gladman and Ronnie Ling.

ExxonMobil Australia is a subsidiary of ExxonMobil, the global oil and gas company who operate upstream, downstream and chemical businesses around the world. My role was to build two Excel-based optimisation models to inform gas marketing strategy for both the Gippsland Basin Joint Venture (GBJV) assets and an onshore storage facility. Additionally, I completed various trainings and site tours.

I used my excel modelling skills, project development, Power Query and VBA programming skills to build the models. I made a presentation to the recruitment team, executives and other vacation students.

I thoroughly enjoyed my experience. Several impressions of ExxonMobil were made on me. I had insight into the company's performance and learned many skills related to technical engineering, emotional intelligence, management and leadership. Additionally, I gained a lot of confidence working at a Fortune 500 company. I am confident working at ExxonMobil was a once in a lifetime opportunity.

Acknowledgements

I want to acknowledge the following people who were instrumental in enabling and supporting my success in the Commercial team and ExxonMobil:

- Nikita Gladman for supervising my projects and keeping me on track.
- Johanna Boothey for being a great role model who's leadership informs my own.
- Alan Antonov for being an exceptional buddy and coffee companion.
- Ronnie Ling for being a great substitute supervisor and sharing great stories.
- Adrian Hamra for the great career and life advice.
- Peter Wood for teaching me the ins and outs of petroleum engineering.
- Catherine Phillips for being a fantastic technical mentor.
- Stephen D for the educational seminars and great stories.
- Alex Catto-Smith for the long trips to Sale.
- Hussain Ali for taking a chance on a Kiwi who knew nothing about oil and gas.
- Ella Ciaravolo for great advice and coffee runs.
- Riley O'Donnell, Liam Warr, May Maung, Kurt Charlton, Sally Costopoulos, Wayne Zaccheus, Gavin Eadon, James Trewin, Lucy Muir, Keegan Mason, Josh Parker, Matthew Lai, Jana Giang and Finlay Robinson for the weekend adventures and being the family far from home.

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1 Introduction

ExxonMobil is a global oil and gas company on the Fortune 500. ExxonMobil finds, extracts, produces, refines and retails petroleum and petrochemical products globally, leveraging global subject matter experts and resources.

I was based in the Upstream - Commercial team. This team determines ExxonMobil's pricing strategy through data, analytics and traditional marketing practises. The team has four subdivisions: Data & Analytics, Operations, Projects and Contracting. Data & Analytics use economics and financial theory to infer the price of gas. Operations plan the transshipment and logistics of transporting products. Contracting sells gas contracts to customers. Projects negotiate new CAPEX projects like the drilling of new wells.

I enhanced my excel-modelling skills, learned how to use Power Query, interpreted legal contracts, improved my presentation skills and developed petroleum engineering capabilities. I learned what it was like to work at both a Fortune 500 company and one of the biggest companies in the world.

2 ExxonMobil

2.1 Company Introduction

ExxonMobil (NYSE: XOM) is a global, vertically integrated energy company who operate petroleum and petrochemical businesses worldwide. ExxonMobil's operations lead to the exploration and production of oil, gas, electric power generation, and coal and minerals. Additionally, the company also manufacturers and markets fuels, lubricants, and chemicals. ExxonMobil resides in the Energy, Oil/Gas and Coal, and Integrated Oils sector, industry and sub-industry respectively. The company was founded 5th August 1882 and is headquartered at 5959 Las Colinas Blvd, Irving, Texas, 75039 United States [1]. ExxonMobil is America's largest publicly traded oil company and has 75,000 employees. The acting CEO is Darren W. Woods. ExxonMobil is one of the most profitable companies in the world's history.

2.2 Operations

ExxonMobil have upstream (red), downstream (blue) and chemical (yellow) operations around the globe (See figure 1).

