an integral part of our living space. There is ongoing research being carried out by Russian scientists indicating that oil and gas may become a renewable resource, forming in the entrails of the Earth in colossal volumes, and far exceeding the needs of mankind in energy resources. Further research in this area can lead to a change or a significant revision of the main ideas of what constitutes the rational development of oil and gas fields.

In your opinion, will the Russian oil and gas industry become more or less attractive to talented young people?

There is a huge market for labour within the different fields in the oil and gas industry. For instance, almost 1 million specialists are currently working in the Russian oil and gas industry. In order to replenish the personnel reserve, 75 universities operate in 49 regions of the Russian Federation, where about 98,000 people study. In 2016, higher education institutions trained 15,516 specialists in the energy field, and young people under the age of 35 account for almost 40 per cent of all employees of the oil and gas industry. The sector is undoubtedly innovative and challenging, offering a solid platform for personal fulfillment for talented youth, and opening the prospects for further growth, making the industry very attractive.

In close collaboration with petroleum companies, Russian universities are doing a great job of attracting young people to the oil and gas industry. This is achieved by supporting student initiatives in the organisation of scientific and practical events, establishing universities with modern equipment supporting the research activities of students, organising internships at the best companies in the industry and scientific institutions, and exchanging students with foreign partner universities – all of which makes our industry even more attractive for young people.

Moreover, last year the Ministry of Energy of the Russian Federation established the Youth Council of the Oil and Gas Industry, whose main task is to establish cooperation between students at higher education institutions, young professionals, scientists, enterprises and government authorities to consolidate efforts in raising the level of R&D activities in the oil and gas industry.

Celebration of the 80th Anniversary of the World Petroleum Council and the 55th anniversary of the Russian National Committee, June 2013, Moscow.
BRIDGES TO OUR ENERGY FUTURE

Bridges connect two parts of land, often separated by water. In today’s industry, and for all young people joining the industry in the future, we are standing on one side of the bridge, called the present. This year’s WPC Young Professionals Magazine presents an opportunity – a platform to connect two parts of land so that we can join, collaborate and create better solutions to today’s challenges. Instead of standing apart – with distance between us – we can come together to bridge our knowledge, our opportunities and our future.

The future is still uncertain, but we can shape it with our everyday decisions. Most importantly the energy industry has to serve as a solid foundation for the future global economy. A sustainable energy supply, and a fair distribution of energy among all nations, as well as climate change issues, will be the main challenges. This presents a challenge for us as young professionals. We must harness all the knowledge that has been gained in the past, and use it in order to build these solid bridges to the other side, called the future.

We must be careful in which direction we build these bridges so we can arrive at our desired destination and create value for future generations. Furthermore, we must build these bridges with superior designs, so we can ensure that future generations will follow.

Regardless of how the future will look the only thing that is certain is that it will be challenging and exciting, and the main driving force will be the people driving this change.

People: a resource deeply valued but considerably under-utilised. Shaping the future is an important task to be undertaken equally by men and women equally. To support this we have introduced a new section in this year’s magazine dedicated to Women’s Empowerment. This section is intended to encourage all young women to fully reach their potential and be fearless of taking over decision-maker roles within our industry.

We want to stimulate a constructive and critical thought process and invite you to share your views and ideas. Join us in shaping our energy future where together, we stand on the same side of the bridge.

Thanks to a great team of volunteers: the WPC YP Chair, WPC YP Committee Members, and the essential support of our WPC YP Secretariat. This year’s magazine gives a well-rounded picture of the responsibility that our generation inherits and of the specific challenges that we will face. Special thanks to our authors and interviewees.

JOIN US:
Join the World Petroleum Council Young Professionals Connect group.
Join us on Linkedin: www.linkedin.com/groups/8189962

Hasnaa Lamik, WPC YP Magazine Editor, Moroccan WPC YP Committee Member, ÖGEW Board Member, Austria Business Development TDE-Group, Austria

“Join us in shaping our energy future where together, we stand on the same side of the bridge”
Dear Readers, dear Friends

Three years have already passed since the last World Petroleum Congress in Moscow, and they have been full of challenges and opportunities. As we gathered in Moscow the oil price was still above US $100/bbl while in early 2016 the price fell below US $30/bbl for the first time in more than a decade. Correspondingly, the industry went through a significant downturn and new regulatory constraints emerged. Moscow anticipated these changes, inviting the attendees, including students and young professionals, to reflect and debate on the responsibility of oil and gas leaders in energising a growing world.

In periods of change and uncertainty, it is important to give people a forum where they can gather and exchange views. To make the opportunity of discussions within the WPC global family more accessible to a greater number of young professionals, we established the one day regional “WPC Tomorrow’s Leaders Symposium”. The first edition in 2014 welcomed 100 attendees to London, and the second addition in 2015 gathered another 100 attendees in Budapest. 2015 was also the year when nations gathered to discuss climate change at COP21. The energy industry is a key player and solutions provider to the climate change challenge.

Also in 2015, the WPC Leadership Conference in Tromsø showcased concrete ways to reduce carbon emissions and their impact on climate change, Arctic challenges and technologies for new frontiers. The constant innovations of our industry are at the heart of these new business and technical approaches, which will be developed and implemented by the new generation.

Finally, the 5th WPC Future Leaders Forum in Rio de Janeiro gathered together more than 500 students and young professionals in 2016. Gathered from all around the world, the participants built momentum in terms of knowledge sharing and global networking. The diversity and energy of the industry is future leaders offers a promising outlook for the future of oil and gas.

While the industry seems to be entering a more stable era, Istanbul will bridge this recent history and our energy future. We appreciate the strong commitment of our Turkish friends in bringing young people from all over the world to take part in the “Olympics”.

The agenda we have developed for the Youth Lounge is exciting and we hope to enjoy many unique opportunities to meet for an intergenerational dialogue!

We invite you to explore this new edition of the WPC YP Magazine. Created thanks to the collective efforts of students and young professionals from the oil and gas industry across the globe, it provides our readers with insights from current and future leaders on our industry. We would like to thank all the contributors and we hope you enjoy this new edition as much as we enjoyed developing it.

From all of us on the WPC YP Committee, we would also like to thank the volunteers and members of the community for these empowering three years, and we look forward to expanding our initiatives for the next cycle.

On behalf of the WPC Young Professionals Committee
We have once again reached that time in our calendar, the time to participate in the biggest event of our industry – the 22nd World Petroleum Congress, which this year takes place in Istanbul.

It is an industry gathering which enables us to summarise the achievements and take a look at both short and long-term issues. The legacy of our predecessors is very rich and we are obliged to share this knowledge with the generations that will follow us.

Almost two decades ago, the WPC’s management recognised that without the active involvement of young professionals as part of its various initiatives and projects, the WPC could not be a successful organisation. With this in mind, the first WPC Youth Forum was organised in Beijing, China in 2004, encouraging young experts to present papers showcasing their achievements. A special committee then selected the best papers, recommending them to the Congress Programme Committee to be presented during the 2005 World Petroleum Congress in South Africa.

Since we held that first WPC Youth Forum in China in 2004, we have enjoyed the continuous involvement of young people in our organisation. Their participation in the Youth Committee helped us to better understand their views on the industry and our future, and also gave us an opportunity to build a dialogue with the next generation.

Connecting young professionals to each other and to industry leaders is a key objective for the WPC. Our global network provides them with an opportunity to build bridges across continents and between peoples.

The petroleum industry’s future faces many new challenges and opportunities, so the profound knowledge our Young Professionals gain during their studies and at the beginning of their professional life provides an important contribution, as the industry deals with our continually changing and highly competitive markets.

You are our successors and so we need to give you all the support we can to equip you with the right tools, knowledge and opportunities, and thereby enable you to successfully lead us in to the future.

Today young people have unprecedented access to information, providing them with real-time information and an in-depth overview of industry options. This also means they face a lot more competition from their peers around the world compared to when I started my career in Budapest over forty years ago. Then, we were the Game Changers, now the job falls to you.

I am satisfied to be finishing my term as President of the WPC this July with the knowledge that this wonderful organisation, our WPC family, will be left in good hands with you – the future leaders of our industry.
One of the characteristics of our modern life seems to be that we are living in a fast-paced world. People have to think, decide and move at an ever-increasing rate today. The oil and gas industry, which is one of the fundamental factors of our global economy, has to keep up with this change as well. Today, our business requires correct and wise decisions in a shorter time frame. With the help of new technological improvements and digital development, business eras change instantly, and without an ability to read and adapt to these fast-changing conditions, failure seems partially inevitable.

As a result of that, our business needs more talented, energetic, flexible and open-minded people. Although the oil and gas industry is not always seen as attractive by the younger generation, it has crucial strengths. First, our business is widespread which offers an opportunity to work around the world in a multicultural business environment. Being a member of a global community has many advantages for career development. Secondly, the industry has to follow and use cutting-edge science and technology which will provide young generations with the opportunity to improve their technical skills and knowledge. For instance, Oil and gas companies were the pioneers of the first digital age in the 1980s and 1990s. Long before the phrases such as big data, advanced analytics, and the Internet of Things had become popular, oil executives were making use of 3-D seismic, linear programme modeling of refineries, and advanced process control for operations. This second digital age, commonly known as Industry 4.0, and followed by the oil and companies, has provided new job opportunities for the youth. Thirdly, our business still has an entrepreneurial spirit. There exist abundant opportunities for companies to invest all around the world. Plenty of oil and gas reserves are waiting to be discovered, produced, developed or rehabilitated. And finally, most of the oil companies are still the biggest companies, and in contrast to the renewable development challenge, it seems that these resources will continue to be the primary commodities of the world economy in the long-run.

It is clear that we are on the edge of a transformation in the oil and gas industry. To achieve that, we need fresh talent, a new type of understanding and active leadership. The era of low oil prices shows that, in addition to technical and operational improvements, young leaders have to take into account new financial, managerial and organisational models for the sustainability of the oil and gas industry. I believe, as the dreamers of tomorrow and the hope of our future, young generations will take on more responsibilities in reshaping our energy future and will recreate new perspectives for development.
SURVEY REPORT ON THE PERCEPTION OF OUR INDUSTRY: THE OIL AND GAS IMAGE AS VIEWED BY YOUNG INSIDERS

“During the 21st WPC, talent attraction and retention was highlighted as one of the main concerns for industry seniors.”

