Skilled Personnel Outsourcing

Market Analysis for the Oil & Gas and Renewable Energy Sectors

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Abstract

This paper aims to **describe the business of outsourcing skilled professionals** in the oil & gas and renewable energy industry, and to estimate the associated market size, with main market trends for the 2020-2022 period.

This market is poorly documented, and a methodology was established, based on a panel of experts doing a peer review of key parameters necessary to assess the outsourcing business (outsourcing rates for main stakeholders, for instance) and on two different evaluation models. It is suggested that the market size is around US$ 55 to 60 Billion per year.

Key regional markets are

- Sub-Saharan Africa, Europe, in Mideast and North Africa, and in Asia.
- Americas and Russia-CIS are significant markets, but less open to non-domestic companies.
- Australia and New Zealand appear to be less attractive at this stage.

This market is very fragmented and the recent 2015-2017 downturn has left a number of companies in a challenged situation. Consolidation can therefore be expected in the short term.

An attractive annual growth rate around 12% is estimated for the next 3 years, primarily driven by increasing spending levels, by the reduction of core human resources observed with most international players, and by the emergence of new technologies and new industrial activities related to climate change management and to a more sustainable environment.

In the longer term there are some risks and challenges that need to be well understood.

- First, the market is very sensitive to the oil price.
- Second, the skill map is changing relatively fast, primarily due to the digital revolution and the move to low carbon emissions and CCUS, and retiring staff is not entirely replaced.
- Third, operators are exerting an ever-increasing pressure on suppliers to lower their costs, affecting margins for outsourcing companies.

Finally, it is very important to understand the **paradigm change of this industry**, with oil & gas operators becoming global energy providers, including the delivery of services such as CO^2 sequestration, and sometimes even water suppliers, shaping a new landscape for talents required for this business in the future.

Keywords: Oil & Gas; Renewable energy; Market analysis; Skilled personnel outsourcing; Upstream market; Downstream market; Midstream market; Energy; Digital Energy; Human resources; Energy skills; Energy efficiency; CCUS; Workforce demographics.

About the author

Dr Eric P. Deliac founded Luy Resources, a consulting company focused on technology and business development strategy, in 2016. Graduated from Ecole Polytechnique (Paris) and from the Paris School of Mines (Mines ParisTech) he earned a PhD in rock physics prior to a career in mining, then oil & gas, then technology management and finally strategic consulting. Eric is a lifetime member of the Society of Petroleum Engineers and a member of the French Corps des Mines.

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Market Analysis for the Oil & Gas and Renewable Energy Sectors

Background and Introduction

The oil & gas and energy provision businesses are subject to abrupt cycles with rapid downturns followed by sustained recovery periods.

As a central indicator, the price of oil influences the upstream hydrocarbon business, and also the downstream activity (refining, petrochemicals) or the midstream one (transport, pipelines, terminals, storage). Furthermore**, a downturn of the oil price also impacts pricing of renewable energy** such as hydroelectricity, wind and/or solar energy.

Yet such industries are very capital intensive, which means that activity is strongly related to either the lifetime extension of mature assets or to the development of large new projects. In such an environment, the various actors involved, national and international operators, service companies, EPC companies (Engineering Procurement and Construction), technology centers, etc. are looking at ways to **maximize flexibility on skilled human resources while managing knowledge and experience**.

In addition to this situation, the energy industry faces a massive “crew change”, whereby professionals hired in the 1960’s and 1970’s are retiring without being replaced, due to a shortage of new graduates and qualified talents from universities and training centers (references 1, 2 and 3).
This explains the rapid development of the skilled personnel outsourcing business to both operators and providers, considered as the solution to upscale project teams when starting a new project, or to source missing skills for a temporary period on a mature asset.
Such skilled resources are then immediately reduced when the business outlook deteriorates. That said, little information is available as to the size of this market, and also as to the main market trend factors.

The purpose of this document is therefore to **suggest an approach that would help define and quantify the market**, and also suggest estimated AGR (annual growth rate) for the next 3 years or so.

Methodology

Assessing the size of an emerging market is a delicate task that requires the quantitative analysis of intermediate parameters, which will in turn be aggregated to define the market dimension.
Examples of such parameters include outsourcing intensity for the various actors of the market, average annual revenue per outsourced person, demographics of the energy population, etc.
Since there is no silver bullet to access their value, it has been decided to gather a panel of experts covering different aspects of the market and to run estimates of the key parameters by the panel, in a sort of trial and error iterative mode.
The selected panel included 10 experts covering the following domains

- Geopolitics and energy policies
- Economics of Oil & Gas and Renewables
- Education and training for the Energy and Petrochemicals industry
- Oil and Gas EPC and service companies
- Oil & Gas operating companies
- Outsourcing companies

The parameters, which will be described in more details in the following sections, were used to estimate the market size from two perspectives: **spending levels and demographics**.
It is indeed considered that comparing results with two different calculation modes should reduce the uncertainty on the final result if the two methods lead to consistent numbers.

Little effort was spent outside of the oil & gas area, because the emerging nature of this business makes it a marginal market for skill outsourcing. The renewable energy segment was therefore extrapolated, with the main focus of the analysis on oil & gas, which was itself subdivided in 3 sectors: upstream (exploration and production), midstream (transport, terminals and storage, LNG infrastructure) and downstream (refining and petrochemicals).

Facts and Figures

Production of Oil & Gas

The BP Statistical Review of World Energy 2019 (68th edition, reference 4) provides details of the world oil & gas production, currently standing around 170,000 koebpd (oil equivalent barrels per day), of which roughly 55% comes from liquids (oil) and 45% from gas. This origin of this production is illustrated in Figure 1.

