THE GAME CHANGERS

SHAPING OUR ENERGY FUTURE

BY WPC YOUNG PROFESSIONALS 2016
“What is Petrobras doing to improve its management?”

We have been performing several changes in order to reinforce the Company’s corporate governance. Among other measures, the contracting and management of suppliers has become stricter. We have also revamped our Complaint Channel, which is now being run by an independent and specialized company.

You have questions. We have the answers. petrobras.com
CONTENTS

Editorial
“The game changers”: what’s in a name? … 3
Hasnaa Lamik

Fostering our generation’s energies …… 4
Katharina Grunenberg & Stéphane Rousselet

A vision on the change and outlook …… 5
of the industry and its meaning for
young professionals
Dr József Toth

A crew change to change the game …… 6
Milton Costa Filho

YP Highlights
by Gudrun Lemmerer

WPC Future Leaders Forum Brazil: ……… 7
building new ways to change the game
Victor Couto Alves

The energy future from a young……………… 8
professionals’ view – conclusions
shaping industry transformation
Laura García Chiquero & Manuel Hurtado Hernández

YP Connect: join the World Petroleum …… 11
Council Young Professionals
Connect group on LinkedIn!
Ali Rahneshin

WPC Mentorship Programme: ……………… 12
share, learn and network!
Varsha More

The road to Istanbul: Turkey – ………… 13
your next destination
Ümmügülsüm Uğurluer

Legacy and Sustainability
by Anna Illarionova

An exciting and ambitious agenda for …… 15
the oil and gas industry post COP21
Georg Oftedal

Transitory era in energy: …………………… 17
from grey to green
Sila Bozok

Energy scenarios of the future ……………… 19
Anne-Fleur Plassais & Angelos Platanias

EU carbon trading: an efficient solution …… 21
for a sustainable energy future?
Aina Neculae & Bodgan Pavel

Technology and Innovation
by Abdulkareem M AlSofi

Oil & gas challenges: ……………………… 23
a Brazilian perspective
Felipe Boteiho Tavares

Competing resources: unconventional………… 24
and the role of technology
Khaid R. AlNoaimi

The role of nanotechnology in …………… 26
oil and gas applications
Jason R. Cox

Virtual reality and it’s use in our ………… 28
industry: how proper utilisation of
technology can improve operators’
competency and safety in the oil
and gas industry
Joe Cheben

Talent/Career Development
by Mathias Mitschanek

Perspectives of a young professional ……… 30
joining the industry
Vijay Anne

The importance of ethics …………………… 31
Lia Medeiros

Full engagement of millennials: ………… 32
the importance of future leaders’
perspectives
Abdulkareem M AlSofi

Stepping outside the box: …………………… 33
oil and gas vs tech start-ups and
young entrepreneurs
Malone Mitchell, 3rd

Bridging Generations
by Salisu Isihak

If I were a CEO ……………………………… 35
Nicole Bogott, Branko Woischwill, Ali Rahneshin,
Oliver Franz Kleinerfutterner, Ahmed Mahmoud
Ibrahim and Sila Bozok

If I were a young professional …………… 37
Hosnia S. Hashim, Besim Şişman,
Chris Osarumwense, Gerhard Thorhauser,
Leopold Bräuer

Pearls of wisdom …………………………… 40
Prof. Anatoly Zolotukhin, Bernadette Spinoy,
M. Zihni Aksoy

Inside back cover
Join the World Petroleum Council
Young Professionals

EDITORIAL TEAM

Hasnaa Lamik, Editor and WPC YP
Committee Member
Morocco & Business
Development, TDE Group,
Austria

Abdulkareem AlSofi, Technology and
Innovation editor,
Petroleum Engineer,
Champion of Chemical
and Heavy Oil EOR,
EXPEC Advanced
Research Center,
Saudi Aramco,
Saudi Arabia

Gudrun Lemmerer, YPC Highlights editor,
Project Consultant,
E.ON Inhouse Consulting GmbH,
Austria

Mathias Mitschanek, Talent and Career
Development editor,
PhD Candidate,
Montanuniversität
Leoben,
Austria

Anna Illarionova, Legacy and Sustainability editor,
Russian representative WPC
YP Committee,
FLF Rio Programme
Committee,
Russia

Salisu Isihak, Bridging
Generations editor,
Supervisor, Project
Investment, Assessment and
Analysis, Nigeria
National Petroleum
Corporation, Nigeria
“THE GAME CHANGERS”: WHAT’S IN A NAME?

Technology has changed the oil and gas industry significantly in recent years – and its impact is felt far beyond, affecting nations and the world’s economy. We as young professionals need to be aware of the world around us and the responsibility that the industry carries in it, which we will “inherit” as the Future Leaders. Reshaping the global energy system towards a more renewable and sustainable future is one of the most pressing challenges in today’s world. So, we have to look to the future and lay that foundation for renewables as best we can. Along with advancing technology, tapping entirely new resources, and the fossil to non-fossil transition, we have to move fast to gain the knowledge and experience required to take on those challenges. Both young professionals and their senior colleagues have to make a combined effort to establish the most effective communication base and knowledge transfer platform in order to manage the challenge of the so-called “big crew change” – the generational handover. In order to do this, we need the best people at the right place: male or female, we need a system of equal opportunities, and we have to focus on talent more than anything else.

Bearing in mind all these areas, a global team of volunteers has come together to make a combined effort to address all the challenges to come. This year’s edition of the WPC Young Professionals (YP) magazine has been designed by a group of young professionals that chose topics and authors to help you prepare for the challenges ahead. Gudrun Lemmerer presenting “WPC Highlights”, Anna Illarionova, editing “Legacy and Sustainability”, Abdul Kareem AlSofi, showcasing latest developments in “Technology and Innovation” both within and outside of the industry, Mathias Mitschanek covering critical evaluation of the current careers opportunities as well as the possible future of YPs in the “Career and Talent Development” section, and Salisu Isihak, who took on the challenge of knowledge transfer in his section “Bridging Generations”.

We would also like to express our thanks to Ulrike von Lonski, Sarah Ashmore, Katharina Gruenberg and Stéphane Rousselet as our Chair and Vice Chair. Without the dedication shown by all the contributors we would not be able to proudly present this magazine to you. Thank you all for your contribution!

We wish you enjoyable reading, and we look forward to the exciting discussions during the Forum.

YOUR FEEDBACK MATTERS
Visit us on LinkedIn and leave your comments or send us your suggestions at: yp-wpc@world-petroleum.org. We’ll be happy to take your comments on board.
Dear readers, dear friends,

Since the last edition of the World Petroleum Council Young Professionals magazine, the industry has entered a new downturn period. The dwindling oil prices have brought companies and nations to their knees and accelerated industrial mergers and acquisitions. COP21 and the growing concerns of the population about global warming have pushed forward the energy transition fostered by investment reorientation and alternative energies. These challenging times will mark our professional and personal lives as we enter or develop our careers in the petroleum industry. However, we also believe that a crisis brings opportunities to imagine a new landscape and to foster innovative solutions and intergenerational dialogue.

In this changing world, our contribution as the World Petroleum Council Young Professionals Committee remains to provide a platform for all petroleum industry students and young professionals. Globally, the national representatives have launched and boosted initiatives aimed at sharing their passion for the industry and bridging the geopolitical boundaries by bringing together global youth perspectives within the industry. The WPC Future Leaders Forum is the highlight of this year and we look forward to bringing the future industry leaders together, with the ambition to collectively contribute to the sustainable growth of our business.

Locally, our volunteers have increased their efforts to multiply the networking and knowledge-sharing opportunities. Let us share just a few examples: In Iran, more than 100 students and young professionals connect continuously to debate their vision while their country and industry open new horizons. Meanwhile, Spain presented its inaugural Youth Petroleum Award, recognising their country’s emerging industry leaders. And of course, Brazil deserves special appreciation: it is gratifying and humbling to see the enthusiasm of the volunteers committed to the success of the Future Leaders Forum. These are examples of successful achievements, and a call for us to build on the momentum they have created.

This momentum will lead the WPC Young Professionals community to the 22nd World Petroleum Congress in Istanbul (9-13 July 2017). Our Turkish friends have put together an extensive programme of lectures, networking opportunities and events to connect all the young participants to the Congress. We look forward to meeting you all and bridging our sustainable energy future together.

On behalf of all the Committee, we would like to thank the volunteers and members of the WPC community!

The WPC Young Professionals Committee.
A VISION ON THE CHANGE AND OUTLOOK OF THE INDUSTRY AND ITS MEANING FOR YOUNG PROFESSIONALS

“Within a sector as diverse as ours the options for a career are vast and can take many different tracks.”

Q: What main changes do you see for the industry at the moment? There is a generally accepted goal to reduce the speed of global warming – and as a consequence of this, oil demand. According to predictions this may plateau in 5-7 years, followed by a slight decrease. If our global consumption rises to 100 Mb/d of oil in 5-7 years from now, that consumed amount needs to be replaced by high-cost new discoveries in order to maintain a continuous level of security of supply. So, the main challenge is being able to balance the security of supply between fossil and non-fossil resources, in order to reduce the carbon footprint.