The Young Professionals of today are the senior leaders of tomorrow. Those industries that will succeed in capturing and retaining the best young talent will be in a better position to become the front runners of the future.

Several events (shale revolution, COP 21 or the rising competitiveness of electric vehicles) are transforming our industry, and also requiring increasingly resilient strategies to adapt to an ever faster changing reality. The industry is changing and so are the incoming profile requirements from the companies.

During the 21st WPC, talent attraction and retention was highlighted as one of the main concerns for industry seniors. WPC’s Young Professionals Committee aims to be an active contributor to build a brighter oil & gas future. As part of our commitment, the WPC Young Professionals Committee have conducted the 3rd survey of the “Students & Young Professionals perception of the oil & gas industry”. This asks students about their views and expectations when entering the industry and asks young professionals, about their concerns when developing their careers, trying to understand the general perception of young people around the world that is determining which talents are entering the oil & gas industry.

The results of this survey aim to serve as tools for decision making, by identifying those areas of improvement and boosting those with higher positive value.
Talent retention: how is the oil & gas industry perceived.

Do you think...

That the oil and gas industry has appropriate messages in the media

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<th>Neutral</th>
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<td>9%</td>
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That the public perception of the oil and gas industry fits the reality

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The on-line survey reached over 2,100 respondents from all around the globe. The young respondents’ profiles followed the same patterns as seniors in the industry, still dominated by engineers – 65% of respondents – and despite strong participation from young women, men still represented 67% of respondents.

The Young Professionals oil & gas industry perception:
The perception and public image of the industry becomes one of the most relevant issues to address when trying to capture and retain talent. In this sense young professionals point out a mismatch between industry reality and its public perception. Despite the fact that over 65% of respondents have a very positive image of the oil & gas industry, the majority doubt that this positive perception reached industry outsiders, identifying a key point of improvement where the industry should act.

Talent attraction: Students view

The survey had three main objectives: determine where to find talent, how to attract them and how to overcome the barriers that hinder the entrance of some of those talents.

Companies’ websites and university job fairs show as the top places where students interested in a career in the oil & gas industry will look to find a job (Chart 1). In fact, several respondents suggested increasing cooperation between universities and companies in order to increase the talent attraction.

Regarding the main reasons that attract students to a career in the oil and gas industry, the strong interest in the field and the opportunity to work in a global and high tech industry, are the top 3 key drawers for young people leaving behind other reasons such as a competitive remuneration.

However, despite representing only 6% of respondents, those that answered NO to the question “Can you imagine yourself working in the oil and gas industry?” deserve special attention. Their main worries were about the future of the industry where they do not see stability or opportunities for young talents (Chart 2). The measures recently undertaken by companies to restructure their portfolios to adapt to the lower-for-longer reality of oil prices, could be behind this perception. Thus, an active and adequate communication to transmit the opportunities in the oil & gas industry might be required to address these concerns.

Finally, big players are in a better position to attract talent (chart 3) as International and National oil companies are preferred as work place by students, with oil still being the king fuel as the interest in working in gas companies falls behind.

Talent retention: Young Professionals view

Regarding young professionals in the industry, the survey looked at the evolution of career challenges at the
entry point into the industry compared to current experiences while also considering the most relevant reasons for talent retention.

University job fairs (18%), company websites (17%) and professional networks (13%) remain the top channels through which Young Professionals are hired. It is interesting to note that young people’s preferences for the type of company they are interested in changes as their career progresses. When comparing the type of company which students are interested to work in, compared with the young professionals answer to the question “In which type of company do you work?” (Chart 3) the variety of profiles is much wider as despite students’ initial preference for big companies, the oil & gas industry offers a wide range of profiles where academia and service companies also play a role.

The top challenges young people expect to face when entering the industry are aligned with those of students as the lack of opportunities for young professionals, future job security and family and work/life balance are also the young professional’s top choices. However, the sentiment of uncertainty about the future of the industry seems to be impacting on the industry’s human capital perspectives, as only 43% of respondents intend to remain in the oil & gas industry for their whole career, almost 30% less than respondents on the 1st Young Professionals perception of the industry survey.
What Young Professionals of today require from a career in the oil & gas industry differs from the requirements that current senior professionals had in the past.

According to respondents, young people are more linked to recognition, career development opportunities and simply liking what they do every day rather than a long term career or a more competitive salary (Charts 5) with other initial concerns such as family work balance loosing share from top 3 to top 5 (Chart 6).

In fact, young professionals consider that providing mentor programs & support from senior leaders and an increasing responsibility for driving projects and initiatives are the best practices that the industry can put in place in order to retain talent. Those actions are again more linked to recognition and continuous improvement, rather than to competitive remuneration that despite retaining the 3rd position, loses considerable share when compared to previous survey editions (Chart 7).

The concluding thoughts of this survey are that it is key to identify the new characteristics of young talent and how best to address them through an adequate communication campaign, which should highlight the bright long term future ahead of the industry, and is essential in order to capture and retain the best available talent.

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**Chart 5: What do you like best TODAY from your career in the oil and gas industry?**

- I like my work: 21%
- Opportunity to work in a highly global and: 20%
- Strong interest in the field: 20%
- Income earning potential: 14%
- Opportunity to work in a High-tech: 13%
- Opportunity to travel: 12%

**Chart 6: Looking at the situation today, which do you think is/are the greatest challenge(s) you face today in your career in the oil and gas industry?**

- Future job security: 13%
- Lack of career path visibility: 12%
- Promotion opportunities for young professionals: 10%
- Lack of innovation and motivation for young talents: 9%
- Family and worklife balance: 9%
- Environmental concerns: 7%
- Speed of promotion: 7%
- Adaptation to a changing environment: 6%
- Gender barriers: 6%
- Negative image of the industry: 6%
- Lack of dynamism: 5%
- Travel requirements / expatriation issues: 5%
- Increasing work load: 5%

**Chart 7: What needs to be done to retain your talent in the oil & gas industry**

- Provide mentor programs and more support from senior & leaders: 18%
- Give more responsibility in driving projects and initiatives: 16%
- Competitive remuneration: 16%
- Improve worklife balance: 13%
- Improve working atmosphere: 11%
- Provide opportunity to travel abroad: 10%
- Develop diversity and inclusion: 10%
- Increase work dynamism: 9%

*1st YP survey on survey perception (2008) 22% of respondents*
The World Petroleum Council (WPC) is committed to involving young people working in the hydrocarbon industry and recognises the importance of attracting, retaining and developing talent for the future. Aiming towards the same vision, the WPC Mentorship Programme offers a unique opportunity to youth to experience mentoring from experts across the world. This global mentorship programme provides a platform where youth and today's leaders can deliberate on issues, learn mutually and share their views with each other.

The WPC Mentorship Programme is a flexible framework and interactive in nature, aiming to make everyone feel comfortable to discuss professional and individual issues. Participation in this programme is voluntary and driven by a desire to learn and grow. It offers full freedom for discussion topic, mode of communication and frequency of interaction.

WPC will shortly launch the 3rd edition of the Mentorship Programme and is keen to choose young people from around the globe, with diverse backgrounds, to participate. As WPC Mentorship Programme Lead, I strongly encourage you to join, because I truly believe that mentoring is beneficial irrespective of the stage of one’s career.

Words from our participants:
As Alfred Mercier rightly said, “What we learn with pleasure we never forget” and the flexibility and openness of the WPC Mentorship Programme strongly reflects this. Additional feedback shared by our programme participants also highlights the same sentiment.

• “Over the mentoring cycles, I have been involved in mentoring participants from India, Iran, Kazakhstan, Russia and Sudan. Being involved with the WPC mentoring program has given me a lot.” - Mentor from Norway.
• “The programme aims to leave no stone unturned in ensuring a smooth transition of knowledge between two generations. Interacting with colleagues on a variety of topics has added new dimensions to the perspective.” - Mentee from India
• “Personally, I find the exchange to be extremely interesting, as all the participants get to discuss and present their views on pressing industry issues in different countries. The process truly is mutually beneficial.” -Mentor from Russia
• “Discussing together to find a common relevant topic to work on, will open new areas to look at.” - Mentee from Italy.

What’s in it for YOU?
We are open for applications for the 3rd Mentoring Programme (2017-2020). Come join us, enhance your skills, be part of WPC projects, develop global networks and get recognised for your participation. I'm sure being a participant in this programme will elevate your professional and personal capabilities. For any further information and clarification on WPC Mentorship Programme, write to us at youth@world-petroleum.org
Turkey is an increasingly important transit hub for oil and natural gas supplies as they move from Central Asia, Russia, and the Middle East to Europe and other Atlantic markets. Over the past decade, Turkey’s economy has expanded and so has its consumption of petroleum and other liquids. Since 2010, Turkey has experienced some of the fastest growth in total energy demand among members of the Organisation for Economic Cooperation and Development (OECD). As an “Energy Corridor” between the energy rich Caspian, Central Asian and Middle Eastern countries and the consumer markets in Europe, Turkey is well positioned to host the 22nd World Petroleum Congress (WPC) on July 9-13, 2017 in one of its most beautiful cities: Istanbul. During the bid for the WPC Congress the motto, “This time – Istanbul!”, was used and after months of planning the doors are open to the Istanbul Congress Center (ICC). As the “Olympics” of the oil and gas sector, the Congress attracts large attendances including over, 500 CEOs, 50 Ministers and 1000s of visitors for the World Petroleum Council Exhibition, which is also one of the largest strategic oil and gas expos in the world. With our theme “Bridges to our Energy Future”, the 22nd WPC Congress Programme Committee has prepared an extensive programme to cover a range of topics focusing on opportunities and challenges in the oil and gas industry including:

- Energy geopolitics to finance;
- Technical innovation to collaboration;
- New business models to energy access; and Many other major issues for our global audience to consider.

The WPC Congress programme has four blocks: Exploration and production of oil and gas, refining, transportation and petrochemicals, natural gas processing, transportation and markets, and sustainable, management of the industry. In addition, there will be a comprehensive Youth Programme capitalising on the energy and dynamism of our Young Professionals and providing an opportunity to give youth a voice on ongoing industry activities.

