International Labour Organization

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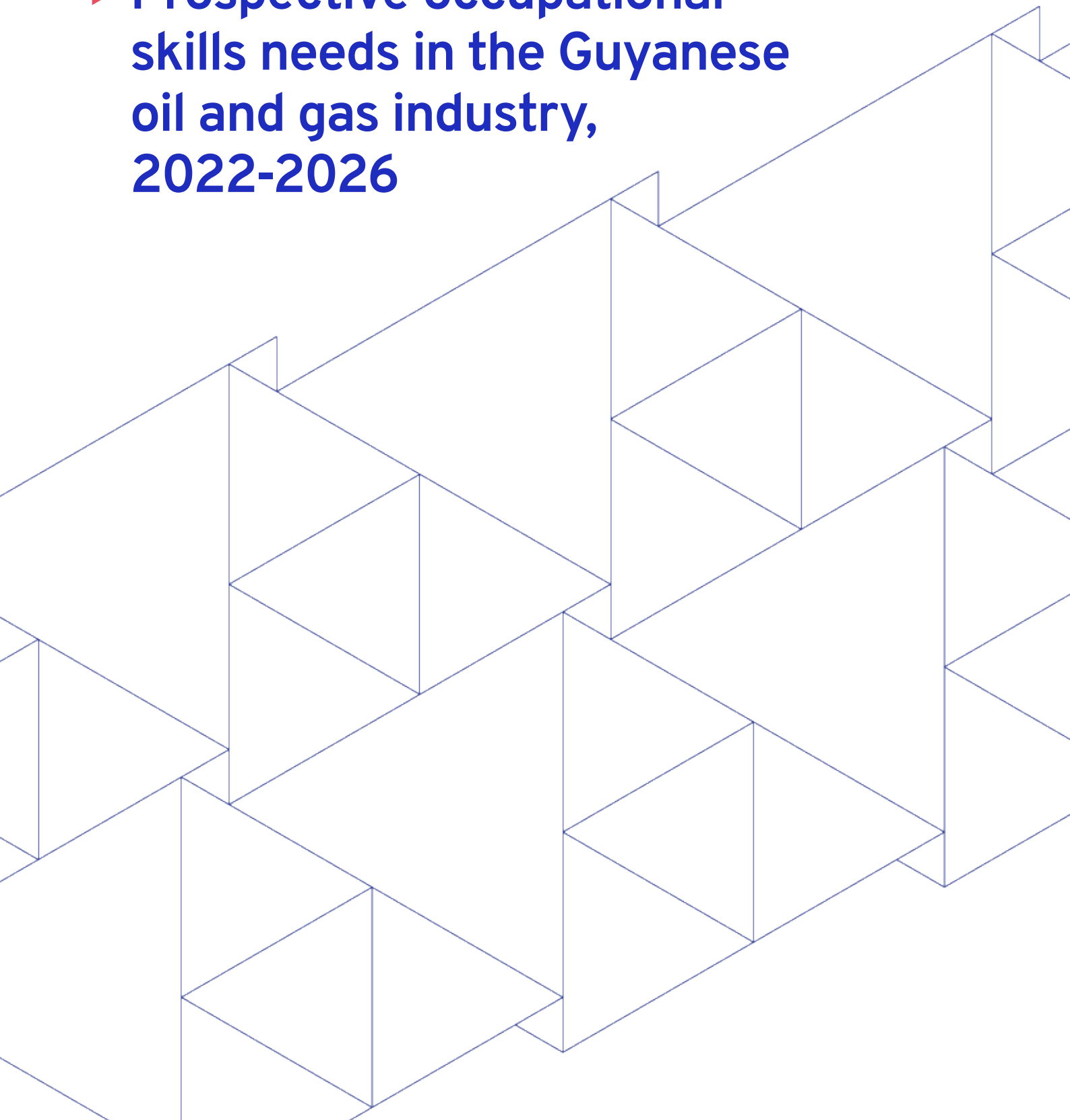
Prospective occupational skills needs in the Guyanese oil and gas industry, 2022-2026



Prospective occupational and skills needs in the Guyanese oil and gas industry, 2022-2026

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Foreword

The present study is part of a concerted effort by the Ministry of Labour, Guyana and the International Labour Organization, Caribbean Office to address a major information gap regarding the human resources needs within the booming oil and gas industry in the country. Often overlooked in the wake of general and sustained economic growth and strong international demand for the product, human resources need(s) play an important part, not only to ensure highest productivity for the private sector, but also in the general efficiency in the educational choices of the Guyanese citizens and in the allocation of public resources to support the national education system.

The study combines a background analysis of the local and international human resources trends in the oil and gas industry and a collection of original data from companies directly operating therein. It provides much valued information about the profiles that the sector will require in the short and medium term and details the competencies accompanying those as well as perceptions about their availability. Preferred hiring methods, a glimpse at current educational options and further insights from industry professionals complete the analysis.

The bulk of the information collected, analyzed, and synthetized in the study originates from a dedicated survey conducted over the months of August and September 2022. Analysis of published web-based vacancies and interviews with representatives from the private sector, the Government of Guyana and academia corroborate and substantiate the findings.

The study was authored by the consultancy firm Blindspot B&HR led by Miguel Macias and by Diego Rei, Employment and Labour Market Policies Specialist at the ILO Caribbean Office. The process would not have been possible without the commitment and continuous efforts of Dhaneswar Deonarine, Chief Labour Office of the Ministry of Labour in Guyana. Francesco Carella, X,Y, Z provided useful comments on a previous version of the study. The ILO Caribbean Office wishes to thank all the stakeholders who contributed to the study by devoting time and resources to answer questions, attend interviews or share available data.

Dennis Zulu,

Director of ILO Decent Work Team and Office for the Caribbean

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List of acronyms

BCG	Boston Consulting Group
bpd	barrel-per-day
DPI	Department of Public Information
FDI	foreign direct investment
GDP	gross domestic product
IMF	International Monetary Fund
ILO	International Labour Organization
IOM	International Maritime Organization
ISIC	International Classifications of Economic Activities
ISCO	International Standard Classification of Occupations
IT	Information technology
LPG	liquefied petroleum gases
STED	Skills for Trade and Economic Diversification
STEM	Science, Technology, Engineering and Mathematics
US	United States
USD	United States dollars

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Executive summary

- Guyana is expected to become one of the top producing oil and gas economies globally within the decade. Despite the growth opportunities, the accelerated expansion of the related operations has exposed a pronounced **gap between the industry's labour demand and the availability of skilled workers** at the local level.
- The challenges for the local oil and gas industry are compounded by **systemic local weaknesses** including quantitatively (headcount) limited workforce, a marked gender gap (especially in terms of labour force participation) **and by worldwide inter and intra industry competition** for talent, notably the one at par with digital transformation or the one replacing retiring professionals.
- Policies to address the current and future gap may include - as countries in a similar situation are currently choosing to address - the **managed immigration of specialized labour** and skills development strategies to respond to **oil and gas, and possibly, green transition** needs.
- Findings from a dedicated survey about occupational and skills needs in the next five years answered by 29 companies operating at diverse stages of the oil and gas value chain (employing an estimated 47 per cent of the total workers in the oil and gas and related sectors) and from analysis of current job openings published on online platforms, suggest the following:

    - In relative terms, the main **occupational profiles in demand** for the next five years in the oil and gas value chain appear to be those of 'engineering professionals' (accounting for 15 per cent of answers to the question about most in demand occupation), 'risk (environment and occupational health and hygiene) management professionals' (11 per cent), 'ships' deck crews and related workers' (10 per cent), and then in decreasing order, 'finance professionals', 'mining and construction labourers', 'physical and engineering science technicians', 'sheet and structural metal workers', 'moulders and welders', and 'mineral processing plant operators'. In addition to those, online job openings highlight, in particular, the demand for 'physical and engineering science *technicians*' (as opposed to professionals).
    - By expected **number of hirings**, survey respondents indicated a potential growth - over the next five years - of up to 459 new "mining and construction labourers", 370 "mining and mineral processing plant operators", 315 "sheet and structural metal workers, moulders and welders", 268 "engineering professionals" and 190 "Ships' deck crews and related workers".
    - **Total employment** is expected to grow by **1,339** full time positions within the next year, and **2,695** within the next five years, or 34 and 67 per cent with respect to the current headcount in responding companies (3,996). If a similar growth rate is applied to employment within the whole value chain (estimated at some

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8,459 in q3 2021), we speculate that, notwithstanding market dynamics, **at least** 5,000 new jobs should be created directly in the most "in demand occupations" for the oil and gas value chain.

- **88 per cent of all the workers performing jobs in "most in demand" occupations are currently 25 years of age or older**. This is connected to the high injury and monetary risk (loss of material, equipment) associated with underperforming a job, hence even for less specialized occupations such as welders or mechanics. As such employers perceive previous working experience as paramount.
- **81 per cent of jobs** in "most in demand" occupations **require either a higher technical or a higher degree** of education and training.
- Overall, **women representation** as workers in the "most in demand" jobs within the responding companies is **21.7 per cent**. However, for more than the half of the positions the representation is as low as 5 per cent.
- The most common **method of recruitment** for occupations identified as "most in demand" is **online job boards** such as LinkedIn or skilledguyanese.com, followed by recruitment agencies (including outsourcing companies)[1] and internal recruitment (promotions).
- In terms of **skills** associated with the most in demand occupations, only **49.6 per cent** of the skills highlighted as "most important" (technical, IT or transferrable) are considered **widely available** in Guyana. **Sixty-two per cent of the technical skills** were considered **scarce** in the country (but generally available abroad), while with regards to **IT and transferable skills**, the most common perception was one of "**wide availability", 58 and 55 per cent** respectively, with some caveats.
- **Capable welding (Standards and equipment), capacity to ensure health and safety compliance, nautical knowledge of vessel operations, rigging (offshore standards and equipment), analysis of data and project management** represent the **technical skills** most in demand and considered scarcely available in the country. While not so extended gaps exist in terms of **IT skills**, leadership, analytical and business conduct amongst the **transferrable skills** appear chronically deficient.

- Comparing potential hirings, occupational profiles and skills needs emerging from the survey and the number of graduates from Guyana's tertiary and vocational training institutions, the data suggests that:
    - There are more or less pronounced gaps in the number of graduates and the numerical needs of the responding companies, however, if one was to consider

[1] This finding supports the previously exposed dynamic, where exploration and production companies outsource their operating activities to service companies. This was confirmed with interviews.

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the entire population of the oil and gas value chain companies, those gaps (even if of different depths) would be universal.

- Expertise in health and safety and risk management appears to be the least acquirable qualification as per current tertiary and vocational training offer, while the number of graduates from welding, metal work and mechanical engineering appear to be vastly undersupplying the market and, in the case of welding, most likely with skills not adapted to the industry needs. Also, there is **an almost complete absence of training supply in trades to allow workers to become ships' deck crews and related workers.**
- For what concerns occupations such as blasters, health and safety professionals, engineers and mechanics on the job training is considered as essential to complete the formal education currently offered in Guyana.

- As recommendations for future actions, the findings from the study allow to indicate:
  - As the shortage of technical skills appears to be the most concerning one, notwithstanding the need to ensure availability of fully fledged curricula preparing students in several competencies**, if a choice linked to investments in educational supply must be made, a focus on technical skills may bring largest payoff**.

  - Other than via training supply, **there is room to provide public assistance by helping the private sector to formalize ongoing (or introduce) traineeship schemes**. Amongst others, this will address the needs of the industry for experienced workers, clearly identified via the survey. Ensuring tripartite (social partners) representation in the scheme design, full integration of occupational health and safety elements, due competency training contents, and certification of competencies will be mandatory elements. National competent authorities, notably the CVTET and the BoIT, may consider the direct engagement in the area.

  - No matter the policy decision regarding the response of the national education system to the needs of the oil and gas industry, the current international context must be duly considered, specifically regarding the possibility of trained workers leaving for other destinations once trained or after having obtained a minimum working experience locally. The implications are multiple. From the public policy perspective, **adequate pricing of educational offer or cost sharing agreements** with the private sector will be paramount. In addition, 'creative' solutions for incentives for Guyanese graduates to stay in Guyana (**bonding**) are to be thought of.

  - Other than addressing skills gaps via direct training supply there are benefits to be gained from **utilizing the findings of the study and any future one to guide (i) educational and career guidance; and (ii) the offer of services** by public

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employment services. This could lead to foster the **participation of women on STEM career paths.**

- If, as is likely the case, the response of the national education system to address the present and (near) future skills need in the oil and gas industry will take some time to roll out, two policy areas may become critical: **labour migration policy** and **educational supply via out-of-country providers**.

  The former could be based on formal identification of the profiles sought by the Guyanese economy (also relying on the information conveyed by this study) and could include built in programmes associating the work permits to skills transfer through internships and shadowing for students, on-the-job training for young professionals. In addition, it could encompass r**eturn policies** for skilled diaspora and must ensure due monitoring for rights abuses and violations notably those occurring at the recruitment stage.

  Regarding **foreign supply of educational services**, an educated comparison between short and long terms costs (for the public and private sectors) associated with provision of public and private sector education services in Guyana vs abroad should drive the policy choice and should the latter prevail, due schemes linked to conditional return of students to Guyana once the attendance abroad is concluded may be considered.

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Introduction

During the last decade, major hydrocarbon deposits were discovered in Guyana's ultra-deep waters and some estimations suggest that the country has more than 9 billion barrels of recoverable high-quality[2] crude oil reserves. Guyana is thus expected to become one of the top producing oil and gas economies globally, and within the next five years, the country is projected to surpass Kuwait, the United Arab Emirates or Saudi Arabia in its per capita production (Mackenzie, 2020).

Thanks to those discoveries Guyana became one of the fastest-growing economy in the world. Oil GDP is expected to grow over 100 per cent in 2022, and by approximately 30 per cent on average per year during the 2023-26 span (IMF, 2022). By the end of 2022, the economy is expected to grow 57.5 per cent (IMF 2022), after a growth of 20 per cent in 2021 and 43 per cent in 2020. The accelerated growth of the oil and gas sector in the country has also attracted foreign direct investment (FDI), which grew from USD1.69 billion in 2019 to USD1.83 billion in 2020, and USD4.4 billion in 2021 respectively.

Despite an exceptional economic performance, the country now faces well-known challenges associated with oil-dependent economies such as the vulnerability to international prices, pressures on the environmental footprint, risk of the phenomenon known as the *Dutch disease*[3] and a worldwide oil and gas specialized labour shortage. In addition, the accelerated expansion of the oil and gas operations has exposed a **pronounced gap between the industry labour demand and the availability of skilled workers** at the local level. If not addressed, the latter will likely slow down the growth of the sector and of the whole economy or, at the very least, generate inefficiencies in the firm level performance and for the economy.

The present study was carried out between June and October 2022 by the International Labo

ur Organization (ILO), in close collaboration with the Ministry of Labour. The analysis is meant to support the Government of Guyana, local stakeholders, employers, workers' representatives, TVET institutions and academia to assess and, to the extent possible, anticipate the labour demand and skills needs within the construction oil and gas industry. It also provides an overview of how those needs are or could be addressed via the present educational infrastructure.

