

THE BRINK OF OIL AND GAS ENERGY: A GREAT LOSS?

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ABSTRACT

There are many persistent local and international conflicts in oil producing countries due to power struggles among the leaders, to have a total control on oil and gas supplies, etc. These conflicts have disrupted the oil and gas production and supplies which at one point saw the world's oil price hit an all time high of US\$147.27 on 11 July 2008. The high oil price was due to escalated demand than supply, and in reality there is no shortage of conventional oil and gas resources. In fact, the Earth has nearly 1.688 trillion barrels of proven crude oil, which will last 53.3 years at current rates of extraction. The problem lies in produceability and accessibility to those resources. Currently the oil and gas industry is facing a very challenging period with the world's oil price has dropped sharply from above US\$100 per barrel to US\$50 per barrel as of 5 November 2015 due to the slowing demand from China, the United States of America, Japan, and Europe. As a result, many local and international oil companies and service companies have released or terminated their technical staff. Oil companies have to reduce their production cost or break-even dollar value per barrel in order to survive in this difficult time. On the other hand, this difficult environment will not stop the Department of Petroleum Engineering from offering the same number of places for the Bachelor Degree in Petroleum Engineering programme to Malaysian and international students. Via the accredited programme and UTM Professional Skills Certificate, those petroleum students are prepared for local and global markets.

INTRODUCTION

The main source of energy for mankind to realize their daily activities is petroleum. It needs millions of years to form crude oil and gas from algae and plankton in the Earth's Crust but it is still regarded as non-renewable energy. Even though the petroleum reserves are dwindling but men are continuously chasing and fighting for this valuable commodity instead of focusing on renewable energies.

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It is not uncommon to find many persistent local and international conflicts over the control of oil and gas supplies since the unforgettable 1967 Oil Embargo – several Middle Eastern countries limited their oil shipments, some embargoing only the United States of America and the United Kingdom while others imposed a total ban on oil exports with an intention to prevent any countries from supporting Israel militarily. Those conflicts may be in the form of territorial disputes over the possession of oil-rich areas, power struggles among the leaders of oil-rich countries, etc. (Deffeyes, 2001). As a result, the oil conflicts have left a sustained economic crisis in those countries and also resulted in millions of innocent people wounded, killed, or taken prisoners. There were many voices indicated that as crude oil and gas become more scarce, the frequency and severity of such a conflict would elevate.

Today, we can notice there is no sign that Middle Eastern countries are in the path of easing the tension in that area. The same goes to oil producing countries in Africa. In Malaysia, it is getting tougher to find ‘easy oil’ reserves. In fact, oil and gas companies in Malaysia nowadays have to venture into deep water to look for hydrocarbon resources and so far, the exploration efforts were fruitful with the findings of Kikeh, Malikai, Gemusut Kakap, Kebabangan, etc. To arrest the dwindling of its reserves, Petronas – a wholly owned company by the Malaysian Government – has ventured into Vietnam, Sudan, Canada (shale gas – an unconventional resource) etc. in order to augment the country’s reserves. Therefore can we say that, “Those scenarios show the world is running out of crude oil and natural gas imminently”?

GLOBAL SCENARIO

If the answer for the preceding question is ‘Yes’, then it is a great loss to mankind because oil and gas are prime source of energy to us. Renewable energy may be the alternative energy solution but it is still insufficient to satisfy the world’s needs for energy. It also involves with high capital and perhaps operational costs if we decided to derive energy from solar, wind, biomass, etc. (Diesendorf, 2007).

If we are looking from global perspective, the answer should be ‘No’. As per BP’s annual report, as of the end of 2013, the Earth has nearly 1.688 trillion barrels of proven crude oil (Figure 1), which will last 53.3 years at current rates of extraction (Tully, 2015). It is interesting to note that during the past 10 years, proven reserves have risen by 27 percent, or more than 350 billion barrels. The truth is there is no shortage of conventional oil and gas resources. The problem lies in produceability and accessibility to resources.