We have invited students, researchers and young professionals in the industry from all around the world, who are under 35, to seize the opportunity of coming together with industry leaders in Istanbul. The Youth participants will be able to take part in the daily industry talks, have the opportunity to speak in the Youth sessions, gather with seniors from the industry (during the auditorium sessions and at the Young Professionals Lounge located at the heart of the Exhibition Hall). They will also have the chance to benefit from networking with the other young professionals and be able to network with each other at social events. Our Young Professionals also have the chance to partake in technical tours, where they will be able to experience some of the latest technologies and business practices.

The 22nd WPC Congress allows for the delegates to connect and collaborate with each other and with the WPC Young Professionals Committee (YPC). They will be informed by the YPC members about our activities; including the YP Magazine, YP Survey, YP Connect, WPC Mentoring Programme and more. Volunteering positions for other WPC Youth activities and how one can become a part of them will also be highlighted.

Furthermore, I hope you will join us at the Young Professionals Special Session on “Disruptive Technologies” in the main Congress programme which will be held on July, 13 between 14:15-15:45. This session aims to take a glimpse at potential ways in which the future may unfold, and how the oil and gas industry is equipped to deal with those changes.

Finally, I would like to express my sincere thanks to WPC YPC members and Turkish Young Professionals for their support, collaboration and dedication on the journey to the 22nd WPC Congress. I’d also like to thank the Youth Programme, the Turkish National Committee and the WPC Secretariat for their valuable contributions, never-ending support and believing deeply in the dynamism of the young generation. Special thanks are also done to the 22nd WPC Congress Young Volunteers for their hard work and time. I highly appreciate being a part of WPC family and know the 22nd WPC Congress will be an unforgettable event for all involved.
“Participants from 18 countries attended the Symposium and discussed the future of European downstream together with experts from leading oil and gas corporations, consultancy firms and universities”

The WPC Tomorrow’s Leaders Symposium, an event series targeting young professionals active in the oil and gas industry, was launched in London in 2014, and the second event took place in Budapest on 8 October, 2015. Some 80 participants from 18 countries attended the Symposium and discussed the future of European downstream together with experts from leading oil and gas corporations, consultancy firms and universities.

WPC’s President, Dr József Tóth, opened the conference and gave the floor to speakers for resourceful presentations and interesting discussions on how the current geopolitical climate affects downstream operations and regulatory issues. Sessions in the afternoon were seeking answers for the sustainability of the downstream business model and brought together HR professionals to discuss the challenges in reducing the generation gap and recruiting top talent in the oil and gas business.

In addition, to expanding professional knowledge at the conference, social events offered some special opportunities for conference participants to build their networks, including a trip to the OPEC HQ in Vienna.

MOL Group, an integrated, international oil and gas company headquartered in Budapest, Hungary, with a track record of 100 years in the industry, hosted the WPC Tomorrow’s Leaders Symposium 2015.
The WPC national committee’s youth initiatives in Russia started in 2011 as part of the preparation for the 21st World Petroleum Congress in Moscow. The 21st WPC, one of the major international events in the petroleum industry, was hosted by Russia in 2014 and provided young professionals and students from more than 20 countries, as well as 550 young volunteers, with the opportunity to engage with oil and gas leaders from industry, academia and government. Young leaders also contributed to the Congress within the main agenda, the social responsibility programme, the technical tours and the organisation of the cultural programme. The Congress empowered dozens of students from Gubkin University by involving them in global WPC YPC projects such as the Young Professionals Magazine, where they contributed a number of articles, YP Connect where they encouraged Russian young professionals to join, the Future Leaders Forum and also the Mentoring Programme, which has included around 20 participants from Russia since 2011, as well as the YP Survey and the successful development of several local initiatives.

Under the leadership of the WPC Russian National Committee, and in collaboration with Gubkin University, 20 students from nine major Russian technical and petroleum universities were awarded a special scholarship, the “Golden Legacy of the WPC” which was established in 2014 as a part of the 21st WPC Legacy Programme. The ceremony to present these scholarships took place during the WPC Tomorrow’s Leaders Symposium in Budapest (2015), the Graduation Event at Gubkin University (2016) and the National Oil and Gas Forum in Moscow (2017).

Special WPC youth sessions and workshops are also organised as part of some selected country forums and conferences for young professionals and students in the petroleum industry. Many events and initiatives take place in collaboration with other international and Russian petroleum and energy associations, and this cooperation helps secure experienced speakers and enables us to share information about the global and local WPC YPC projects with different professional communities.

Please stay tuned for future activities of the WPC National YPC in Russia!
The 5th edition of the WPC Future Leaders Forum (FLF) took place in Rio de Janeiro, Brazil, from October. In a time when major shifts in the oil and gas industry are determined by a handful of variables such as social development, environmental concerns and poverty reduction, the forum occurred in a timely manner for young professionals to rethink their roles and reshape their goals.

Undergoing a transformation that includes renewable power generation growth and nuclear power revival, oil consumption and production imbalance, price volatility, longstanding electricity demand growth and the development of shale oil resources, a number of forces are changing energy dynamics. The global energy system will change at an even faster pace as a result of the Paris Agreement (http://unfccc.int/paris_agreement/items/9485.php), which establishes an international framework to strengthen the global response to climate change, and there will be even more interest in wind and solar energies that have become energy sources to be reckoned with.

While there is a movement towards cleaner sources of energy, the oil and gas downturn presents a significant opportunity to recapture the industry’s competitiveness. Focusing on strong balance sheet practices and staying competitive are vital to long-term success with the challenges facing the oil sector during this lower-for-longer oil price environment. What is equally important is helping both industry and society manage this period of energy transition.

Regarding young professionals, the major transformation underway provides a myriad of possibilities in spite of the current oil price scenario and uncertainties in the global economy. Within a sector as diverse as oil and gas, vast opportunities underscore the way ahead for future leaders.

Under the motto “Game changers: New leaders for a new competitive energy industry” the goal of the WPC FLF 2016 was to engage young professionals of the energy industry, we are directly interested in its sustainability and continuous improvement because this is our future.”
professionals in an open dialogue with leaders from the energy industry. The forum gathered 70 speakers from 25 countries, and over 600 young professionals from the host country together with participants from several other countries. With 7 plenary sessions, 18 lectures, opportunities to dine with 22 industry leaders and a technical visit to Ilha do Fundão Technological Park, the forum was held alongside Rio Oil and Gas 2016, the leading event of the sector in Latin America.

Moreover, the Rio WPC FLF 2016 also became a milestone for Brazil’s future economy, as the Brazilian oil and gas industry is going through a major shift towards attracting private companies. Regardless of any political point of view about the Presidential impeachment that recently occurred, it is undeniable that the changes in the pre-salt (Brazilian geological formation) regulatory framework, new partnerships and divestments by Petrobras, improvements in local content policy, economic stability and new guidelines on the regularity for bids for licensing rounds are key factors reshaping and fostering investments.

The event was mainly organised by the Brazilian Petroleum, Natural Gas & Biofuels Institute (IBP), alongside WPC’s expertise from previous Youth Forums. The event was prepared by young professionals, both Brazilians and foreigners, all volunteers, who carefully planned and dedicated so much to ensure that each participant of the FLF could find their own way to become a game changer. The event was designed to create a casual and relaxed atmosphere that would encourage two-way learning, collaboration and knowledge transfer through participant interaction. It featured three main areas separated by colours and arranged side-by-side where the lectures took place simultaneously. The forum focused on important topics related to business leadership, technological innovation and industry sustainability thereby creating opportunities to exchange experiences and bring together different generations. Policy tools and the technology required to address climate change, decarbonisation or carbon management, as well as, discussions on challenges and solutions to increase energy access in the developing world were also discussed.

As a final step for the Rio WPC FLF 2016, a letter addressed to energy leaders was written, sharing the industry’s main values as perceived by young professionals. Focusing on important themes like safety, ethics and compliance, sustainability, innovation and human capital, the manifesto was read during the Rio Oil and Gas closing ceremony to more than 800 executives representing a significant voice that will be included at the 22nd World Petroleum Congress in Istanbul on 9-13 July 2017. Read by Jaime Naveiro (Petrobras and WPC YP Brazilian Representative), the letter states as a final message:

“... as young professionals of the energy industry, we are directly interested in its sustainability and continuous improvement because this is our future. (...) We strongly believe in the value our activities create for society, and we acknowledge the responsibility of being part of the oil and gas sector. We wish an environmentally conscious, collaborative and innovative future, filled with opportunities for the next generations.”

Rio WPC FLF 2016 marked a turning point and fueled young professionals’ motivation to face this unparalleled transition. It is time to build on the strong momentum, making way for the bridges to our energy future.

If you missed it you can still check out some of the highlights at http://www.flfrio.com/.

Delegates attending Rio WPC Future Leaders Forum 2016
The Sustainability & Legacy section focuses on real examples and practices demonstrating how sustainability is becoming a key driver for long-term industry development, how it is aligned with the business strategy of the petroleum companies, helps gain a competitive advantage and also brings benefits to our society. You will have the opportunity to read about a unique unconventional project in Argentina that creates value for the local urban development, making a significant impact on the regional economy. Additionally we have included an example of the Energy Futures Lab in Canada which engages professionals in the petroleum industry in cross-sector collaborations for finding new business and technical solutions, as well as leaving a legacy and expertise for future generations. We also have a special focus on health, safety and environmental issues, with examples from Russia demonstrating that safety should be the number one priority not only in operational activities but also in the daily life of every person.

by Sustainability Editor Anna Illarionova

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by Sustainability Editor Anna Illarionova

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SUSTAINABLE DEVELOPMENT OF UNCONVENTIONALS IN ARGENTINA: THE VACA MUERTA CASE

“Vaca Muerta is a unique shale formation not only due to its geological features, but also to its location which greatly facilitates operations”

According to the International Energy Agency (IEA) report 2013, Argentina has the world’s second largest unconventional gas resources behind China, with recoverable resources (through technical means) of 800 trillion cubic feet (TCF). Vaca Muerta is the main shale gas formation in the country with a potential of 308 TCF of recoverable gas. It also has important oil resources of up to 16.2 billion barrels, which is ten times the current local reserves.