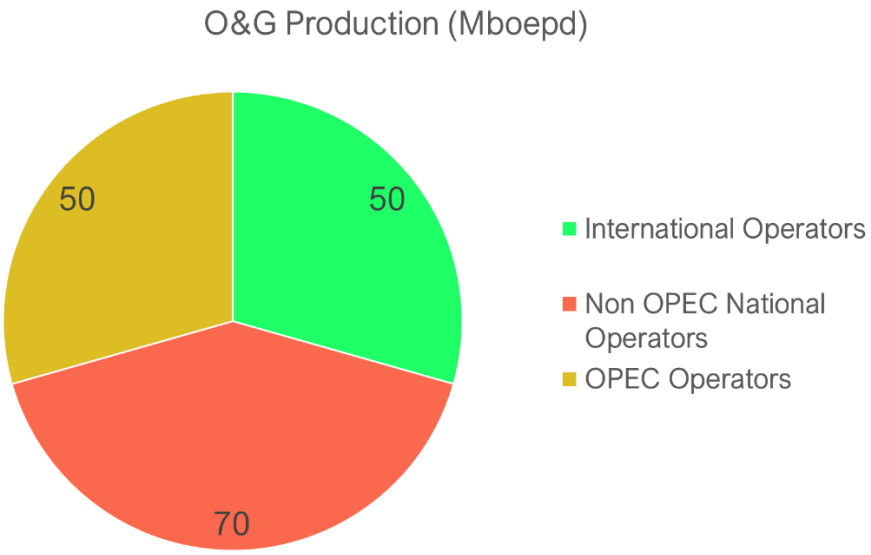

Figure 1 – Origin of the oil & gas production by producer profile (rounded numbers)

Spending Levels

The Energy business as a whole is slowly recovering from a very brutal downturn between 2015 and 2017. In Oil & Gas, the number of new projects recently sanctioned with positive FID (final investment decision) provides visibility for a sustained growth rate until 2023. Yet, for 2020 Rystad Energy forecasts a 4% overall decline in global oilfield services revenue if oil prices stay flat to current levels (around $60 per barrel), after 3 years of growth, reaching US$ 647 billion in 2019 (reference 5).

In its "World Energy Investment 2019" report (reference 6), the International Energy Agency provides detailed insights into 2018 spending levels for the various segments of the energy market, showing a stable situation between 2017 and 2018 (see Figure 2).

In its analysis of oil and gas spending levels in 2018, Petrofac reports similar levels for global upstream CAPEX and OPEX around US$500 billion (reference 7), with the majority of the new oil and gas projects (bidding pipeline) in upstream gas (55%), while downstream represents 28%, confirming that OPEX is higher than CAPEX for downstream, with proportionally less new projects than upstream.

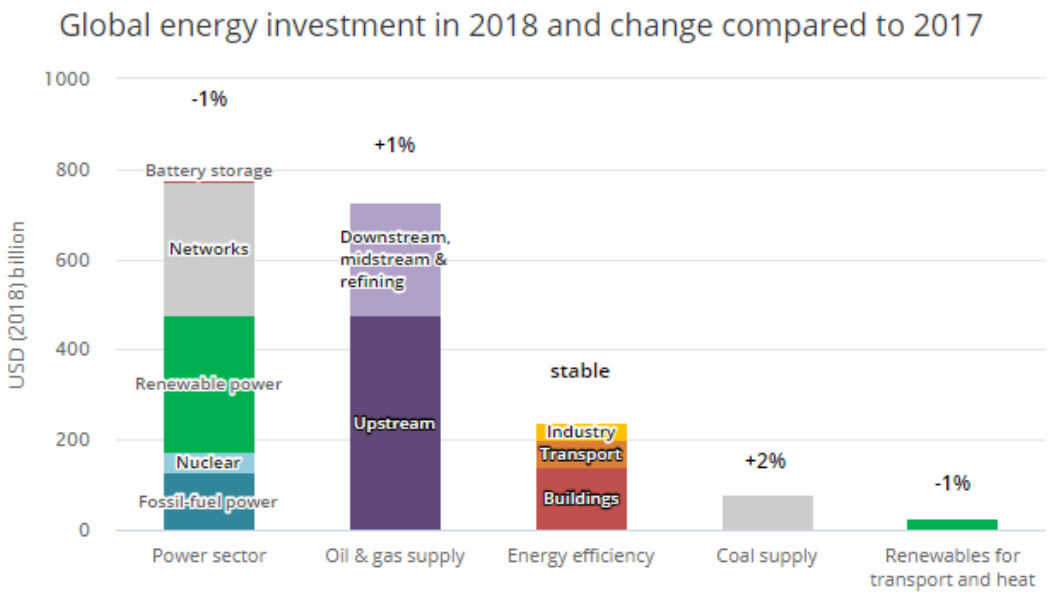

Figure 2 – Energy investment in 2018 (from IEA)

Based on the above sources and on exchanges with the above mentioned panel of experts, a synthesis of spending levels for the Oil & Gas and Renewable energy spending is illustrated in Figure 3, with a total amount estimated around US$ 1,800 Billion.

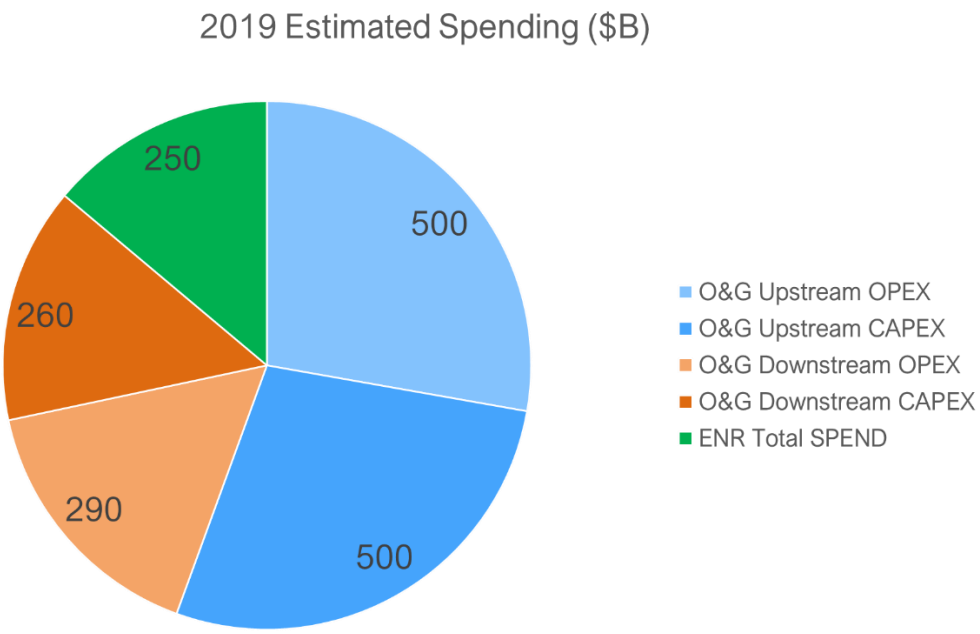

Figure 3 – 2019 estimated spending for Oil & Gas and Renewable Energy (ENR)