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[2] Guyanese oil drilled to date is considered high quality or "sweet" because it is easier and less costly to refine; this characteristic also increases its demand in the market.

[3] The Dutch disease occurs when an economic boom motivated by an increase in price, or a natural resource discovery can affect the economic performance of the non-booming tradable export sector. The economic boom leads to an increase in wages, first in the booming sector and then in all the other sectors of the economy. As a consequence, demand and prices of goods and services increase and the economy's real effective exchange rate appreciates. At the same time, the non-booming sectors contract as a result of not being able to catch up with the wages of the booming sector, compromising the capability of the country to diversify its economy.

Combined, the results are intended to guide the design of policy responses, some of which are suggested in the recommendations section.

This report is organized into three parts:

1. **Chapter one** provides a summary description of the standard oil and gas value chain followed by the analysis of the present human resources challenges for the oil and gas labour market in Guyana, while reflecting on local and global trends.
2. **Chapter two** presents the detailed results of the investigation on occupational profiles and skills gaps together with an overview of the methodology utilized. Findings from survey responses and interviews are then analysed *vis-à-vis* existing web-based vacancy announcements and complemented with information on hiring methods and management of human resources in the industry. Finally, an overview of the current education offered in Guyana and how it matches current and future skills requirements is provided.
3. The final **chapter three** suggests some solutions and recommendations for both the private and public sectors, regarding the development, attraction and retention of the human resources needed.

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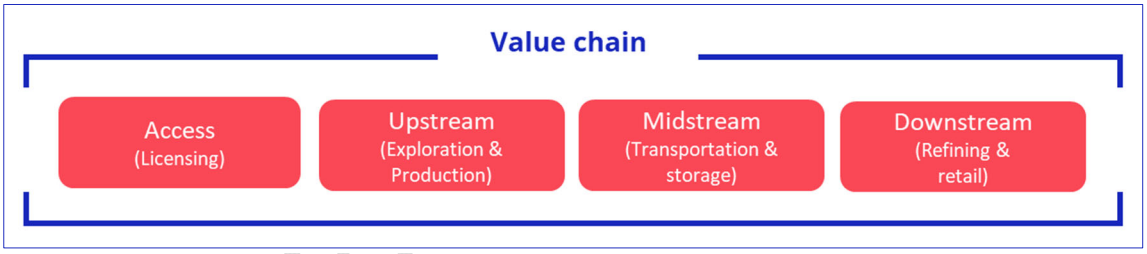
1. Setting the stage

After providing a summary **overview of the organization of the oil and gas value chain**, the chapter presents some key background elements for the study of occupational profiles and skills gaps for the oil and gas industry in Guyana. In particular, **labour market challenges linked to the profile of the Guyanese labour force**, and **worldwide trends regarding human resources in the oil and gas industry** are elaborated upon as constraining elements that virtually any actor in the Guyanese oil and gas value chain is confronted with. To conclude, the chapter provides an overview of the **current employment impact** of the industry.

The oil and gas value chain

The process within the oil and gas value chain includes three main facets, *upstream* (exploration and production); *midstream* (transportation and storage); and *downstream* (refining and retail markets). In addition, all oil and gas operations start with an initial "*Access phase*" where all the regulatory aspects and interactions between authorities take place before the actual exploration can start.

Figure 1. Oil and gas value chain (as considered for the study)



Source: Authors' own elaboration

Access

During this stage oil and gas companies negotiate the collaboration agreements with the owner of the mineral rights (normally governments). In Guyana, the type of agreements between the companies and the Government for petroleum prospecting and production are usually "*License systems*", in which the contractor assumes all the risks and costs of finding, developing and producing. The contractor usually receives all production, and then pays royalties and taxes to the Government.

For petroleum production, a license is issued if a commercial petroleum discovery is made and it has an initial period of twenty (20) years, with a single renewal period of up to ten (10) years, which can be applied for, if necessary. In Guyana, the current contract/ license splits the oil output at 50-50 between the Government and licensee. In addition, Guyana receives a 2 per cent royalty. The oil split reflects the costs and risks that a company faces in any project and can vary

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significantly from country to country, and by contract. In this light, a 50-50 split for a new producer is not especially unusual.

Employment implication. While this activity is not a driver of employment, it paves the way for local and foreign investment and directly influences how the industry will be structured in the upcoming years.

Upstream

This stage comprises the most high-risk, high-reward activities within the oil and gas value chain: exploration and production.

The companies that have licenses for exploration and production in Guyana are Anadarko Petroleum Corporation, CGX Resources, Eco Atlantic Oil and Gas, Esso Exploration & Production Guyana Limited, Frontera Energy Corporation, Hess Corporation, JHI Associates Inc, NAKI/KCL Oilfield Construction Services Guyana, ON Energy, Qatar Petroleum, Ratio Oil Exploration, Repsol, Total and Tullow Oil.

Exploration

As for types of upstream assets in the exploration process, we can broadly differentiate three types of oil and gas developments:

1. **Conventional onshore fields:** this is when oil fields, gas deposits and geothermal energy are on land;
2. **Unconventional onshore:** this is unconventional gas, which occurs in reservoirs with very low permeability compared to conventional reservoirs; and
3. **Offshore**: this is when hydrocarbons are located under seafloor; this upstream type are technologically the most complex, particularly when operations take place in deep or ultra-deep waters[4] (Offshore ultra-deep water oilfields are the most commonly found in Guyana). This type is also the most capital intensive since offshore platforms require not only a major investment on its assembly, but also a higher working capital given the need for transportation between offshore and land as well as generalized higher salaries (when compared with the market) for offshore workers.

Employment implication. Activities associated with exploration generally demand highly skilled labour. Some of the most demanded occupations in exploration are geologists and geophysicists, surveyors and engineers (chemical, mechanical, civil and petroleum).

[4] 500 – 3,500 meters in water depth.

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Production

During this phase the hydrocarbons are extracted through pipes to a floating production and storage facility where different processes are conducted to separate crude oil from gas and water. **Employment implication**: some of the most "in high demand" occupations during the production phase are engineers (chemical, mechanical and petroleum), maintenance technicians (mechanical and electrical), environmental and occupational health and hygiene professionals[5] and plant operation labourers.

In addition, for recently discovered oilfields, as the case of Guyana, wells and facilities need to be built and/or assembled. **Employment implication:** the above operations require specialized technical professional and trades workers such civil engineers, well designers, structural metal workers (welders, sand blasters and riggers) and construction labourers.

It is important to highlight that for both production and construction of wells and facilities, a big proportion of the operative and specialized jobs are outsourced by oil and gas multinational corporations to specialized industrial services and/ or engineering companies. This explains why some companies with license for exploration and production have a very reduced workforce compared with its service providers.

Mainstream

During this stage, hydrocarbons are transferred either to a repository facility or to their destination, the two main activities at this stage are transportation and storage.

Transportation

The main forms of transporting crude oil and gas from offshore oilfields are pipelines and marine tankers. Pipelines are used to move hydrocarbons from floating production and storage facilities to port terminals for loading onto tankers, and to deliver oil from supply points to refineries and other market destinations. Pipelines are usually preferred since their operating costs and environmental footprints are lower. In Guyana, there are no pipelines in operation. However, Exxon is building a 141-mile offshore natural gas pipeline for a new power plant in Georgetown and the Guyanese Government is considering the construction of a second pipeline (Bharrat, 2022).

Employment implication. Construction and operation of pipelines require specialized technical professional and trades workers such as engineers (civil, mechanical and petroleum), geologists, structural metal workers (welders, sand blasters and riggers) and construction labourers. For marine tankers operations, the most "in high demand" occupations include ships' deck crews and

[5] Environmental and occupational health and hygiene professionals assess, plan and implement programmes to recognize, monitor and control environmental factors that can potentially affect human health, to ensure safe and healthy working conditions to prevent disease or injury caused by chemical, physical, radiological and biological agents or ergonomic factors.

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related workers, nautical engineers, mechanical engineers, and technicians (electrical and mechanical).

Storage

In offshore deposits the storage occurs through cargo containment systems in the marine tanker and as a consequence, demand for labour is similar to transportation.

Downstream

The downstream sector refers to the oil and gas processes that occur after the production phase to the point of sale. This involves crude oil refining to oil products and its marketing. It also includes the selling and distribution of processed natural gas and the products derived from petroleum crude oil.

Refining

Refining refers to those processes that transform crude oil and other raw liquid hydrocarbons into oil products, such as gasoline, diesel, or liquefied petroleum gases (LPG). As of the date of this report, there is no refining operation in Guyana. However, in September 2022 the Government of Guyana called for proposals to design, finance, and build a 30,000 barrel-per-day (bpd) oil refinery. The construction is expected to begin by the first half of 2023 with an estimated project completion two years thereafter.

Employment implication. Construction and operation of the refinery will trigger the demand for occupations such as engineers (civil, mechanical, chemical, electrical, industrial and petroleum), surveyors, construction equipment operators, structural metal workers (welders, sand blasters and riggers) and general construction labourers. Once built, the refinery will demand occupations such as chemists, engineers (mechanical, chemical, electrical, industrial and petroleum), environmental and occupational health and hygiene professionals, maintenance technicians (mechanical and electrical) and plant operation labourers.

Retail

The oil, produced in Guyana by the international companies such as Exxon Mobil, Hess Corp, and CNOOC consortium, is entirely exported. Guyana sells its share through open-market tenders and via a trading unit of Saudi Aramco to different international markets. Export markets for Guyanese oil have experience a variability during the last years. In 2020, the main destination of refined petroleum exports were Trinidad and Tobago, Saint Vincent and the Grenadines, the United States, Antigua and Barbuda and Saint Martin; in 2021, Guyana exported 101,000 bpd of crude, most of which went to Asia; and in 2022, 49 per cent of Guyana's total oil exports have been to Europe.

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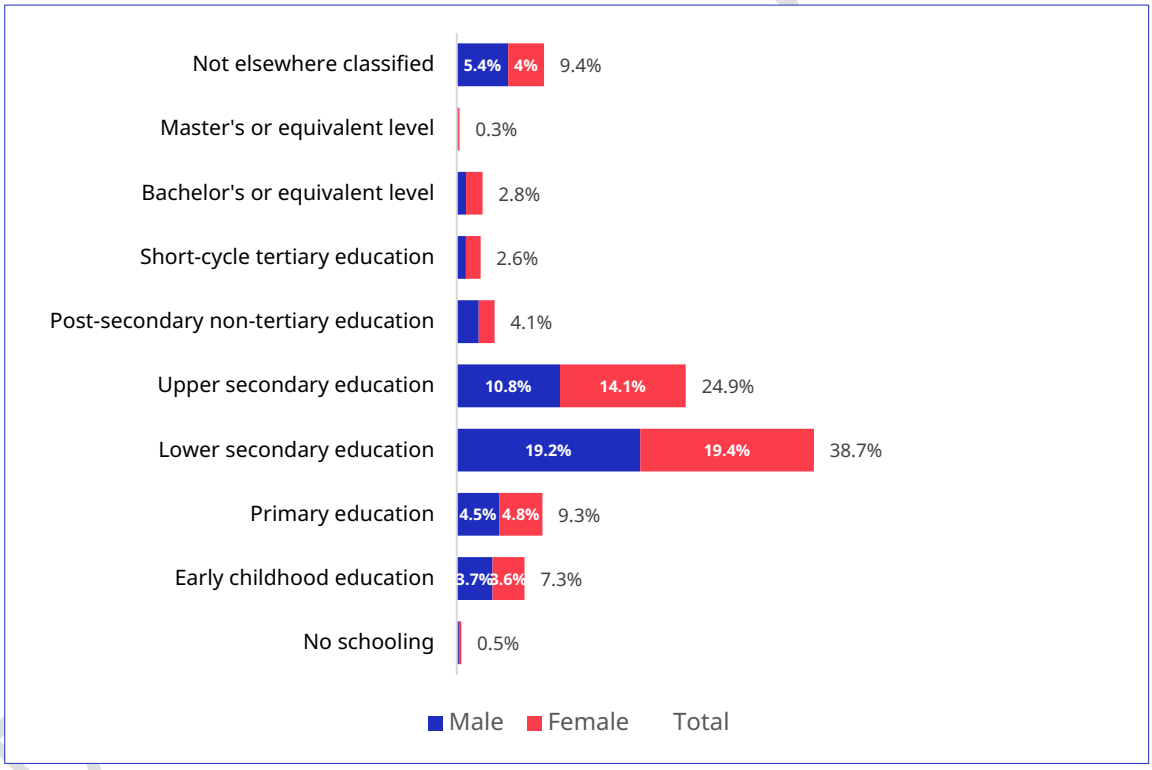
Guyana's labour market challenges

Availability of qualified human resources. According to IMF (2019) one of the key weaknesses that the Guyanese economy would have to overcome to fully benefit from the oil boom is the issue of skilled labour shortage. Although oil and gas operations employ a wide range of jobs, including unskilled, an important proportion of the job openings require at least a higher technical or vocational degree. In contrast, gross school enrolment ratio at tertiary level for Guyana is just about 12 per cent, much lower than the Latin America and the Caribbean average of 44 per cent (IMF, 2019). Figure 1 shows the distribution of educational attainment (in thousands) for the total working age population as derived from the labour force survey performed during the third quarter of 2021. Over 80 per cent of the total working age population did not complete education beyond upper secondary education.

▶ **Figure 2. Educational attainment (ISCED) – Working age population (15+), Guyana. Q3, 2021**



Source: Authors' own elaboration based on data from Guyana Labour Force Survey (Bureau of Statistics, 2021)

It is also noteworthy to mention that between 1965 and 2000, almost 90 per cent of Guyanese nationals with a tertiary level education, and 40 per cent of those with a secondary level education emigrated from Guyana (Mishra, 2006). Continuation or interruption of such trend may affect the labour supply available to the construction industry.

Quantitatively limited workforce. Although certainly worrisome, the quality of available human capital is not the only constraint: quantitatively, Guyana's labour force is not big enough to serve

the expected growth of the economy. The labour demand driven by the oil and gas sector and its support services in Guyana for the forthcoming years is estimated to be 260,000 workers (IOM, 2021), while - perhaps simplifying - it is worth noting that the national potential labour force[6] is estimated to be 39,342 (Bureau of Statistics, 2021). With the population expecting to remain constant, even under a hypothetical scenario where all unemployed, underemployed, and discouraged workers are trained, retrained, and upskilled, to become employed, demand will still outstrip supply in the medium-term (IOM, 2021).