The development of unconventional resources is the main challenge of the Argentine energy industry and represents a paradigm shift in the sector. These resources are the key to ensuring the country’s energy self-sufficiency and could have a major impact in the national economy and in regional economies.

Vaca Muerta is a unique shale formation not only due to its geological features, including a significant amount of total organic carbon, high pressure, good permeability and great thickness, but also to its location far from urban centres, which greatly facilitates operations. Vaca Muerta
is located in the Neuquén Basin, in the southwest of Argentina, and has an area of 30,000 square kilometres (km²). This region already has an important oil and gas activity from conventional reservoirs, allowing shale development to take advantage of the existing infrastructure.

Another key issue is that Vaca Muerta is located at a depth of more than 2,500 metres, well below freshwater aquifers, making extraction safer and reducing environmental risks. It’s important to emphasise that the water of the hydraulic stimulation that returns to the surface, and that eventually produces the well, is never poured into a natural water channel or released into the environment. On the contrary, it is treated and managed in accordance with strict regulations established by the state authority and monitored by the specific control agencies.

Social license to operate, meaning approval within local communities and other stakeholders, is crucial to achieve sustainability throughout the project lifecycle. This also applies to the exploration and production of unconventional resources.

A key aspect related to social license is urban impact. Indeed, nearby towns are directly or indirectly impacted by the scale of shale operations, including an influx of people, trucks, drilling equipment, pipelines, etc. It has been the case of Añelo, the closest town to the Loma Campana block, which is the largest in the development phase at Vaca Muerta, and a joint-venture between YPF (Argentina’s leading energy company) and Chevron. Currently, its population is growing and the town is facing a lack of basic infrastructure and services to cope with the boom. Therefore YPF, in partnership with the IDB (Inter-American Development Bank) and local authorities, has established a programme called “Sustainable Cities”. Targeting the towns of Añelo (Neuquén province) and Las Heras (Santa Cruz province), the 20-year outlook programme aims at innovative and sustainable urban planning based on IDB’s Emerging and Sustainable Cities’ methodology. It assesses environment, housing, water availability, health, education and sports, among others. This urban development roadmap is funded by all parties involved (including other Oil and Gas companies, multinational organisations and local governments), and its impact is constantly checked to maintain alignment with the different initiatives.

Last but not least, the use of chemicals during the hydraulic stimulation, commonly known as fracking, has also been in the public eye. Therefore, the Argentine Oil and Gas Institute, based on other countries’ best practices for unconventional development, has established an online disclosure tool. This registry provides a full disclosure and details of all the chemical components used in the different frac stages at well sites. This information is provided by the company operating the unconventional well, and is key for better understanding and debunking false information about the components used during the stimulation.

According to the IEA, Argentina has the world’s second largest unconventional resources, after China.
While oil prices have recovered, the upside oil price momentum has not gone away, at least in the near term. The unwillingness of the Organisation of the Petroleum Exporting Countries (OPEC) members to reduce production, and increasing exports from the United States as a result of the shale gas boom, will likely drag oil prices down further. However, increased demand projections in the long term are likely to drive oil prices up (US$ 55-58 per barrel in the next couple of years, according to the International Energy Agency).

Although recent years have been intense for the industry, companies’ corporate strategies have been focusing the efforts to limit emissions and to comply with climate change regulatory initiatives.

The following diagram explains the methodology leading oil and gas companies are beginning to integrate into their operations by aligning sustainability and overall business strategies, structuring non-traditional collaborations and extending existing collaborations while setting up a governance structure that is supported by the right infrastructure.

Companies count on a proactive and committed leadership that strives to develop a culture of sustainability by identifying motivations, drivers and achievable goals for success. Exxon Mobil’s Corporate Citizenship Report states the manner it applies strategies that help guide and measure their commitment to good corporate citizenship and address society’s diverse sustainability objectives.

Furthermore, BP surveyed more than 1,000 affected Brazilian farmers in 2015 to understand their attitudes on issues such as code of conduct, speaking up about concerns, discrimination, retaliation.
Companies see value chain implications crucial in terms of sustainability in order to understand the environmental footprint and identify key as measurements metrics, prioritising and tracking programmes aggressively through key performance indicators.

Ben van Beurden (Royal Dutch Shell’s CEO) states that greater co-operation across society is needed for a successful energy transition, and that these collaborations within the oil and gas value chain and with the broader society ensure sustainable success. Companies are developing incentive systems and metrics to encourage sustainable behaviour by sharing best practices in sustainability to ensure continual improvement. Companies such as Repsol include a Corporate Foundation that continuously carries out initiatives to encourage and promote innovation and entrepreneurial culture among students and graduates of energy-related fields in order to be at the forefront of the industry.

The primary oil and gas industry is implementing an institutional strategy for sustainable development for large oil investments, which seeks to reconcile infrastructure growth with biodiversity conservation. The Spanish company CEPSA believes that in the rural areas impacted by its activity, reputation building is based on its social management with communities and in the protection of the local environment. The development of a permanent and active relationship between companies and communities gives rise to new projects, in this way, companies are working aggressively on building a sustainable reputation among their main shareholders, clients and investors. In conclusion, the integration of sustainability into the oil and gas business is not a burden but an advantage.

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**A Structured Approach to Implementing Sustainability**

**Strategic Alignment**
- Leadership Commitment
- Vision
- Drivers
- Goals and Priorities

**Governance and Infrastructure**
- Dedicated Resources
- Governance Structure
- Central Tracking and Reporting
- Best Practice Sharing

**Operational Integration**
- Baseline and Benchmarks
- Value Chain Implications
- Program Selection and Business Case
- Metrics, Policies and Procedures

**Collaboration**
- Upstream Collaboration
- Downstream Collaboration
- Measurements and Incentives
- Non-traditional Collaborations

Source: Deloitte
EXPERIMENTS IN ENERGY TRANSFORMATION: BUSINESS AS A LABORATORY

“There is a huge opportunity for provinces with oil and gas dominated economies, like Alberta, to try new tools like the Social Lab to identify new opportunities for energy leadership.”

Meeting the needs of 9 billion people requires a tremendous amount of energy. How it is produced matters. New market forces on both the supply and demand side are emerging and our traditional business models aren’t always ready for them. These disruptions increase risk in a traditionally conservative sector. People get understandably touchy when they face the prospect of reduced mobility, comfort, health care, or access to information. How can we position ourselves and our companies to be the most agile in a transitioning energy system?

While oil and gas companies have comfort with geological risk, technical risk can be more difficult. The culture of oil and gas engineering is so focused on reliability and safety (rightfully so!) that innovation can be challenging. In fact, a 2016 Deloitte study on innovation in the Oil and Gas industry, showed that the industry has scored 10 per cent lower than even the notoriously slow to innovate mining sector, on the basis of average innovation maturity within upstream E&P. With the industry at a crossroads, there is no better time to seek new means to drive innovation across the value chain.

One emerging tool for driving innovation in the field of sustainable development is the Social Lab. It facilitates stakeholder collaboration on new solutions to various systemic issues. Prototypes are quickly deployed at low cost to learn how to address part of the bigger challenge, identify consequences and evaluate scalability. Failure is celebrated as a way to de-risk and capture lessons for the next iteration, without threatening, shaming or blaming innovators for exercising the courage and boldness necessary to challenge norms.

In Canada, energy exports accounted for 14 per cent of total exports in 2016, and the federal government has placed a priority
on innovation in the sector to help the economy adjust to the forces of energy transition. With this extra attention, there is a huge opportunity for provinces with oil and gas dominated economies, like Alberta, to try new tools like the Social Lab to identify new opportunities for energy leadership. The Energy Futures Lab (EFL) is one example that aims to move beyond polarising conversations about climate change and energy system issues towards partnerships and new ideas. Launched in 2015, the EFL has convened 59 Fellows from across Alberta’s energy system, from industry, non-profits, academia, First Nations communities, and more, to develop cross-sector collaborations and creative solutions that consider our needs and assets. Examples of some lab projects include building public-private partnerships for technology development, educating citizens on energy issues, developing alternative ownership models for energy infrastructure and much more.

One project that is seeing early results is an effort to explore repurposing end-of-life oil and gas wells for geothermal energy. By bringing diverse stakeholders together in the lab, hurdles due to regulatory and liability issues have been cleared faster than they would have otherwise, and one fellow has even started a new venture to market fit-for-purpose geothermal technology to the oil and gas sector. Another project that is accelerating through the lab is a campaign to retrain tradespeople that have been hurt by recent market conditions as solar energy installers. With Canada’s deep talent pool, there are many people who can easily redeploy their skills to the changing energy landscape. The lab has allowed fellows who are leaders of that campaign to refine their ideas and make connections to support their execution.

The other benefit of the lab is that the fellows are trained to use these new collaborative tools and mindsets that can be brought back to their own organisations. At my company, Imaginea Energy, we are using our experience from EFL to build new systems to help us on our journey to produce a clean hydrocarbon. Each collaborative project we embark upon is framed as an experiment in energy transformation and our learnings push us to new efficiencies. Hopefully the tools of the EFL can be useful for others who are looking to build successful businesses and healthy communities as our relationship with energy continues to transform.

Links:
3 http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/gblec04-eng.htm
4 http://www.budget.gc.ca/2016/docs/plan/ch4-en.html#Toc446106750
5 www.energyfutureslab.com
6 www.imagineaenergy.com

Canada’s Government has placed a priority on innovation to help the economy adjust to the energy transition.
HSE ISSUES: A DRIVER OR A CHALLENGE FOR THE INDUSTRY’S DEVELOPMENT?

HSE: What do these three letters stand for and what does it mean to the oil and gas industry?

Going back through history provides a dark reminder of some of the awful disasters that have happened in the oil and gas sector which not only harmed the environment but also claimed people’s lives:

- Piper Alpha (167 people died),
- Glomar Java Sea Drillship disaster (81 people died),
- Deepwater Horizon (the deaths of 11 workers).

These examples above show how significant gaps in an HSE regulatory framework and insufficient and unclear procedures can lead to life-threatening accidents. Fortunately, these disasters were catalysts for significant changes to be made in the sphere of oil and gas HSE.