Q: Do you see changes happening slowly or are the changes rapid? Change is continuous – the cycle is long. The forced introduction of electric cars might bring about a quick change and would result in a surplus in gasoline and diesel fuel. If governments ban the use of new gasoline or diesel powered cars, as we hear mentioned from time to time in the media reports, then the fuel production needs to be replaced by other target production, like petrochemicals, speciality chemicals, etc, and this could be a costly transformation. Young Professionals need to be able to think innovatively to create new demand for these products.

Q: Do you think the oil price and current uncertainty and job cuts will make it harder for Young Professionals to get jobs and retain them? Currently, the biggest concern for the industry is the oil price. As we face a period of change with a low oil price, it makes it hard to implement previous investment decisions. However, our industry is experienced and has to be ready to act once the circumstances allow for that. So the petroleum industry will need the excellence of young professionals, and I therefore encourage all young people to join this sector, which offers a challenging environment.

Q: What other challenges do you think Young Professionals in the oil and gas sector face at this time? When we speak about innovation we should not forget that technologically the oil and gas sector is a high tech industry. To be innovative requires excellence in all technical disciplines, which can be the basis for individuals to make a contribution to further technological development. The same can be said about the managerial, organisational and financial aspects.

Q: What do you feel our industry offers Young Professionals? It provides many possibilities, of course this is also based on the level of performance by the individual Young Professional. They have the opportunity to be part of an innovative environment and will also be exposed to global opportunities and the chance to work around the world. Our industry also offers a chance to understand the world economy in more depth. Within a sector as diverse as ours the options for a career are vast and can take many different tracks.
The steep drop in oil prices in recent years could be seen as just the end of another commodity cycle. However, a closer look reveals this downturn is in fact unique: a super-cycle termination that carries far-reaching implications and structural changes for the energy industry.

Make no mistake, the game is changing. We are currently living in a transition scenario. Energy companies are seeking to survive in the short run through massive lay-offs, mergers & acquisitions, project deferrals and divestments. But if they are to capture future opportunities they will have to go one step further and re-invent themselves.

There is a new energy world coming, where many different trends will shape the future. The industry is trying to understand the consequences these changes will bring about and how best to prepare for that future.

On the supply side, competition from renewable energy, climate change and emissions capping, fast-changing geopolitics and new threats such as cybersecurity will have an increasingly strong effect.

An array of new technologies and innovations such as robotics, sensors, 3D printing, big data and artificial intelligence will gradually open new opportunities to increase efficiency and reduce costs towards leaner operations.

All of which will change the human resources requirements for the industry.

On the other hand, the future demand for energy will be influenced by new consumer behaviour, due to population growth, urbanisation, mobility, connectivity, environmental concerns and the water-food-energy stress nexus.

The situation is complex. It requires a new global energy order in a world where petroleum and gas will likely remain the main energy sources. For that we need a generation of young, responsible leaders with a new mindset to re-invent the industry.

Effectively, to change the game, we need a crew change. That’s what the WPC Future Leaders Forum (FLF) aims to discuss.

Brazil, a vast South American country with one of the world’s most diverse energy mixes, has great geological prospects and also big challenges. How can we exploit its huge pre-salt ultra-deep water reserves in this current scenario? The answer lies in the hands of the new generation of future leaders.

Rio de Janeiro, the Brazilian oil capital, will serve as the main stage for young professionals from all over the world to participate in discussions on leadership, sustainability, technology and innovation in the oil and gas industry. This will be a great, exciting opportunity to learn and network with top industry leaders and inspiring keynote speakers.

“Energy companies are seeking to survive in the short run through massive lay-offs, M&A, project deferrals and divestments. But if they are to capture future opportunities they will have to re-invent themselves”

Milton Costa Filho, Secretary General, IBP – Brazilian Petroleum, Gas and Biofuels Institute, Brazil
We are happy to welcome the WPC Future Leaders Forum to Brazil, and to South America, after it has crossed almost all continents of the world. The first forum, then known as WPC Youth Forum, took place in China, in 2004, focusing on Youth & Innovation – The Future of the Petroleum Industry. Five years later, 1300 attendees congregated in Paris to discuss Tomorrow’s Energy Landscape. One year later, in India, 500 young leaders discussed The Power of Youth Leadership When Building Nations. In 2013, in Canada, during the oil industry boom, the 4th edition of the event received more than 1600 participants from over 60 countries. Now, under the new name “WPC Future Leaders Forum” we come together in Brazil, to discuss the theme: Game Changers: New Leaders for a New Competitive Energy Industry.

The current macroeconomic scenario of the industry is not the most favourable. However, it is in adversity that opportunities arise. It is time to change the game. It is time to rethink how things are done and how we want the operations to function.

There is no better place in the world to do this than at the WPC Future Leaders Forum 2016 – a forum organised by young professionals from all over the world, with the support of two important organisations of the petroleum industry: the World Petroleum Council (WPC) and the Brazilian Petroleum, Gas and Biofuels Institute (IBP).

Being a game changer means getting informed, connected and involved with what happens in our industry.

Welcome to Rio!
The current Oil and Gas industry environment could not be more different from the one experienced during the last Youth Forum celebrated in Alberta (Canada) in October 2013. The Brent crude price at the time was about US$105/bbl and investment flowed into the Oil and Gas market. Just three years later, the price has dropped over 50% and the Oil and Gas industry faces a complex moment.

However, it is not only the price that makes this time different from others. The COP21 agreement, the increasing competitiveness of renewable energies, the market penetration of electric vehicles, and the disruptive technologies that are gaining momentum, let us glimpse a potential paradigm change for the energy industry.

One of the main reasons for the creation of the World Petroleum Council’s Young Professionals Committee back in 2004 was to create and nurture a collaborative, global forum for young people to be heard and to champion new ideas within the petroleum industry.

To satisfy this mandate, the Young Professionals Committee has conducted the survey The Future Landscape of Energy: Sustainability and Alternative Technologies to quiz Young Professionals and Students, the emerging leaders of the industry, on their views on the future of the energy industry as well as their preferences as consumers.

This on-line survey reached over 1,800 respondents globally. The young respondents’ profiles maintained the same patterns as seniors in the industry, still dominated by engineers – 64% of respondents – and despite increasing gender parity, men still represented 68% of respondents.

The survey addressed four main blocks to assess the biggest challenges and main uncertainties that the industry will face in the coming years.

Block 1: Oil and gas industry Future: The survey points to an encouraging future for the industry. The majority of respondents (57%) have a positive or very positive perception of the sector and believe (66%) that we will not stop using oil and gas in the next 30 years.

But that bright future will not be free of changes. Respondents paint a picture of an industry on the move: almost 70% see an industry in 30 years completely different from the one we know today.

What are the main differences they remark on?

Young people see a 2030 industry that has shifted from oil towards gas as the predominant fuel. They expect Brent oil prices to remain at relatively low levels averaging US$72/bbl by July 2018, with less than 1% of those seeing a price above US$100/bbl by that date.

Accordingly, after a decrease in upstream investment in the short term, it would slightly increase in the next two years but accompanied by a major change: rising investment in alternative energies by oil and gas companies.

Block 2: Renewable energies’ future and other sources of energy: There is a clear consensus among respondents: Competitiveness of alternative fuels and energies will have a major impact on the energy future.

According to the survey, 4 in every 5 Young Professionals and Students affirm that renewable energies will play a major role in the future energy mix. Even in the Middle East 62% of respondents agree.

A larger role for renewable energies would inevitably reduce oil and gas contribution to energy production.
The question is whether oil and gas companies will lead the future development of alternative energies and technologies to fill that space. According to the survey’s respondents, the answer is NO. Respondents see alternative energy companies, governments, universities and institutes, in that order of importance, taking the lead in new energies development.

Solar photovoltaic, with a score of 3.78 out of 5, followed by electric vehicles (3.7), compressed natural gas (3.59) and wind Power (3.46) are expected to be the most promising energies and technologies. However, none of these technologies and energies are very promising to North American survey participants, who strongly predict unconventional oil and gas to succeed in their region.

Energy storage is one of the main challenges for renewable energies’ viability. Young professionals and students are quite confident that in less than 12 years battery storage can be efficient enough to solve this problem. Nevertheless, energy storage would only be a starting point, as 80% consider that renewable energies would take up to 20 years to compete with oil and gas in economic terms.

Block 3: Oil and gas company strategies:
As stated before, oil and gas companies are not currently considered to be leaders to a different energy future. Companies should rethink their strategies if they want to become game changers of the energy future.

In this sense, the coming five years would lay the foundations of the future industry via investment, focusing on alternative energies (with solar photovoltaic as the preferred one) and petrochemicals.

As for Upstream investment, the Middle East, Russia and North America, in that order of importance are the three regions that will play a more vital role in the next 5 to 10 years for the upstream business, according to respondents.