Even though oil and gas companies are still finding new crude reserves but unfortunately new extraction methods are costly and may pose environmental problems. So, it is very important for the oil and companies to keep the cost of production per barrel or the *break-even dollar value per barrel* as low as possible without sacrificing health, safety, and environment. Generally, the break-even dollar value per barrel depends on factors such as conventional or unconventional resources, geological conditions, cost of labour, age of the oilfield, etc.

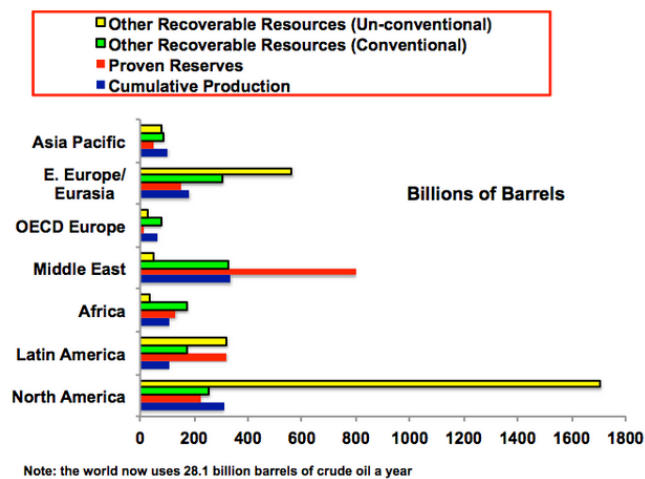


Figure 1 The world's recoverable resources (Tully, 2015)

According to Vinnakota (2014), Saudi Arabia operates at the lowest marginal cost of \$3 per barrel at the minimum while the rest of the middle-eastern OPEC countries' break-even dollar value per barrel is around US\$6 to US\$9 per barrel (Figure 2). International and local oil and gas companies in South-East Asia, North Sea, and the Gulf of Mexico incur a cost of from US\$50 to US\$80 per barrel for producing from offshore oil fields and the cost may increase further for deep water and ultra deep water fields with HPHT wells. As a comparison, the break-even dollar value per barrel for producing crude oil from tar sands (unconventional resources (Ma, 2015)) in Canada is around US\$80 per barrel.

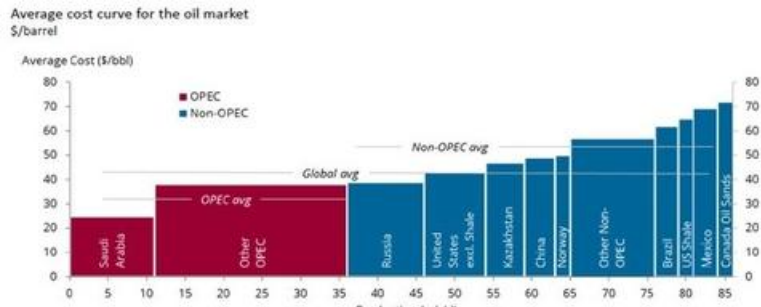


Figure 2 Oil producing countries' break-even dollar value per barrel (Vinnakota, 2014)

The current world's oil price of below US\$50 per barrel has caused oil producing countries feeling the pinch as oil exports are a key component of their GDP. The oil producing countries in South-East Asia are of no exception, especially those operating with US\$50 cost of production per barrel or more.

It is widely known that crude oil and gas industry is cyclical. Now the world's oil price has been hovering around US\$40 to US\$50 per barrel and may be near to the bottom of the cycle! The oil price is influenced by the demand and supply. Currently, the slowing demand from China, the US, Japan, and Europe has negatively impacted crude oil prices in the short term and may in the medium term (Figure 3). According to Yao and Qing (2015), "China grew at its slowest pace in six years at the start of 2015 and weakness in key sectors suggested the world's second-largest economy was still losing momentum, intensifying Beijing's struggle to find the right policy mix to shore up activity."