Today, HSE issues are a great challenge for some countries. Due to the absence of technologies, financial support, difference in legislation, lack of HSE awareness, culture and on-the-job trainings etc, developing countries face problems with HSE regulation. At the same time developed countries are introducing new green technologies, developing a profound regulatory framework and setting the pace in HSE. To achieve a global balance it is necessary for developed countries to become a driver for developing nations. It is impossible to create a unified policy for the whole world; however, developed countries can determine and benchmarks for further realisation and advancement. This could include: the development and implementation of zero-waste technologies, use of space satellites and drones for detection and monitoring, creation of non-hazardous working places and evolving environmentally-safe values and mindset.

As for Russia, one of the world’s biggest oil and gas producers, the problem is the difficulty in the implementation of environmentally-friendly technologies. However, today government policies focus on the development and progression of innovation technologies in the sphere of the environmental management. A great example of such implementation is the start-up of the gas processing plant Prirazlomnoe. By using Canadian production equipment it became possible to exploit Associated Petroleum Gas (APG) by 95 per cent. This technology allowed APG to replace dry gas, leading to improvement of the technical-and-economic conditions of the power plant. This enabled the production of producing about 200 million cubic metres of APG and the extraction of about 99 per cent of valuable hydrocarbon molecules from incoming gas. Consequently, such complex technology has led to greenhouse gas reduction. Moreover, the introduction of new technologies in the oil and gas industry will contribute to sustainable and rational resource use.

As you can see, HSE issues are global issues. Only by working together, collaborating, discussing and sharing experiences with each other will we be able to make the oil and gas industry greener and safer for us all and for future generations. Summing up, HSE issues in the petroleum industry create challenges for companies and governments. However, the point is in turning these challenges into a driver to develop industry in an environmentally-friendly way.

References:
The world is continuously undergoing rapid transformations and will continue to do so, and Technology and Innovation are key to this continuous and rapid change. They either facilitate change or provide solutions to the new challenges that are presented by change. The energy industry is no different. Innovation across the energy industry is imperative to effectively respond to the ever-changing world and its new challenges and needs. A combination of many incremental technologies and innovations, combined with a few disruptive ones, will continue to transform this industry, and these innovations will span the whole spectrum of the industry value chain. This section previews a few examples of such innovations including water management solutions, electric car adoption, big data, the internet of things, and innovative capital management. But it is unforeseen innovations in renewables – especially those addressing their characteristic intermittency – that are likely to be the most disruptive.

by Technology & Innovation Editor Abdulkareem Al Sofi

Andreas N. Berntsen, Research Scientist, SINTEF Petroleum Research, Norway

MULTIPHASE FLOW TECHNOLOGY FOR MARGINAL FIELDS

“Multiphase flow technology is one of the pieces of the puzzle that reduces capital and operational expenditure in order to make upcoming marginal offshore developments viable”
the production fluid is cooled from reservoir to sea bottom temperature along the production pipe, it is prone to wax deposition and the formation of ice-like hydrates, which lead to pipe plugging. The usual remedy is either increasing the temperature or pouring anti-freeze into the stream – both costly procedures – and more often a conservative “better safe than sorry” approach is employed. A good understanding of these phenomena saves money, energy and chemicals.

The flow can also take many forms and some forms drastically reduce production rates by increasing pressure loss due to friction. One especially problematic flow regime is slug flow, where gas pockets accelerate high-speed liquid slugs. These slugs can be miles long, carrying great momentum, and may overfill receiving facilities and wreak havoc with pipes. If slugs are correctly predicted, we can appropriately dimension separators and relief tanks, and avoid damage to vital infrastructure.

The sum of all this knowledge is multiphase flow technology. It is a combination of advanced modelling of fluid mechanics, fluid chemistry, temperature and pressure. Large-scale flow experiments at realistic pipe diameters and operating pressures provide vital input. Better predictions lead to less use of chemicals, appropriately sized process facilities, fewer pressure boosters, and allow smaller margins without compromising safety. It has been and will continue to be a key piece of knowledge in offshore oil and gas developments.

Deepwater projects – with high pressure and low temperature – provide the ideal grounds for hydrate formation. New developments in the Arctic and in other remote areas see little existing infrastructure, and would need long seabed transport pipelines. Similarly, many smaller discoveries on the outskirts of mature fields would need to be developed using subsea tiebacks in order to be profitable. Multiphase flow technology is one of the pieces of the puzzle that reduces capital and operational expenditure in order to make upcoming marginal offshore developments viable.

Figure1 (flow): The simultaneous flow of oil, water and gas can lead to many challenges. Here from multiphase flow simulation at SINTEF.

Figure2 (overview): Smaller discoveries, remote regions and harsh climates – multiphase pipeline flow is essential for many of tomorrow’s developments. Illustration (c) SINTEF.
Since the second half of 2014, oil prices crashed from US$100 a barrel to US$26 a barrel in January 2016 before stabilising in the mid-US$50s. Coupled with this, the lifting of Iranian sanctions and the increasing efficiency of US shale producers is putting pressure on oil and gas companies – both IOCs and NOCs – to reduce costs and improve efficiency. So that they generate positive cash flows that cover investments and dividends. The actions taken by companies to adapt to the current environment are well known and include: investment deferrals, workforce reductions, contracts renegotiation, divestments, etc.

However, there is a source of cash flow that remains untapped: working capital management. It is estimated that oil and gas companies have nearly US$340 billion* tied up in working capital – payables, receivables and inventories – that could be put to work on, projects that would grow the companies value.

But how can working capital efficiency be improved? Companies are starting to look at their supply chain but are finding it is fraught with complexities such as a need for internal cultural shifts, improved inventory management, contract structure revisions, and subcontractor relationship management to name a few. In this process, a lot of information needs to be handled and digitalisation can be the answer to maximise the impact of the actions taken. Big data analytics have already unleashed a clear technology-based competitive advantage for other industries, yet the oil and gas industry appears not to be exploring these opportunities.

Oil and gas operations generate billions of data points throughout the sourcing, processing and selling stages of the supply chain and that information needs to be segmented, analysed and made visual to decision makers. Improvements within each of these stages would enhance working capital efficiency and free up cash to invest in other projects from the financing pressure derived from lower oil prices. Big data analytics can help in all stages of the supply chain by reducing supply risk, leveraging negotiations, reducing inventory, preventing unexpected maintenance, as well as forecasting production and estimating consumer behaviour and preferences.

But big data should not be segmented and treated separately for each stage. The key to its success is in full integration in the upstream-midstream-downstream value chain. Moreover, vertically integrated companies are more likely to see a bigger impact as the amount of data they collect is larger and they cover the whole supply chain.

The challenges for the implementation of big data analytics at such a large scale are significant as it requires structural, contractual and cultural changes and the involvement of the entire company. But as painful as it may look, oil and gas companies that take the big step towards digitalization will harvest the benefits of lower costs and improved efficiency and safety. “Lower for longer” is the new normal and those companies that entrust their future growth to high oil prices will see themselves displaced from the industry.

The scenario of a fully integrated and connected world is no longer new. We are accustomed to searching for quick and practical solutions that can solve our daily needs. And this is also true in companies and industries with the application of technologies that increase the quality of goods and services, efficiently, and enable better communication between teams, analyse health, safety and environmental levels, and can monitor operational data. All of these tools on the devices are supported by applications designed exclusively for the company’s business.

IoT Big data/analytics and mobile devices can be supported by cloud computing, also called the Cloud. Cloud is the storage and processing of data performed on the internet, in a single system, and can be accessed from anywhere. All these tools can integrate, providing the construction of agile, effective and flexible operations.

These and other digital technologies are already part of the reality of the oil and gas industry, according to the survey “The 2016 Upstream Oil and Gas Digital Trends Survey” conducted by Microsoft and Accenture. Currently, companies have their investments in digital technologies directed to mobile devices and this scenario will change, with the growth and highlight of big data/analytics shifting their focus of digital investment for the next 3-5 years. This trend represents the pursuit of companies in profitable and competitive businesses in a more disputed and demanding market.

Digital transformations are already occurring and the oil and gas industry is looking to digitise its operations to ensure better results. Information Technology (IT) innovations are mainly responsible for these changes in an increasingly digital society.

One of the main technologies of digital transformation is the Internet of Things (IoT). This concept, which goes beyond the internet we are accustomed to, refers to connectivity through sensors, which provide the exchange of information between physical devices and systems. From the moment that all the devices are connected in the internet, a huge volume of information is obtained in the network.

The obtaining of sets of information results in the generation of an immense amount of data, structured or not, that has to be stored and processed practically in real time. This large dataset is called Big Data. Big data associated with analytics tools is used to provide important analysis and generate value for operations and businesses, providing the best strategies for decision making in the companies.

Another technology that is commonly seen is the use of mobile devices as a working tool in operations. These devices...
Climate change and decarbonisation are two environmental issues that are receiving considerable attention from policy makers around the world. Several options are being pursued at the energy system level in search of solutions including renewables in power generation. The transportation sector is tackling decarbonisation through avenues such as fuel and efficiency improvements, mode shifting and alternative fuel vehicles.

Electric vehicles (EV), in particular, are receiving strong support from several governments, which aim to use EVs to meet their climate change obligations as well as develop national value chains. The adoption and relative shares of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) in the auto market are strongly influenced by incentives. In Norway, for example, BEVs have been eligible for generous support, whereas PHEVs have only recently become eligible for limited incentives, hence the rapid uptake of BEVs over PHEVs. In the Netherlands, on the other hand, incentives for BEVs and PHEVs have been similar and consequently the market is dominated by PHEVs, which offer better functionality. See Figure below for the breakdown and market share in several major economies.

Charging infrastructure is also a strong enabler of BEV adoption, hence why some countries have started building an extensive network of public chargers. The type, density and location of charging points deployed is geared toward reducing users’ range anxiety and increases the perceived utility of BEVs. However, it is difficult to know in advance the effectiveness and utilisation of such infrastructure.

As EV battery costs rapidly decline, a growing number of countries are increasing their support for BEVs relative to PHEVs, which are seen by some as a transitional technology. The emphasis on rapidly electrifying passenger car transport could impact the EV and charging infrastructure mixes that are deployed in the short and medium term, which may not provide the most practical and cost-effective way of achieving intended goals.