Potential gender imbalances. Another main challenge to overcome in the Guyanese labour market is the profound gender asymmetry. Indeed, the employment-to-population ratio for women is 30.9 per cent compared with a 54.6 per cent for men, and a similar path is identifiable for the unemployment rate with the women's rate being 18.4 per cent compared with 12 per cent for men (Bureau of Statistics, 2021). Against the above framework, if one assumes that most of the future jobs will come (directly or indirectly) from the oil and gas industry, women labour market performance may further worsen - in the absence of offsetting mechanisms that foster women's employment in other industries - considering that such industry and its value chain have traditionally shown very low rates of women employment.[7]

Policy responses and the oil and gas industry's contribution to address labour market challenges. To maximize the level, quality, and benefits of participation in the petroleum sector value chain by Guyanese workers as well as to reduce any possible skills gap, a "Local Content Bill" was passed in January 2022 by the Guyanese Parliament. The legislation prioritizes Guyanese nationals and companies in the procurement of some goods and services for the oil and gas sector by setting targets of local business participation. The Local Content Bill also plays an important role in skills development since companies are required to present plans on local employment and local capacity development (DPI, 2021). In Chapters 2 and 3, some initial considerations concerning the implementation of the Local Contents Bill and modifications to the national education supply to respond to the needs of the oil and gas industry are presented.

To summarize, given the current profile of the Guyanese labour force and the dynamics of the local labour market:

- Companies involved in the oil and gas value chain are likely to be confronted with challenges in finding suitable qualified candidates because of the (i) inadequacy of available profiles; (ii) limited number (headcount) of workers available in the country; and

[6] Potential labour force is defined as all persons of working age who are neither in employment nor in unemployment and either carried out activities to "seek employment", even if they are not "currently available" but would become available within a short subsequent period or did not carry out activities to "seek employment," but wanted employment and were "currently available".

[7] Worldwide, only 22 per cent of employees in the oil and gas sector are women, in upstream activities (exploration and production areas) the figure is as low as 15 per cent (BCG, 2021)

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(iii) inter industry competition for qualified candidates stemming from the general economic growth.

- Increasing oil and gas specific qualifications of women may, on paper, contribute to a double objective: addressing the scarce availability of qualified human resources for the oil and gas industry and enhancing overall women's performance in the labour market (participation, employment, income generation).

Global trends for human resources in the oil and gas industry

Labour shortage. In addition to the local constraints previously described, for the sake of projecting skills needs for the Guyanese oil and gas industry, it is important to highlight global trends. Specifically, it is ascertained that companies in the oil and gas sector are facing a global labour shortage. Under current circumstances, by 2025, the energy industry will face a shortage of up to 40,000 qualified employees (Andrews, Datta, Newman, & Rousset, 2017) and according to the Global Energy Talent Index report by Air swift and Energy Jobline (GETI, 2022), 39 per cent of companies in North America and 42 per cent in Europe reported the talent crisis as already happening.

Several factors have contributed to this phenomenon including:

Shrinking of the talent pool

- In 2014 an economic downturn resulted in the cutting of nearly half a million jobs in the oil and gas sector. Many of those workers either got hired in another industry, got retired or went back to school thereby reducing the availability of the skilled labour force in the market (Andrews, Aleek, Newman, & Rousset, 2017).

- It can be argued that COVID-19 made people readdress their priorities where salary ceased being the most important driver in the professional careers of many employees. Work life balance, health, and overall quality of life, all of which are hard to come in the (offshore) oil and gas sector, became a priority for job seekers.

- Many workers in the industry are reaching retirement age: within the next five years, oil and gas companies could lose 50 to 80 per cent of workers aged 55 and older, which equates to 150,000 years of experience. According to Global Energy Talent Index (GETI, 2022), 20 per cent of workers in the oil and gas industry are above 55 years of age.

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Increased inter and intra industry competition for talent

- Many experienced specialists are leaving the oil and gas sector to join other more lucrative, attractive, or stable fields such as manufacturing, technology, or renewable energies (Tu, 2022). According to Global Energy Talent Index (GETI, 2022), 79 per cent of workers in the oil and gas sector would consider switching to another energy sector in the next three years, with renewables being the most popular.

- According to interviews with industry professionals performed as a background to this study, labour shortage has driven aggressive strategies for recruiting top talent employees from rival firms resulting in high turnover rates and a generalized increase on wages.

- With younger generations of workers more concerned about sustainability and climate change, it's becoming increasingly challenging to identify entry level professionals to work in the oil and gas sector. To millennials and gen Z job seekers, a career in oil and gas might not look as attractive as one in the renewable energy industry. In addition, despite evidence to the contrary, many millennials believe that the sector is lacking innovation, agility, and creativity, as well as opportunities to engage in meaningful work. In fact, only 2 per cent of US college graduates consider the oil and gas industry their top choice for employment (Accenture , 2016).

Skills mismatch[8]

- The oil and gas industry is rapidly moving towards digital transformation as today's workers need more advanced skills than ever before as new technologies are introduced. In addition, new highly skilled occupations such as data scientists are becoming essential for oil and gas operations and according to Andrews et al. (2017) who prepared a study for Accenture, approximately 12,000 data scientists are needed immediately to support the upstream oil industry.

- Travel restrictions associated with COVID-19 resulted in a slowdown in global mobility options for oil and gas companies, which triggered an increase in the recruitment and development of local talent. However, it can take several years to adequately train recent graduates for oil and gas technical roles. In addition, education in developing countries tend to be weak on foundational knowledge which represent a higher time and cost investments for training.

[8] In this framework, skills mismatch is defined as a discrepancy between the skills that are sought by employers and the skills that are possessed by individuals. This means that education and training are not providing the skills demanded in the labour market, or that the economy does not create jobs that correspond to the skills of individuals (ILO, 2020).

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The implication of the above is twofold: on the one hand, companies operating in Guyana must **compete globally for qualified workforce** which is becoming scarce. Such competition is likely to be **based on wage and non-wage elements**[9], the relative weight of each is hard to assess. On the other hand, any possible endeavour to train local workforce to respond to the industry needs to account for the possibility of the **trained labour force to migrate** responding to offers coming from other parts of the world. Suitable preventative measures should thus be envisaged.

Public policy response in oil and gas producing countries to attract and retain talent

Oil and gas producing countries have adopted different strategies to attract, develop and retain skilled workers to overcome the global labour shortage. These can be grouped in three major approaches:

1. **Managed immigration of specialized labour**
   Historically, this has been the most common approach, especially for countries with a numerically limited labour force. Indeed, since the oil and gas industry requires a very skilled labour force, and since that training may require long periods to conclude, oftentimes the issue has been dealt with by hiring specialized workers from abroad, thus guaranteeing a faster response, and the possibility to meet the labour needs easily. However, under the current global labour shortage situation, the effectiveness of this strategy has been challenged. To start with, foreign employees are more likely than local ones to switch company/firm as occasion occurs. Also, foreign workers tend to be more expensive than local employees.[10] In addition, as mentioned previously, internationally specialized workers have left the industry or are close to retirement. Adopting this policy in Guyana must be assessed considering all the elements and the potential trade-off between the short- (immediate availability of qualified labour force) and long-term (possibility to develop local competencies).

2. **Promoting local skills development**
   A second approach traditionally employed is the strengthening of skills development capabilities through a suite of options. Those could include a variable combination of needs assessments, development of training infrastructure and the promotion of job matching services. An interesting approach is the one put in place by the Canadian Government, through the Energy Safety Canada, which is an online platform where Government, companies and training centers actively participate in publishing relevant labour market information which results in constant reviews of training offers (both public

[9] If Guyana will compete with a range of other countries to attract foreign talent, elements other than salary and benefit may be part of the individual decision-making process. Those elements may include geographical proximity to origin country (usually OECD), ease of migration policy for the individual and the family, availability of accessory services (educational, recreational services) or even general considerations such as degree of perceived safety and infrastructure and service development.

[10] Considering relocation and legal migration costs and an international compensations market.

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and private) and job listings. This initiative came about because of the development of three projects intended to overcome the skills shortage in the oil and gas sector. The first one focused on the forecasting and planning of skills and the configuration of the labour market for the next ten years. The second one aims to create the infrastructure to identify and respond to skills needs in the industry, representing the collective interests of the private sector while developing links with the education system. The main result of this project is the Petroleum Labour Market Information initiative.

Another relevant example of this strategy is in the case of Mexico. The Mexican Government, with the cooperation of the United Kingdom Government, developed a framework to address Mexico's oil and gas skills gap over the next 15 years including recommendations for higher education; vocational training; sector leadership and Mexico´s educational system. In addition, the Mexican Government signed agreements with other countries to send personnel to train in skills related to deep-water exploration in countries such as the United Stated, England and Norway (Tapia, 2015).

3. **Broadening the scope of skills development strategies to enable a green transition**
   It is worth mentioning a new approach to address the skilled workers shortage consisting of combining skills development strategies across energy subsectors to take advantage of some common elements in curricula design and prepare for future transition. Indeed, some countries have started to experience a higher pace in the migration of workers from oil and gas to renewable energies. While this has become a challenge for the industry worldwide, some governments have adopted a broader approach. The United Kingdom, for example, has integrated all the energy companies (wind energy production, hydrogen production, carbon capture and storage, oil and gas, solar, among others) into the same skills development strategy. By doing this they have identified transversal skills[11] and develop training accordingly. This strategy is particularly relevant since it provides a robust pipeline of potential employees suitable to relocate within any energy company.

Current employment in the oil and gas industry in Guyana

Table 1 summarizes the numerical profile of employment within the oil and gas industry in Guyana as per the third quarter of 2021. According to the research conducted for this study the figures presented - intrinsically limited in terms of statistical representativeness[12]- most likely underestimate the current (q4 2022) labour force but are nonetheless relevant to give the order of magnitude. If one considers only economic units active within a narrow definition of oil and

[11] According to Oil and Gas UK (OGUK) 90 per cent of the skills are transversal in the offshore energy industry *(Vella, 2022)*.

[12] This is due to the small sample size obtained once the variable "employment by economic activity" is studied at too detailed ISIC (International Standard Industrial Classification of All Economic Activities) a level. The figures are presented for orientation only notably to provide a framework for representativeness of the specific survey conducted.

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gas value chain as currently existing in Guyana, i.e., businesses operating within "Extraction of crude petroleum", "Extraction of natural gas", "Support activities for petroleum and natural gas extraction" and "Transport via pipeline", an estimated **1000 workers** were directly employed therein during q3 2021. If including also activities linked to "Manufacture of gas; distribution of gaseous fuels", then the total raises to an estimated **1800 workers**. Ideally, however, to determine the actual employment impact of the oil and gas industry, indirect and induced employment effects should be considered. While that goes beyond the scope of this study, it may be helpful to provide a guiding figure. Considering workers in the oil value chain, plus workers employed by businesses which may be deemed more substantially (or directly) linked to oil and gas operations[13], the total employment could raise to at least about 8,450.

▶ Table 1. Employment profile of the oil and gas industry in Guyana (estimates) (Q3 2021)

Total employment in oil and gas (narrow)	**1,001**
As percentage of total employment in the economy	0.4%
Total employment in oil and gas (expanded)	1,813
As percentage of total employment in the economy	0.7%
Total employment oil and gas and direct suppliers of accessory goods and services linked to production of oil and gas.	8,459
As percentage of total employment	3.7%

Source: own elaboration based on Guyana Labour Force Survey Q3 (Bureau of Statistics, 2021). Note reliability may be limited due to small sample size, figures are for orientation only.

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[13] Those businesses operate in activities such as 'wholesale of specialized tools', 'wholesale of machinery, equipment and supply' are 'Renting and leasing of other machinery, equipment and tangible goods', 'Manufacture of special-purpose machinery', 'Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms', 'Manufacture of other chemical products', 'Renting and leasing of other machinery, equipment and tangible goods'.

2. Research findings

Research design

As a preliminary activity, a comprehensive **desk review** was completed looking at secondary data sources, including Government's public information, reports published by cooperation agencies, academic journals, national legislation, policy documents, newspaper archives, and national data sets. This stage was useful to provide context on the sector structure, identify the most demanded occupations and main challenges in the industry and adjust the data collection tools and sample. The findings of this stage are presented mostly in chapter 1.

Once the general stage was set, a dedicated **labour** (**occupational and skills) demand** survey was prepared and disseminated amongst companies within the oil and gas value chain to gather information on dimensions of interest with a focus on the most demanded positions and the skills associated with those (see Annex 1 for full details). The design of this questionnaire partially reflected the **STED methodology**[14] developed by the ILO (ILO, 2020) and was adapted according to the findings of the desk review. The analysis was framed to the extent possible within the International Classifications of Economic Activities (ISIC) and the International Standard Classification of Occupations (ISCO). During this stage, 29 companies active in the oil and gas sector completed the survey (some online and some with the assistance of an enumerator). As an indicative figure, **the total headcount of the companies studied is 3,996**. **This represents 47 per cent of estimated 8,459 workers of oil and gas and direct suppliers of accessory goods and services in Guyana**.[15]

In terms of economic activities, those 29 companies appear to be fairly diversified. As described in the Figure 3, 48 per cent of the participating firms declared "business / engineering consulting services" as their main economic activity. However, as described in the value chain section, both construction and operation of wells and other oil and gas facilities tend to have a large proportion of employees outsourced by specialized industrial services and/ or engineering companies.

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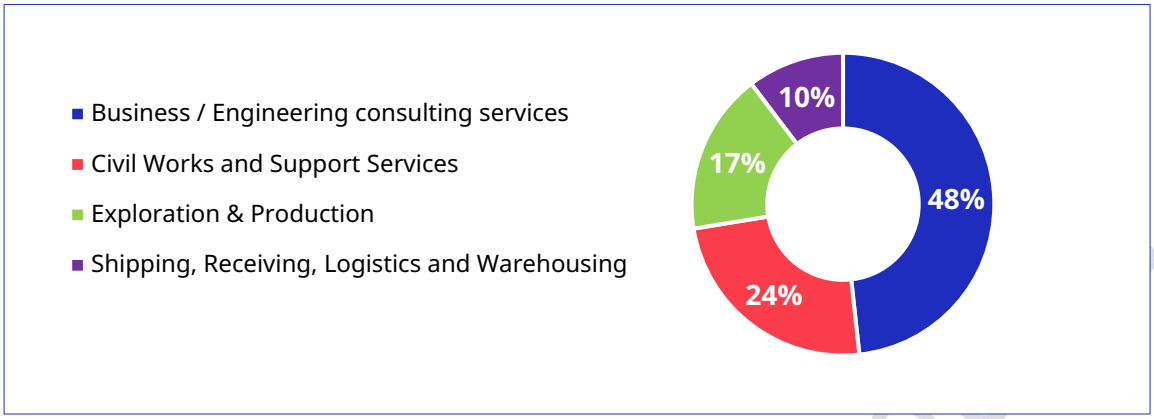
[14] Skills for Trade and Economic Diversification (STED) is the ILO's development cooperation methodology to assist partner countries in meeting the skills needs of the tradable sectors that they expect to play an important role in leading economic and social development *(ILO, 2020)*.

[15] According with the calculations made at the "Current employment in the oil and gas industry in Guyana" section in this report.

▶ **Figure 3. Main economic activities of participating firms**



Source: Own elaboration based on information from the skills demand survey (n=29)

After initial screening, the survey findings were elaborated upon and checked for robustness through in-depth interviews with business owners, other key informants, and sector experts. In addition, an **analysis of current web-based job openings** was done to contrast survey findings and future and current demand.[16]

Finally, an overview of the educational offer in Guyana was performed to determine the suitability of the current system to respond to the market demand in both TVET and higher education.