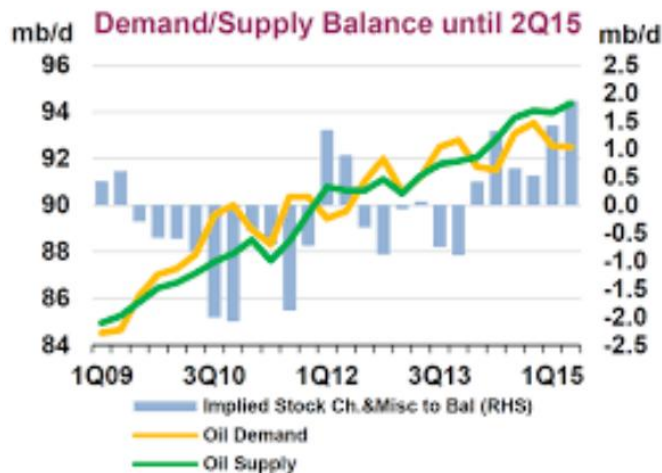


Figure 3 Demand and supply of crude oil from 1Q09 till 1Q15 (Tully, 2015)

Many international and local oil and gas companies in those countries have suspended or shelved their new exploration and drilling operations. Consequently, this effect has spilled over to international and local service companies in the respective country that has led to release or termination of their technical staff. In this difficult and challenging environment, many of those companies are still recruiting, albeit a smaller number of new bloods, for their sustainability once the oil price recovers.

UTM'S ROLES IN THIS CHALLENGING PERIOD

The slowing down of exploration and drilling activities, in some cases deferment, by international oil and companies including Petronas in Malaysia – which may worsen next year – coupled with the crude oil price and consequently oil and gas activities which may take about two to three years to recover, these scenarios have affected new hires. But the Department of Petroleum Engineering of Universiti Teknologi Malaysia continues to provide the same number of places for Malaysian students who are interested to enrol in its Bachelor Degree of Petroleum Engineering programme. It is a four-year accredited programme (done by the *Engineering Accreditation Council* (EAC) – a delegated body by the Board of Engineers *Malaysia*) to produce well-rounded petroleum graduates for Malaysia and global markets. It is interesting to note that there was a sudden increase in enrolment for the petroleum postgraduate programmes, namely Master of Science in Petroleum Engineering (both in Johor Bahru and Kuala Lumpur), Master of Petroleum Engineering, PhD in Petroleum Engineering in 2015. In fact, it is the right time for the graduates and professionals to improve their skills and/or acquire higher and relevant qualifications (which may take two to four years to complete) prior to recovery of oil and gas activities.

All the undergraduate (UG) students are required to pass and complete their basic sciences, mathematics, basic engineering, and petroleum engineering courses within the four-year period. The UG students are exposed to oil and gas activities via their industrial training while the capstone courses during the final year require petroleum students to apply the contents that they have learnt from Years 1 to 4.

All students are encouraged to join their respective societies, namely SPE-UTM Student Chapter (SPE-UTM), Gas Engineering Student Society (GESS), etc. These societies are very active in organizing activities that can enrich students' technical knowledge and

improve their generic skills, such as International Oil and Gas Symposium (by SPE-UTM), Energy and Technology Camp 2015 (by GESS), etc.

The curriculums for the UG Petroleum Engineering Programme have been designed as outlined by the Engineering Accreditation Council Malaysia such that petroleum graduates should achieve satisfactorily (i.e., with KPI of 65%) all of the following programme learning outcomes upon graduation (EAC, 2013):

- (1) Acquire and apply knowledge of mathematics, science, engineering fundamentals, and petroleum engineering principles to solve complex petroleum engineering problems
- (2) Identify, formulate, research relevant literature and analyse complex petroleum engineering problems
- (3) Design solutions for complex petroleum engineering problems that fulfil public health and safety, cultural, societal and environmental considerations
- (4) Investigate complex petroleum engineering problems using research-related knowledge and methods to provide conclusive results
- (5) Develop or utilize appropriate techniques, resources and modern engineering and computational tools to complex petroleum engineering activities with an understanding of the limitations
- (6) Apply reasoning to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice
- (7) Identify the impact of petroleum engineering solutions in societal and environmental contexts and demonstrate the needs for sustainable development
- (8) Practice professional ethics with full responsibility and integrity
- (9) Communicate effectively on complex petroleum engineering activities through written and oral modes to all levels of society
- (10) Function effectively as an individual, as a member or leader in a team that may involve diverse multi-disciplinary settings
- (11) Acquire knowledge and engage in life-long learning in the broadest context of technological change
- (12) Demonstrate and apply knowledge on finance and management principles and acquire entrepreneurship skills

After working for three years in the oil and gas industry, they should satisfy the following programme educational outcomes (FPREE, 2015):

- (1) Graduates perform in oil and gas industries and become important contributors to national development.
- (2) Graduates become creative, innovative and adaptable engineers regardless of their position as leaders or team members in their organizations and society.
- (3) Graduates contribute professionally towards environmental well-being and sustainability development.