Nevertheless, it is important to note that a relevant percentage consider that the most suitable strategy is to stick to current oil and gas competences, with particular representation of this conviction in the North America region.

It is important to emphasise that the energy alternatives are considered
Regarding regulatory policies as a driver of change, only 36% consider that the COP 21 agreement would have an impact on companies’ strategies, and the majority believes that governments would bear the biggest burden to implement COP21 regulation.

Block 4: Energy and citizens:

Oil, gas and products made from oil are an important part of our everyday lives, as petroleum is one of the main components when manufacturing the majority of these items.

Respondents are completely aware of this fact: 3 in every 4 respondents think that oil prices affect their daily life. This percentage varies between regions: 90% of African respondents think that oil prices affect them, while only 70% of Europeans have that perception.

However, young professionals are willing to change their consumer habits and patterns if this contributes to a better and more sustainable environment: 76% of respondents would be willing to modify their behaviour and energy usage to help achieve the COP 21 goals and limit the increase in global temperature to less than 2°C.

Furthermore, these changes in consumer habits are directly observed when young professionals are asked about the next car that they will buy, as 38% of young professionals opt for an electric or hybrid car. This percentage is lower in Africa and North America, where half of the respondents prefer a gasoline car. In addition, it is also interesting to point out that 1 in every 6 respondents in Europe, Russia and Central Asia, and 1 in every 5 in Latin America, prefer different mobility options instead of owning a car.

From The Future Landscape of Energy: Sustainability and Alternative Technologies survey analysis we can conclude that Young Professionals and Students see an industry in transformation, where oil and gas consumption remains key but alternative energies (especially solar photovoltaic) will increasingly gain importance as they improve their economic competitiveness, regardless of regulatory policies. So, the content of our survey suggests that oil and gas companies need to become game changers, redefine their strategies and incorporate new energy divisions in their companies, in order to adapt to the future landscape of energy.

The following have also contributed to the survey’s distribution: Raquel Cantón Jara, Yasmine Dialdas, Stefan Alexandru Ghita, Jesús Moreno Herrero, Salisu Rabiu Isihak and Ali Rahneshin.
YP CONNECT: JOIN THE WORLD PETROLEUM COUNCIL YOUNG PROFESSIONALS CONNECT GROUP ON LINKEDIN!

“WPC YP Connect is your one-stop shop for industry insights, diverse news, and thoughtful posts”

Wether you are a student contemplating a career in the industry or an experienced young professional, WPC YP Connect is your one-stop shop for industry insights, diverse news, and thoughtful posts! This ever-growing community is willing to help shape the global energy future by bringing together the passion and talents of industry students, young professionals and emerging leaders.

The virtual community seeks collaborative and innovative solutions to key technical, social, environmental and management energy challenges, for future generations, guided by the WPC Young Professionals’ values and commitment to leadership, diversity, participation, sustainability, transparency and excellence.

Why join?
• Connect future leaders to each other and to current industry leaders
• Share passion for the industry and the WPC brand “globally” (globally + in local regions)
• Bridge geopolitical boundaries to build new relationships

Find information on all WPC YP initiatives, including:
• Regional and global WPC YP initiatives and events, including the WPC Future Leaders’ Forum, our annual survey, magazine, and mentoring programmes
• Discussions, engagement, polls, videos and enriched media
• Country news and reflections
• Volunteer opportunities

YP Connect is the one-stop shop for discussions with other young professionals worldwide and updates on the latest WPC news, events and publications. This is a platform to showcase the WPC and emerging innovators in our industry – meaning – it’s a platform designed to showcase you!

Any questions? Post them on LinkedIn!
www.linkedin.com/groups/8189962
The words of Benjamin Franklin: “Tell me and I forget, teach me and I may remember, involve me and I learn” well describe the WPC Mentorship Programme. It is a knowledge sharing platform between a Mentor – an experienced member of the oil and gas industry – and mentees who are professionals or students.

As the WPC Mentorship Programme Lead, I am pleased to say that this programme is truly global; at present it includes participation from 14 mentors from 10 countries and 56 mentees from 21 countries.

The experiences of the current programme participants truly proves that ‘When one teaches two learn’. As stated by one WPC Mentor from Norway, “linking with young people develops a better understanding of common, but often also very different challenges and opportunities.” Similarly, a mentee from Russia shared that “the exchanging of knowledge and experience is extremely interesting, as all the participants get to present their views on pressing industry issues, and the process truly is mutually beneficial”.

It is also motivating to participate and gain from the diverse perspectives coming out of the discussion, such as the issue of Gas Flaring. An environmentalist presented a pro-environmental protection view, and production engineers emphasised the impact of flaring on the production of crude oil. The Mentor added an outlook on government regulations and international association views related to gas flaring. Being part of such discussions make one aware of unique solutions to specific problems.

Apart from industry topics, many participants also share their personal career progression plans with the mentor for their guidance. It makes this programme not only a knowledge sharing medium but also more like a relationship development programme, with mutual benefits for both mentor and mentee. The same was expressed by a mentee from Italy, who said: “the most important and interesting aspect of this programme is entering into the professional friendship network and working and learning under the supervision of an experienced expert”.

I strongly believe that the more we share, the more we learn and there is nothing better than sharing, learning and networking at the same time.

WPC Mentorship offers you your own programme and I see it as an opportunity to expand one’s horizons.

For further information and clarification on the WPC Mentorship Programme, write to: yp-wpc@world-petroleum.org.
THE ROAD TO ISTANBUL: TURKEY – YOUR NEXT DESTINATION!

“Many students, researchers and young professionals in the industry from all around the world will have the chance to come together with around 5,000 industry leaders and 20,000 visitors in Istanbul”

The 22nd World Petroleum Congress will be held in Istanbul, from 9-13 July, 2017 and covering all aspects of the industry, from upstream to downstream, including management, sustainability and social responsibility. At the 22nd WPC, there will be an extensive “Youth Programme”, aiming to utilise the energy and dynamism of the youth, as well as to engage young professionals more in the ongoing industrial activities and provide a platform for them to have their say. Many students, researchers and young professionals in the industry from all around the world will have the chance to come together with around 5,000 industry leaders and 20,000 visitors in Istanbul.

Besides a special plenary session dedicated to young professionals, there will be a “Young Professionals Lounge” in the exhibition area, which will serve as a gathering point for young people during the Congress. The lounge will offer many useful facilities such as sofas and tables to sit, relax, read the YP magazine, enjoy a worthwhile discussion or simply work on their laptops. The lounge, branded with the theme “Bridges to a new competitive energy industry”, will be the meeting point for the informal speeches, oil games, mentoring meetings, technical tours and many other youth activities and surprises that will bring together young people and seniors to share their insights. These activities will also provide a perfect atmosphere for networking opportunities.

This time, the Turkish WPC Young Professionals Committee came up with a new concept: “OILYMPICS” to increase interaction between young and senior professionals, where the concept mainly refers to oil-oriented games and activities. Within the context of the OILYMPICS, “OILYMPICS ISTANBUL” is the most popular game, where the aim is to team up young professionals and
industry experts in oil games, to develop the skills they will need, and to enable networking, as well as providing two-way industry learning. Participants will be placed in teams and set challenges such as mini puzzles, industrial questions and quizzes, while discovering the fascinating highlights of Istanbul, just before the Congress starts.

Another amazing opportunity for students and young professionals attending the 22nd WPC is to participate in the “Volunteers Programme”. Volunteers will gain free access to the Congress and free accommodation in exchange for their part-time voluntary work during the event. In this way, they will not only have the chance to listen to industry experts from all over the world but also enjoy spending time on the exhibition floor enabling them to feel more involved in this unique event.

In light of its previous experience of organising various big international events, Istanbul, a city with amazing cultural attractions, facilities and services will make the 22nd WPC an unforgettable event for all participants.

As a country believing deeply in the dynamism of its younger generation, Turkey is ready and eager to welcome you to Istanbul!

So, come and be part of this prestigious event, the 22nd WPC in Istanbul, from 9-13 July, 2017, and check www.22wpc.com for detailed information.

Turkey awaits you!

Istanbul, one of the world’s greatest cities, will make the 22nd WPC an unforgettable event

JOIN US On WPC Young Professionals Connect on LinkedIn www.linkedin.com/groups/8189962
AN EXCITING AND AMBITIOUS AGENDA FOR THE OIL AND GAS INDUSTRY POST COP21

In 2015, during the Paris Climate Conference, for the first time in 20 years, UN negotiations attempted to establish and initiate a legally binding universal agreement on climate change, with the prevailing goal of keeping global warming below 2 degrees Celsius. This article will address the role of the global oil and gas industry following the Paris agreement.