Skills demand survey

To ensure the most universally valid and detailed interpretation of the findings - after verification with the respondents - profiles and jobs analyzed were categorized consistently with the ISCO 08 Occupational Classification of occupations at minor group level.[17]

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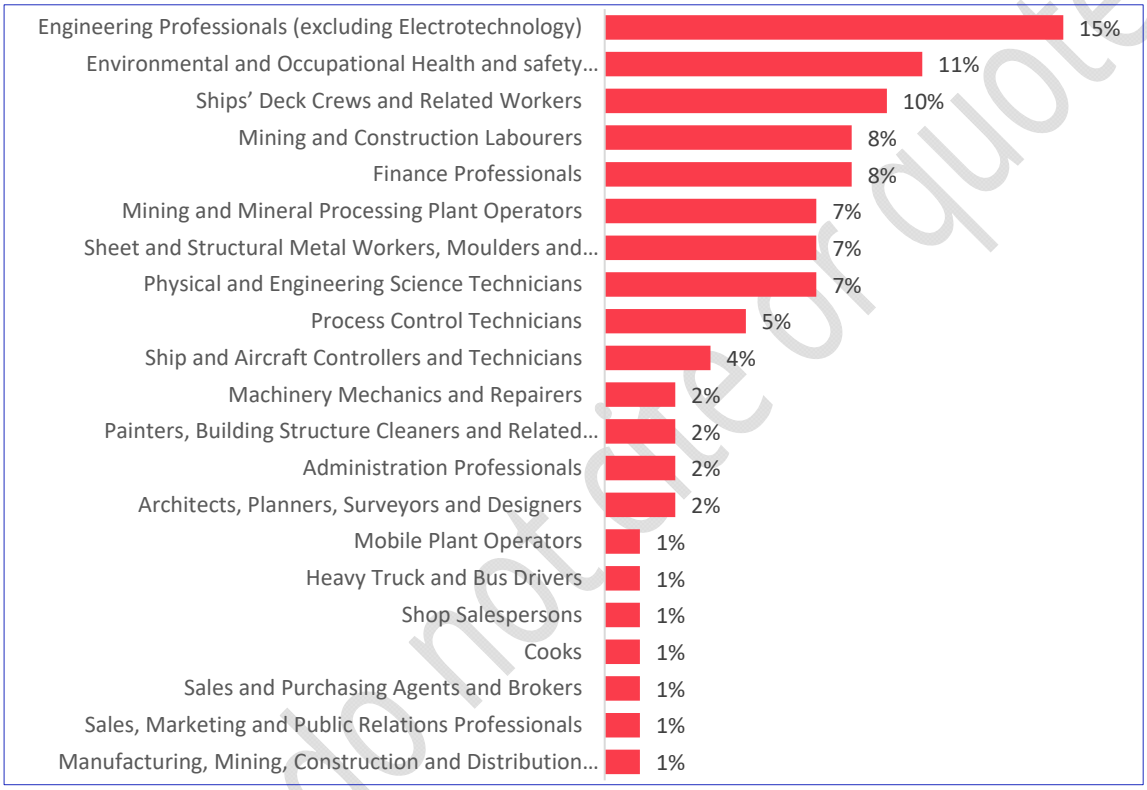
[16] This exercise was performed by web scraping job postings related with the oil and gas sector in online job boards, social networks and oil and gas companies' web pages. The methodology excludes - by construction - job openings (attempted to be) filled via in person referrals, on-site spontaneous applications, public employment services, newspapers, or printed media although there may be some overlapping with the latter postings.

[17] ISCO is structured in four hierarchical levels. 1. Major groups; 2. Sub major groups; 3. Minor groups; and 3. Unit groups. Minor groups, each unit group is made up of several "occupations" with a certain degree of similarity in terms of skills level and specialization.

Profiles sought

Out of the answers provided by the 29 respondents to the question "What occupation/job will be most in-demand in your company for the next five (5) years?", 21 occupations/jobs were identified. Amongst those, eight (8) profiles represented over 74 per cent of the total answers[18].

Figure 4. Occupations most in demand (percentage of the total number of answers to the question "What occupation/job will be most in-demand in your company for the next five (5) years?"



Source: Authors' own elaboration based on information from the skills demand survey (n=84[19])

Number of hirings

Responding companies indicated that a total of **1,339** full time positions within the next year, and **2,695** within the next five years, are expected to be filled with profiles corresponding to the twenty-one (21) occupations identified as "most in demand" (Figure 4).

[18] While participants were asked to rank the first, second and third "most in demand" occupations (in case they have more than one), during the follow up interviews, several participants expressed that most of the positions identified were equally important, hence the reason why this study does consider the rank as part of the findings.

[19] Every respondent had the possibility to highlight up to three occupations as "most in demand" but some of them only identified one or two, resulting in 84 answers.

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Within the short term (up to one year), the most sought-after profiles will be those of engineering professionals (203 FTE's), followed by processing plant operators (198 FTE's) and construction labourers (177 FTE's). For the next five years, construction labourers (459 FTE's), processing plant operators (370 FTE's) and sheet and structural metal workers, moulders, and welders (315 FTE's) will be the most demanded profiles. Annex 2 elaborates on the top ten profiles and provides a detailed description of tasks normally performed in each occupation, typical educational background.

▶ Table 2. Expected hirings (FTE's) for "most in demand" occupations

Occupations	Expected hirings within the next year	Expected hirings within the next five years
Mining and construction labourers	177	459
Mining and mineral processing plant operators	198	370
Sheet and structural metal workers, moulders and welders	79	315
Engineering professionals (excluding electrotechnology)	203	268
Ships' deck crews and related workers	144	190
Machinery mechanics and repairers	50	175
Heavy truck and bus drivers	50	150
Ship and aircraft controllers and technicians	148	148
Finance professionals	44	145
Physical and engineering science technicians	113	139
Process control technicians	32	91
Administration professionals	30	80
Other health professionals	34	54
Architects, planners, surveyors and designers	13	40
Painters, building structure cleaners and related trades workers	7	27
Shop salespersons	3	15
Cooks	5	15
Others	9	14
Total	**1,339**	**2,695**

Source: Authors' own elaboration based on information from the skills demand survey

The above presented figures suggest a projected growth of, respectively, 34 per cent over a year (1,339) and 67 per cent over five years (2,695) against the current employment headcount (3,996) in the oil and gas companies that responded to the survey. [20] If a similar growth rate is applied to employment within the whole value chain (estimated at some 8,459 in 2021, see Table 1), that would lead to the creation of some 5,727 jobs **only amongst the 'most in demand'** occupations and not including any activity linked to refinery construction - a very recent development (October 2022) which is not part of this investigation. In summary, we conclude that even accounting for uneven growth in employment stemming from competition and market dynamics, a conservative

[20] The projected growth may be even more substantial as an increase in employment within the occupations listed in Table 2 will be associated with the growth of other occupations such as human resources professionals, legal counsels, and technology professionals which are not quantified in the study. In addition, employee related services such as catering or transportation also experience an increase in the demand and, in consequence, growth in their respective workforces.

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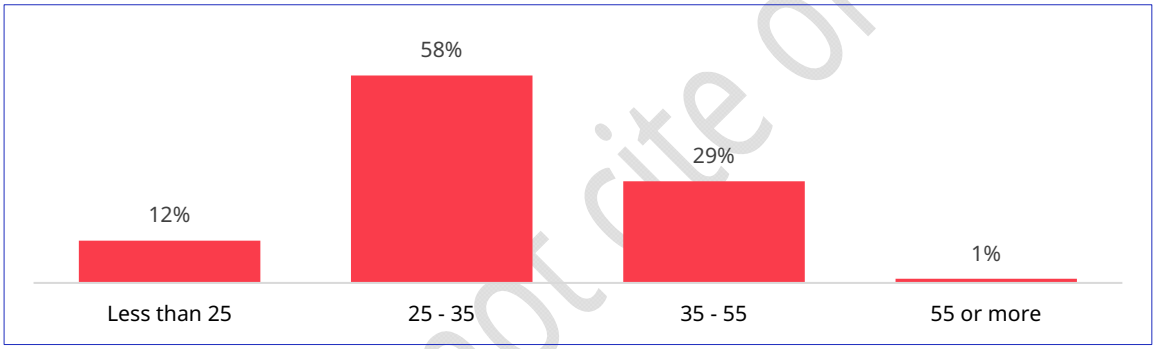
estimate of at least 5,000 new jobs created directly in the oil and gas value chain can be reasonable.

Average age

Survey findings show that at present, 88 per cent of all the workers performing jobs in "most in demand" occupations are currently 25 years of age or older. The finding was corroborated by answers to interviews with business representatives. Specifically, in the oil and gas industry, there is a high injury and monetary risk (loss of material, equipment) associated with underperforming a job, hence even for less specialized occupations such as welders or mechanics, previous working experience is perceived as paramount. In addition, conditions such as working in enclosed spaces or offshore can be challenging, thereby resulting in a higher turnover. To avoid this, employers prefer to hire workers with similar work experiences.

Figure 5. Average age of the employees working in jobs in the "most in demand" occupations



Source: Authors' own elaboration based on information from the skills demand survey (n=84)

We interpret the finding as emphasizing the importance of working experience in addition to training, a crucial element which will have to be considered once the design of educational responses is considered.

Educational background

Eighty-one per cent of jobs in "most in demand" occupations require either a higher technical or a higher degree of education and training. This demonstrates the need for a highly skilled labour force contrasting with the current levels of educational attainment, where only 10 per cent of the population have a post-secondary degree and only 3.1 per cent hold a bachelor's and/or master's degree.

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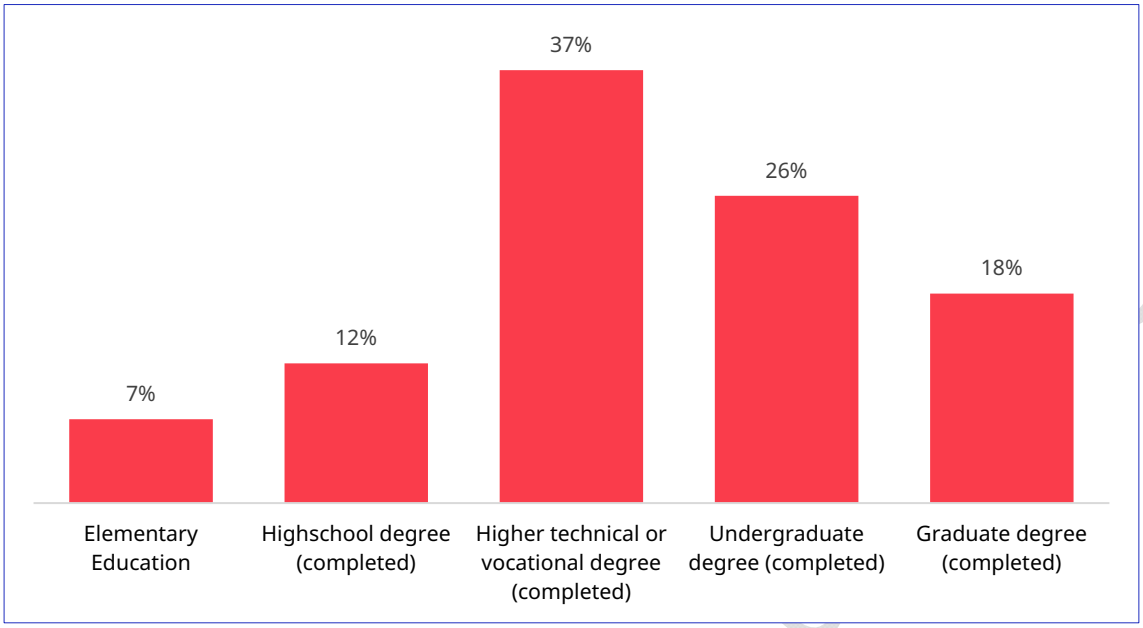
Figure 6. Average educational attainment of workers currently working in "most in demand" occupations



Source: Authors' own elaboration based on information from the skills demand survey (n=84)

Gender

Overall, women representation as workers in the "most in demand" jobs within the responding companies is currently 21.7 per cent. However, for more than the half of the positions the representation is as low as 5 per cent. For unskilled occupations, jobs with a higher participation of women tend to be associated with support services such as stewardess or cook. This segregation of occupations impacts not only the diversity at the workplace but is likely also reflected in inter-occupation wage disparity since such jobs mostly held by women tend to be remunerated lower than the ones where men are predominant (such as technicians and engineers.

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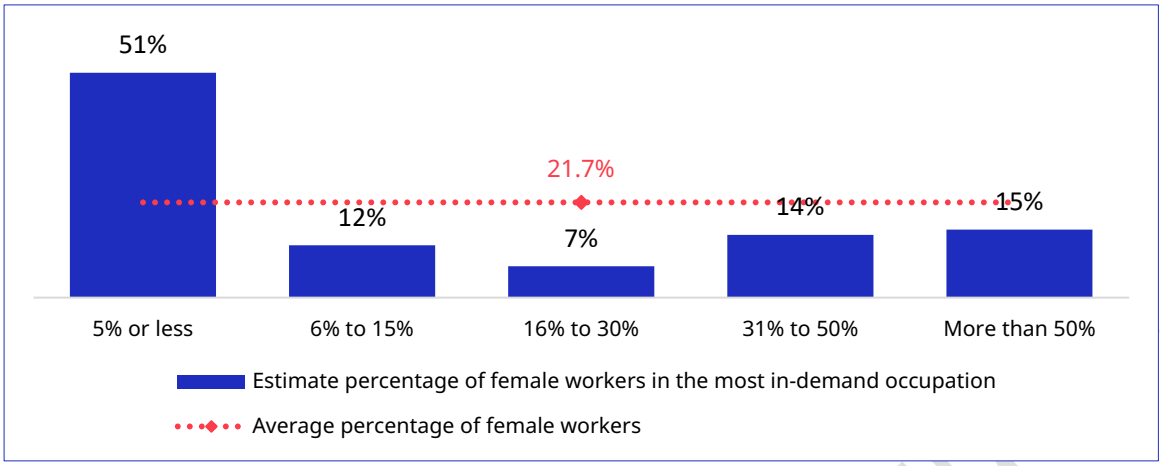
▶ **Figure 7. Relative share of women in "most in demand" occupations (Q2 2022)**

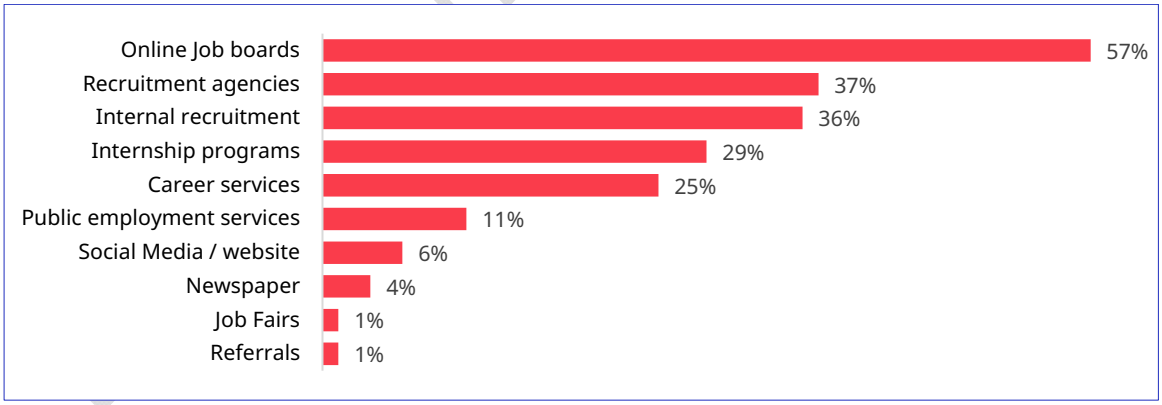


Source: Own elaboration based on information from the skills demand survey (n=84)

Method of recruitment

The most common method of recruitment for occupations identified as "most in demand" is online job boards such as LinkedIn or skilledguyanese.com, followed by recruitment agencies (including outsourcing companies)[21] and internal recruitment (promotions)[22]. Only 11 per cent of the jobs corresponding to the occupations identified as "most in demand" are filled via public employment services, revealing a need to strengthen the capacities of the Ministry of Labour in this area.