Note: midstream oil & gas spending is integrated in upstream numbers in the figure

Demographics

To estimate the demographics of the oil & gas industry, a step by step approach was used as follows:

Upstream population

A number of large international operators publish information concerning their upstream population. This allows to compute a ratio of approximately 4.5 persons per kboepd. Due to local considerations (employment protection, gradual translation of international positions toward local staff, etc…), it is estimated that this ratio is somewhat higher for national operators, hence a value of 6 persons per kboepd assumed for NOC's in this study.

Finally, it is generally accepted that equipment manufacturers, EPC (engineering procurement and commissioning) and service companies altogether represent approximately twice the employment of upstream operators. This leads to the results shown in Figure 4, with approximately **2.8 million professionals in upstream**.

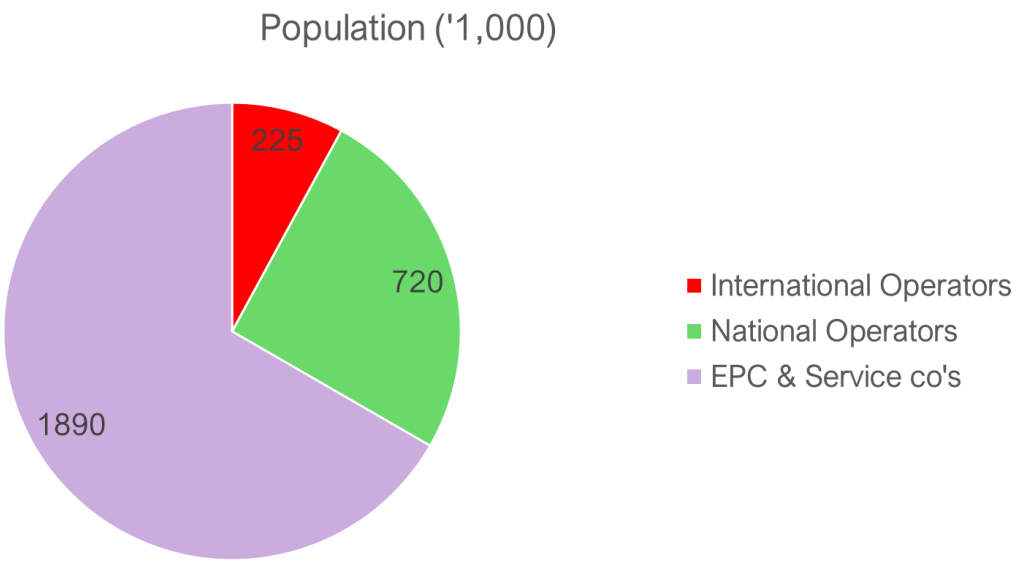

Figure 4 – Oil & Gas upstream population (in thousand professionals)

Midstream-Downstream population

No attempt was made to estimate the mid-downstream population in detail. It is however considered that operators represent between 2 and 3 million professionals, while manufacturers, EPC and service companies represent around 1 to 1.5 million professionals, hence a total **around 4 million individuals**.

As will be shown further down in this paper, this parameter is not essential for market sizing since the downstream/midstream outsourcing market will be extrapolated from the upstream one which represents the majority of new investment projects.

Market Definition and Segmentation

Skillsets

It is essential to understand the skills outsourced and their evolution as the energy world is going under a very tangible technology revolution (see below). Our initial focus is on the oil & gas upstream sector, since the rest of the market will be extrapolated from there. The main parameters studied in this work are the following

- Size of the corresponding population – 3 levels were considered (High population, Midsize, Small or Emerging population)
- Rate of outsourcing in the oil & gas industry
- Industry enrolment (global intake of freshly qualified or graduated professionals)

To simplify the analysis, it was decided to aggregate the skills in 10 types, as follows

- Geoscience (including geology, geophysics, etc.)
- Reservoir engineering (including petroleum engineering)
- Drilling engineering
- Production operations (including maintenance and inspection)
- Construction and field development
- HSE and Risk management
- Project management
- Energy efficiency (including carbon management)
- Artificial Intelligence (AI) and data science
- Information technology (IT)

A summary map of the result is illustrated in Figure 5.

The skill map shows some interesting patterns. For instance, we estimate that the Drilling population, although large in size and highly outsourced, should be expected to decrease over time due to a low enrolment, itself probably impacted by new technologies which reduce the need for skilled personnel on the rigs. Canadian statistics already show evidence of this trend (see reference 8).
It is also worthwhile noting **the emergence of two recent skills, AI/Data Science and Energy Efficiency**. Again, new technology is the explanation, with a high demand from the industry, but a low outsourcing rate because the industry players want to mater the technology first and acquire enough expertise before they would consider outsourcing. That said, it seems clear that these two

skills will generate a strong growth of the associated populations which will in turn create outsourcing opportunities, especially for independents and national companies.