Fossil fuels account for 60 percent of primary energy demand, and the situation is likely to remain the same until as far as 2035. Platforms such as COP21 offer these industries, both within the private and public sector, an opportunity to demonstrate that they can work towards tackling climate change while protecting economic development and growth. But COP21 also emphasises international collaboration as a means of combating market distortions that result in unilateral actions by different nations. There are some widely shared assumptions that help assess the future of energy:

1. Over 1 billion people do not have access to electricity today.
2. The world’s population will reach 10 billion by 2050 and require more energy, transportation solutions, food supply and access to technology. While this opens new growth opportunities, it also creates challenges.
3. Population growth and human activities lead to the increase of the earth’s temperature.
4. According to the IPCC Fifth Assessment Report (AR5) the increase of global mean surface temperature by the end of the 21st century is expected to be 2.6°C to 4.8°C, whilst the Arctic region will continue to warm more rapidly than the global mean.

If we are to provide the world with the energy it demands and address climate change, the oil and gas industry should collaborate globally to create a roadmap to reduce the consumption of energy in the production phase, replace the current energy need in production...
with renewable energy, and implement a low-emission vision with a carbon capture and storage strategy. This roadmap should consist of the following elements on how to:

- Strengthen measures and research that provide more efficient energy consumption in oil and gas production (e.g., gas turbines, subsea solutions that reduce energy)
- Achieve more efficient drilling technology
- Reduce flaring and incorporate zero-emission solutions
- Consider for prospects whether it is possible or feasible to have electrification of rigs and offshore installations
- Implement a procurement strategy gradually promoting the introduction of low-emission ships (platform supply vessel, anchor handling tug supply vessel, seismic, subsea)
- Adapt hybrid solutions such as fuel cells, wave power, offshore wind and battery solutions
- Field development with low emission energy solutions
- Consider production of hydrogen from natural gas offshore and on land with and without CO2 storage
- Collaborate internationally in building a commercially feasible carbon capture and storage (CCS) technology solution offshore (both pre and post combustion)
- Increase oil recovery without increased emissions.

A global roadmap addressing the above points will be the first step to incorporate COP21 ambitions and brace the global oil and gas industry for the exciting period ahead. However, this requires nations to be highly flexible and adaptive, whilst also meeting their energy and economic needs. The oil and gas industry is particularly sensitive because it contributes directly to the currently increasing levels of carbon in the atmosphere. For countries that depend on these industries, continued investment may compromise their carbon emission reduction goals, while also compromising their ability to keep to the COP21 agreement.


The Arctic region will continue to warm more rapidly than the global average.
TRANSITORY ERA IN ENERGY: FROM GREY TO GREEN

“Whilst hydrocarbons and economic growth announced their break-up at COP21, who will adjust and who will benefit?”

COP21 in Paris does not herald an unprecedented transitory period, but instead a reversed one. The 20th century of oil-fuelled navies, coal-fired factories and grey clouds can be summarised as the marriage of hydrocarbons and economic growth.

However, the shale revolution resulted in a hydrocarbon glut around the world. The demand increase cannot catch up with the oil excess because of the increasing energy efficiency in developing countries. The growth of coal is slowing down in favour of renewables and natural gas. As “grey” is reversed to “green”, we are entering a new energy cycle. Whilst hydrocarbons and economic growth announced their break-up at COP21, who will adjust and who will benefit?

Who adjusts?
The oil-asset-dependent nations will have to adjust the most. The OPEC countries suffer from melting fiscal incomes, recession risk, and even bankruptcy. The reversed cycle will force them to diversify their economies, introduce income taxes and even austerity measures. The oil-importing OECD countries have already been more willing to adjust and decarbonise their economies. The EU is pioneering efficiency policies, regulations and decoupling the economy from fossil fuels.

Oil companies are the biggest private actors to adjust. They have already ceased high-cost oil exploration activities, reduced the
Companies generating electricity from renewable sources such as solar will be able to offset their capital expenditure with favourable climate change policies.

With the US giant Peabody having gone bankrupt, the coal industry will be the second private actor to adjust. The demand of the Chinese middle class is shifting from coal to gasoline and renewables. The growth of coal demand is less than a fifth of its rate over the past 20 years, and prices have been very low in the last two years. Given the IEA World Energy Outlook, coal will arguably not beat carbon prices/taxes once the cycle is completed.

Who benefits?
Due to the lowering of renewable prices, being climate-friendly is “less expensive”. Photovoltaic panels are cheaper and BP predicts that renewables will represent 16% of the world’s power generation by 2035. The companies generating electricity from renewables will offset their capital expenditures with favourable climate change policies. Also, hybrid engine and electric car producers like Tesla Motors will help decouple transport from gasoline.

The gas glut is integrating regional gas markets with abundant, cheap and low-emission LNG spot cargoes. BP forecast that the LNG market will represent 15% of the global energy demand by 2035. US LNG exports also have a multiplying and maturing effect over the gas fields in the Eastern Mediterranean, Black and Caspian Sea. So, gas is “the” transitory fuel of the reversed cycle.

Although fossil fuels will continue to be here for the foreseeable future, the correlation between world GDP growth and energy usage is eroding. In fifty years, fossil fuels will arguably reach their lowest share since the industrial revolution.

References
• BP Energy Outlook 2016
• World Energy Council World Energy Focus April Issue
• IEA World Energy Outlook 2015
There are many scenarios attempting to forecast energy demand, a number of which are shown here – predicting growth in a range of 0.4 to 1.5% per year to 2040. Each is driven by underlying assumptions about how the world might develop in terms of macroeconomics, policy and technological developments.

McKinsey Energy Insights’ Business as Usual scenario sees a world where energy demand grows at an average of 0.8%/yr to 2040, primarily driven by GDP growth, estimated at 2.7% per year. Our projections differ from others as we have taken greater account of structural changes in economic growth, including an ageing population and the shift to less energy-intensive activities, particularly in developed countries and China, where 1 in 4 people will be over 65 by 2040.

We expect all energy demand growth will come from non-OECD markets, adding around 190 million TJ between 2013 and 2050 – while demand from OECD markets falls by roughly 30 million TJ.

Slowing population growth and falling fertility rates will eventually see the global workforce plateau, and according to the McKinsey Global Institute, industrialisation at the level seen in China is unlikely to be replicated elsewhere. This means a greater share of global GDP growth will also be driven by services, which are less energy-intensive. Hence we expect a decline in overall energy intensity of 50% in the next 35 years.

Looking at the sources of demand in more detail, there are 3 sectors of interest:

- **Light vehicles** – by 2035 improvements in vehicle efficiency are expected to improve fuel economy by 38%, while electric car sales could account for 36% of the market by then.

- **Chemicals** – demand is expected to grow at double the rate of the rest of oil demand, potentially adding 7.5 mbd by 2035. This is especially true in developing regions, where substitution of basic materials such as wood, steel and paper are providing market opportunities.
• Power – electricity demand is expected to grow at twice the rate of all other energy sources, creating many opportunities for new generation technologies. Demand will be mainly driven by building and industry electrification in China, India and other developing countries. Solar and wind generation are expected to grow 4-5 times faster than the rest, leading to a 34% share by 2050, while coal declines after 2025.

Even with significant disruptions taking place in the McKinsey Energy Insights’ Business as Usual scenario, we expect fossil fuels to meet roughly 75% of the rise in energy demand from non-OECD countries, complemented by renewable energy sources (solar, wind, biomass, geothermal and marine), which will account for about 19% of the mix by 2050.

**Primary energy demand**

<table>
<thead>
<tr>
<th>Index, 2013 = 100</th>
<th>CAGR 2013-2040</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>2020</td>
<td>2030</td>
</tr>
<tr>
<td>Shell Oceans</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Greenpeace – Reference</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Shell Mountains</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>IEA Current policies</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>IEA New policies</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>ExxonMobil</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>McKinsey Energy Insights’ Business as Usual</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>IEA 450</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Greenpeace – Revolution</td>
<td>-0.1</td>
<td></td>
</tr>
</tbody>
</table>

1 Primary energy consumption is fuel into power generation and other transformation activities, fuel used in energy sector and final consumption excluding electricity/heat.


**The growth is becoming increasingly energy efficient**

| Litres/kilometres for passenger cars |
|-------------|-------------|
| 1960 | 0.10 | -22% |
| 2015 | 0.08 | -38% |
| 2035 | 0.05 | -38% |


**Electricity growing at twice the rate of other energy sources**

<table>
<thead>
<tr>
<th>Final Energy Demand, million Tt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
</tr>
<tr>
<td>% electricity in final energy demand</td>
</tr>
<tr>
<td>1960</td>
</tr>
<tr>
<td>2015</td>
</tr>
<tr>
<td>2035</td>
</tr>
<tr>
<td>2050</td>
</tr>
</tbody>
</table>

CAGR 2013-2040: 0.8%

Production of Organic Chemicals, Billion Tons

<table>
<thead>
<tr>
<th>Production of Organic Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
</tr>
<tr>
<td>2035</td>
</tr>
<tr>
<td>2050</td>
</tr>
</tbody>
</table>

EU CARBON TRADING: AN EFFICIENT SOLUTION FOR A SUSTAINABLE ENERGY FUTURE?

“Negotiations aimed at linking the EU ETS with other cap-and-trade systems are currently being held.”