▶ **Figure 8. Method of recruitment, "most in demand" occupations**



Source: Own elaboration based on information from the skills demand survey (n=84)

[21] This finding supports the previously exposed dynamic, where exploration and production companies outsource their operating activities to service companies. This was confirmed with interviews.

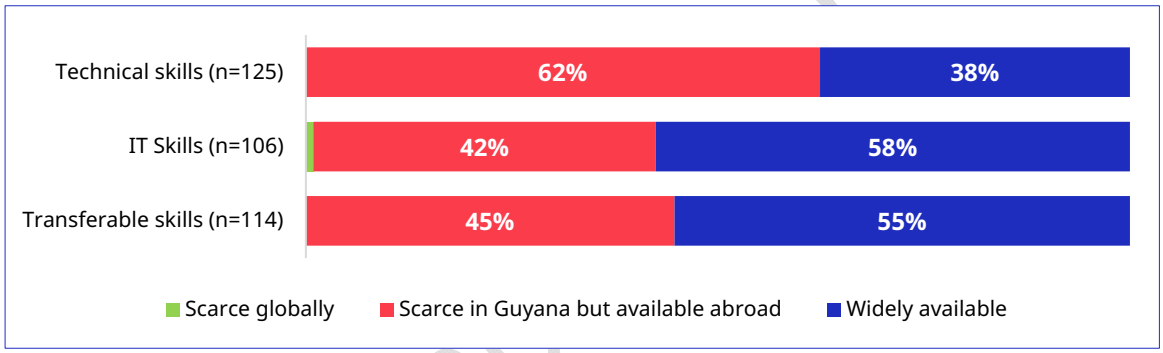
[22] According to interviews with business representatives, given both, the limited offer of training available in the country and the very specific skills needed (software, methodologies, tools, etc.), some of these occupations are intended to be occupied by internal workers, this stimulates employee's progression and decreases the need to recruit qualified personnel. However, while this practice is the most recommended one, given the exponential growth of the industry in the country it is not always possible.

Skills sought

General trends. After providing estimates about the profiles most in demand in the next years, the survey asked respondents about the skills deemed to be associated with each of those. Specifically, further information was sought - upon initial screening of data - on three macro skills categories: technical[23], IT[24] and transferable[25] skills. In addition, respondents were asked to provide an assessment about the current availability of those skills in Guyana and abroad.

Only 49.6 per cent of all the single skills highlighted as "most important" (technical, IT or transferrable) are considered widely available in Guyana. Sixty-two per cent of the technical skills were considered scarce in the country (but generally available abroad). With regards to IT and transferable skills, the most common perception was one of "wide availability", 58 and 55 per cent respectively, with some caveats (see Figure 9).

▶ **Figure 9. Availability of skills in "most in demand" occupations (perceived)**



Source: Authors' own elaboration based on information from the skills demand survey (n=345)

Technical skills

Only nine (9) individual technical skills represent 54 per cent of the 125 answers to the question "Please list the most important technical skills for the most in-demand position in your company". The following analysis provides some further insights on those.

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[23] Technical skills are those skills that are particular to the specific occupation. They include specialist knowledge needed to perform job duties; knowledge of particular products or services produced; ability to operate specialized technical tools and machinery; and knowledge of materials worked on or with, with the exception of information technology skills.

[24] Information technology skills are the ones related to the use of software, hardware of any other tech related capability (e.g., programing, data analytics, data visualization).

[25] Transferable skills are the ones relevant to a broad range of occupations and can be easily transferred from one job to another (e.g., problem-solving, teamwork, physical skills, and any other behavioral skills).

▶ Table 3. Summary of technical skills required by "most in demand occupations"

Skill	Health and safety compliance	Perception of availability in Guyana	22%
Description		**Occupations linked with this skills**	
Refers to the capacity to follow health and safety regulations as well as identify, prevent and actuate to potential environmental, occupational health and hazards and risks.		• Engineering professionals (excluding electrotechnology) • Environmental and occupational health and safety professionals • Physical and engineering science technicians • Process control technicians • Sheet and structural metal workers, moulders and welders, and related workers	
Skill	**Mechanics (Tools and machinery)**	**Perception of availability in Guyana**	**82%**
Description		**Occupations linked with this skills**	
Refers to the general knowledge of machines and tools, including their designs, uses, repair, and maintenance.		• Physical and engineering science technicians • Process control technicians • Machinery mechanics and repairers • Mining and mineral processing plant operators • Mining and construction labourers	
Skill	**Nautical knowledge of vessel operations**	**Perception of availability in Guyana**	**29%**
Description		**Occupations linked with this skills**	
Refers to the general knowledge of regulations, safety practices, nautical equipment, protocols and processes within the nautical industry. machines and tools, including their designs, uses, repair, and maintenance.		• Ships' deck crews and related workers	
Skill	**Rigging (offshore standards and equipment)**	**Perception of availability in Guyana**	**50%**
Description		**Occupations linked with this skills**	
Refers to the knowledge of placing and assembling the various parts of equipment that make up the rig and preparing the rig for drilling. This requires knowledge of operation processes, safety standards and the use of specialized equipment.		• Sheet and structural metal workers, moulders and welders, and related workers • Mining and mineral processing plant operators • Ships' deck crews and related workers • Mining and construction labourers process control technicians	
Skill	**Data analytics**	**Perception of availability in Guyana**	**40%**
Description		**Occupations linked with this skills**	
Refers to the capacity of report insights and analyze data. This skill includes basic knowledge of statistics and a good command of Microsoft Excel.		• Engineering professionals (excluding electrotechnology) • Finance professionals	
Skill	**Finance and accounting**	**Perception of availability in Guyana**	**60%**
Description		**Occupations linked with this skills**	
Refers to the knowledge of the generally accepted accounting principles, ability to prepare and analyze financial statements and knowledge of general business practices.		• Finance professionals	
Skill	**Knowledge and management of logistics**	**Perception of availability in Guyana**	**80%**
Description		**Occupations linked with this skills**	
Refers to the knowledge of the inventory management and materials planning applied and ability to coordinate efficient transportation and storage of goods.		• Engineering professionals (excluding electrotechnology) • Sales and purchasing agents and brokers	
Skill	**Project management**	**Perception of availability in Guyana**	**40%**
Description		**Occupations linked with this skills**	
Refers to the knowledge of planning and organizing techniques to manage a project in order to achieve a predefined goal or outcome.		• Engineering professionals (excluding electrotechnology) • Environmental and occupational health and safety professionals	
Skill	**Welding (Standards and equipment)**	**Perception of availability in Guyana**	**0%**
Description		**Occupations linked with this skills**	

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Refers to the knowledge of **specialized** welding techniques for oil and gas, knowledge of materials, safety standards and use of specialized equipment.	• Sheet and structural metal workers, moulders and welders, and related workers • Mining and construction labourers

Information technology skills

Only three (3) IT skills gather 54 per cent of the 125 answers to the question "Please list the most important IT skills for the most in-demand position in your company". The following analysis provides some further insights on those.

Table 4. Summary IT skills required by "most in demand occupations"

Skill	**Microsoft Suite (Office, Teams, etc.)**	**Perception of availability in Guyana**	**78%**
Description		**Occupations linked with this skills**	
Refers to the command of the Microsoft Suite, particularly Office and Teams. It is worth mentioning that even though this skill was consistently identified for both professional and non-professional occupations, the level of specialization is not expected to be the same, while an engineer is expected to be able to use Excel to process data, a general labourer will be expected to know how to use Word to submit a form or a simple report.		• Engineering professionals (excluding electrotechnology) • Environment, occupational, health and safety professionals • Finance professionals • Administration professionals • Sales, marketing and public relations professionals • Physical and engineering science technicians • Process control technicians • Sales and purchasing agents and brokers • Shop salespersons • Sheet and structural metal workers, moulders and welders, and related workers • Mining and mineral processing plant operators • Ships' deck crews and related workers • Mining and construction labourers	
Skill	**Data management (Analysis, visualization, and reporting)**	**Perception of availability in Guyana**	**64%**
Description		**Occupations linked with this skills**	
Includes analysis, visualization, and reporting. While this may also need a good command of Microsoft Office, it also can use other tools (software).		• Engineering professionals (excluding electrotechnology) • Environment, occupational, health and safety professionals • Finance professionals • Process control technicians • Sheet and structural metal workers, moulders and welders, and related workers • Machinery mechanics and repairers	
Skill	**Use of hardware (PC, tablets, etc.)**	**Perception of availability in Guyana**	**69%**
Description		**Occupations linked with this skills**	
Refers to the basic command of mainstreaming hardware such as PCs or tablets.		• Painters, building structure cleaners and related trades workers • Sheet and structural metal workers, moulders and welders, and related workers • Mining and mineral processing plant operators • Ships' deck crews and related workers • Mining and construction labourers	

Draft do not cite or quote

It is worthy to mention that most of the other IT skills not mentioned as priority by respondents, refer to specialized software in different areas, such as accounting, engineering, logistics or

design. However, drawing clear cut conclusions from this finding is not immediate as software use is not standardized in the industry, meaning workers with the same job can use completely different software to perform the same job depending on the one used by their company.

Transferable skills

Eight (8) individual skills gather 78 per cent of the 114 answers to the question "Please list the most important transferable skills for the most in-demand position in your company". Communication (oral and written), teamwork and problem solving appeared to be the most relevant ones. Only two skills are perceived as scarce in Guyana: Analytical skills and business conduct (intended as the capacity to perform with high standards of professionalism and include some other skills such as gravitas, punctuality, politeness, or even assertive communication). The following analysis provides some further insights on those.

▶ **Table 5. Summary transferable skills required by "most in demand occupations"**

Skill	**Communication**	**Perception of availability in Guyana**	**59%**
Description		**Occupations linked with this skills**	
Refers to the capacity to send messages that are properly an entirely received and understood by the target audience.		• Manufacturing, mining, construction and distribution managers • Engineering professionals (excluding electrotechnology) • Architects, planners, surveyors and designers • Other health professionals • Finance professionals • Administration professionals • Sales, marketing and public relations professionals • Sales and purchasing agents and brokers • Cooks • Painters, building structure cleaners and related trades workers • Sheet and structural metal workers, moulders and welders, and related workers • Mining and mineral processing plant operators • Mobile plant operators • Ships' deck crews and related workers • Mining and construction labourers	
Skill	**Teamwork**	**Perception of availability in Guyana**	**76%**
Description		**Occupations linked with this skills**	
Is the ability to work with others and to help others attain their full potential and achieve the shared goals.		• Engineering professionals (excluding electrotechnology) • Finance professionals • Process control technicians • Ship and aircraft controllers and technicians • Shop salespersons • Painters, building structure cleaners and related trades workers • Sheet and structural metal workers, moulders and welders, and related workers • Machinery mechanics and repairers • Mining and mineral processing plant operators • Ships' deck crews and related workers • Mining and construction labourers	
Skill	**Problem solving**	**Perception of availability in Guyana**	**69%**
Description		**Occupations linked with this skills**	
Problem solving is the process of identifying a problem, developing possible solution paths, and taking the appropriate course of action.		• Manufacturing, mining, construction and distribution managers • Engineering professionals (excluding electrotechnology) • Other health professionals • Finance professionals • Administration professionals • Physical and engineering science technicians	

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	• Process control technicians • Sales and purchasing agents and brokers • Sheet and structural metal workers, moulders and welders, and related workers • Machinery mechanics and repairers • Mining and construction labourers
Skill **Planning and organization**	**Perception of availability in Guyana** **67%**
Description	**Occupations linked with this skills**
The ability to manage self and/or others, and resources including time and surrounding circumstances to reach a specific goal.	• Manufacturing, mining, construction and distribution managers • Engineering professionals (excluding electrotechnology) • Environmental, occupational health and safety professionals • Sales, marketing and public relations professionals • Physical and engineering science technicians • Mining and mineral processing plant operators • Ships' deck crews and related workers
Skill **Leadership**	**Perception of availability in Guyana** **43%**
Description	**Occupations linked with this skills**
Leadership is the accomplishment of a goal through the direction of human assistants.	• Engineering professionals (excluding electrotechnology) • Architects, planners, surveyors and designers • Environmental, occupational health and safety professionals • Finance professionals • Administration professionals • Physical and engineering science technicians • Process control technicians • Ship and aircraft controllers and technicians • Cooks • Shop salespersons • Sheet and structural metal workers, moulders and welders, and related workers • Machinery mechanics and repairers • Mining and mineral processing plant operators • Heavy truck and bus drivers • Mobile plant operators • Ships' deck crews and related workers • Mining and construction labourers
Skill **Analytical skills**	**Perception of availability in Guyana** **33%**
Description	**Occupations linked with this skills**
Refers to the capacity to extract key information from data and develop workable solutions for the problems identified in order to test and verify the cause of the problem and develop solutions to resolve the problems identified.	• Engineering professionals (excluding electrotechnology) • Environmental, occupational health and safety professionals • Finance professionals • Sheet and structural metal workers, moulders and welders, and related workers • Mining and mineral processing plant operators • Mining and construction labourers
Skill **Business conduct**	**Perception of availability in Guyana** **33%**
Description	**Occupations linked with this skills**
Refers to the basic capacity to perform with a high standard of professionalism, this also includes gravitas, punctuality, politeness and assertive communication	• Engineering professionals (excluding electrotechnology) • Environmental, occupational health and safety professionals • Finance professionals • Sheet and structural metal workers, moulders and welders, and related workers • Mining and mineral processing plant operators • Mining and construction labourers
Skill **Training skills**	**Perception of availability in Guyana** **50%**
Description	**Occupations linked with this skills**
Refers to the capacity to use structured methodologies to train and develop others.	• Environmental, occupational health and safety professionals • Mining and mineral processing plant operators • Ships' deck crews and related workers • Mining and construction labourers

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Analysis of web-based job openings

To validate the above findings on most in demand occupation and skills, we performed an analysis of the web-posted job openings during September and October 2022. Seventy job postings related with the oil and gas sector which were published on online job boards, social networks and oil and gas companies web pages[26] were analyzed (but no follow-up interviews with the hiring managers were conducted). While the exercise exposes itself to two potential biases, sample selection (not all the vacancies are posted online but, presumably, only the hardest to fill); and interpretation (written text without detailed explanation by the hiring manager may be misleading); the findings provide some interesting insights and allow to test consistency with the previous exercise.