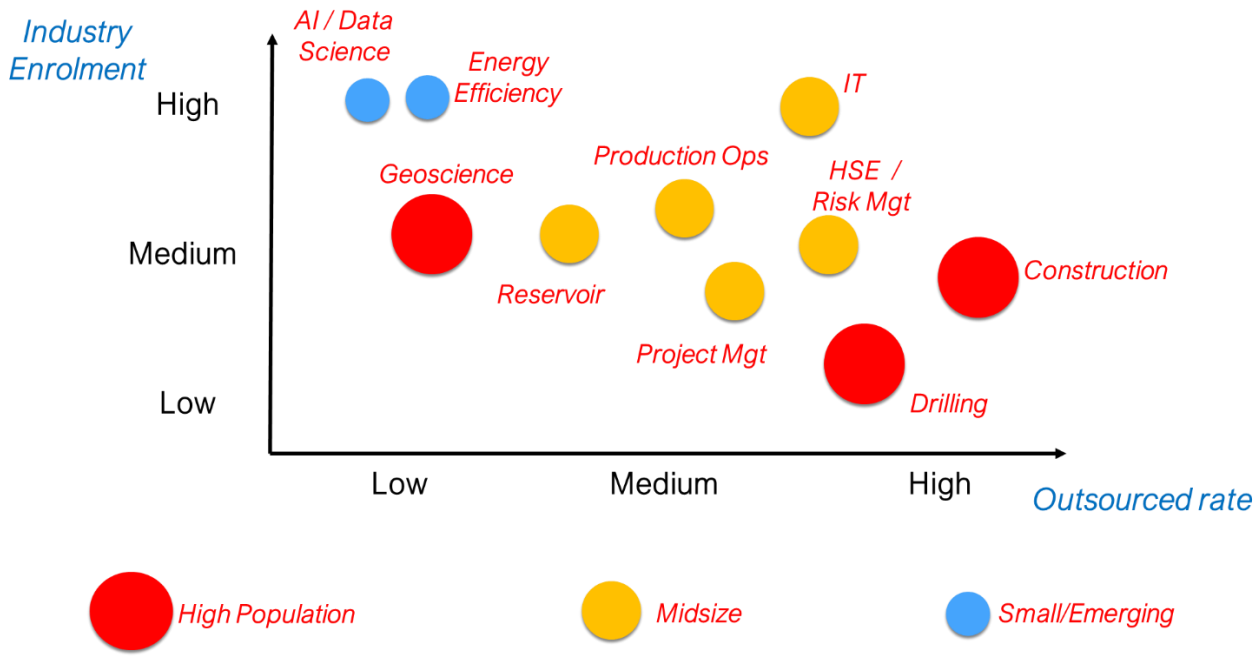

Figure 5 – Skill map for Oil & Gas upstream professionals

Geographies

Although it is relatively subjective to qualify geographical markets, due to the geopolitical aspects and other poorly defined criteria, it was felt that such an assessment was important to better understand the market and its near-term evolution. Regions were defined as follows, with a perspective from a European provider of outsourcing services:

- Europe
  - Good opportunities related to high number of international operators and EPC
  - Upstream and ENR dominating
  - Operators prefer to rely on outsourced resources to be flexible in downturn cycles
- Mid-East and North Africa
  - Good opportunities for Downstream (large petrochemical projects)
  - Uncertain growth potential for Upstream
    - Large service companies have mega contracts – they drive the skilled resource market
    - National operators always look for highly technical expatriates, but in moderate number (priority on upgrading local engineers)
    - Sourcing of low-cost resources from Asia is high and growing
- Sub-Saharan Africa

  - Very strong Upstream & LNG opportunity – multiple mega-projects decided (Mozambique, Nigeria, Angola, Uganda and more) and active exploration under way
  - Downstream poised to grow in specific areas (ex: Uganda, West Africa)
  - High number of ENR initiatives (Solar)

- North America
  - US is a tough market for non-US companies
  - Canada O&G hit hard by multiple factors (of which environmental & economical)
  - US Upstream dominated by Shale oil & gas, with relatively low profitability and high sensitivity to oil price - poor visibility and violent business cycles
  - US Midstream active and growing (pipelines and LNG)
  - US active with ENR projects (offshore wind booming, solar growing fast)
  - Mexico is growing and presents good Upstream potential
- South America & Caribbean
  - Good potential Upstream in general, dominated by national operators
  - Uncertain future for shale oil in Argentina, and Venezuela in crisis
  - Growing LNG activity (ex: Trinidad & Tobago)
  - Emerging ENR activity (Solar)
- Asia
  - Upstream and Downstream growing – but overall reliance on imports for oil and for gas
  - Growing environmental awareness could affect industry
  - Highly active region for ENR (India, China, Japan)
  - Providers of low-cost technical resources
  - China is expected to become a major player for new energy projects (exp ENR), but it is a difficult market to penetrate for foreigners
- Australia & New Zealand
  - Region is affected by high costs (ex: labor) putting pressure on new projects at current oil price
  - Environmental concerns also impacting the Energy sector
  - Growing ENR activity (Solar, Wind, Geothermal)
- Russia-CIS
  - Energy business growing in all areas
  - A tough market for foreign companies, with complex regulations and administrative framework
  - Viable approach through international companies operating in CIS

This very basic analysis is summarized in Figure 6, with color codes from Good (green) to Tough (red)

