President's Page

The future of our industry

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At the 2017 SEG Annual Meeting in Houston, several students, including two students from Romania, asked me if there is a future for our industry. Listening to media stories of renewable energy replacing fossil fuel energy in a utopian decade or so, and electric cars replacing internal combustion cars, the students were wondering whether getting a degree in geology or geophysics is a good long-term career choice. After giving the students several variations on the same answer, I decided to write an entry on this subject for my personal blog and for *TLE*.

We are working in the largest industry in the world by revenue and market capitalization. The top four oil and gas companies — ExxonMobil, Shell, Chevron, and BP — have a market capitalization of about US$1 trillion and annual revenues in the same range. Yet these four companies represent only 18% of the total market, with the remaining 82% distributed among many national oil companies such as Saudi Aramco, Petronas, Petrobras, Pemex, Statoil, Sonangol, Ecopetrol, etc. The initial public offering (IPO) of Saudi Aramco in 2018 will create a company with a market capitalization in the US$1–2 trillion range, the largest IPO in history, making Silicon Valley unicorns look like tiny blips in the market. This enormous value and value-creation industry will not disappear overnight and be replaced by renewables and electric cars, as the media would like you to think.

Rising living standards around the world, particularly in non-OECD countries such as China and India, will move billions of people into the global middle class. As growth accelerates, so does consumption as more people get access to air-conditioned homes, cooking energy, cars, and appliances such as refrigerators, dishwashers, and laundry washers. Access to energy is fundamental to improving quality of life and is a key imperative for economic development. In the developing world, energy poverty is still rife. Nearly 1.6 billion people still have no access to electricity, according to the International Energy Agency.

The first part of my answer to the students was that oil and gas products are not only used for energy and transportation; they are the main components in plastics and fertilizers. Also, asphalt and road oil used to build roads, highways, playgrounds, and sidewalks are made from oil products. Plastics are produced from natural gas, and feedstocks are derived from natural-gas processing and from crude-oil refining. In the big picture of primary energy consumption, according to the BP Statistical Review of World Energy 2017, oil is about 33%, gas is less than 25% and increasing, coal is less than 30% and decreasing, hydro has been constant for the last 50 years at around 7%, nuclear is around 5%, and renewables are around 4%. According to the ExxonMobil 2017 Outlook for Energy, oil and gas remain — and will remain for the next 50 years — the world's primary energy sources. Nuclear and renewables will grow strongly, with natural gas growing the most. Solar and wind renewable energy account for only 4% of the global energy mix and will see tremendous growth in the next 25 years to account for about 11% in 2040. Renewables will have the greatest impact on electricity generation and, to a much smaller extent, transportation, with almost no impact on residential, commercial, and industrial energy use. The bottom line is that 50 years from now, when the current student generation is retired and will start mentoring the next generation, oil and gas will still be the world's most important energy source.

As global economies grow and government policies change, the energy mix will continue to diversify. The diversification of energy supplies reflects economics and advanced technologies as well as policies aimed at reducing emissions. Natural gas is the largest growing fuel source, projected to provide a quarter of global energy demand by 2040. The abundance and versatility of natural gas is helping the world shift to less carbon-intensive energy for electricity generation while also providing an emerging option as a fuel for certain types of transportation. The world will need to pursue all economic energy sources to keep up with the increase in global population from 7 billion to 9 billion people. Again according to ExxonMobil's outlook report, oil and natural gas will likely be nearly 60% of global supplies in 2040, while nuclear energy and renewables will grow by about 50% and be approaching a 25% share of the world's energy mix.

The second part of my answer to the students was that the number of electric cars will grow from the current 1.2 million to 100 million in 20 years, but will be only 5% of the total of 2 billion cars. There are about 1.2 billion cars in the world today, and the number will grow to about 2 billion in 20 years. In the United States, there are approximately 800 cars per 1000 people. In Germany, 600; in China, about 100; and in India, around 20. As China and India catch up to the car density in the United States and Western Europe, a lot more cars will be manufactured, and electric cars will see tremendous growth, by a factor of 100. But 20 years from now, 95% of the cars will still run on gasoline, and the internal combustion engine will also increase in efficiency to keep up with the technology advances in the electrical cars. And this is just my personal opinion, but I think electric cars are for wusses. I love the low growling vibration of my 5.5-liter V8 turbocharged Mercedes AMG engine, even though I get less than 20 miles per gallon.

So my advice to the students in summary? It's a great industry to work in for the long run. The salaries are good, you get to travel and see the world, and you can provide energy services to the world. Business, industry, commerce, and public services such as modern healthcare, education, and communication are highly dependent on access to energy services. There is a direct relationship between the absence of adequate energy services and many poverty indicators such as infant mortality, illiteracy, life expectancy, and total fertility rate. And if you want to do even more good in the world, volunteer for Geoscientists *Without* Borders®. TLE

— Alexander Mihai Popovici
Second Vice President