Occupations

Following the same methodology presented above, we converted job postings in ISCO 08 consistent labels. The most frequently jobs posted on virtual job boards within the oil and gas sector are c**onsistent with the "most in demand" occupations identified through the skills demand survey**. **In both exercises Engineering Professionals occupy the first rank**. However, as expected, some technical and basic occupations were not identified by the web scrapping exercise, since those jobs are normally not posted on web-base job posting.

▶ **Table 6. Comparative analysis of most in demand occupation identified by web scraping and skills survey**

Occupations/jobs most frequently identified as "in demand" in skills survey	Frequency [27]
Engineering professionals (excluding electrotechnology)	15%
Environmental and occupational health and safety professionals	11%
Ships' deck crews and related workers	10%
Finance professionals	8%
Mining and construction labourers	8%
Physical and engineering science technicians	7%
Sheet and structural metal workers, moulders and welders	7%
Mining and mineral processing plant operators	7%

Occupations/jobs most frequently posted in job boards	Frequency [28]
Engineering professionals (excluding electrotechnology)	33%
Physical and engineering science technicians	13%
Manufacturing, mining, construction and distribution managers	13%
Environmental and occupational health and safety professionals	13%
Process control technicians	7%
Finance professionals	7%
Sales and purchasing agents and brokers	7%
Transport and storage labourers	7%

Source: Authors' own elaboration based on information from the skills demand survey and web scraping.

[26] Given the limited use of recruitment sources in this exercise, positions traditionally hired by offline recruitment sources such as referrals, on-site spontaneous applications, public employment services, newspapers or printed media may be excluded from this analysis.

[27] Frequency represents the times this skill was mentioned, divided by the total number of skills identified in the skills demand survey.

[28] Frequency represents the times this skill was mentioned divided by the total number of skills identified in the web scraping exercise.

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Skills

As no follow-up interviews with the hiring managers were conducted in this exercise, it was difficult to classify the skills with the same rugosity as was done in the skills demand survey. However, certain patterns can be identified. Technical skills, such as, health and safety compliance (6 per cent), engineering knowledge (6 per cent), data analytics (6 per cent) and logistics (6 per cent) that ranked within the most frequently identified in the skills demand survey are also part of the most sought skills described in the job postings.

Although not all the skills detected in the survey appeared in the web exercise, it is important to mention that the findings regarding technical skills associated with occupations requiring a higher educational level are consistent with those surveyed.

Table 7. Comparative analysis of most important technical skills identified by web scraping and skills survey

Technical skills most frequently identified as "important" in skills survey	Frequency
Health and safety compliance	15%
Mechanics (Tools and machinery)	9%
Rigging (offshore standards and equipment)	5%
Data analytics	4%
Finance and accounting	4%
Logistics	4%

Technical skills most frequently found in job boards	Frequency
Maintenance (Mechanics)	13%
Health and safety compliance	12%
Quality control	8%
Engineering Knowledge	6%
Data analytics	6%
Logistics	6%

Source: Authors' own elaboration based on information from the skills demand survey and web scraping.

In the case of transferable skills, findings were also consistent with the information collected in the Skills demand survey. Skills such as communication, planning and organization, critical thinking, problem solving and leadership, where identified in both exercises as some of the most important transferable skills.

Table 8. Comparative analysis of most in important technical skills identified by web scraping and skills survey

Transferable skills most frequently identified as "important" in skills survey	Frequency
Communications	20%
Teamwork	15%
Problem solving	14%
Planning and organization	8%
Leadership	6%
Analytical skills	5%

Transferable skills most frequently found in job boards	Frequency
Communications	20%
Planning and organization	18%
Critical thinking	12%
Problem solving	10%
Leadership	8%
Analytical skills	6%

Source: Own elaboration based on information from the skills demand survey and web scraping

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Finally, regarding IT skills, little information was disclosed on the job boards. However, the advanced use and knowledge of the Microsoft Suite (Office, Teams, etc.) appears in most job postings, which is also consistent with the information collected in the survey.

On matching of educational supply and labour market demand

To complement the analysis of the demand presented in the above sections, we provide an overview of relevant educational offer in Guyana. The goal is to have a general idea of the number of students acquiring skills which are sought after in the oil and gas industry while also comparing raw numbers with some indications about perceived quality of graduates.

Three main training options contribute to the development of skills and competencies needed in the construction industry. Higher education, technical and vocational training, and on the job training.

Higher education

The offer of higher education degrees in Guyana is mostly limited to the University of Guyana[29]. The latter offers, amongst others, science and engineering degrees including a petroleum engineering programme which was introduced in 2019.

To **preliminarily assess** the offer of higher education degrees vis-à-vis the future needs of the oil and gas industry, we compared the number of graduates in selected subjects from the University of Guyana 2020 /2021 Graduation Convocation to the occupational needs emerging from the labour demand survey. Looking at the graduates is a better indicator of potential availability of suitable skills for the private sector as it removes attrition (students who are not completing the courses) from the analysis.

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[29] See here for further details. University of Guyana has law and medical schools, campuses at Turkeyen, Georgetown, and Tain, Rose Hall; Cyril Potter College of Education (for teachers), based at the Turkeyen campus of the University, with branches at Linden, New Amsterdam and Rose Hall; Guyana College of Agriculture; and Commonwealth Youth Programme Caribbean Centre at Georgetown (which train youth workers from Commonwealth countries in the region).

▶ **Table 9. Graduates by discipline (University of Guyana) and estimated job openings requiring higher education degrees over the next five years in the oil and gas industry.**

Discipline	Number of graduates (2020/2021)	Estimated needs within the oil and gas industry - professionals and highly qualified technicians
Bachelor of Engineering Applied and Exploration Geology	31	• Engineering professionals 203 (one year) to 268 (5 years) • Physical and engineering service technicians[30] 113 (one year) 139 (five years) • Process control technicians 32 (one year) 91 (five years) • Architect, planners surveyors 13 (one year) 40 (five years) • Manufacturing, Mining, Construction and Distribution Managers 2 (one year) 4 (five years) • Environmental and Occupational Health and Safety professionals 34 (one year) 54 (five years) **Total demand for professionals and highly qualified technicians: 397 (one year) 596 (five years)**
Bachelor of Science Civil and Environmental Engineering	53	
Bachelor of Science Electrical Engineering -	21	
Bachelor of Science Engineering	12	
Associate of Science Applied and Exploration Geology	27	
Associate of Science Electrical Engineering	20	
Associate of Science Industrial Engineering	17	
Associate of Science Mechanical Engineering	36	
Associate of Science Mining	2	
Associate of Science Petroleum Engineering	27	
Total graduates in disciplines directly linked to the oil and gas industry's needs over the next five years	**172**	
Bachelor of Science Chemistry	21	
Bachelor of Science Environmental Science	3	
Bachelor of Science Environmental studies	20	
Associate of Science Civil Engineering	72	
Associate of Science – chemistry	17	
Associate of Science Physics	1	
Associate of Science Architectural and Building Technology	22	
Associate of Science Civil Engineering	72	
Diploma in Technology Architecture	1	
Master of science Env Management	10	
Total graduates other partially related disciplines	**145**	
Total all	**317**	

At first sight, if one limits the analysis to sample of respondents[1] [31] the number of students graduating in relevant subjects *may* be able - if sustained over the next years - to fulfil the estimated demand in the industry. One notable exception to the above is the category of health and safety professionals (50 of them will be needed in the next five years in the industry) which normally require a higher education degree (see Appendix 2) associated with relevant work experience. From the analysis of offer of higher education, it appears that dedicated degrees are not currently offered in Guyana.[32]

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[30] Physical and Engineering Science Technicians are traditionally though to need at least an advanced vocational training degree.

[31] **The exercise is performed for indicative purposes only**. On the one hand, the number of graduates in 2021 it is not a flawless predictor of future availability, on the other, the industry needs may be fulfilled via other means such as internal transfers or hiring of profiles not strictly adhering to needs**. Last and most importantly, the projected demand derived from the survey is a partial indicator as the sample chosen is not fully representative of the industry and the figures retrieved indicate the total demand over one and five years, not the annual demand for each of the next five years**.

[32] Certainly, elements of occupational safety and health may be incorporated in various curricula, however, the demand survey allowed us to identify a specific need for fully fledged professionals in the field.

Despite the *potential* **numerical** match between the number of graduates in the oil and gas industry, there are few caveats worth emphasising:

- **General needs of the economy, interindustry and international competition**. While the absolute number of engineering (and related) students may be able to fulfil the demand in the oil and gas industry, engineering (and related) graduates are or will be in high demand in other sectors of the economy. It will be interesting to determine if and how conditions of employment in the oil industry may incentivise local graduates to join. Importantly, as mentioned in Chapter 1, emigration of qualified professionals to other countries given the international human resources constraints in the other industry may also be at play. We could speculate that the most plausible scenario is one where graduates choose to leave after having acquired experience locally. As such, **it is likely that the current offer of graduates per year (if maintained constantly) will only partially fulfil the industry's needs**.

- **Qualitative mismatch**. The conclusion hinted by Table 8 may me partially misleading for another reason. Results from the skills demand survey (see Tables 3, 4, 5) suggest there are marked perceived gaps in terms of availability of some skills in the industry, first and foremost - for what concerns professional occupations - regarding **health and safety competencies**, **data analytics and project management** (technical skills) and **leadership, analytical skills, business conduct** (transferrable skills). While it is hard to conclude that current degrees do not sufficiently prepare graduates on those matters, it appears to be a certain area of reflection for curricula development. Specifically in the oil and gas industry, resorting to foreign experienced labour to fill managerial positions may be the most immediate choice.

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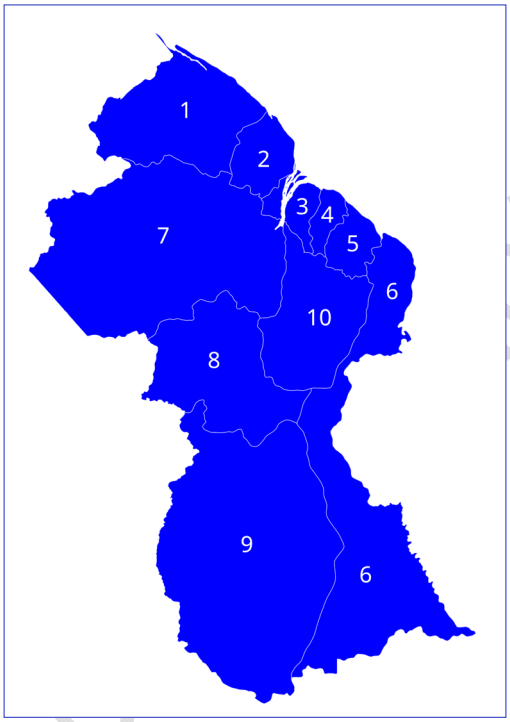
Technical and Vocational Education and Training (TVET)

There are two main actors in Guyana providing vocational education: the Board of Industrial Training and the (eight) Technical and Vocational Institutes under the Council for Technical and Vocational Education and Training (CTVET) within the Ministry of Education. They offer similar types of degrees, with few distinctions.[33]

Comparing available degrees by field of study and needs of the oil and gas industry, there are some immediate gaps which are to be noted. Two of the technical occupations most in demand in the oil and gas industry are categorized as "**Ships' Deck Crews and Related Workers"** and "**Ship (and Aircraft) Controllers and Technicians**". Skills associated with those occupations are perceived to be extremely scarce in Guyana (see Table 3). While local offer of training in those fields is extremely limited or non-existent, it is to be noted that according to international regulations, only countries assessed by the International Maritime Organization (IMO) as properly implementing the STCW-95 Convention[34] can certify mariners. Guyana's maritime administration is not in this list of assessed countries (known as the whitelist), in consequence, it is not possible for the country to open a maritime academy and train and certify mariners locally.

▶ **Figure 10. Map of Guyana's regions**



Conversely, courses offered by either vocational training institutes or the BoIT may- in principle- respond to other occupational and skills requirements for the oil and gas industry for qualified technicians. Specifically, the eight technical colleges under the aegis of the Ministry of Education have, between 2018 and 2022, offered courses on Electrical Installation and Engineering (regions 3, 4, 5, 6, 10), Metal Work Engineering (regions 3, 4, 5), Welding (regions 3, 4, 5, 6,10), Architectural Drawing (regions 4, 6), Mechanical Major (regions 10, 4), Heavy Equipment Maintenance (regions 4, 10), Motor Vehicle work/repairs (regions 3, 4, 5, 6), Data Operations (regions 3, 5), Mechanical Engineering (region 4), and Building and Civil Engineers Diplomas (region 4). The BoIT offered, as per 2021, courses in disciplines like Heavy Duty Equipment Operation (regions 2, 3, 4, 6, 8, 9, 10), Welding & Fabrication (region 2), Motor Vehicle and Small Engine Repairs (regions 1, 6, 10), Data Operations (region 2), and Boat Building (region 2)

[33] (i) Courses from the Board of Industrial Training (BoIT) allow, upon successful completion, to achieve National Vocational Qualifications awarding degrees. Conversely, courses offered by the various technical vocational institutions are certified under the Caribbean Vocational Qualification Framework (and thus can be referenced throughout the Caribbean for employment and educational purposes)[33]; (ii) the duration of courses offered by the technical vocational institutes normally ranges between two and four years (for specific courses). Contrarily, courses at the Board of Industrial Training run for a duration of four to six months, or, exceptionally, nine months; (iii) the offer by the BoIT is more geographically broad, covering regions 1, 2, 7 and 8 in addition to regions 3, 4, 5, 6, 9 and 10 covered by the Vocational Institutes; (iv) programmes offered by the technical vocational institutes can be categorized as "diploma" or "certificate" with the former targeting the more advanced learners who have gained passes at the Caribbean Examination Council (CXC) or other technical qualification.

[34] STCW Convention establishes the basic requirements on training, certification and watchkeeping for seafarers on an international level.

To have a better understanding of the potential numerical match between vocational training students and future demand in oil and gas, we proceeded to compare not only the offer in terms of academic subjects, but the actual outcome in terms of graduates. This is particularly important if one considers the problem of non-secondary educational drop-out in vocational training. [27]

Table 10 and 11 provide a snapshot of the number of 2021 graduates (for Vocational Training Institutes) and "beneficiaries" (for the BoIT28) vis a vis the projected demand for selected occupations in the oil and gas industry.