This is risky because the type of EVs and infrastructure initially deployed will influence the choices of adopters and the development of related institutions, and hence will contribute to pushing future EV transition down a certain path. This will, in turn, further influence consumer adoption of new EV models and the formulation of policy and regulation. This entire process, within technology studies is generally referred to as co-evolution and is illustrated in the diagram below.

As policy and regulation co-evolve with the new technology and
user preferences, the electrification of passenger cars will end up being locked into certain EV mixes and charger types. While policies have common goals, they risk setting the transition on a high-cost path. To illustrate, based on KAPSARC analysis, the Figure below shows different annual cost scenarios for the UK with same electrification targets in terms of EV sales and CO2 emissions. Long-range BEVs increase future policy cost uncertainty and exposure to battery development risk. The battery development cost uncertainty is illustrated by the black bars.

While currently these mixes are made affordable through incentives, governments do not plan to maintain such support indefinitely. With increasing adoption and removal of incentives, the full costs will eventually be passed on to consumers. This growing burden of actual costs on consumers could undermine the sustainability of the EV transition. Switching to more cost-effective pathways later is possible, however it will be more expensive and time consuming. While assuming that EV transition policy is a cost-effective approach to decarbonisation, policy makers should consider these pitfalls as they create incentives, initiatives and policies to promote the use of various EVs.

### 2015 Market Share of EVs in Select Countries

Source: International Energy Agency

### Coevolution in the EV Sector

Source: Journal of Transport Geography

### Annual cost scenarios in the UK

Source: KAPSARC

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1 IEA, Global EV Outlook 2016


Digital technologies have changed not only industries but generations. The most recent generation was born with a finger on the screen. For them, digital is evident and has been there forever.

We can only attract the best talent from those who are aware of this career path. Unfortunately, currently not every child is made aware of our sector and great talents are lost along the way. So more projects to educate children at a young age need to be initiated to sustainably attract more people to our industry.

Prior to entering the corporate world, we have to be educated properly, and educated in the right disciplines. As a second step, our university programmes have to be more appealing to young people, in order to hire the brightest of the available talent pool. As a third step, we have to know how to develop this talent so all young professionals are equipped with the right tools and, more importantly, with the right mindset, in order for all nations and people to be headed towards a desirable future.

by Talent & Career Development Editor Mathias Mitschanek
Oil and Gas HR benchmark survey, studying workforce composition, its productivity and industry best practices. Based on this study, we noted that the majority of oil and gas companies are simply maintaining the status quo: the curriculum given to the new generation has hardly changed in the past 5 to 7 years. And it is not because companies do not see the changes, they simply do not know where these changes will lead to. Indeed, it is hard to foresee what skill mix will be needed in even 5 years’ time. So, they just keep teaching the existing material because of inertia.

In general, companies’ management remains quite conservative about innovations in learning and does not fully appreciate how different the new generation is. In return, the millennials choose more innovative companies or industries where they can progress and learn in a new digital way.

However, there are a few companies that demonstrate very different behaviours. They have established a strong focus on time-to-autonomy (number of years from entry position to the moment when the oil and gas professional becomes autonomous). When we started the survey 10 years ago, this number was in the range of 8 to 10 years for oil and gas companies, whereas today now we see that best-in-class companies have reduced it to 4 to 6 years.

This cohort of companies have an aspiration of **time-to-autonomy tending to zero** in a sense that whenever engineers want to learn a new technology or process, they should be able immediately to connect to the relevant material, case study or a subject matter expert via video to address their needs in real time.

Additionally, clear differentiation into structured (group-centric and standardised) and unstructured (individual-centric and customised) learning has been embraced. Whereas the structured learning is well known and explained, the unstructured learning is still an experimental area. Learning professionals are testing different forms of media to align them with the preferences of Millennials.

Long curriculums are split into bite-size learning blocks that can be consumed within 20 to 30 minutes. Those blocks are easily searchable, accessible on mobile devices and can be shared with peers at the push of a button.

Such changes do not happen on their own. Companies set up a team of unstructured curriculum managers who professionally manage knowledge networks of subject matter experts, organise and moderate social learning circles, and create customised learning paths based on individual needs of Personas within Millennials.

These days we may witness a new trend where to stay competitive oil and gas companies should focus less on knowledge creation, but on how quickly this knowledge is channeled and consumed within their organisations.

The scale of coming change triggered by digital technologies will impact not only learning, but the entire corporate ecosystem. Companies should prepare to rethink the decision-making process entirely to prepare the future for emerging workforce.
ENGAGING THE NEXT GENERATION IN ENERGY CAREERS AND STEM EDUCATION

“Students can only envision themselves in careers they have heard of. For students living outside regions with high energy industry employment, exposure to jobs in energy may be few and far between.”

There was likely a teacher, a class, an afterschool activity, or an adult in your family who has contributed, at least in part, to your career choices.

In a direct sense, the courses students choose in middle and high school influence the options they have as they move on to higher education. An interest in science and maths and choosing more rigorous science and math classes in school prepares students to take higher level courses in these areas once they reach tertiary education or on the job training programmes. Positive experiences in these fields, and educators in elementary and middle school who promote these fields help students at a young age find success and enjoyment in science and maths, leading to a positive feeling towards the subjects and interest in pursuing these areas of study.

Students can only envision themselves in careers they have heard of. For students living outside regions with high energy industry employment, exposure to jobs in the energy industry may be few and far between. By engaging students in energy activities, helping students understand the energy we use, and showing students career opportunities in the energy sector, educators open young students’ eyes to a possible career path they had not previously considered.

Engaging students in STEM fields and exposing them to energy careers at a young age, in practice, means engaging educators. Current classroom educators and pre-service educators benefit from professional development, learning about energy concepts and careers. To enhance teaching teachers about energy, we should also provide them resources, lesson plans, and hands-on materials to explore the concepts with their students.

With support for educators and more resources for classrooms, students have an opportunity to explore STEM lessons and energy concepts at a young age and may continue their interest in these areas as they continue their education and look ahead to their careers.
Getting young people excited about natural sciences and engineering, and petroleum engineering in particular, is a task which definitely has to be approached collaboratively. The stakeholders who need to collaborate are the industry and the universities, as well as high schools.

As a university and petroleum engineering programme we approach potential future students in their final years of high school. We do that in close cooperation with industry and with their support. Universities in Austria are governmental, the access to a university in Austria is not limited by any means and tuition (a few hundred Euros per semester) is not a decisive factor.

We started this programme by visiting high schools with a show truck and running dedicated marketing campaigns with the aim of explaining what we do and what career opportunities the petroleum industry offers. Even more impact was achieved with a programme called “teach the teachers”, supported by the ministry of education, where we invited a large number of high school teachers to our university to explain petroleum engineering and what we do. This initiative taught us that even natural science high school teachers had very little knowledge about the petroleum industry. We discovered that teachers would perceive the petroleum industry typically the same way as consumers. It is typically known “as the place where I fill the gasoline tank of my car”, and for large scale incidents like Macondo.

Our focus has to be to communicate and to educate – to explain what we do and what petroleum engineering is. We expanded this effort and with the support of our local petroleum industry it was possible to show high school students drilling rigs and our work in oil fields. The result of this effort to educate and try to attract young people showed enormous results with an increase in enrollment by a factor of 2.5 within one year.

But what attracts our students to come to our university? We run entry polls to better understand the motivation of students to join our programme. The dominating factors are still the opportunity to have an international career, being trained to be one of a few experts ready to work in an international community, typically with an exceptional salary, and a high probability to find a job after the programme is finished.

In order to prepare our students to enter the industry, we advise and encourage them to have as much contact with the industry as possible during their study programme. Our students have to complete mandatory internships working in the oil field. Ninety per cent of our students deliver their Master’s thesis work in cooperation with industry, typically in the form of an internship or thesis project over a 3 to 5 month period.
In times of divestments and staff reductions, avoiding loss of knowledge, implementation of new technologies and increasing pressure to achieve more with less resources are some of the biggest challenges the industry is facing, while many oil and gas companies are seeking to survive the down-turn. To meet these challenges, the industry needs to attract the next generation of professionals while also retaining existing talent and developing new opportunities for career growth and development.

Oil and gas projects are very complex by nature, involve large, multidisciplinary teams and require vast capital investments. The key to success is efficient and sustainable project delivery, which highly depends not only on the technical skills of the individuals but also on the ability to understand and solve complex problems as a team. This requires effective communication, a high quality of interpersonal skills and the ability to learn quickly and adapt. These are some of the most important qualities companies are looking for in graduates and young professionals. Paired with vision and passion for the field of work, this will allow one to develop, progress and be successful.

To start a successful career, one of the most important but often underestimated steps is self-reflection. The objective is getting to know oneself, one’s goals, expectations, strengths, skills and competencies, but also ones weaknesses and gaps. It is important to recognise and enhance the first while overcoming the latter. But also, getting to know companies as well as the industry as a whole, will help in finding an attractive and fulfilling position.

Unfortunately, as a result of the recent downturn, finding the perfect match is challenging and many graduates and young professionals struggle to secure a job at all. In a tough market it becomes increasingly important to sell oneself effectively and take every opportunity to develop. Making a strong statement on how one can add more value to a company than others by adding unique knowledge, experience and skills helps you to stand out of the crowd.

While university education equips young professionals with the basic tools and knowledge which form the foundation of a future career, the first years within the industry are extremely important to learn as much as possible and gain experience. Companies recognise the importance of a structured approach to early career development and competency assurance, as part of a sustainable business model. Therefore, many companies implemented fast-track development programmes for university graduates, young professionals and high potentials. Ideally, fast-track programmes offer a balance between strengthening core technical skills and non-technical training to support broader development. Differences are mainly in the flexibility participants are given to develop in certain directions. While some programmes use a broader multidisciplinary approach to form future leaders, others focus more on developing experts in their respective fields. In any case, participants are empowered to develop personally and professionally, and are given access to a network of technical experts, mentors and tools to help them integrate into the organisation. Through on the job training and mentoring, one participates in projects and contributes to the company’s business goals, which stimulates motivation and performance.