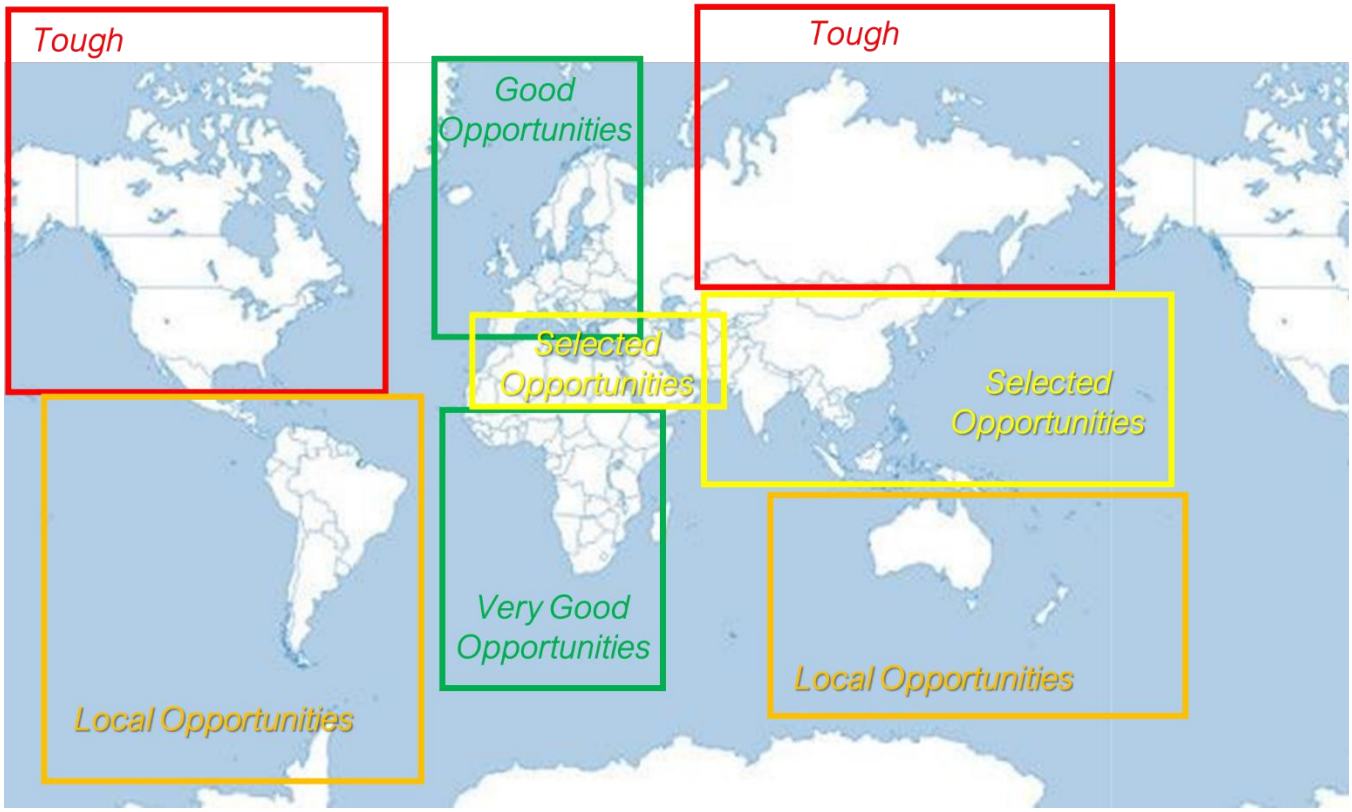

Figure 6 – Geographical market analysis for Outsourcing (European perspective)

Tentative Market Size Assessment

Two different methods were used to quantify the outsourcing market size for skilled professionals, one based on spending levels, and one based on demographics and expected revenue per outsourced head. That said, prior to the calculation, it was decided to simplify the problem through a specific market segmentation.

Segmentation for Market Size Assessment

Given the high level of uncertainty resulting from the lack of data on the outsourcing market, and also given the spending information provided above, it has been decided **to focus the analysis on the oil & gas Upstream sector first**, since it represents by far the largest segment.
Midstream/Downstream is estimated around 60% of the Upstream (higher population but significantly lesser spending).
Finally, the Renewable energy sector (ENR) is still largely an emerging business, even though spending levels are now quite significant (see Figure 3).

As a result, the approximate market segmentation used in this study is the following (market size in monetary value):

- Upstream sector: 60%
- Midstream/Downstream sector: 36%
- ENR: 4%

Spending Approach

As shown in Figure 3, the global spending in the energy (Oil & Gas and Renewables) and downstream petrochemicals business is around US$ 1,800 Billion per year.
It is generally accepted (reference 9 for instance) that labor costs represent between 40 and 50% of the overall cost in the extractive industry (mining and quarrying, oil & gas, etc), when labor is aggregated along the value chain (operator, maintenance companies, engineering and other service companies, construction design etc.). For the business evaluated in this study, we have chosen 40% as a conservative estimate, due to the growing impact of new technologies to reduce manpower. This results in a labor cost around US 720 Billion.
After consulting the expert panel mentioned above, it seems reasonable to assume an average of 8% for the share of the labor cost associated to outsourced resources, based on a 15-20% range for

operators and 5-8% for engineering and EPC companies. As shown in Figure 7, this in turn translates into **an estimated size of US 58 Billion for the outsourcing market**.

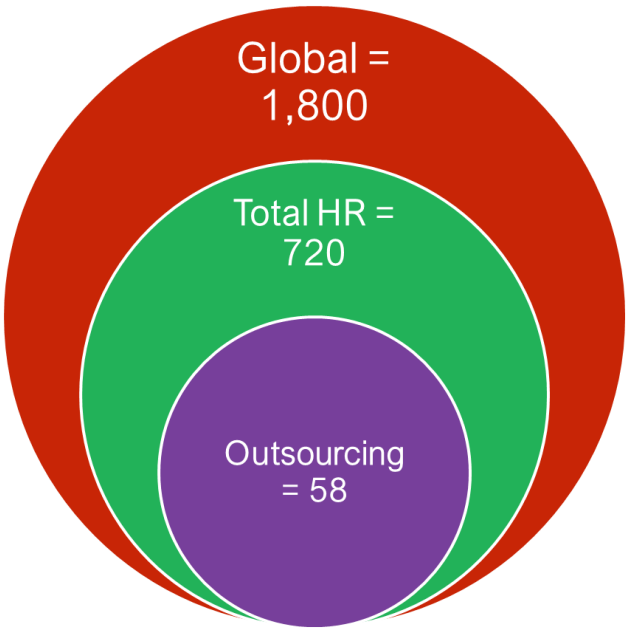

Figure 7 – Outsourcing market size estimation from global spending

Demographics Approach

The approach used here starts with the upstream business and is based on the demographic's analysis shown in Figure 4 as well as on typical day rates estimated by type of employer. Such rates, which include all costs associated to a professional person (travel, accommodation, visa, medical coverage, etc…) are assessed as follows and further documented in regular publications such as SPE's Journal of Petroleum Technology (reference 10, for instance):

- International operators around US$ 250,000 per year (this varies widely and only represents a typical average)
- National operators around US$ 100,000 (such employers are mixing high cost specialists with low cost workers often coming from South East Asia)
- EPC and other service co's around US$ 120,000 per year (lower than international operators due to lower logistics costs for project work)

The last parameter required for the upstream market evaluation is the outsourcing rate for each employer profile. The assumptions, validated with our expert panel are as follows

- International operators around 20%
- National operators around 12%

- EPC and other service co's around 6%

As highlighted in Figure 8, this relates in an overall **upstream market of US$ 33.5 Billion**. Assuming the 60-36-4 distribution of the market provided above, between upstream, midstream-downstream and ENR, the model provides **an estimate of the global outsourcing market size around US $ 56 Billion**, consistent with the value found above (spending approach).