2.2.1 Upstream

This business division includes the exploration, development, production and processing of conventional and unconventional fuel types. The projects are complex and capital intensive including oil, natural gas, heavy oil and deepwater projects. ExxonMobil's major upstream projects are deepwater oil extraction (Guyana, Brazil) and upstream liquified natural gas (LNG) (Mozambique, Papua New Guinea) [3]

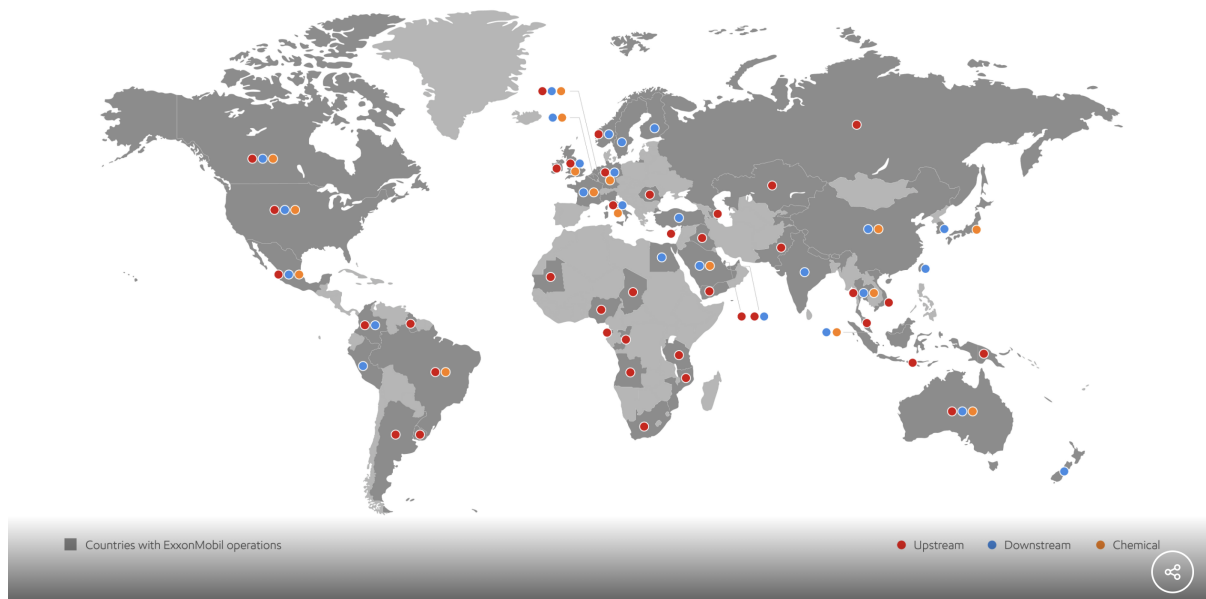


Figure 1: ExxonMobil Global Operations

2.2.2 Downstream

This business division refines, manufactures and distribute products derived from crude oil and other feedstocks. Synergy fuels (Petroleum, Diesel etc.) are distributed through Esso, Exxon and Mobil-branded retail service stations to millions of customers. Global business to business segments (Industrial, Wholesale Fuels, Aviation Fuels & Lubricants and Marine Fuels & Lubricants) are sold to businesses around the world.

2.2.3 Chemical

This business division is one of the largest chemical manufacturing companies in the world as produces sales from approximately 25 million tonnes of prime products annually [2].

2.3 Financials

The company faced a challenging 2019. Profits fell 31% year on year to \$14,340 million (USD) with debt levels rising 24%. Revenues fell 8.7% to \$264,938 million. Total assets were \$362,597 million with Total Stockholder Equity \$191,650 million. Investors received a 7.2% return in 2019. The total return to investors, annualized over a 10 year period, is 3.5%. In 2020, ExxonMobil was 3rd on the Fortune 500 [4].

2.4 Organizational Structure

Each country ExxonMobil operates in is a subsidiary of the global company and is led by a Lead Country Manager. ExxonMobil Australia is the subsidiary based in Australia. I was based in the Upstream - Commercial team at ExxonMobil Australia. ExxonMobil Australia has both Upstream and Downstream business divisions. Upstream manages the extraction, processing and commercialization of Natural Gas from the Bass Strait

Assets. Downstream refines crude products using the Altona Refinery and distributes fuels using the Yarraville Terminal.