The European Union Emissions Trading Scheme (EU ETS), considered the “cornerstone and flagship of EU climate policy” – was implemented in 2005, limiting greenhouse gases (GHG) emissions by establishing specific ‘allowances’ (rates of GHG permitted by law).

At first a decentralised mechanism, the ETS allowed member states to decide upon the rate of admitted allowances (the so-called cap) and their own National Allocation Plan (NAPs), while the European Commission generally acted as a ‘watchdog’ and oversaw the overall implementation of the directive, with particular regards to the power area and several energy-intensive industries.

The 2013 ETS reform has shifted the regulation of emissions towards a more centralised system as a “response to a lack of international change” in energy and environmental policy. The new provision decided in favour of a more ambitious cap (a 21% ETS emissions cut by 2020, compared to 2005 levels), less power for Member States and stricter control on the concession of allowances to the above mentioned targeted areas, although industries were only partially compelled to adopt the ETS approach in their sector.

The core problem for negotiations for the current phase (2012-2030), is the price of Carbon Units, which is too low to create a real incentive for companies to participate in clean
energy projects, as a consequence of an over-allocation of permits in the economic crisis context. The EU has adopted several policies oriented at adjusting the offer and demand on the market and creating an effective Carbon scheme. As a direct consequence, the cap\(^7\) is decreasing every year by 1.74% the number of permits (2.2% beyond 2021) and the European Commission has postponed the auction of 900 million permits until 2020 – reducing the cap and allowing the offer and demand principles to create a truly cost-effective price on GHG emissions.

The creation of a market stability reserve by 2018 is also important to tackle the price volatility of the Carbon Units. What is foreseen for improving the system’s resilience to major shocks is the adjustment of the supply of allowances to be auctioned\(^8\) according to binding strict regulations, which are non-negotiable for either the EC or member states of the EU.

The European Community strongly believes that market tools can be used to invest in cleaner energy and wants to contribute to the creation of an International Carbon Market. Negotiations aimed at ultimately linking the EU ETS with other cap-and-trade systems\(^9\) and supporting third countries in the implementation of new emission trading systems\(^10\) are currently being held. The EU-Brazil agreement\(^11\) on fundamental market rules, for example, displays the international willingness to ensure the environmental integrity of the carbon market. The proposal seeks to underpin an ambitious and robust agreement by providing a common basis to avoid double counting when parties use international markets\(^12\).

As ambitious as it may seem, a positive outcome of COP21 could provide legal and financial support to emission schemes for shifting the perspective on Carbon Credits from a “right to pollute” to an essential tool for sustainable energy investments. Nevertheless, this is still to be seen, as evidence has shown a decrease in carbon prices in the ETS in the aftermath of COP21\(^13\).

The EU believes that market tools can be used to invest in cleaner energy according to binding strict regulations, which are non-negotiable for either the EC or member states of the EU. The European Community strongly believes that market tools can be used to invest in cleaner energy and wants to contribute to the creation of an International Carbon Market. Negotiations aimed at ultimately linking the EU ETS with other cap-and-trade systems\(^9\) and supporting third countries in the implementation of new emission trading systems\(^10\) are currently being held. The EU-Brazil agreement\(^11\) on fundamental market rules, for example, displays the international willingness to ensure the environmental integrity of the carbon market. The proposal seeks to underpin an ambitious and robust agreement by providing a common basis to avoid double counting when parties use international markets\(^12\).

As ambitious as it may seem, a positive outcome of COP21 could provide legal and financial support to emission schemes for shifting the perspective on Carbon Credits from a “right to pollute” to an essential tool for sustainable energy investments. Nevertheless, this is still to be seen, as evidence has shown a decrease in carbon prices in the ETS in the aftermath of COP21\(^13\).

---

3. Ibid.
6. The price of allowances dropped from €30 per tonne CO2 in April 2006 to €0.10 in September 2007.
7. The overall volume of greenhouse gases that can be emitted by the power plants, factories and other fixed installations covered by the EU emissions trading system (EU ETS) is limited by a ‘cap’ on the number of emission allowances. http://ec.europa.eu/clima/policies/ets/cap/index_en.htm
9. National or sub-national systems are already operating or under development in Canada, China, Japan, Kazakhstan, New Zealand, South Korea, Switzerland and the United States. http://ec.europa.eu/clima/policies/ets/linking/index_en.htm
10. Bilateral cooperation with China and Korea on the development of emission trading schemes.
The global oil and gas scenario has entered a period of complexity. Economic development, technology, fierce competition and environmental concerns are playing a central role in energy markets and policies around the world.

With the steep drop in international oil prices and related fuels, agents are changing positions to protect themselves against further losses due to price volatility. Deferral of projects and portfolio adjustments are the choices that oil companies seeking efficiency and profitability in this landscape are taking. However, new business opportunities may arise in the midst of market uncertainty, and actors need to be attentive to them.

At the same time, large gas companies have firmly claimed the importance of gas as the fuel for “energy transition”, explicitly against coal development as the major source for electricity generation worldwide. In this context, carbon pricing is being viewed as a way to increase the competitiveness of gas while addressing climate change requirements within a global sustainable development agenda.

If we look at the Latin American region, oil exporting countries are facing a deepening crisis. Sector reforms are envisaged in order to attract investments, easing the effects of the oil downturn. World class conventional and unconventional resources are found in places such as the Brazilian offshore (e.g. Pre-salt) or the Argentinian onshore (e.g. Vaca Muerta shale), which give a differentiated advantage in the international market.

In the Brazilian context, new and large pre-salt reserves are currently being reviewed. The national strategy to develop new fields in this area is now being revised, given current economic and political constraints, both for companies and government. The aim is to adapt the rules to market changes while maintaining socioeconomic objectives. If this strategy becomes successful, the Brazilian oil and gas sector would again be a powerhouse for the country’s economic development.

Therefore, factors such as geopolitical change, the increasing share of American unconventional oil and gas production, and changes in the global demand (particularly Chinese demand) guide the trajectory of prices and production in the short and medium term. Decisions of oil and gas companies, new projects and regulatory activities will define the direction that the industry will take in the future, in Brazil and elsewhere.
COMPETING RESOURCES: UNCONVENTIONALS AND THE ROLE OF TECHNOLOGY

"Even with our existing technical knowledge, the main challenge remains of how to optimise the number of frac stages”

After the successful experience of hydrocarbon production from shale sediments in North America, many countries around the world have attempted to "frac" these ultra-low permeability reservoirs. Thanks to the combination of hydraulic fracturing and horizontal drilling, hydrocarbon production from shale became technically possible and economical. Innovation keeps growing in this sub-sector of energy, driven by the necessity to unlock every possible hydrocarbon resource we have.

Effective exploration, development, and production of these unconventional resources require a strong understanding of the rock’s mechanical properties, in-situ map of stresses, and rock flow and storage capacities. This improves the solutions to all the technical and economic challenges and facilitates breakthroughs. Hydraulic fracturing and horizontal drilling are two examples of innovation in the petroleum industry.

The hydraulic fracturing technology relies on pumping a "fracking fluid" into the subsurface at a pressure great enough to penetrate the near wellbore region and establish communication between the created fractures and the matrix. It requires a sufficient understanding of the earth’s geo-stress in terms of magnitude, orientation, and direction, to control the fracture initiation and propagation in the targeted zone. The created fractures would close as the injected fluid is set to flow back during production, i.e. at decreased pore pressure. Proppants in this case are used to keep the fractures open. They are solid materials that are made in different shapes and sizes, and can be made of ceramics, sands or resin-coated sands. The fracking fluid carries them along the fractures. This fluid usually contains

Khalid R. AlNoaimi, Petroleum Engineer, EXPEC Advanced Research Center, Saudi Aramco, Saudi Arabia
water mixed with some chemical additives (slick water) to increase the fluid viscosity, improve formation compatibility, reduce fluid loss, and thus, increase fluid flow. Sufficient fluid viscosity is required to hold the proppant and ensure its delivery into the fractured zone.

Even with our existing technical knowledge, the main challenge remains of how to optimise the number of frac stages, to maximise production and well performance. This is possible through innovative improvements to solve problems related to the operational challenges of hydraulic fracturing, drilling, and well completion.

The pool of challenges associated with hydraulic fracturing mainly revolves around the development of improved fracking fluid rheology, reduced pumping volume, and the manufacturing of effective proppants with reduced volume requirement. Nevertheless, innovative solutions may expand in different directions. For example, increasing the density of in-situ fractures through altering the stress fields around the wellbore, and therefore, increasing production. This is done via “zipper fracking” in which two concurrent and parallel wells are drilled horizontally close to each other. The two wellbores are perforated and fractured at alternative, opposite intervals. The cost can be a challenge to this technology. Innovation, however, keeps driving more advanced techniques. Alternating sequence fracturing technique, for example, was developed to do exactly what zipper fracking does but with a single wellbore. This is done through placing the stages in an alternating order of frac stages.