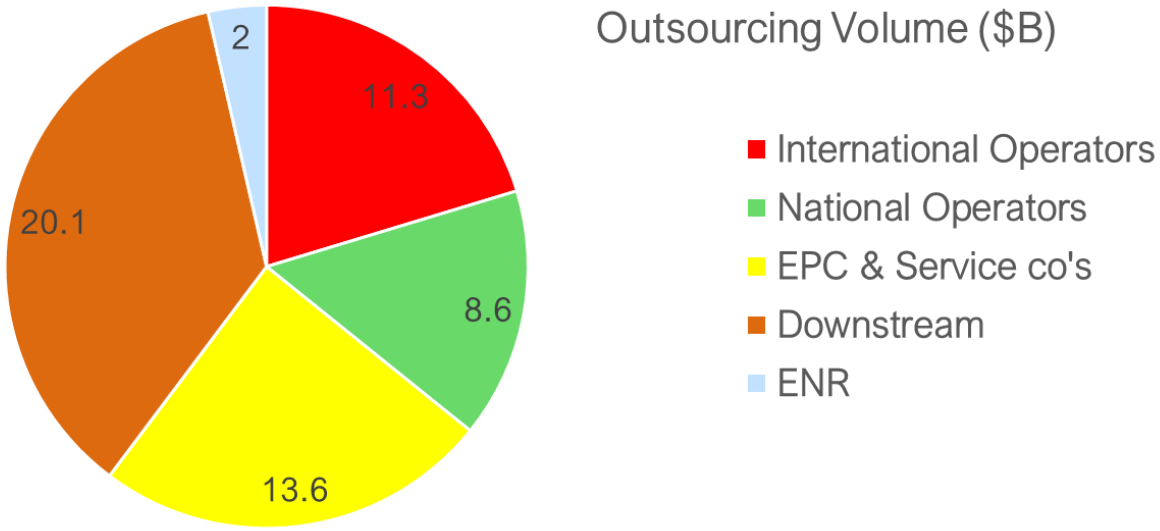

Figure 8 – Outsourcing market size estimation from demographics

Competitive Landscape

Outsourcing Company Profiles

Although there is a wide variety of outsourcing service providers, it seems possible to classify them as follows

- Large diversified players (over 10,000 staff available), providing services across multiple industry sectors including energy
- Large providers focused on energy and downstream petrochemicals (over 1,000 staff available for outsourcing) – example: Petrofac
- Medium size "pure players" (500 to 1,000 staff available for outsourcing), by difference with companies having a similar resource base, but affiliated to the first group above – example: IOTA Group
- Small size "pure players" (up to 500 staff available), usually focused on domains where the company has a track record of technical excellence – examples: Groupe CVA or EP2C Energy

It should be noted that the resource base is difficult to define, since outsourcing companies mix their own resources with an external pool of professional staff contracted on specific projects. A better indicator could be the number of persons in their data base, but this is obviously kept confidential.

Another important point deals with the services offered by outsourcing companies, due to the nature of their business. All of them have had to develop expertise in ancillary domains such as global mobility, recruitment, logistics, etc., which explains why such expertise is also provided as a service for many of these companies, in addition to the provision of outsourced skilled personnel.

Given the estimated market size (cf previous section), it is clear that **the outsourcing market is quite fragmented**. One of the largest players, Petrofac, indicates a resource base around 4,250 persons (employed) and a corresponding 2018 revenue of US$ 1.48 Billion. This would represent between 2 and 3% of the market, and each of the second-tier outsourcing providers (500 to 1,000 staff) represents less than 1% of the market.

Entry Barriers

Providing outsourcing services does not lend itself to an easy differentiation on technical aspects since, by definition, the staff being outsourced is quite mobile and can be found across many operators.

Companies have therefore had **to develop differentiating aspects** in areas such as quality of the resource base, the loyalty of their staff, their reliability on short notice requests, the ability to send the right person anywhere for any kind of period, etc…). Figure 9 shows a simplified illustration of such differentiation factors, which also represent the main entry barriers to this market.

Figure 9 – Main entry barriers for Outsourcing services

Analysis of Market Trends

Relevant Market Indicators

In order to understand a market, it is usually valuable to use a small number of macro-indicators that provide for a snapshot of the market health and trends. Such indicators need to be easy to find and readily available. In our opinion, 3 indicators are relevant to the market dealing with Oil & Gas and with Renewables:

- Oil price (BRENT or WTI) – it is interesting to note that this indicator appears to correlate relatively well with other energy sources, in the sense that, when the price of the barrel is down, other energies seem to also suffer from such an environment (during the 2015-2017 downturn, for instance, hydroelectricity prices were strongly reduced) – it is also worthwhile noting that a low oil price means better refining margins and therefore a profit transfer from upstream to downstream.
- Rig count – this well-known indicator is regularly published with geographical details by authoritative sources (Baker-Hughes, for instance) and it strongly correlated to the dynamics of the upstream business
- OPEX+CAPEX spending plans – this is available at least annually from various consulting organizations for the oil & gas business, and it is also part of authoritative publications such as the annual IEA “World Energy Investment report”. Ideally, it should be coupled with CAPEX plans for new projects, which are tightly correlated to new human resource needs, but this is less straightforward, although available through paid subscriptions.