To improve further UTM students' generic skills, they are required to attend all the courses listed under the UTM Professional Skills Certificate:

- (1) How to Get Yourself Employed
- (2) ISO 9000:2008 Quality Management System Requirement
- (3) Occupational Safety and Health Awareness
- (4) How to Manage Your Personal Finance
- (5) Test of English Communication Skills for Graduating Students

For instance, *How to Get Yourself Employed* is offered to all 3rd and 4th Year students. The contents of the module are: (1) What Do I Want?, (2) What Employers Look For, (3) Job Search Plan and Research, (4) Resume and Cover and Thank You Letter Preparations, (5) Presenting Yourself, (6) Pre-Interview Preparation, (7) Facing the Interview, and (8) Managing Interview Success and Failure. Those students are then exposed to a mock interview.

**ACADEMIC EXCELLENCE IS OUR TOP PRIORITY:
FROM STUDENTS' PERSPECTIVE**

This segment was written by *Abdul Hakim Mazeli*, a bright Final Year petroleum engineering student. He is doing very well with both academic and outside classroom activities.

It has been told that in a university life, we have to choose between good grades, social life, or a nice sleep. I beg to differ. It is possible to have all of them, with the most important aspect in determining the productivity of university life – time management. I was

brought up in a simple family background, with no special methods or outstanding behaviour to achieve success. It is all about the simple things. Habits, that most of us have forgotten, or even, taken granted of.

I've always been passionate about studying. Most students have taken that as a part of their job, or rather routine that needs to be fulfilled. In fact, some of us, do it for the sake of our parents, which is a good thing, but not entirely fulfilling. I've taken up studying as a way of life, something I've enjoyed greatly throughout my schooling years. There's so much to learn about, and my morbid curiosity have always gotten the better of me.

Everyone has been searching for the best method of studying in their whole life. Perhaps it's because the great amount of joy I've received upon studying, but I personally feel that there's no such thing as the best method. There are always all kinds of fun and interesting ways of studying, to constantly spark our interest in our field of study. Especially in this hyper connectivity era, all information can be received effortlessly through the Internet and social media. It is most crucial, that us, as students should always keep up with current news, whether in our field of study, or everything else. This is to remind us of the days ahead of us, where we will be a part of, working as a part of society. Sure, university life is entertaining and amazing. But, this is not the end point. We can't possibly live in this bubble our whole life pretending not to care about the future. In fact, university is the starting point of our life. Which is why it is very important to prepare for the future, to gain as many knowledge and soft skills as possible. What is the best place to gain all these benefits other than the university?

In general, it has been said that who we are and what we accomplish depends largely on a vast network of routines and behaviours that we carry out with little to no thought whatsoever. As a student, I've made it a point to stick to routines every day, and create good lifestyle out of it. Every day, I will always wake up early to attend classes on time, and sit in the front row. The phrase *early birds get the worms* has always been my mantra, to ensure a good start of the day. A great start with a proper breakfast can always make us feel good about the rest of the day. It looks like a small thing to think of, but my days have never been greater.

After my lectures and classes, I've always dedicated my evenings for physical activities such as footballs and cycling. In fact, I'm also involved in sports competition such as the Higher Learning Institution Game (SUKIPT). Students do not necessarily need to dedicate their 24 hours in studying only. I personally think that, it is better to manage time well, in order to be an all rounder student. In fact, 24 hours is a vast amount of time, if we

manage it wisely. I've divided my time evenly for studies, sports, personal time, and also organizational work. Of course, it looks like a tiring job to manage everything daily, and to perform excellently in all aspects. Honestly, it is actually possible and very satisfying to be able to do so.