Despite the current economic environment in the petroleum industry, innovation keeps growing and smart solutions to reduce capital and operating costs are being implemented.
THE ROLE OF NANOTECHNOLOGY IN OIL AND GAS APPLICATIONS

“Without a doubt, the oil and gas industry should expect a major impact from this branch of technology as resources become more difficult to extract”

We are all familiar with the promises of a not-so-distant future where nanometer-sized robots quickly assemble macroscopic objects or perform targeted delivery of therapeutics to tumour cells in the human body, but the real question is: has nanotech made a real impact on society? We need look no further than the electronics or biomedical fields for an answer to this question. We find nanomaterials embedded in our television displays, as contrast agents in MRI imaging applications and in high-performance transistors. Where will nanotechnology take our industry going forward? The oil and gas industry has already leveraged nanostructured materials to develop high-strength composites and coatings that can withstand the aggressive conditions that exist in the subsurface. These initial applications only serve to fuel the future development of improved alloys, reinforced elastomers and cables for offshore applications, and smart coatings that adapt to changing conditions in the subsurface. We also expect significant advances in engineered fluids for drilling and production applications. Dendrimers and nanoparticles are already finding utility as loss control additives and rheological modifiers. Nanotechnology has significantly accelerated the development of new diagnostic and therapeutic tools for biomedicine. Cancer treatments are
now being delivered to tumours using liposomes, micelles and polymeric nanoparticles – nanomaterials that can be decorated with active targeting modalities to increase the efficacy of treatment by avoiding circulation of the toxic payloads to healthy cells. When we consider these advances in the context of the oilfield we see parallels, namely, the similar objective of delivering chemistries to specific locations in order to maximise the effectiveness of the treatment. This is certainly the case in chemically enhanced oil recovery (CEOR) and acid stimulation applications. The development of smart encapsulation strategies to deliver surfactants and other chemicals deep into the reservoir while mitigating loss to the rock matrix will become invaluable as conventional oil recovery techniques become less effective. We also expect significant advances in nanomaterials being used for reservoir reconnaissance and imaging. Much like the biomedical field, we seek to image deep within difficult matrices that are often obscured by the presence of multiple fluid phases and interfaces. The unique optoelectronic characteristics of nanomaterials offer potential solutions to this challenge, particles that can provide contrast during electromagnetic imaging surveys or the development of acoustic contrast agents.

Finally, the major challenge facing our young generation undoubtedly lies with unconventional tight resources. With recovery rates frequently below 10% and approximately 1/3 of fracture completions unproductive, there is much still to be elucidated. Nanotechnology has spurred the development of high-resolution imaging techniques and instrumentation that are helping researchers to understand the behaviour of shales. Electron microscopy and nanoindentation techniques have allowed scientists to understand how shale structures, and their resulting mechanical properties, evolve as a function of maturity. This information, in turn, is helping us to make informed decisions regarding completions and production.

Without a doubt, the oil and gas industry should expect a major impact from this branch of technology as resources become more difficult to extract.
VIRTUAL REALITY AND ITS USE IN OUR INDUSTRY:
HOW PROPER UTILISATION OF TECHNOLOGY CAN IMPROVE OPERATORS’ COMPETENCY AND SAFETY IN THE OIL AND GAS INDUSTRY

“A typical oil and gas production facility runs using sophisticated computer controls. A highly-skilled individual sits at a computer console and runs the plant. Additionally, several highly-skilled workers or field operators are continuously making sure all the equipment is running properly and smoothly. The computer console operator works with the field operators as a team to manage the facility.

Today, this natural work team is not being trained together. The computer operator trains on a computer console simulator which closely mimics the dynamics of the actual plant. The training instructor gives the console operator a wide array of problems to solve. They are taught to quickly identify an anomaly, gather the data needed to solve the problem and then to take corrective action before the plant becomes unstable. The field operators, on the other hand, train in a classroom setting and in the field, working with the more experienced operators. It takes about 8-10 years of experience before the field operator becomes proficient enough to be able to work on their own.

Another fact worth mentioning is that oil and gas facilities are becoming increasingly safe and reliable over time. However, the more reliable a plant becomes, the more time passes between major plant upsets. The operators lose their ability to troubleshoot efficiently and may not have the skills needed to put the plant in a safe condition.

To address these concerns, a Virtual Reality simulator provides a

“Using VR, trainees can practice low-probability, high-consequence events and be ready to respond to any plant anomaly”

Joe Cheben, VP Projects, EON Reality, Inc, USA
major benefit. This invention couples the computer simulator with a Virtual Reality display that creates an immersive 3D representation of the oil and gas facility. The computer operator and the field worker can now train on the same training scenarios. The computer operator sits at the console simulator and the field worker goes into the Virtual Reality environment. The mass and energy balance data generated by the computer simulator streams between the simulator and the Virtual Reality device. When the console operator opens a control valve, the field person can see it move in VR and vice versa. This complete operator training system or OTS closely mimics the real plant.

The natural work team can now train together on a wide variety of training scenarios, from simple work tasks such as swapping pumps to more complex scenarios such as fires and explosions. At a minimum, communication skills can be honed. Better though, trainees can practice low-probability, high consequence events and be ready to respond to any plant anomaly. Our experience indicates that we can give these trainees 8-10 years of real-world experience in as little as 6 months, making them more proficient.

Note: The I3TE technology and software are licensed from ExxonMobil Upstream Research Company.
“In a tough environment like these days, companies have very decisive recruitment policies and it is crucial for graduates to have an outstanding record.”

Oil and gas is not just a source of energy with numerous related products, but also drives the world’s economy and is a driver for innovation. Joining this industry was the best decision for me.

In a tough environment like these days, companies have very decisive recruitment policies and it is crucial for graduates to have an outstanding record. Once you have made it, personal development never stops and in today’s world it is essential to develop managerial and interpersonal skills as well.

Coming from a so-called developing country, and facing difficulties in getting a job at first, I can only say: Take on any opportunity. It will be exciting and challenging!

Having defined your desired career path definitely helps you grow faster. However, beware of one fact: Change is certain! Just accept it and turn it to your advantage. One important catalyst for this are networking events like the World Petroleum Congress or Future Leaders Forums, where both young and senior people from various backgrounds meet and enable you to increase your knowledge base and get to know the latest developments in the industry. Reaching out to other young professionals in the various programmes, such as WPC Youth Connect or the WPC Mentoring Programme, will give you a great headstart.

With that, I wish all the very best to the new graduates and experienced professionals who choose to join the Oil and Gas Industry.
The high degree of complexity in the global oil industry requires a constant updating of the profile and education of its professionals, who easily find training courses and expertise, on many levels, to meet the industry’s technical demands.

Today, however, the challenge of working in this market has grown. Professionals and companies are placing on the corporate agenda ever more stringent requirements for procurement that go far beyond technical training: they require professionals with certain characteristics of a moral and ethical nature.

With the development of new technologies and the need for greater investment to meet the challenges in increasingly deep waters in Brazil, the market needed changes in the control and management of its business, throwing the country on a path against corruption, which gained force in January 2014, when the Brazilian Anti-Corruption Law was enacted, creating the ideal setting for compliance professionals in the country.

Lia Medeiros, Communication and Sustainability Director, TN Petróleo – Guia do Estudante (Student Guide), Brazil

“...The current crisis in the Brazilian industry presents a unique opportunity for professionals who wish to contribute to historic changes within our industry”

Technical profile of the compliance professional

The compliance professional can be trained technically in various areas such as communication, management, engineering, accounting, and psychology, among others. Knowing the law is important, but that is not all. We are talking about a manager of cultural change, including the change of habits, beliefs and values of each member of the company.

Transition and opportunities

It is time to make the transition to this area that is so sensitive and important for the sustainability of organisations. Young professionals who like challenges and want (dream of) a more dynamic career now have an excellent opportunity for growth and innovation in the oil and gas market. They will act as true influencers of a new corporate culture, promoting change and helping to distance the company from negative impacts on their brand and reputation.

The current crisis in the Brazilian industry presents a unique opportunity for professionals who wish to accept this challenge and contribute to historic changes within our industry.
The "great crew change," a phenomenon the petroleum industry is facing, is well known and has been thoroughly studied. This change refers to the demographic shift as Baby Boomers (workers born between 1946 and 1964) are gradually replaced by Millennials or Generation Y (new entrants born between 1982 and 1996). Various studies have stressed the importance of employing strategies that cater to the unique values and needs of this new generation. Such strategies have mainly focused on affecting sufficient attraction and retention through both student outreach programmes and fresh graduate training and development programmes. However, since Generation Y will very soon – if not already – constitute the major workforce within the industry and will eventually assume its leadership, such strategies shall move from recruitment toward full engagement – engagement not only in daily activities but also in the formulation of long-term strategies. This requirement has been highlighted by a 2005 Deloitte research study which identified that Generation Y’s unique needs include embracing open and honest communication. According to the study, this need implies that employers must institute channels not only to communicate corporate goals clearly and transparently but also to receive feedback on those goals.

"Employers must institute channels not only to communicate corporate goals clearly and transparently but also to receive feedback on those goals.”