▶ **Table 10. Graduates by discipline and region (2021 Vocational Training Institutes) and estimated job openings oil and gas industry (technical occupations) over the next five years**

Discipline	Region	# of graduates (all levels, 2021)	Prospective job openings requiring the skills (as per result of company survey)[35] technicians	Tentative assessment of gross[36] numerical match vis-à-vis needs of the oil and gas industry
				Over-supply-> more graduates than openings
				balanced
				Under-supply->more openings than graduates
Motor vehicle works/repair and small engine repairs	3	42	50 (one year) to 175 (five years) including machinery mechanics and repair.	**Likely balanced although technical skills may be substantially different from what required**
	4	31		
	5	16		
	Total	89		
Metal work engineering	3	1	79 (one year) to 315 (5 years) including sheet and structural metal workers, moulders and welders, and related workers	**Likely under-supply**
	4	27		
	5			
	Total	**28**		
Data operations	3	9	30 (one year) to 80 (5 years) includes administration professionals	**Likely balanced, possibly under-supply due to competition from other industries**
	4	28		
	5	4		
	Total	41		
Welding	3	7		**Likely under-supply**

[35] The numbers presented in this column are derived by adding potential job opening in related fields as collected via the demand survey. As more than one job opening may require the skill, the total is derived by adding all the occupations potentially relevant.

[36] The assessment is based on gross numbers, comparing the future needs of the industry and the number of graduates (from VTIs) and "beneficiaries (from BoIT) in 2021, assuming both to be constant. It does not account for various factors which may influence the net number of openings linked to a specific skill set, such as filling of vacancies with workers having different skills set than the one in principle most pertinent, (pre) retirements. Also and most importantly: (i) **it is circumscribed to the construction sector (the graduates may be able to find employment in other sectors of the economy) and (ii) it does not deepen the analysis into actual competencies linked to degrees but only on theoretical match between the degree and the occupation**, It is to be considered as **indicative only** for main trends.

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	4	30	79 (one year) to 315 (5 years) including sheet and structural metal workers, moulders and welders, and related workers.	
	5	4		
	6	5		
	10	17		
	Total	**63**		
Mechanical engineering	4	57	280 (one year) to 631 (five years) including machinery mechanics and repair, mining and mineral processing plant operators and process control technicians	**Likely undersupply**
	10	11		
	Total	**68**		
Architectural drawing	4	21	13 (one year) to 40 (five years) including architects, surveyors, drawers.	**Likely balanced, possibly under-supply.** [37]
	6			
	Total	**21**		
Building and civil engineers diplomas	4	66	13 (one year) to 40 (five years) including architects, surveyors, drawers.	**Likely balanced, possibly under-supply** [38]**.**
	Total	**28**		

Source: own elaboration based on data from Ministry of Education

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37 The conclusion is based on considering the market demand vis a vis the demand for workers with vocational training qualification plus workers with university level qualifications. While it is hard to precisely identify the skills required, it is assumed that between university graduates and vocation training ones, the demand for architectural and civil engineering skills could be met (at least numerically) but the interindustry competition, and the shift to greener processes highlighted above will likely hamper availability for the construction industry.

38 The conclusion is based on considering the market demand vis a vis the demand for workers with vocational training qualification plus workers with university level qualifications. While it is hard to precisely identify the skills required, it is assumed that between university graduates and vocation training ones, the demand for architectural and civil engineering skills could be met (at least numerically) but the interindustry competition, and the shift to greener processes highlighted above will likely hamper availability for the construction industry.

▶ **Table 11. Beneficiaries BoIT Graduates by discipline and region (2021, Board of Industrial Training) and estimated job openings in the oil and gas industry (technical occupations) over the next 5 years.**

Discipline	Region	# of students (all levels, 2021)	Prospective job openings requiring the skills (as per result of company survey) technicians and manual labour.	Tentative assessment of gross[39] numerical match vis a vis needs of the construction industry
				Over supply-> more graduates than openings
				balanced
				undersupply->more openings than graduates
Welding & fabrication	2	15	79 (one year) to 315 (5 years) including sheet and structural metal workers, moulders and welders, and related workers	**undersupply->more openings than graduates**
	Total	**15**		
Motor vehicle and small engine repairs	1	10	50 (one year) to 175 (five years) including machinery mechanics and repair	**Likely balanced although technical skills may be substantially different from what required**
	6	48		
	10	**52**		
	Total	**110**		
Data operation	2	10	30 (one year) to 80 (5 years) includes administration professionals	**Likely balanced, possibly under-supply due to competition from other industries**
	Total	10		
Boat building	2	10	144 (one year) to 190 (5 years) includes ships' deck crews and related workers	**Under-supply as the skills required in the industry are more complex that the ones provided via the BoIT still, there is some marginal overlap.**
	Total	**36**		
Heavy duty equipment operation	2	18	50 (one year) to 150 (five years) including "heavy truck and bus drivers""	**Likely balanced although skiils required for machine operations to be assessed.**
	3	15		
	4	44		
	6	80		
	8	85		
	9	12		
	10	50		
	Total	**304**		
	6	15		

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39 The assessment is based on gross numbers, comparing the future needs of the industry and the number of graduates (from VTIs) and beneficiaries (from BoIT) in 2021, assuming the latter to be constant. It does not account for various factors which may influence the net number of openings linked to a specific skill set, such as filling of vacancies with workers having different skills set than the one in principle most pertinent, (pre) retirements. Also and most importantly: (i) **it is circumscribed to the construction sector (the graduates may be able to find employment in other sectors of the economy) and (ii) it does not deepen the analysis into actual competencies linked to degrees but only on theoretical match between the degree and the occupation.** It is to be considered as **indicative only** for main trends.

	Total	**31**		
	9	8		
	Total	**23**		

An analysis of Tables 10 and 11 allows drawing some tentative but potentially important conclusions:

- **Numerical match.** Notwithstanding the intrinsic limitations of the above analysis, from **a purely numerical standpoint**, there seems to be meaningful gaps between the vocational education offer and the profiles needed in the industry. Specifically, there will likely to be a marked undersupply of qualified workers holding vocational degrees in mechanical engineering, welding, and metal work to be employed as "sheet and structural metal workers, moulders and welders, and related workers" or as "mining and mineral processing plant operators". Such gaps may be exacerbated as other graduates holding degrees which allow them to work as "machinery mechanics and repairers" or heavy machine operators may also be in short supply. For the latter, however, **the extent of the gap is to be determined.**
- **Qualitative match**. The findings on quantitative match do not undermine the existing gaps in terms of competencies. Tables 3, 4, 5 above highlight the perceived skills gaps for technical, IT and transferrable skills. **Welding skills** are indicated as being very scarce in the country, possibly hinting at the fact that available curricula do not provide students with skills needed by the oil and gas industry.
- **Gender breakdown.** While exact figures about national breakdown of graduates in "oil and gas industry relevant" vocational training disciplines by sex are not presented in detail from the analysis of available data on graduates (for VTIs) and beneficiaries (for BoIT) one main trend emerges, specifically, attendance to the majority of relevant vocational courses (welding, mechanical engineering, metal work) is male dominated although still showing non null attendance by women.

    - The above suggests the existence of rigid barriers, not only in employment (see chapter 1), but also in educational choices linked to oil and gas related trades.

On the job training

Local and international companies interviewed as part of this study agreed on how complex it can be to find trained staff in Guyana. Even people with higher education tend to have room for improvement in both foundational knowledge (mostly in technical areas) and in general business acumen (including business conduct). In addition, oil and gas operations normally require specific knowledge of tools, materials and protocols that are not considered to be part of the current curricula in TVET and higher education institutions. **There was consensus that occupations such as welders, blasters, health and safety professionals, engineers and mechanics are required to have additional training to their formal education to be able to work in an oil and gas related assignment**.

Therefore, large corporations have developed some strategies for internal development, prioritizing the hiring of young staff through internship and/or development programmes (according with the skills demand survey, 12 per cent of the occupations identified as "most in

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demand" use internships as one of their methods of recruitment) where they match their profile with what is required by the companies.

While this kind of trainings can be well structured (with a planned curriculum, training objectives and assessments, certification of competencies and curated material and specialized instructors) or more informally so (via informal traineeship schemes developed by individual employers), current labour demand makes it difficult for the business operation to wait until one young professional is upskilled to fill a job.

It is also to be noted that the degree of formal organization of traineeships tends to be higher within international companies and lower (or not existence) for local companies, possibly revealing the opportunity to provide targeted assistance via public interventions.

Conclusions and policy implications

Overall, the data presented in this section (on matching of educational supply and labour market demand) suggest the following:

- **On paper**, there is a **quantitative mismatch** between courses offered, number of graduates, subjects, and future demand in the oil and gas industry that is not necessarily generalized to all occupations and subjects of study. In terms of higher education, the main numerical gap concerns offer of degrees allowing to become **occupational health and safety professionals**; for vocational training the most substantial gaps are regarding **welders and metal workers and technicians trained as engineers** or **other trades allowing workers to become plant operators.** In addition, there is **an almost complete absence of training supply in trades to allow workers to become ships' deck crews and related workers.** Such gaps may be exacerbated to the extent that graduates in oil and gas relevant disciplines may be in demand in other areas of the economy.

- **Qualitative gaps do exist**. Lack of skills amongst the graduates is not necessarily reflected in credentialling terms (number of graduates/students in each subject required by the market) but, rather, in terms of quality of available skills which is deemed insufficient by the market (see Tables 3, 4, 5).

- **Possible paths for the expansion of education supply.** Expansion of the offer in the fields most in demand (especially in TVET engineering, metal work, welding, "nautical" subjects will have to be gauged against the capacity of the system (facilities, teachers, financial resources) to possibly consider easily executable solutions to expand the offer of education in selected trades including (i) development of a private market for selected trades were the capacity of expansion from the public sector may not go at the same speed as required in the market; and (ii) provide recognition of prior learning services to informal on-the-job training currently provided in the construction industry.

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- **Guidance on educational and career choices.** The above findings on job prospects associated with certain degrees should help shape, not only the educational offer, but also the educational and career guidance one. Available or future tools (public employment services, job orientation at school (middle and above), online resources providing information on careers and qualification requirements) should incorporate the encouraging perspectives concerning employment in construction and clearly outline the educational offer instrumental to acquire a job in the industry.

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3. Recommendations

- The findings from the study appear to clearly identify the main gap for the industry as the shortage of technical skills (see Figure 9). An initial recommendation could be that notwithstanding the need to ensure availability of fully fledged curricula preparing students in several competencies**, if a choice linked to investments in educational supply must be made, a focus on technical skills may bring largest payoff**.

- Other than training supply, **there is room to provide public assistance by helping the private sector to formalize (or introduce) traineeship schemes**. Amongst other this will address the needs of the industry for experienced workers, clearly identified via the survey. Ensuring tripartite (social partners) representation in the scheme design, full integration of occupational health and safety elements, due competency training contents, and certification of competencies will be mandatory elements. National competent authorities, notably the CVTET and the BoIT may consider the direct engagement in the area.

- **Develop public-private partnerships for skills development.** It is necessary to develop cooperation mechanisms between employers, Government, workers' representatives and academia, through which it is possible to structure continuous spaces for dialogue for curriculum development, articulate practical learning spaces in work centers, link job offers with graduates and promote technological development and research. This study is a possible beginning for such collaboration.

- **Access to locally provided training and education and incentives for emigration and permanence.** No matter the policy decision regarding the response of the national education system to the needs of the oil and gas industry, the current international context has to be duly taken into account, specifically with regard to the possibility of trained workers leaving for other destinations once trained or after having obtained a minimum working experience locally. The implications are multiple. From the public policy perspective, **adequate pricing of educational offer or cost sharing agreements** with the private sector will be paramount. In addition, 'creative' solutions for incentives for Guyanese graduates to stay in Guyana (**bonding**) are to be thought of
- In parallel, private sector offered incentives to skills acquisition (within Guyana or abroad) may be considered. Our findings, in particular, show that those schemes will have to ensure **palatability of the monetary and non-monetary offer**. Elements such as the availability of relevant accessory services for future workers (transport, nurseries, housing, family services) may play a role to ensure retention once trained.

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- Other than addressing skills gaps via direct training supply there are benefits to be gained from **utilizing the findings of the study and any future one to guide (i) educational and career guidance; and (ii) the offer of services** by public employment services.

- **Promote the participation of women on STEM career paths.** An increase in women graduation in Science, Technology, Engineering and Mathematics studies, at both higher education and vocational training levels, could directly address some of the numerical gaps identified. Aside from individual preferences, an effective education of the public concerning employment opportunities and skills requirement within the oil and gas industry may alter the educational choices and lead to a better educational and employment outcome. The latter, however, may be **linked to several other factors including safety at work, housing, transport, and availability of childcare** which will have to be considered from the outset.

- **Balancing immediate needs from companies via foreign workers and ensuring sufficient development of national competencies**. If, as is likely the case, the response of the national education system to address the present and (near) future skills needs in the oil and gas industry will take some time to roll out, two policy areas may become critical role: **labour migration policy** and **educational supply via out-of-country providers**. With respect to the labour migration, striking a balance between the industry's needs and the desire to ensure benefit from the newly created employment opportunities for Guyanese, in particular young citizens, will be the main challenge. Along the same lines, an arguably lesser potential issue to take into account is the need to ensure that immigration of skilled workers does not undermine the domestic labour market, not necessarily in terms of employment opportunities which will likely abound, but also in terms of wages and conditions of work. To achieve both objectives, few punctual recommendations can be made:

    - **On migration policy.** The formal identification of the profiles sought by the Guyanese economy (also relying on the information conveyed by this study) can help to determine priority sectors for issuing work permits on the basis of demonstrable labour shortage. That may simplify not only the (issue of permits related) administrative process but - more generally – influence investment decisions by private sector and individuals. Also, it may be considered to link the work permits to skills transfer programmes through internships and shadowing for students, on-the-job training for young professionals.
    - **Return policies** for skilled diaspora may be envisaged and the results of the present study do provide a detailed overview of what profiles may be considered in designing those policies.

    - Rights abuses and violations, including the most grievous ones such as forced labour and trafficking in persons, frequently occur at the recruitment stage, and some workers – including migrant workers – are particularly vulnerable to them.

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In view of the numbers of skilled workers who are predicted to join oil and gas sector companies in Guyana, it will be crucial to ensure that recruitment, whether carried out directly, through public employment services or public recruitment agencies, occurs in full compliance with ILO **Fair Recruitment** Principles and Guidelines

- Regarding **foreign supply of educational services**, an educated comparison between short and long terms costs (for the public and private sectors) associated with provision of public and private sector education services in Guyana vs abroad should drive the policy choice and should the latter prevail, due schemes linked to conditional return to Guyana of students once the attendance abroad is concluded may be considered.

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Annex 1 – Skills demand survey

Data collection period: From July to September 2022

Collection method: The survey was distributed digitally through direct email to a selected list of companies provided by the Ministry of Labour and the Local Content Secretariat.

Method of Sampling: Non-probabilistic deliberate-type sampling. This type of technique consisted of selecting firms to participate in research based on specific characteristics (in this case be part of the oil and change value chain), rather than randomly.