After classes in between breaks, I will always take the time to review the lecture slides, sometimes jotting down notes. Research has shown that we can easily forget what we read in the past 24 hours, if we failed to repeat them. Therefore, I will always allocate some times to review the slides after lectures. This does not even take much time, but have a profound effect on sustaining knowledge.

Consistent learning has trained me to make early preparations for all sorts of quiz, exams and presentations. One of my biggest pet peeves is last minute preparations. I find it truly comforting to be able to make thorough preparations for all sorts of things. Hence, the good results through full marks in quizzes and CGPA 3.56, in which my knowledge is tested, has always given me abundant joy and satisfaction.

Besides that, it is very important to have a realistic target. With these checklists, we can list down the *modus operandi* in order to achieve our very own target. Furthermore, it helps to maintain my focus from time to time. It is all about our mindset. Once we've set our goals, we tend to make all efforts possible to achieve them. In long terms, I've set my goals to further studies in United Kingdom until the PhD level. And in near future I've set my goals before the semesters to achieve excellent CGPA. I've always challenged myself to do better than yesterday.

Even though studies are my number one priority, I've allocated some of my precious time for another passion of mine which is volunteering works. This is what drove me to be a part of Universiti Teknologi Malaysia's Student Representative Council (UTM SRC) as General Secretary in 2014/2015 and Deputy Secretary in 2013/2014, which addressed the students' needs besides giving me opportunities to get involved in such volunteering works. In fact, UTM SRC is the right place that empowered my soft skills, such as leadership, social networking, and also public speeches. One of the most memorable events was the 1 ringgit 1 nation program, in which we travelled across five states in five days to help the homeless. We also travelled all the way to Medan, Indonesia to continue the second phase of the program. Truth to be told, it was an eye opening experience for me, how fortunate I am compared to these people. Besides that, I'm also actively involved in soup kitchens and community works. I do believe in the saying, the more you give, the more you get back. And the satisfaction upon joining these programs is simply priceless.

During holidays, I've also dedicated my time joining the youth programs organized by various NGOs and universities. Among them were CHANCE and Leadership Summer Camps organized by UMNO's overseas clubs and Student Leaders Conference organized by National Student Secretariat. These help to widen my social circle and improve my public relation. Through these events, I've also gotten the opportunities to meet leaders of the nation, including Malaysia Prime Minister, Dato' Sri Mohd Najib Tun Razak. Competitions such as Petrobowl Regional Qualifier (Asia Pacific), gave a great opportunity to represent our beloved university, and furnished us the pride for being a part of UTM, especially when ending up in top eight elite of the competition.

For preparation towards future career life, I've completed my summer internship programme at Technip Geoproduction (M) Sdn. Bhd. It was a great exposure to the oil and gas industry, besides giving me an opportunity to work alongside fellow engineers and expertise. Definitely it was a memorable one.

To sum all experiences in UTM and put it into words will not do them justice. UTM has nurtured me into who I am today. All these programs are not just plain activities to fill up my time, they are life lessons that I couldn't possibly get anywhere else in the world. All these experiences have successfully shaped me into a better man, not only in academic but also in curricular activities and social life. As I said before, it is possible to have all of them.

INTERNSHIP EXPERIENCE

This segment was contributed by *Mohd. Anas Asalem*. He would like to take this opportunity to share his *international experience* with readers and eventually motivate them to be a better person.

Industrial training is one of the main UTM requirements for all undergraduate students to receive the degree certificate at the end of their study. It has been almost a year since oil prices hitting low after OPEC's November 2014 decision not to cut the production margin. Affected by that, the opportunities for students to be placed for internship with the oil and gas players have intensely declined.

Fortunately, I was offered to do my internship at Schlumberger which is the world's largest oilfield services company. The path of getting into this well-known company was not easy. I had put a lot of efforts and had a bit of luck. Since this company provides the industry's widest range of products and services for oil and gas upstream sector, it requires a lot of passion and focus to be a good intern.