Along those lines, a few years ago Saudi Aramco established a Young Leaders Advisory Board (YLAB). According to His Excellency Mr Khalid Al-Falih*, the former President and CEO of Saudi Aramco, the YLAB was established “to advise senior leadership on our transformation journey, and to incorporate the ideas and insights of the new generation of employees.” Each term, a diverse group of male and female employees representing different business lines, grade codes, educational backgrounds and geographical areas, are selected to comprise this Young Leaders Advisory Board. Among the YLAB work streams are advisory services and youth engagement. Advisory services provide and deliver the unique perspective of the younger generations to senior management. Youth engagement channels are the pulse of the youth by communicating corporate strategies to the youth and sharing their ideas with senior management. While the effectiveness of such a non-traditional youth engagement approach is yet to be fully assessed, the need for better youth engagement in setting future directions or at least gauging their perspective while setting future plans is mandatory. After all, as Mr Al-Falih stated, yes “[we] must prepare [Generation Y] for [the industry] … but even more importantly we must proactively prepare [the industry] for them.”

* His Excellency Mr Khalid Al Falih is currently the Kingdom of Saudi Arabia’s Minister of Energy, Industry and Mineral Resources.
STEPPING OUTSIDE THE BOX: OIL AND GAS VS TECH START-UPS AND YOUNG ENTREPRENEURS

You started your own business in the oil and gas industry in the 1980s. Could you repeat this today? To start an oil and gas company nowadays is probably more difficult due to stricter regulatory and financial requirements.

When I started my business, my total capital was about US$1,200 in today’s value. I started buying small oil and gas leases, 16 hectares in size with two wells on them, which was and is only possible in the US and Canada in the private sector.

In order to repeat that today, one would need much more capital or to have partners, who can provide the capital required.

What are the qualities that young entrepreneurs need to have to be successful in oil and gas nowadays? First of all they need to have some level of knowledge of the industry. In my case, it was mechanical operations of wells and pipelines. Then one has to be very optimistic, because setbacks have to be expected. In particular, when raising capital, one must be prepared for many rejections.

Tech and IT start-ups are dominated by entrepreneurs aged 30 years or younger. Can you see that being replicated in oil and gas too, or are “years of experience” required in our industry? I can see that continuing in oil and gas as well. From what I have seen, people who spend longer (8-10 years) in larger corporations become dominated by the need for continual paychecks. So they are less optimistic when it comes to becoming an entrepreneur.

How important are universities for the development of technology solutions for oil- and gas-related problems? Can serious concepts be developed that...
can serve as a basis for later spin-offs?
Universities can be very important when it comes to developing technology solutions. However, as I have been a judge in university competitions, my experience is that as soon as a solution or a concept is developed, people should leave any kind of structured environment – like university – and get backed up financially, because staying in university might require young entrepreneurs to focus on the scientific aspect rather than on the commercial aspect of a product.

In which areas of our industry do you see the most potential for young entrepreneurs?
Because of technological innovation there is significant opportunity for young entrepreneurs to apply US and Canadian technology to oil and gas assets in Europe, Eastern Europe or the FSU, because most of those assets are about 30-50 years behind, compared to the US.

There continues to be a tremendous amount of disconnect between the development of the assets and the reservoirs in Europe, Eastern Europe and the FSU versus the US and Canada: it is generally a matter of dealing with the organisational structure of the state oil companies, which is probably the greatest restriction. Thus there is a tremendous opportunity for young entrepreneurs with local knowledge to get funding from the US or Canada. Americans or Canadians, on the other hand are far more able to understand the risk, which makes Europe and the FSU attractive, because the assets are so poorly developed from a technology standpoint, so the issue just becomes the extreme bureaucracy attached to those countries.

What advice would you give students in the current crisis, considering that job offers are scarce these days?
It is true that the social context for employment is challenging, but there has never been a better opportunity if you have some experience, to start a business, because the cost of assets are much lower. However, the system in Europe is very different to the system in the US so it is very less likely for a startup to be successful because of the increased regulatory issues.

As for the current job situation, I’m sure the demand for people will increase again by 2018. I would advise anybody to establish relationships with the energy industry in the US and Canada. The development of the industry since 2004 has really put the US and Canada far ahead of Europe and the FSU in terms of technology application. A young person, who can also demonstrate that connection and has some first-hand knowledge, is several decades ahead.

In thinking over and summarising all the answers to these questions, the picture is clear:
Do your studies. Gain first-hand experience of the latest technologies – but no older than 5 years. Take your knowledge to less developed areas. Be optimistic. Be relentless. Be willing to live on little money. Simply put: Entrepreneurship is a mindset rather than a career.

With this, I would like to say thank you, Mr Mitchell for your time and contribution, and hope that those thoughts stimulate many readers’ thinking, whether one is “career” or “mindset” driven.
IF I WERE A CEO

We asked YPs what would they consider if they were a CEO today

by Nicole Bogott, Branko Woischwill, Ali Rahneshin, Oliver Franz Kleinferchner, Ahmed Mahmoud Ibrahim and Sila Bozok

“A leader is best when people barely know he exists, when his work is done, his aim fulfilled, they will say: we did it ourselves”. Lao Tzu

In times of growing modernisation and digitalisation in the workplace, is the hierarchical leadership-blueprint still the best model to achieve the highest level of productivity? Perhaps it is time to consider a modern perspective on productive results. A scrum master is not a leader in the traditional sense. He or she supports the team so that team members themselves find the best way. Scrum masters keep a close eye on the overall process and support and influence communication. Coaching and educating are further tasks the scrum master is entrusted with to support the entire team.

Productivity does not always require a leader. One could consider a paradigm shift toward advanced styles designed to replace outdated hierarchies. The concept of top-down leadership is losing ground in the modern workplace.

The increase in energy consumption, especially fossil-based energies, worldwide has created challenges for the environment. If I were a CEO, I would shift the focus towards Green Tech, which should lead the companies toward more environmental and green technologies.

As a CEO, the main strategy for energy conservation would focus mainly on providing technologies in order to reduce industrial energy consumption, including that of the oil and gas industry.

Since more than 51% of global energy is consumed by industries, this means that an innovation such as the one that Tesla used for its electric cars, would create a revolution in the industries.

As a CEO, I would encourage the adoption of a combination of technologies that are cost-effective and then encourage their application, such as the brushless, wound-rotor, doubly-fed electric machine and energy-saving module which can reduce the amount of greenhouse gases that would otherwise be introduced to the atmosphere, if electricity is generated using fossil fuels.

It seems that a positive trend towards green technology is inevitable and the greatest challenge of this trend is the implementation of green projects in industrial energy consumption, to mitigate the effects of fossil fuel use on the environment.
If I were the CEO of a major oil company in these challenging times, I would find my way to the universities and listen to what the students are saying. Listening to their thoughts and fears is of the utmost importance, because they are the future of the industry. An investment in their education and training is an investment in the future of the oil and gas industry. Therefore I would work to cooperate with universities to recruit ambitious students, who have both the knowledge and the motivation to change the old way of thinking, for research and development projects. I would build a research centre where young professionals could take part in all manner of experiments and research. Furthermore, I would refresh my whole personnel and recruit focused and innovative graduates from universities all over the world in order to establish a company that is ready for the future and is prepared to handle any crisis.

Here are my recommendations to oil and gas CEOs on how to survive low prices:

1. Positive net cashflows (short-term): Companies currently suffer from high invested capital levels strangling free cash flows in their profit and loss tables. Shorten daily sales out-standings, cut spending and sell inefficient fixed assets to focus on the most value-added operations.

2. Capital expenditure (Capex) (mid-term): Concentrate on projects with small capex and high profits, refrain from buying lands, storages and supply vehicles (ships and tankers) in downstream. In upstream, suspend high-capex projects with a low probability of exploration and keep the existing rigs.

3. Portfolio diversification (long-term): Make operations leaner to reduce operational expenditure, balance the upstream business portfolio with downstream, because oversupplied refineries will increase their earnings thanks to outstripping demand. Don’t rely on only exploration projects. Increase the share of B2B and B2C sales to compensate for the unfavourable high-capex upstream projects.

Ask the employees to recreate the image of the company in their minds. Doing so can reveal who has more creativity and potential that can benefit the organisation. Consequently, some important decisions could be made that involve training, development and/or change in the company’s structure.

In the same context, I would speak regularly to my employees. This is crucially important to help them comprehend that they are the most valuable asset. As a result, operational performance can be thoroughly monitored, problems tracked to the root cause and effective solutions proposed.

At the same time, we need to show the world who we are. Taking part in major events supporting global causes would be the best way to do it. This is drastically important because it will attract young talents, in addition to experts, to join the company, making its future more sustainable.
I would like to express my full support for initiatives aimed at fostering the enhancement of leadership skills in the youth, as I am convinced that the energy sector increasingly requires the new insights that a fresh perspective will bring to the complex problems ahead.