Survey structure: Questions were organized into 2 sections:

1. Characterization of the firm
   - Contact information of the respondent
   - Main business
   - Headcount
2. Examination of the most in demand occupations (participants were asked to respond the first, second and third most in demand occupations)
   - Expected hirings of workers in this occupation (In the next year and next five years)
   - Sources of recruitment for hirings in this occupation
   - Average age of incumbents of workers in this occupation
   - Average percentage of female workers in this occupation
   - Common nationality of workers in this occupation
   - Educational background expected for workers in this occupation
   - Expected tenure of workers in this occupation
   - Most relevant technical, information technology and transferable skills for workers in this occupation
   - Availability of most relevant skills previously identified in local labour market

Number of responses: 29

Representativeness: Given the exploratory purpose of the study and the non-probabilistic nature of the sampling technique, it is not possible to perform a statistical reliability calculation. However, as an indicative figure, the total headcount of the companies studied is 3,996. This is 47 per cent of the estimated 8,459 workers of oil and gas and direct suppliers of accessory goods and services in Guyana (Bureau of Statistics, 2021) described in the sector profile. While this percentage may be subject of changes and requires a greater statistical precision, considering the accelerated growth of employment of oil and gas in the country, still it illustrates the feasibility of drawing accurate conclusions about the findings resulting from this study.

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Annex 2 – Occupation profiles

Engineering professionals (excluding Electrotechnology)

Definition[40]: Engineering professionals (excluding electrotechnology) design, plan and organize the testing, construction, installation and maintenance of structures, machines and their components, and production systems and plants; and plan production schedules and work procedures to ensure engineering projects are undertaken safely, efficiently and in a cost-effective manner.

Tasks performed usually include: planning and designing chemical process systems, civil engineering projects, mechanical equipment and systems, mining and drilling operations, and other engineering projects; specifying and interpreting drawings and plans, and determining construction methods; supervising the construction of structures, water and gas supply and transportation systems, and the manufacture, installation, operation and maintenance of equipment, machines and plant; organizing and managing project labour and the delivery of materials, plant and equipment; estimating total costs and preparing detailed cost plans and estimates as tools for budgetary control; resolving design and operational problems in the various fields of engineering through the application of engineering technology.

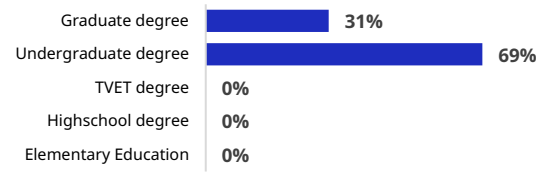
Examples of jobs in this occupation

- Civil engineers
- Geoscientist
- Mechanical engineers
- Chemical / petroleum engineers
- Industrial and production engineers
- Logistics and materials coordinators

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
203	265	22%

Education background



Area of study

- Mechanical, electrical, industrial or similar engineering
- Petroleum engineering
- Civil engineering
- Geologists and Geophysicists

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
38%	77%	46%	31%	62%	31%	0%	0%

Top technical skills		Top IT skills		Top transferable skills	
Skill	Local availability	Skill	Local availability	Skill	Local availability
Engineering knowledge	0%	Microsoft Suite (Office, teams, etc.)	30%	Problem solving	25%
Logistics	75%	SAP	17%	teamwork	25%
Project management	25%	Data management (Visualization and reporting)	13%	Cultural awareness	33%
Data analytics	33%	specialized technical software	9%	Leadership	0%
				Planning and Organization	33%

[40] All the definitions used in this section are referencing ISCO-08

Environment and occupational health and hygiene professionals

Definition: Environmental and occupational health and hygiene professionals assess, plan and implement programmes to recognize, monitor and control environmental factors that can potentially affect human health, to ensure safe and healthy working conditions and to prevent disease or injury caused by chemical, physical, radiological and biological agents or ergonomic factors.

Tasks performed usually include: developing, implementing and reviewing programmes and policies to minimize potential environmental and occupational risks to health and safety; preparing and implementing plans and strategies for the safe, economic and suitable disposal of commercial, industrial, medical and household wastes; implementing prevention programmes and strategies for communicable diseases, food safety, waste water treatment and disposal systems, recreation and domestic water quality, contaminated and hazardous substances; identifying, reporting and documenting hazards, and assessing and controlling risks in the environment and workplace and advising on compliance with relevant law and regulations; developing, implementing and monitoring programmes to minimize workplace and environmental pollution involving chemical, physical and biological hazards; advising on methods to prevent, eliminate, control or reduce the exposure of workers, students, the public and the environment to radiological and other hazards; promoting ergonomic principles within the workplace such as matching furniture, equipment and work activities to the needs of employees; providing education, information, training and advice to persons at all levels on aspects of occupational hygiene and environmental health; recording and investigating injuries and equipment damage, and reporting safety performance; and coordinating arrangements for the compensation, rehabilitation and return to work of injured workers.

Do not cite or quote

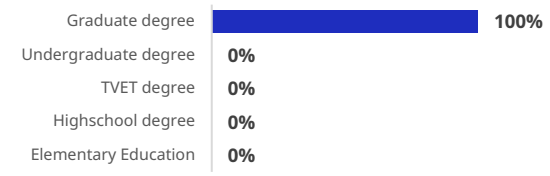
Examples of jobs in this occupation

- Environmental protection professional
- Occupational health and safety inspector
- HSEQ Professionals
- Safety officers

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
34	54	38%

Average age



Area of study

- Chemistry
- Industrial or similar engineering
- Petroleum engineering
- Civil engineering

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
11%	78%	46%	22%	11%	56%	0%	11%

Top technical skills

Skill	Local availability
Health and Safety	0%
Environmental management practices	0%

Top IT skills

Skill	Local availability
Data management (Visualization and reporting)	50%
Microsoft Suite (Office, teams, etc.)	100%
Specialized HSE software	50%

Top transferable skills

Skill	Local availability
Business conduct	33%
Critical thinking	50%
Research	100%

Ships' deck crews and related workers

Definition: Ship's deck crews and related workers carry out deck duties on board ships and similar duties on board other water-borne craft.

Tasks performed usually include: standing look-out watches at sea and when entering or leaving harbour or other narrow waters; steering ship according to instructions; handling ropes and wires, and operating mooring equipment; maintaining and, in some cases, operating ship's equipment, cargo gear, rigging, lifesaving and firefighting appliances; performing deck and hull cleaning, scraping, painting and other maintenance duties as required; breaking out, rigging and stowing cargo-handling gear, stationary rigging and running gear.

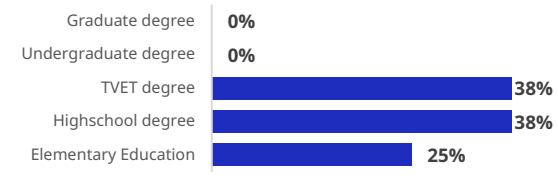
Examples of jobs in this occupation

- Seafarers
- Vessel officers
- Marine vessel coordinators
- Able bodied seamen
- Ordinary seaman
- Steward

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
79	135	23%

Average age



Area of study

- IMO Certified nautical training

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
25%	50%	63%	0%	38%	13%	0%	0%

Top technical skills

Skill	Local availability
Nautical Knowledge of vessel operations	29%

Top IT skills

Skill	Local availability
Microsoft Suite (Office, teams, etc.)	50%
Specialized nautical software	0%
Use of hardware (PC, tablets, etc.)	100%

Top transferable skills

Skill	Local availability
Communication	100%
Training skills	67%

Do not cite or quote

Finance professionals

Definition: Finance professionals plan, develop, organize, administer, invest, manage and conduct quantitative analyses of either financial accounting systems or funds for individuals, establishments and public or private institutions.

Tasks performed usually include: preparing and organizing financial statements for an organization; reviewing financial materials of an organization; providing financial advice to individuals and organizations; preparing analytic reports concerning segments of the economy and the economy as a whole.

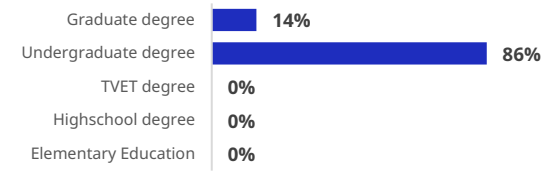
Examples of jobs in this occupation

- Accountants
- Financial analysts
- Auditors

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
44	145	51%

Average age



Area of study

- Business administration
- Accounting
- Finance

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
43%	43%	29%	0%	29%	29%	29%	14%

Top technical skills

Skill	Local availability
Finance and accounting	60%
Data analytics	50%

Top IT skills

Skill	Local availability
Data management (Analysis, visualization and reporting)	50%
Microsoft Suite (Office, Teams, etc.)	100%
Specialized finance and accounting software	40%

Top transferable skills

Skill	Local availability
Problem Solving	100%

Do not cite or quote

Mining and construction labourers

Definition: Mining and construction labourers perform simple and routine manual tasks in mining, quarrying, civil engineering and building operations.

Tasks performed usually include: digging and filling holes and trenches using hand-held tools; shoveling and spreading excavated materials, sand, soil and gravel; sorting, loading, unloading, stacking and storing tools, materials and equipment and transporting them around work sites; cleaning machinery, equipment, tools and work sites and removing obstructions.

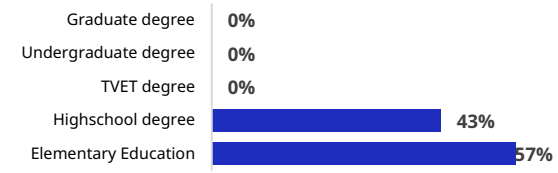
Examples of jobs in this occupation

- Construction labourer (civil engineering)
- Civil Engineering Labourer
- Driller (oil or gas well)
- Drilling plant operator
- Banksman

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
177	459	3%

Average age



Area of study

NA

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
29%	57%	14%	14%	14%	14%	14%	14%

Top technical skills

Skill	Local availability
Health and safety	33%
Rigging (offshore standards and equipment)	50%

Top IT skills

Skill	Local availability
Use of hardware (PC, tablets, etc.)	60%
Microsoft Suite (Office, Teams, etc.)	0%

Top transferable skills

Skill	Local availability
Communication	66%

Draft - do not cite or quote

Physical and engineering science technicians

Definition: Physical and engineering science technicians perform technical tasks to aid in research on and the practical application of concepts, principles and operational methods particular to physical sciences including such areas as engineering, technical drawing or economic efficiency of production processes.

Tasks performed usually include: undertaking and carrying out technical work related to chemistry, physics, geology, meteorology, astronomy, engineering or technical drawing; setting up, operating, and maintaining laboratory instruments

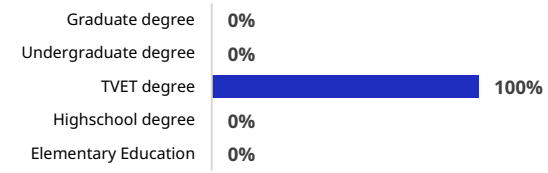
Examples of jobs in this occupation

- Technical personnel in engineering
- Environmental technician
- Electronic document preparation
- Draughtsperson

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
113	139	39%

Average age



Area of study

- Technical education in electronics
- Technical education in mechanics
- Technical education in maintenance

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
50%	67%	33%	0%	0%	67%	0%	0%

Top technical skills

Skill	Local availability
Mechanics (Tools and machinery)	66%

Top IT skills

Skill	Local availability
Microsoft Suite (Office, Teams, etc.)	100%
Specialized drafting software	0%
Specialized Technical software	0%

Top transferable skills

Skill	Local availability
Attention to detail	0%
Planning and organization	100%
Problem solving	100%

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Sheet and structural metal workers, moulders and welders, and related workers

Definition: Sheet and structural metal workers, moulders and welders, and related workers, make moulds and cores for casting metal, weld and cut metal parts, make and repair articles of sheet metal, and install, erect, maintain and repair heavy metal structures, tackle, cable-cars and related equipment.

Tasks performed usually include: making moulds and cores for casting metal; casting, welding and shaping metal parts; making and repairing articles of sheet metal such as sheet steel, copper, tin or brass; installing, erecting, maintaining and repairing heavy metal structures as well as tackle, cable cars and related equipment.

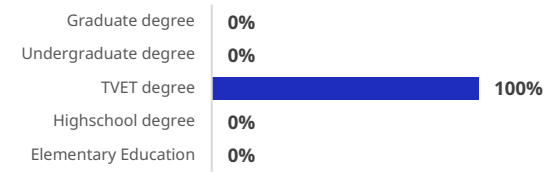
Examples of jobs in this occupation

- Riggers
- Scaffolding
- Welders

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
79	315	3%

Average age



Area of study

- Welding
- Rigging

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
33%	17%	33%	0%	17%	17%	0%	0%

Top technical skills

Skill	Local availability
Welding (Standards and equipment)	100%
Rigging (offshore standards and equipment)	50%

Top IT skills

Skill	Local availability
Data management (Analysis, visualization and reporting)	0%
Geographic Information Systems GIS	0%
Microsoft Suite (Office, Teams, etc.)	0%
Use of hardware (PC, tablets, etc.)	0%

Top transferable skills

Skill	Local availability
Problem solving	50%
Teamwork	100%

Do not cite or quote

Mining and mineral processing plant operators

Definition: Mining and mineral processing plant operators operate and monitor plant and machinery and operate hand tools to extract rock and minerals from the earth, process minerals and stone, drill wells and bores, and manufacture and finish cement and stone products.

Tasks performed usually include: setting up, operating and monitoring a variety of mining and mineral processing plant and machinery such as drilling rigs and auxiliary machines and equipment, continuous mining machinery, and cutting, crushing, grinding, pumping and mixing plant and machinery; operating washing, separating, extracting and combining equipment to remove waste and recover minerals; operating plant and machinery to make cement, concrete, artificial stone, and precast concrete and stone products; monitoring the performance of a variety of plant and machinery, detecting malfunctions and taking corrective action; performing plant and machinery maintenance, repairs and cleaning; and maintaining production records.

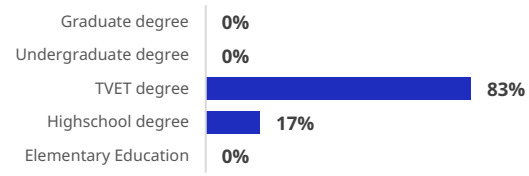
Examples of jobs in this occupation

- Machine operators
- Sandblasting
- Plant operators and technicians

Expected hirings

Next year	Within the next 5 years	Average percentage of female workers
198	370	11%

Average age



Area of study

- Technical education in electronics
- Technical education in mechanics
- Technical education in maintenance

Sources of recruitment

Internal Recruitment	Online Job boards	Recruitment agencies	Public employment services	Career services	Internship Programs	Social media / website	Others
50%	50%	50%	17%	17%	33%	0%	17%

Top technical skills

Skill	Local availability
Mechanics (Tools and machinery)	100%

Top IT skills

Skill	Local availability
Microsoft Suite (Office, Teams, etc.)	33%
Use of hardware (PC, tablets, etc.)	50%
Specialized technical software	100%

Top transferable skills

Skill	Local availability
Communication	0%

Do not cite or quote

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