2.4.1 ExxonMobil Australia Upstream Structure

The leadership team is composed of representatives from each of the subsequent business units who execute the subsidiary's strategy set by the global company.

- **Leadership:** Inform and execute the subsidiary's strategy under the Leadership of the Lead Country Manager.
- **Commercial:** Inform pricing strategies, negotiate gas contracts, manage operating logistics and negotiate new drilling operations.
- **Wells:** Manage the installation and maintenance of well heads on production platforms.
- **New Developments:** Manage the exploration process of finding new gas/oil blocks to investigate for production.
- **Safety, Health and Environment (SHEs):** Manages safety, health, environment and risk requirements for ExxonMobil Australia's operations.
- **Integrity:** Manage the integrity of production and processing assets.
- **Drilling:** Manage the drilling of new wells.
- **Platform Surveillance and Optimisation (PS&O):** Manage the operations of production platforms in the Bass Strait.
- **Onshore Surveillance:** Manages the operations of onshore gas processing assets.
- **Audit, Legal & Tax:** Manages the auditing, legal and tax reporting requirements of ExxonMobil Australia.

2.5 ExxonMobil Australia Operating Assets

1. Corporate Office

- Levels 9, 10 and 11 of the 664 Collins Street office.
- Seven boardrooms, twenty meeting rooms, two lunchrooms, cubicles of six hot desks with two external monitors per desk.
- Laboratory with private drug testing equipments, doctor's office and in-house physician.

2. Yarraville Terminal

- A distribution facility complete with storage tank farms and fuel distribution infrastructure.

3. Altona Refinery

4. Long Island Point Processing Plant

5. Longford Gas Processing Plant

- One crude treatment train.
- Three gas processing trains for sweet gas (Low carbon dioxide content).
- One gas conditioning plant for sour gas (High carbon dioxide content).
- Office site with various offices and a cafeteria.
- Private helicopter port with five Agusta Westland AW139 helicopters.

6. Barry's Beach Marine Terminal

- Supply terminal complete with supply vessels.

7. Bass Strait Production Platforms

- 23 Production Platforms connected by an underground pipeline network to the Longford Processing Plant.
- All production platforms are named after fish.

3 Personal Work Experience

Disclaimer: I signed a non-disclosure agreement on the last day of my employment. I can provide general descriptions of the work undertaken but may not disclose pricing strategies or volumes traded. I was assigned two projects while working at ExxonMobil Australia as a member of the Upstream - Commercial Team.

1. GBJV Optimisation Model
2. Storage Optimisation Model

Additionally, we toured all processing assets and undertook comprehensive training.

3.1 GBJV Optimisation Model

The GBJV Optimisation Model is an Excel-based optimisation model to forecast the production capabilities of ExxonMobil's \$3B (AUD) share of the Gippsland Basin Joint Venture assets. The model analyses the quantities of gas available for sale, informs ExxonMobil's Victorian gas marketing strategy, and considers separate gas balancing agreements. I took an existing model and built a brand new model from scratch. This project took 100 hours.

3.1.1 Modelling Process

1. Determine project structure and timeline from understanding the project brief.
2. Familiarization with the functionalities of the existing model.
3. Understand the technical engineering involved in platform production (Rates of production determined by remaining volumes and reservoir prioritization).
4. Understand the commercial and legal implications of the Separate Gas Balancing Agreement between ExxonMobil Australia and BHP on reservoir entitlements.
5. Engage with key stakeholders to project requirements to scope new functionalities.
6. Begin prototyping a new model with new functionalities.
7. Incorporate the use of Power Query to manipulate and import data external needed for the model to improve computational efficiency.
8. Receive feedback to make improvements to the model.
9. Write VBA macros to run simulations and produce multiple outputs.
10. Finalize Model
11. Conduct user testing
12. Write handover documentation

3.1.2 Results

The project was successful. The model met both stakeholder and functional requirements, was user friendly and contributed to a great performance review.