As a university student who spends most of the time studying and going through formal education system, it's quite difficult for me to adapt to fast-paced work-driven environment. All of my colleagues will be doing their job efficiently and make sure that they completed the task correctly all the time. This is a very good lesson for us, students who tend to make mistakes without even checking it for several times besides the habit of doing the task or assignment at the very last minute before the submission date. It is something valuable that you may learn when you have the right exposure towards what it can cost you if you do mistakes in real life.

Being in this multi-national company makes you feel as if you are not in your own country because there are a lot of employees coming from different countries all over the world. Based on my experience, working with my team members who are from India and Mexico, gives me a lot of rooms for improvement in communication. Yes, it honestly does. Petroleum engineers are surprisingly friendly. Most of the time, we heard rumours about these people receive a huge amount of pay. After I have experienced the environment, I can assure you that the workload is seriously worth the pay.

This priceless experience of internship should not be wasted by anyone. Students who will do their internship during this dipping oil price should build their passion and grab the most from your host company. You must keep this in mind, passion makes you hungry for excitement and confidence comes when you have the passion. It is a stepping stone in your professions that will prepare you for the better future.

NURTURING A FUTURE LEADER

This segment was written by *Mohd. Anas Asalem*, another bright Final Year petroleum engineering student. He is the President of SPE-UTM Student and can speak three languages including French. He has shown an outstanding performance both in academic and societal activities.

Involving in the oil and gas industry is undeniably challenging. Just like other professional lines, oil and gas industry has its own organization. It is well-known as SPE which stands for Society of Petroleum Engineers. It has a recognizable stand in the world. As the largest individual members' organization serving professionals in the upstream oil and gas industry, SPE represents 143 000 members in 147 countries. The society's alarming growth is built on a solid foundation that embraces a diversity of languages, cultures, and locations to form a cohesive organization serving members since 1957. In sustaining the quality of this upstream sector, SPE has established and credited student chapters worldwide. As of today, there are 333 student chapters all over 121 countries.

Each student chapters has a president and its supporting organization. In order to be the president, there are a few steps and qualifications that need to be considered. The responsibilities are quite weighty on our shoulder as the society will be graded and awarded by year-based of the society's achievements and progressions. SPE-UTM SC has been consistent in achieving awards for the past nine years and their latest achievement was '2015 Outstanding Student Chapter Award'.

As a SPE-UTM student chapter's President, there are a lot of unexpected problems coming to us as we hold the throne. One of the obvious problems was the lacked participation of the chapter's members. This was crucial and agreed by most of the chapters' leaders during our latest meeting in Kuala Lumpur. One of the solutions took by our board of officers is to put some innovations on our planned events instead of being comfort with what we had done the previous year. Based on the feedbacks we have received, the participation number of a specific event has increased to 98% which was quite impressive for a short term impact. On the other hand, it appeared to us that the commitments given by our students are increasing in all activities we have organized. It shows that they have the passion to be an active member.

During this downturn of oil and gas sector, students are advised to take the opportunity in any terms to develop their skills. Competitiveness is one of your assets that will give a better chance in your future recruitment process. Students should be proactive and consider this downturn phenomenon as a positive way to motivate them to become a petroleum engineer.

CONCLUSION

Oil and gas is a cyclical industry. Even though there are many local and international conflicts in oil producing countries but the slowing demand for crude oil from China, the United States of America, Japan, and Europe has pushed the oil price to US\$50 per barrel as compared with US\$147.27 on 11 July 2008. This scenario reveals that there is no shortage of conventional oil and gas resources. In fact, the world's latest proven crude oil can last 53.3 years at current rates of extraction. Apart from obtaining a new method or surfactant to produce the residual oil from reservoirs, the world should solve the conflicts and improve the produceability and accessibility to those resources. It is interesting to note that many countries including Malaysia are conducting extensive research works on natural resources to generate sufficient renewable energy for mankind at lower prices – this may take a long journey. Even though crude prices are getting hammered as concerns over a supply glut

deepen and this may worsen next year, this environment will not deter the Department of Petroleum Engineering of Universiti Teknologi Malaysia from offering the same number of places for the Bachelor Degree in Petroleum Engineering programme to Malaysian and international students. It takes four years to produce petroleum graduates for local and global markets, and hopefully by then, the oil price will recover to a healthier level.

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