Never stop learning and stand out by going the extra mile, which will be rewarded with a fulfilling career in the oil and gas industry.
We interviewed Hinda Gharbi, President of Schlumberger’s Reservoir Characterization Group to get her insights into Women’s Empowerment: Inspiring Young Women To Take On Today’s Challenges.

The energy sector has always been a male-dominated industry. What is your perception and what would be your recommendations for women to enter and succeed in such an environment?

While the industry started as mainly a male-dominated environment, it is also a technical industry that today attracts an increasing number of women graduating from technical disciplines, both in engineering and geosciences. I believe this fact is rapidly changing the face of our industry and we see a number of women are also entering the sector through functional roles.

I believe that over time, the advancement of information technologies is going to remove many of the barriers that previously prevented women from joining the industry. For example, real-time technologies, automation, and the digital transformation of the industry will make it equally accessible for women, by removing the constraint of the field lifestyle, that for the longest time prevented many women from joining us.

Gender equality is partly related to a country’s culture and legislative evolution. Some regions, for instance, have seen women successfully reaching the top of their respective organisations. Would you recommend that young women in countries with less equal opportunities go abroad to develop their career and then serve as a role model for others, or that they develop their career within their home country?

It is hard to advocate either way, it may or may not be possible for some women to have a career outside their country. I think what really matters is how one chooses to develop and progress. Self-taught people tend to do really well in any industry, and even more so in a
fast-changing and challenging industry like ours.

My advice to young women is to have an interest in technology, continuous improvement and the desire to learn and progress. These are timeless qualities that are particularly important in the oil and gas sector.

What role can regulation play in fostering gender equality? What would be the best legislation to drive change in cultures and habits (e.g. in companies, professional federations, states, regional and institutions)?

Coming from the private sector, I would say that companies in general in the energy industry can play a key role in driving a gender balance agenda. Often they are large enterprises within the countries where they operate and can then share best practices where they work.

Many key players in our sector have already demonstrated that gender balanced organisations make business sense and add value to all stakeholders, local and otherwise. Articulating such a vision and showing how this actually works will be beneficial to share across the industry.

What have been the important drivers of your development as a female leader?

I think the capacity to continuously learn and have the opportunity to be exposed to a variety of assignments helped me develop my personal leadership. In the last 21 years in Schlumberger, I have had the opportunity to be exposed to a number of roles both in line management and in functions, from Human Resources to Technology development. I have also worked in a number of countries, allowing me to experience different cultures and ways of working. The combination of these experiences challenged me in different ways and allowed me to reflect on my strengths and areas of development, and to act on this knowledge. As I was stretched in some of these assignments, I also understood that my areas of development could also be enhanced with a judicious choice of team members that could complement those areas, making the overall team stronger and allowing us all to succeed.

What are the key barriers to getting more women into leading positions in the business and political world?

I would comment on the business world that I come from, I believe that two key barriers, if tackled, could help increase the number of women in leading positions. The first is what I refer to as inclusion. If the decision makers who are staffing those leading positions, consider the inclusion of women as a competitive advantage to their companies, then we will see an acceleration of the empowerment of women.

The second is fully within the control of women themselves. During my career I have met very capable, competent women who abandoned the industry because they believed that they couldn’t manage their work/life balance or at times doubted their abilities to cope. To address these two concerns, I think we need a critical mass of women in our industry who gradually will provide other women with role models they can look up to. The increased number of women will also allow for more balanced workplaces which will further address any work/life balance concerns.

What are the key factors contributing to the development and retention of young women in the industry?

Again, I am reflecting on what I have witnessed in Schlumberger. It took the commitment of the executive management at the highest level, together with very strong piloting of the gender balance agenda by senior executives and managers, to make real and lasting progress.

All aspects were studied and addressed, from how to increase the intake at the recruiting level to how to facilitate career progression. We worked tirelessly on understanding the key barriers to advancement and tore them down – from specific policies to ensure women assigned to field operations were provided with the best possible support, to creating a mentoring programme and to ensuring that we are developing ‘gender bilingual’ managers.

One important example I would like to share is how we manage dual careers. Geographical mobility is part of how we develop our people, creating major challenges for dual career couples. We have worked on specific dual career standards and counseled and supported couples as they grapple with how to reconcile both careers.

In summary, what would be your advice to all our young male and female readers, as they embark on a career in the oil and gas industry? How can they increase the empowerment of women in the oil and gas sector?

I would encourage all newcomers to the oil and gas sector to be lifelong learners and to be versatile. This is an extremely challenging industry where we are always pushing the boundaries of what is possible and achievable. Being curious, driven and wanting to make a difference in everything you are involved in, are solid traits to possess for success.

Lastly, gender bilingual professionals are people who understand the value that a balanced workforce brings to any enterprise. Women empowerment will be greatly increased with many more such professionals in our industry!
Energy is the mother of all markets. Everything is made of energy: your home, your car, the food that you eat, the electricity that provides you with light and warmth and powers the computers I have used to write this article. Energy is indeed the mother of all markets, yet women are scarce in this field, and the energy business remains a male-dominated industry. The WPC YC asked me for my recommendations for women to start and succeed in this male-dominated environment and embrace careers taking them to the top of their organisations. The idea is to encourage young women to be fearless in a male-dominated environment, to be fearless of the “natural sciences” in the broadest sense and to use their personal capabilities to thrive in such an environment. What does it take? It takes passion, and this in turn requires an understanding of the ability of the energy sector to change the world in which we live. Each of us has the ability to change the energy field, so it can produce what humans need to survive and thrive in the future. Energy is not just about oil and gas, nor is it solely about the money involved in those markets, which measures the great importance of energy to human societies. Energy and energy-related industries are rapidly changing now because of the importance of this field to our society, and at the same time due to the newly discovered risks that we now know it can cause to our environment and our future. Change in the energy industry is here today. It is related to a country’s culture and to the evolution of legislation in the face of climate change. These risks can be catastrophic and could threaten the survival of the North and the South Poles that are now melting and the thousands of animal species on the ocean and the land that are threatened by climate change, including our own.

Can we do something about all this? Yes, we can. There are now natural sciences technologies that can remove the carbon we have already emitted and they can do so in a way that is commercially feasible, so we can make money while we produce energy in a way that cleans the atmosphere. Carbon-negative power plants. I have not met a woman who does not respond with passion to this possibility. We can participate and lead the change in the energy industry, and do it while empowering our commercial institutions and creating jobs, exports and wealth. This is the change coming to the energy industry.

This leaves us with a question: what are my recommendations to young women on how to survive, thrive and succeed in such a male-dominated environment? Overall, any career has its ups and downs, and the key to success is persistence, which requires a person to move from one up to the next, and ignore as much as possible the downs in between. Do not let them discourage you. Often the downs have nothing to do with you but it is in the nature of things, don’t take it personally. Focus on success. This is particularly true when the downs are old-fashioned prejudices about women and their abilities. Try to ignore them or at least focus on what you can achieve rather than comparing the rewards to others, particularly males. Comparing oneself to others is generally a bad policy anyway, for a number of reasons. Focus on what you can give to others rather than what they give to you. Be relentless and put no barriers on what you can achieve. And, most of all, enjoy life, enjoy yourself in the pursuit of your passion. It is that pursuit and the happiness that comes with it, and what you can give to others because of it, that gives meaning to one’s life.
It is clear that the energy industry is going through one of the most transformative periods in its history, which will ultimately redefine the energy business and require knowledge sharing between young professionals and senior executives. In this year’s WPC YP Magazine, the “Bridging Generations” section draws on the experiences of both young professionals as well as more experienced people from the industry. Nilay Gungor, Kerstin Kogler and Allyson Simpson share their thoughts on what they would focus on if they were a CEO, whilst, Dr Maikanti Baru, Meriem Mokrani and Haddou Jabour provide an insight into what they would do if they were Young Professionals in the oil and gas industry. In addition to these insights, Russia’s Energy Minister, Alexander Novak highlights the challenges and enormous opportunities available within the Russian petroleum industry.

by Bridging Generations Editor Salisu Isihak

We asked Young Professionals what would they consider if they were a CEO today

by Nilay Gungor, Kerstin Kogler, Allyson Simpson

Although women comprise a portion of the talent pool that makes up the oil and gas industry, historically, more men occupy roles within the sector. As a CEO, how would you promote more meaningful participation by women in operational and leadership roles?

The more different types of leaders work together, the higher the rate of success. It is a fact that men and women lead in dissimilar ways, so why not use this to improve a company’s performance? I would encourage women to go for promotions, expect equal pay and to be treated with the same respect as their male counterparts. One suggestion could start in the hiring process by assessing them in order to select the interview candidates. Candidates should be selected based on education, experience and other necessary qualifications, not based on gender. Another suggestion is a change in organisational culture by promoting a better work-life balance. Often women do not go for the top executive positions as they feel they cannot combine a strong career with a strong dedication to their family life. Finally, new role expectations and organisational support need to be created, including flexible working hours and child care options. To empower women, we need to change our way of thinking, as actually what is more important than the number of hours worked is the outcome achieved.
What key aspects of the future of the energy industry would you focus on that are not sufficiently addressed at present?

In the modern world, we rely heavily on oil and gas for energy. Because these are finite resources, renewable sources of energy should always be within our scope, both to increase sustainability and to alleviate environmental issues. At present, if I were a CEO, I would invest in technologies related to the production and transportation of natural gas. I would also focus on exploration and operational strategies, to increase efficiency and bottom-line performance during periods of unfavourable prices. To make smarter and faster decisions during the planning and drilling stages, we should better utilise data science and combine it with technological learning to increase operational efficiencies. Finding novel ways to reduce risk and decrease costs will be the key for short-term success, however, ground-breaking technological advancements are needed for long-term sustainability.

Allyson Simpson,
(Chair, WPC Canada Future Leaders)
Senior Advisor,
Transformation Communications,
Enbridge Inc, Canada

What technologies would you encourage to drive changes to lower energy intensity for oil and gas production and operational integrity?