3.2 Storage Optimisation Model

The Storage Optimisation Model is an Excel-based 3rd party storage optimisation model to optimize ExxonMobil's sales strategy from an onshore storage facility. The model compares different sales strategies, informs how to maximize gas revenue, and ensures ExxonMobil meet their gas storage contractual obligations. No existing solution exist so I built this new model from scratch. This project took 200 hours.

3.2.1 Modelling Process

1. Determine project structure and timeline from understanding the project brief.
2. Read and Review the Gas Storage Services Agreement (commercial and legal contract between parties)
3. Catalogue sets, parameters, objective function, variables and constraints from the Gas Storage Services Agreement.
4. Understand the economics behind gas prices and consumer behaviour in the Australian market.
5. Begin prototyping a new model with new functionalities.
6. Incorporate the use of Power Query to manipulate and import data external needed for the model to improve computational efficiency.
7. Receive feedback to make improvements to the model.
8. Write VBA macros to run simulations and produce multiple outputs.
9. Tour the storage facility to understand the technical elements of natural gas storage and transportation.
10. Finalize model
11. Conduct user testing
12. Write handover documentation

3.2.2 Result

The project was successful. The model met specifications, was user friendly and contributed to a great performance review.

3.3 Presentation

One key deliverable was making a presentation on both projects to the recruitment team, executives and other vacation students. This encompassed a ten minute powerpoint presentation followed by five minutes of questions and answers.

3.4 Site Tours

I spent 100 hours completing site tours. ExxonMobil Australia has an unique position in Australia as has a vertically integrated supply chain. We took time touring each facility. We spent a week in Sale, Victoria touring the Longford Gas Plant (Figure 2) and

completing associated trainings. We toured several other assets: Altona Refinery (Figure 3), Long Island Point Gas Processing Plant and the Yarraville Terminal (Figure 4).