Classification of Market Trend Factors

In our analysis, we have identified the following key factors to estimate the outsourcing market evolution over the 2020/2022 period

- Spending levels
- Demographics
    - Change in the international workforce
    - Requirement for flexible resourcing scenarios
- Impact of new technologies and climate change
- Evolution of ENR and of the Water business

A conservative approach was preferred due to the fair level of uncertainty in some of the factors, and therefore the downstream market was assumed to be little impacted by demographics, compared to the upstream activity.

Spending levels

As explained above, even though 2020 is expected to be a consolidation year, with no growth of spending levels (a slight decrease is even forecast by some analysts), the overall consensus is that spending will grow by an average 2 to 4% per year, based on identified new projects. We therefore consider that a 2% average growth rate (AGR) is reasonable for the 2020-2022 period.

Considerations on Demographics

Among the main factors impacting the outsourcing business, two stand out significantly, namely

- The evolution of the international workforce in exploration and production
- The trend for flexible resourcing scenarios.

International workforce evolution

The vast majority of oil & gas related universities report a marked decrease in student enrolment, only partially compensated by a relatively steady intake of students from such regions as the Middle East or Africa. This impacts all skills, including Geoscience and reservoir engineering. Aggravating factors can be summarized as follows

- The oil & gas industry suffers from a poor image within the millennials community, especially concerning climate change and environmental sustainability
- Brutal lay-offs over the last two decades have created a lack of trust in the ability of most companies to keep and manage their workforce with a long term perspective (see Figure 10 and reference 11 for instance)
- Given the cyclical nature of the business, more and more companies do not replace retiring personnel entirely and prefer to call on outsourcing providers to manage peak needs
- Most oil & gas rich states have constraining “translation” programs in place to replace international staff by national professionals
- Women in general are turning away from Oil & Gas in order to preserve the quality of their personal lives
- New technology reduces the need for people, thanks to more efficient Geoscience interpretation or more intelligent operations.

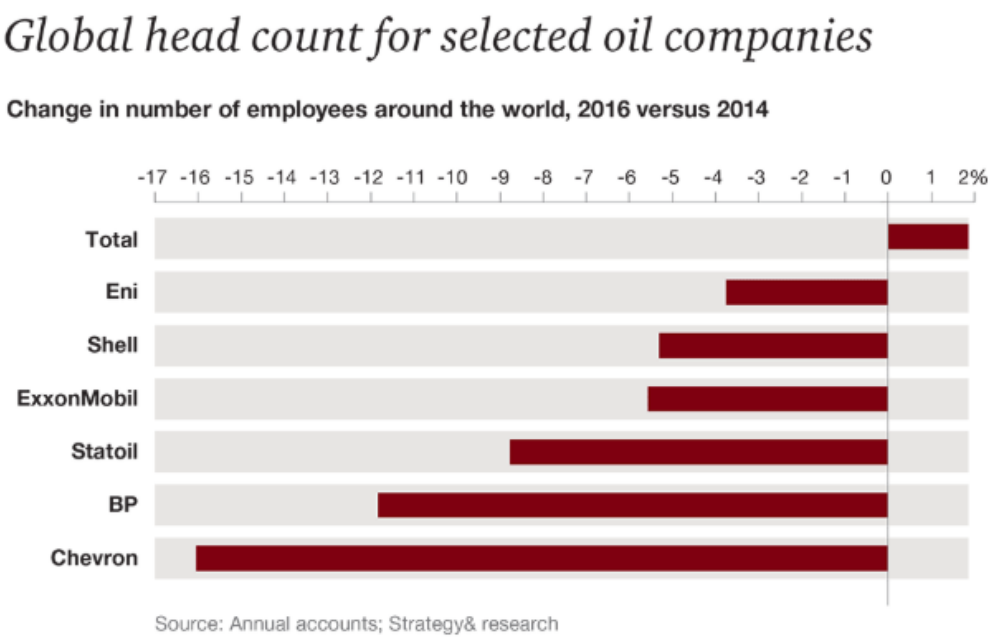

Figure 10 – Staff reductions for Oil & Gas majors – 2016 vs 2014 (from PWC – reference 11)

We estimate that, for a same level of activity (e.g. excluding activity related to business growth), the overall impact of international workforce evolution the balance (deficit) between outgoing staff and incoming personnel can be conservatively estimated around 1% per year to be found elsewhere (upstream oil & gas).

Increased flexibility for resourcing scenarios

To face the risk associated to downturn challenges, companies are now combining their own (organic) resources with an increasing pool of outsourced personnel. While this holds for all players, it is particularly relevant to **engineering and EPC companies**, which correspond to the highest staff levels (see Figure 4).

As the industry is embarking on a fair number of new projects (as an example, it is estimated that the development of the giant gas fields discovered offshore Mozambique will employ over 60,000 staff, in a country where the local professional population is quite limited), it is estimated that a large part of the additional workforce will come from outsourced resources.

This is supported by the relative abundance of baby boomers who retired from senior positions over the past decade or so, and are looking to dedicate a significant part of their time to generate complementary income, calling on their deep experience and knowledge, as well as by the development of younger resource pools in such countries as India, Pakistan or Indonesia.

The impact of this factor is conservatively estimated around 2% growth of the workforce in EPC and other service providers (upstream) per year, to match the expected demand for new projects.

Impact of New Technologies and Climate Change

As explained above, new technologies (typically information technology, data science and artificial intelligence) already have a negative impact on resourcing needs in conventional areas, such as Geoscience or production operations.

In the same time, other new technologies are bringing new skills to the table, that were not present only a few years ago. In addition to IT/AI, these technologies relate to the powerful evolution of the energy industry towards lower gas emissions, more sustainable operations and the management of energy in general (for instance, stop flaring gas and use it to generate power across production facilities).