In the Middle East, there is a growing trend of positioning young professionals in increasingly relevant roles, that were previously given only to very experienced professionals. This is a result of the recognition of the importance of incorporating the young vision, the young enthusiasm and above all, the young preferences and expectations in the shaping of our collective future. I hope that the WPC “Future Leaders Forum” – the 5th Youth Event for the WPC – will provide another opportunity to listen to the leadership vision of the young professionals, which will ignite with a fresh insight the discussion about the main topics relevant to the energy sector. I want to see a vivid exchange of opinions in Rio and new ideas on the main aspects of the world’s energy ecosystem, the production and distribution of energy, the new sources of energy, the geopolitics, the sustainability of energy sources, and the security of operations.

It is thanks to the participation of you, the young professionals in our society, at work and especially in the energy sector, that we all pay more attention to the environment, to sustainability and to the issues of inclusivity in the World.

How can the industry empower women for sustainable development?

I believe the corporate world has a lot to say (and to do!) in relation to empowering women at work, and most particularly, to ensure their fair inclusion and participation, for sustainable development.

Several elements would be of prime importance:
1. Motivate young females from high school years or even earlier, to pursue careers in the oil industry, by expanding the oil sector liaisons with academia. We need to do more to reach out, and explain that oil sector careers for women encompass not only engineering and geosciences, IT and HSE careers, but also the lawyers, accountants and human resources professionals. Young women and girls need to understand that the oil industry will be an option for many decades to come, and that joining our workforce is a prime option.
2. Utilise our available role models, ie: women who are in leadership positions in technical or managerial roles. Encourage them to give lectures, establish networking sessions and give interviews, so that younger generations both in and outside our corporate ranks gain inspiration and see no barriers to their own promotion to higher responsibilities. We need to instill self-empowerment in the replacement generation.
3. Share the stories of success of women in the industry more and more, particularly using modern media. I want to see our women leaders in energy participating more in Twitter, Snapchat, YouTube, Facebook, Linkedin, and other platforms. We need them, our established leaders globally, to be near and accessible to the younger generation of females in the industry. They need to “speak” and inspire them in their own “language”, with their own media.
4. Finally, we need to have gender-diversity policies to facilitate the careers of women in the industry - better succession pipelines, more inclusive of women, better career progression options, and even work schedule options related to maternity years. Women are a minority in the industry now, but coming out from academia, the percentages tell us we will have equal entry numbers of both genders. Are we prepared?
If you were a young professional, what career paths would you have chosen if you did not choose your current path, and why?

If I were a young professional, I would choose one of the engineering disciplines. I believe that human development is closely related to the improvement of engineering applications, with more practical impacts on the quality of daily life than any other professions.

Engineers make a world of difference and always think of tomorrow wrapped up with technology and innovation. Any type of engineering, whether civil, industrial, mechanical, agricultural, biomedical, aerospace, mining, computer, chemical or environmental, touches different aspects of life to make it better and more liveable. To do so, we need creativity, independence, willingness to take risks, analytic thinking, inexhaustible curiosity and passion, which are all part and parcel of the engineering mindset. For me, engineering is a kind of endless adventure of novelty, which makes me excited.

How would you develop yourself professionally for increased productivity in the industry?

The oil and gas industry in most countries is the champion of technological advancement, leading edge processes and systems, diversity and corporate culture. In most instances, the culture is multinational, competitive and driven by professional competence, therefore any young professional wishing to have a successful career in this environment will find the following advice helpful:

• Be visible and available for work – staff who are visible and available for work get more recognition from their supervisors and managers. It is your responsibility to bring your skills and capabilities to the attention of your supervisors. Holding back is not well appreciated in the industry.

• Focus on and invest in your own development – the YP must seek out and take advantage of development opportunities in his or her early years. Monetary benefits should be secondary considerations. Growing your professional discipline skills/competences should be the primary objective.

• Take advantage of exposure or broadening opportunities – international exposure or opportunities to develop multi-discipline skills are useful where staff are comfortable with the depth of their own discipline skills.

• Seek out a mentor or role model who will coach and mentor you in support of your personal and professional development through continuous learning.

• Be self-starting and unlimited in action – YPs must be self-motivated and learn to work and deliver with minimal supervision. They must not allow themselves to be limited by the bureaucracy of the system. They must continue to push the boundaries of achievement.

• Grow your relationship skills – many oil and gas companies are giving more priority to relationship skills. The ability to get along with others and work effectively in teams is getting more attention in the selection of business managers.

A career in the Oil and Gas business can be very professionally fulfilling and financially rewarding for those willing to put in the work required to grow the depth and breadth of expertise required.
If you were a young professional: what essential knowledge would you need to start a business nowadays in our industry?

Being an entrepreneur is a question of mindset rather than knowledge. You have to be aware of your strengths and weaknesses, work hard to compensate for these or team up with others. Develop a passion for what you do and be the best in this area – nothing less! You will have to be persistent, be able to listen to others, to learn fast and accept working with even smarter people than you.

Knowledge about a certain subject is a means to make you unique, a prime condition for success. Being a petroleum engineer, particularly one who can bridge “old industry” with the “web-age” will bring you into the right position. If you can combine uniqueness with value creation for your clients and are able to communicate, then you will succeed. Share your passion and you will convince – do not “sell”!

Sharpen your knife, never stop learning and be ready for opportunities. The more you know, the better you are prepared for opportunities that may open up.

If you are a deliverer, team up with a seller. If you are a seller, team up with a deliverer. If you are both, you are lucky but have to deal with the question of how you will scale up.

Get started – go for it. A good friend once told me “you can’t learn to play the piano by reading about it”.

Leopold Bräuer, Head of Department, Technology Development and Application, OMV, Austria

What technology would you consider important in driving the industry over the coming years?

Technology is a key driver in the upstream industry of the future. Technologies will cover the whole area of exploration, drilling, production and reservoir management, as well as surface facilities onshore and offshore.

There is a need for professionals of all disciplines: geologists, physicists, chemists, petroleum engineers and others.

What we see currently in seismic acquisition and processing is equally intriguing to the developments in reservoir simulation and reservoir management. To illustrate some of the achievements of our industry: if you drilled at OMVs headquarters in Trabrennstraße in Vienna your wellbore could easily reach Saint Stephan’s Cathedral in the very centre of Vienna.

Another exciting development: oilfields will become more digital in the future: most of the relevant measurements on the wellbore will be taken remotely and will directly influence the measures to be taken to manage our reservoirs to maximise recovery and production.

So it is not one single technology that makes the breakthrough: it is all of them. Let’s go for it!

Gerhard Thonhauser, Chairman and Founder, TDE Group, Austria
What was the most difficult situation you faced in your career path and how did you manage this situation?

Prof. Anatoly Zolotukhin
The most difficult situation is when you have to change your job assignment due to force majeure circumstances. You should be patient and remember that patience is a plaster for all sores.

You should like your job, be patient and have an internal focus of control, and commitment to success.

Bernadette Spinoy
A majority shareholder wanted to withdraw from a key asset. He was also the biggest supplier of the third shareholder’s JV. For Total, I fought for compensation. The third parties’ CEOs asked my boss to replace me in the negotiation. He answered I had his full trust and they should not expect interference in the negotiation. This gave me leverage up to arbitration in New York, where a settlement was reached.

M. Zihni Aksoy
It became clear to me after a few years in the industry (with Turkish Petroleum) that a university education was not enough to achieve the goals I wanted as a professional. While working, I first got my MSc degree in the USA and then a PhD in Turkey. It was not easy to get both degrees without interrupting my professional work. There was only one way to do this; to work harder and harder every day - which I did.

What advice can you give to young professionals in order to achieve a successful career in the industry?

Prof. Anatoly Zolotukhin
Be motivated to do your job, gain the respect of colleagues and develop a tolerance for difficult situations. Your job is what can make you successful, your family and friends are those who can make you happy, and sport is what makes you healthy. If all three components are in place – you are bound to succeed.

Bernadette Spinoy
Your first bosses will help you to develop your skills and confidence.
- It is important to understand the business fundamentals, develop your intuition and a vision. The figures are merely the consequences.
- Step out of your comfort zone.
- Go beyond expectations. Give your opinions in the company’s best interest and, once a decision is made, be loyal.
- A positive mindset and enthusiasm energises you and encourages others. Hard work is part of the recipe, along with continuous learning. Also, have some fun, and work in teams.
- Develop yourself, others and your passions. Make use of the woman or man in you.

M. Zihni Aksoy
My advice to young professionals would be to work more and harder every day, and to accept this as a professional philosophy. Success stories are written only by those who have a philosophy.
UPCOMING EVENTS

• WPC Expert Workshop: Local Content Development
  31 October 2016 – Astana, Kazakhstan
  http://www.world-petroleum.org/events/wpc-expert-workshops

• WPC Expert Workshop: 2nd Edition: Challenges of the European Refining Industry in a Global Market
  3 November 2016 – Madrid, Spain
  http://www.world-petroleum.org/events/wpc-expert-workshops

• 22nd World Petroleum Congress:
  9-13 July 2017 – Istanbul, Turkey
  www.22wpc.com