Figure 2: ExxonMobil Vacation Group at the Longford Gas Processing Plant

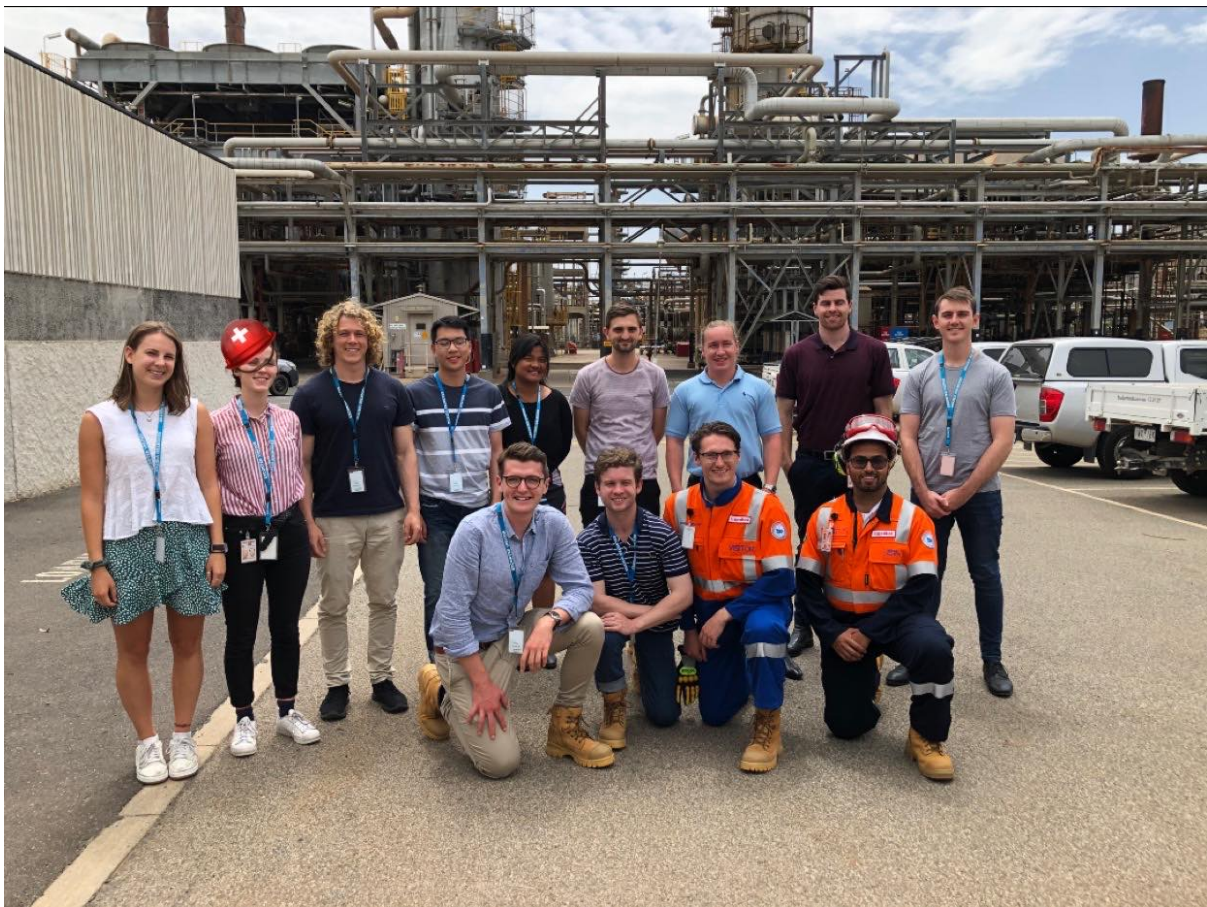


Figure 3: ExxonMobil Vacation Group at the Altona Refinery



Figure 4: ExxonMobil Vacation Group at the Yarraville Terminal

3.5 Training

I completed 50 hours of training.

3.5.1 Geology and Geophysics

A subject matter expert explained the technical operations of using Geology and Geophysics to find new oil reserves in the Highlands, Papua New Guinea.

3.5.2 New Developments

Tim from New Developments explained the processes involved in finding new gas and oil blocks in the Bass Strait.

3.5.3 Lead Country Manager Session

Nathan Fay (Lead Country Manager of ExxonMobil Australia) led a session on ExxonMobil's strategy, market position and the future of energy from ExxonMobil's perspective.

3.5.4 Toxic Substances

We completed safety procedures on hazardous substances produced when processing hydrocarbons.

3.5.5 Onshore Safety

We completed safety courses on how to operate and execute safe work practices on Onshore processing facilities.

3.5.6 Fire Fighting

We were taught the science behind fight fires and were trained to use fire extinguishers.

3.5.7 Helicopter Underwater Evacuation Training (HUET)

The vacation students were trained to evacuate platforms, execute water-based emergency procedures, survive in the Bass Strait and evacuate submerged helicopters.

4 Reflective Appraisal

I was uncertain to take this opportunity as received backlash for considering working for an oil and gas major. I can confidently say the summer vacation programme at ExxonMobil was one of the best in Australasia. There is nothing like it in New Zealand. I was most impressed with the quality of the internship and the investment in the interns. ExxonMobil flew 45 applicants from around Australia and New Zealand for a half hour interviews while covering all expenses. They selected fifteen from this pool of applicants who were some of the best and brightest engineers from around Australia. The company found us accommodation and covered 75% of rent. We received high quality training as they spared no expense on the interns. This was a once in a lifetime opportunity.

4.1 ExxonMobil: Impressions and Performance

It's difficult to understand how much influence and power the ExxonMobil have until you work at the company.

4.1.1 Personnel

ExxonMobil truly does hire some of the best engineers from around the World. I met some of the brightest engineers I have come across who won their respective university medals and are worldwide subjective matter experts in disciplines such as geology, process engineering and instrumentation. My team were incredibly experienced having worked across the world in various roles in different business units such as Drilling, Downstream Commercial, Gas and Power Marketing I learned a lot from Johanna Boothey who is the Commercial Manager. She is very senior as has worked across the world in various roles including in Russia as a Drilling Manager. Her leadership informs my own in both leading and managing high performing people. I learned a lot about how to bring out the best in those I lead.