In the short term, this evolution generates needs for new skills, such as environmental engineering, energy efficiency, low carbon mix management, etc.
In the midterm, a very significant change can be observed with major international energy producers and service companies, resulting in adding new businesses to their traditional activity, such as CO^2 sequestration (Carbon Capture Use and Storage – CCUS), water management (essential for shale oil & gas operations), provision of renewable energy and associated services, etc (reference 12).
As examples, Total and Oxy announced early January 2020 that they are leading a consortium to assess the viability of a commercial-scale carbon-capture facility built specifically for cement operations. During the EVOLEN Days 2019 (Paris, 23-24 October 2019), Total indicated that “the capitalistic intensity of the CCUS business is comparable to that of the whole O&G business”. Based on a 3 Gt/year CO^2 CCUS example, the total cost of such a facility represents € 150 Billion per year for 20 years.

A significant mutation of the energy industry is therefore under way, that will require very significant skilled resources.

The impact of this factor is conservatively estimated around 2% growth of the overall market per year, including climate change management, environmental and sustainability engineering, midstream and downstream needs (beyond these associated to increased spending), water management and the transition of oil & gas operators towards global energy companies.

Assessment of Market Growth (AGR)

Aggregating the factors described in the above paragraphs results in a global estimate around US$ 7 Billion of annual growth, as shown in Figure 11, where the last factor has been split in two similar parts, to distinguish water management and renewables on one side, and "other" (CCUS, national companies, midstream-downstream, etc.)

	Spending Level	International Workforce Reduction	Flexibility EPC + Service co's	Other (NOC, Midstream, ENR, Water, CCUS)
Estimate ($ B/yr)	1.1	0.6	4.5	1.1
Comments	2% applied to market size	1% applied to int. upstream @ $250 k/yr	2% applied to upstream EPC @ $120 k/yr	2% applied to market size

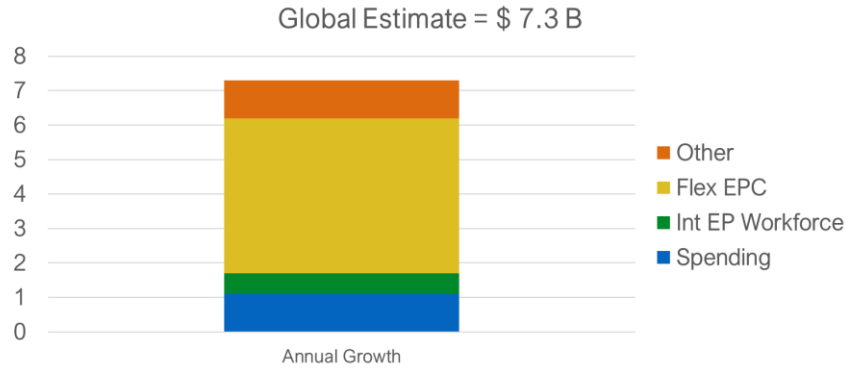

Figure 11 – Outsourcing market AGR estimates (2020-2022)

Interestingly the biggest component of this substantial growth is associated to the need for increased flexibility expected from EPC and other service companies. In a period of multiple and major new projects, such as 2020-2022, this generates more than half the market growth.

Given the assessment of market size presented above, **the expected AGR for the upcoming three years is therefore estimated around 12%**.

Conclusions

The outsourcing market for skilled professionals in the oil & gas and renewable energy industry is a significant market (size estimated between US$ 55 and 60 Billion per year) with an attractive growth rate expected for the next 3 years (around 12% AGR). Growth is especially important in sub-Saharan Africa, but very good opportunities can be found in Europe, in Mideast and North Africa, and in Asia. This market is very fragmented and the recent 2015-2017 downturn has left a number of companies in a challenged situation, which means that an active consolidation phase should come as no surprise over the next couple of years.

Growth of the outsourcing business is primarily driven by increasing spending levels, by the reduction of core human resources observed with most international players, and by the emergence of new technologies and new industrial activities related to climate change management and to a more sustainable environment.

Yet, beyond the good short-term visibility of the market, there are some risks and challenges that need to be well understood. First, the market is very sensitive to the oil price. Second, the skill map is changing relatively fast, primarily due to the digital revolution and the move to low carbon emissions and CCUS, and retiring staff is not entirely replaced. Third, operators are exerting an ever-increasing pressure on suppliers to lower their costs, affecting margins for outsourcing companies.

Finally, it is very important to understand the paradigm change of this industry, with oil & gas operators becoming global energy providers, including the delivery of services such as CO^2 sequestration, and sometimes even water suppliers, while more and more oil & gas service providers are engaged in a strategy to increase their business out of oil & gas to more than 50% of their activity.

References

1. "Preparing for an aging workforce – Oil, Gas and Mining Industry", SHRM, Dec 2015
2. "Crew Change: Oil & Gas Skills Shortage Crisis", Oil & Gas IQ, Jan 2013
3. Workforce Report 2019, Oil & Gas UK
4. BP Statistical Review of World Energy 2019 | 68th edition
5. "Growth in Service Industry set to take a Hit", Press Release by Rystad Energy, Sep 11, 2019
6. IEA World Energy Investment 2019
7. "Delivering our Strategy", Annual Report and Accounts 2018, Petrofac (https://www.petrofac.com/media/4559/2018-annual-report_web-version.pdf)
8. "2019 OIL and GAS Labour Market Update" by PetroLMI (Canada), Apr 2019 (https://careers-oil-gas.s3.amazonaws.com/publications/34/en/2019_Labour_Market_Update_FINAL.pdf).
9. "Overview of Mining Costs" by Rohit Savant, CPM Group, Aug 2012 (http://www.goldconvention.in/iigc2012/presentation/CPM%20Group%20Overview%20of%20Mining%20Costs%20RS.pdf)
10. " Industry Salaries Continue to Inch Up ", Journal of Petroleum Technology - 1 November 2019, a SPE publication
11. Strategy& (PwC) - Oil and Gas Trends 2018-19 - Strategy shaped by volatility, PwC, 2018
12. " Oilfield Service Firms Branch Out Past Oil and Gas ", Journal of Petroleum Technology - 30 October 2019, a SPE publication