If I were a CEO, I would focus on the energy sector’s proverbial “software and hardware”. In starting with the software, I would foster a culture of ideas and innovation, and place a keen focus on exploiting smart technology to lower energy intensity. Smart technology is the hardware and can be many things, however, at its core it will provide ways to do business smarter, more efficiently, and more effectively by using the best information available to create solutions. As a CEO, I would leverage smart technology (hardware) in coordination with the innovative power of human capital (software) and create new opportunities to lower energy intensity. More importantly, I believe smart technology, along with creativity, integrated technology and data analysis, can be the quintessential Tipping Point (Gladwell) to unlocking innovative opportunities across the entire energy sector’s value stream.
IF I WERE A YOUNG PROFESSIONAL

We asked Senior Professionals what would they focus on to render the industry a better place for all if they were Young Professionals today

by Dr Maikanti Kacalla, Meriem Mokrani, Haddou Jabour

How would you develop yourself professionally to increase your competitiveness in the industry?

As a young professional, I always wonder why other regions of the world are technologically advanced, leaving Africa, which has vast untapped resources, behind. The key to Africa’s underdevelopment is insufficient energy to galvanise the economic growth of the continent.

Therefore, if I were a young professional, I would like to champion the creation and promotion of new, sustainable ideas and strategies that will provide practicable solutions to the key energy challenges facing our environment, our country and by extension, the African continent. Personally, I would challenge myself to develop new business models that are energy-efficient and environmentally sustainable.

As oil producers, we are faced with the realities of dwindling oil and gas reserves and the related consequences on our respective economies and nations. Therefore, as a young professional, I would work hard to come up with new ideas to ramp up crude oil and gas production, improve operational efficiency and grow our crude oil and gas reserves in an environmentally friendly manner, for the benefit of our citizens and other stakeholders.

Technology will continue to shape the way we do things in decades to come, and the oil and gas industry will be greatly impacted. There is no better set of people to take up the technology challenge than the youth. As a young professional, I would arm myself with the right set of technological skills to make the business much easier, while improving the bottom line in the process.

In addition, I would, as a young professional, strive towards understanding the relationships between the various energy mixes, our delicate environment and changing faces of technology. With time, competition and technology will shrink the opportunities in the entire oil and gas value-chain. As a generalist, my knowledge of “something-about-almost-everything” will open as many doors for me in the future.

Of course, a young professional should not be unmindful of his or her image going forward. As a youth, I would make professionalism, integrity, transparency, accountability and good governance my watchwords.

Finally, the work environment is made up of people with different worldviews, perspectives and knowledge bases. As a young professional, I would pursue the promotion of diversity and inclusiveness because everyone, the youth especially, has the potential and talent to contribute towards the success of the business.
What career paths in the industry would you have chosen if not your current path, and why?

The petroleum industry is a growing, global industry with many opportunities for those interested in the geosciences. The types of jobs on offer are diverse and suit many different interests and personality types. There are careers available in virtually every part of the world – the petroleum industry is a great gateway to foreign countries and exotic locations.

The geoscience sector is highly interactive, interdisciplinary and rewarding. Geoscience integrates the diverse skills of all fields and applies them directly to real world problems. Geoscience addresses critical issues such as energy, meteorology, water and mineral resources, stewardship of the environment, oceanography, reducing natural hazards for society, planetary science and more! Not only does this area allow students to work on many of society’s most important challenges, it also unlocks lucrative and personally rewarding careers in industry, academia, research and government.

Geoscience jobs are plentiful, salaries are robust, and the demand for young and enthusiastic geoscientists is expected to continue growing. This kind of job security is unparalleled in any other field today. We know supporting students through college is economically challenging, but because of the demand for future professional geoscientists, there are many scholarship opportunities for undergraduate and graduate students in the discipline. With the appropriate education, interest and background in geoscience, one can pursue a plethora of internships and job opportunities, maximising the value of students and parents’ investment in college.

Employment of geoscientists is projected to grow by 10 per cent from 2017 to 2024, faster than the average for all occupations. The need for energy, environmental protection, and responsible land and resource management is projected to spur the demand for geoscientists.

Countless individuals around the world aspire to acquire a job, maintain it, and succeed in the oil and gas industry. The geosciences path requires mental alertness, physical strength and endurance, and the upshot of walking the extra mile in this field is definitely rewarding.

What would you do to decrease the environmental impact of energy use in the oil and gas industry?

The first idea is simple: as for any other industry, enhanced energy management is a must – and there are many ways to implement it. But one good option is to follow the ISO 50001 standard, which sets a framework for a methodic approach to reaching better energetic performance, thereby automatically reducing the related CO2 emissions. At the heart of this method there is a clear management commitment and a detailed energetic review aiming at characterising actual energy uses and identifying potential savings. The review outcomes can also lead to incentivising technological developments: for instance, the development of Compact Heat Recovery Steam Generators to ease the use of steam bottoming cycles, in combination with gas turbines on offshore platforms or FPSOs, could lead to massive CO2 emissions reductions linked to upstream activities. The same applies to the efforts that can be deployed to minimise gas flaring or where possible substituting gas for renewables. In the latter case, I find the concept of supplying the energy needs of offshore hydrocarbon production systems with nearby offshore wind farms very interesting.

The second idea relates to the direct emissions of methane by our industry into the atmosphere. As for improved energy management, one must begin with a detailed investigation of today’s situation before looking for mitigation measures. Therefore, I fully support the approach embodied by the Climate and Clean Air Coalition (CCAC) Oil and Gas Methane Partnership – a public-private partnership bringing together oil and gas companies, NGOs, national governments and technical agencies, which aims to find and then minimise methane emissions in partner companies’ operations, creating a new global standard for methane emissions control.

Meriem Mokrani, Senior Vice President Operations, Engie, France

Haddou Jabour, Promotion Manager, ONHYM, Morocco
We interviewed a renowned industry leader asking him to look back on his career and share his wisdom on two topics.

How would you assess the future development of the oil and gas sector in the Russian Federation?

It is worth noting that Russia has huge hydrocarbon resources. In 2016, a national record for oil production, 547.5 million tonnes, was set. Our task for the next few years is to maintain this indicator in the same range – 530-550 million tonnes. Currently, oil production in new regions – such as Eastern Siberia and the Far East – has grown by 8.3 per cent, to nearly 70 million tons, and offshore oil production has increased by 17.4 per cent to more than 22 million tonnes. While production of “difficult” oil reached 37 million tonnes, an annual increase of 12.1 per cent. The growth rates in these areas are significantly higher than the industry average, which compensates for the declining volumes in the “traditional” producing regions.

This year, a positive trend is evident in the gas industry – production of gas in Russia is increasing for the first time in the past three years. This situation is even more unusual due to the fact that nearly 80 per cent of the gas reserves are located in the challenging Arctic zone. Nevertheless, there is no doubt that among other hydrocarbon-based energy sources natural gas is the most promising due to the fact that it is clean, cheaper than oil, and, most importantly, its availability for consumers is growing.

The rapid development of LNG technology is making the gas market more global, viable, and liquid. Present global liquefaction capacity today exceeds 300 million tonnes of LNG per year, and total re-gasification capability more than 750 tonnes per year, which offers increased flexibility to the producers when choosing the delivery routes and commodity markets.

The increasing availability of LNG will continue to have a major impact on the global energy market. At the moment LNG accounts for about 34 per cent (337 out of 966 billion cubic metres) of total world gas trade. However, this share may exceed 50 per cent by the beginning of the next decade if the projects that are currently at the initial stage, are taken into account.

Russia has one of the largest and most viable resource potentials in the world – with more than 48 trillion cubic metres of gas reserves, as well as gas production and export which have yet to reach their maximum potential. Moreover, Russia is focused not only on the development of its pipeline infrastructure, but also on the development of its LNG sector, which can increase the flexibility of Russian gas exports, attract investments and increase market share. According to the gas industry development strategy, Russian LNG capacity would reach 76 billion cubic metres by 2035 (approximately 15 per cent of total world LNG capacity), compared to 16 billion cubic metres in 2014, and even more, with the necessary stimulation.

As for the export of natural gas, Russia is able to at least maintain its position in the European market, and to greatly increase its presence in the gas markets of various countries in the Asia-Pacific Region by supplying them with both pipeline and liquefied gas. In the absence of artificial barriers caused by the diversification of supply sources, the export of Russian gas to the European market also has the potential to grow, partly due to competition with LNG.

We believe that the development of the energy of the future is in the development of non-traditional sources of hydrocarbons. This requires the formulation of new production development goals, the introduction of innovative technologies for exploration, drilling, production and transportation of energy sources, and the training of specialists for solving new tasks for many decades to come. At the same time, emphasis is placed on minimising the anthropogenic impact on the environment, taking measures to ensure the effectiveness of federal state environmental control, and, of course, fostering a proper attitude among specialists towards the environment is
an integral part of our living space. There is ongoing research being carried out by Russian scientists indicating that oil and gas may become a renewable resource, forming in the entrails of the Earth in colossal volumes, and far exceeding the needs of mankind in energy resources. Further research in this area can lead to a change or a significant revision of the main ideas of what constitutes the rational development of oil and gas fields.

In your opinion, will the Russian oil and gas industry become more or less attractive to talented young people?

There is a huge market for labour within the different fields in the oil and gas industry. For instance, almost 1 million specialists are currently working in the Russian oil and gas industry. In order to replenish the personnel reserve, 75 universities operate in 49 regions of the Russian Federation, where about 98,000 people study. In 2016, higher education institutions trained 15,506 specialists in the energy field, and young people under the age of 35 account for almost 40 per cent of all employees of the oil and gas industry. The sector is undoubtedly innovative and challenging, offering a solid platform for personal fulfillment for talented youth, and opening the prospects for further growth, making the industry very attractive.

In close collaboration with petroleum companies, Russian universities are doing a great job of attracting young people to the oil and gas industry. This is achieved by supporting student initiatives in the organisation of scientific and practical events, equipping universities with modern equipment, supporting the research activities of students, organising internships at the best companies in the industry and scientific institutions, and exchanging students with foreign partner universities – all of which makes our industry even more attractive for young people.

Moreover, last year the Ministry of Energy of the Russian Federation established the Youth Council of the Oil and Gas Industry, whose main task is to establish cooperation between students at higher education institutions, young professionals, scientists, enterprises and government authorities to consolidate efforts in raising the level of R&D activities in the oil and gas industry.

Celebration of the 80th Anniversary of the World Petroleum Council and the 55th anniversary of the Russian National Committee, June 2013, Moscow