4.1.2 Influence

ExxonMobil has a lot of influence globally. ExxonMobil Australia produces approximately 40% of Victoria's Natural Gas Supply. The Prime Minister of Australia use to receive daily production reports from ExxonMobil when the Bass Strait was producing 80 mega litres of Crude Oil per day. I was working with Gas Schedulers in Budapest who control gas scheduling operations around the world. ExxonMobil leverages global subject matter experts from around the world to build and operate assets. ExxonMobil negotiates with foreign governments on behalf of consortiums as witnessed in the Commercial team.

4.1.3 Performance

ExxonMobil are behind their competitors in adopting sustainable energy technologies in established markets. Their focus is pivoting their existing business models from mature markets to emerging markets. The nature of a large organisation and the required focus on safety makes progress and innovation very slow. The optimisation models were Excel-based and pushed the limits of excel's capabilities. The models would have been more efficient if python-based but needed to be Excel-based due to the turnover in the Commercial team and the skill requirements to use the tools. ExxonMobil moves you around the different business divisions to both give you exposure to the different aspects of the company and to give you promotion opportunities. You are either promoted upwards based on performance reviews and internal sponsorship or moved laterally into a new role. You are ranked against everyone at your level. Top performers are given the most exciting and offshore opportunities.

4.2 Skills

I developed a comprehensive set of skills.

4.2.1 Technical

1. **Power Query:** Use of Power Query to manage external databases and integrate with Excel.
2. **VBA Programming:** Use of VBA to run simulations, automate pivot tabling and data visualization.
3. **Process Modelling:** Ability to model the technical capabilities and production of 23 operating platforms and an onshore production facility.
4. **Excel Modelling:** Ability to build Excel-based Network and Process Models.
5. **Presentation:** Communicate complex engineering concepts succinctly with conviction.

4.2.2 Emotional Intelligence

1. **Managing Expectations:** Ability to manage stakeholder project expectations.
2. **Communication Skills:** Ability to communicate and liaise with managers with varying levels of seniority.

3. **Help Recognition:** Ability to reach out and ask for help when required.

4.2.3 Leadership and Management

Most of these lessons were learned from observing the Leadership and Commercial team.

1. **Rebalance Workload:** Ability to prioritize the Health and Wellbeing for team members by reassigning work accordingly.
2. **Balance Praise with Criticism:** Ability to balance praise with criticism when reviewing work.
3. **Lead during Uncertainty:** Lead teams when your organisation faces budget cuts, protesting and pandemics.
4. **Speak with Conviction:** Ability to run team meetings and speak with conviction.

4.3 Confidence

My experience at ExxonMobil gave me a big boost in confidence and taught me to believe in myself. I have struggled with both tall poppy syndrome and imposter syndrome for many years. When I started at ExxonMobil, I felt out of place and questioned like why they hired me. After some self reflection and support, I realized I was capable and could be one of their best. I know now I can do anything I put my mind to.

5 Conclusion

In conclusion, my internship in the Commercial team at ExxonMobil Australia was an unique, once in a lifetime opportunity. I completed the following:

- Learned a lot about ExxonMobil.
- Built the GBJV Optimisation Model.
- Built a Storage Optimisation Model.
- Completed various site tours.
- Completed various trainings.
- Developed technical, emotional intelligence, leadership and management skills.
- Developed more confidence in my abilities.

I look forward to using the lessons I learned and the skills I developed for the rest of my career.

References

- [1] Bloomberg. *ExxonMobil Corporation Company Profile*. <https://www.bloomberg.com/profile/company/XOM:US>. Aug. 2020.
- [2] ExxonMobil. *ExxonMobil Business Divisions*. Available at <https://corporate.exxonmobil.com/Company/Who-we-are/Business-divisions> (2020/08/27).
- [3] ExxonMobil. *ExxonMobil Investor Presentation*. Available at <https://corporate.exxonmobil.com/-/media/Global/Files/investor-relations/Investor-presentation.pdf> (2020/08/27).
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