

Introduction

South Africa's power sector relies significantly on substantial indigenous coal supplies. Today, **coal-powered facilities generate over 80%** of electricity, with a total capacity of over 38 GW. According to the IRP's 50-year decommissioning program, approximately 10% of coal power producing capacity will be retired by 2030 and more than 60% by 2045 [1]. This threatens job stability in a variety of sectors and demographics, that include young workers. There are four options for responding to this threat while lowering carbon emissions:

- Retrofitting coal plants
- Replacing coal with baseload gas
- Building renewable energy plants
- Replacing coal with flexible nuclear

Of these options, renewables are the cheapest with a cost of 0,91 c/kWh solar PV and onshore wind 0,61c/kWh compared to 1,01 c/kWh retrofitting coal plants, 107 c/kWh for baseload gas, and 109 c/kWh for nuclear when employed Small Modular Reactors (SMR) [2]. Such **cost threatens job stability in a variety of sectors**, especially in coal-energy value chain, transport, and agriculture. To address this threat, **this booklet focuses on youth upskilling and reskilling for sectoral mobility** as the country transitions to a low carbon and climate-resilient economy.

Challenges and access to economic opportunities for the youth

Youth in South Africa face a variety of **challenges**. High unemployment, various types of poverty, educational inequality, limited access to technology, and a lack of mentorship programs. Today, **these challenges appear to be exacerbated by climate action to reduce carbon emissions and the cheap cost of renewables**, which threatens the replacement of coal-energy value chain. Many young people working in coal mines are low skilled with low alternative employment prospects, and their reliance on mining income puts them at risk as the country transitions to a new low-carbon and climate-resilient economy.

COSATU's role in the transition

COSATU, or the Congress of South African Trade Unions, has actively promoted the concept of a just transition in South Africa. COSATU created a comprehensive just transition **Blueprint for Workers**. The **Blueprint explains what a just transition** comprises and how it might help workers as the economy shifts to a low-carbon, climate-resilient model. COSATU's role is clearly articulated in the Blueprint that in the transition no worker is to be left behind, but **rather be capacitated to participate and contribute to the development of an eco-socialist economy** [3].



KEY MESSAGES

Message 1

Climate change is real and is affecting labor

Message 2

Young workers face various challenges, but the transition should be their opportunity to economic freedom

Message 3

Reskilling and upskilling of the young workers is crucial for South Africa to create new, reallocate workers, and minimize job losses

Message 4

The next five years are crucial for reskilling and upskilling of the young workers

Message 5

Reskilling and upskilling of the young workers is key in preventing market failures and continuation of monopolies

Message 6

Unions should contribute to reskilling, upskilling, and placement of young workers

CYW's concerns about climate change and just transition

COSATU recently launched a Cosatu Young Workers (CYW) to promote peer-to-peer recruitment and organizing, build leadership capacity of youth in unions, promote health and safety training, and fight precarious work. YWF was created to allow young workers a space to discuss their challenges and find solutions related to labour and the transition [4]. **In the recent held**

COSATU's Just Transition Blueprint to Structures Workshop with CYW in Johannesburg, November 2023, YWF's interests were aligned with COSATU's Just Transition Blueprint for Workers on climate change and just transition.

CYW on climate change

While specifics of CYW's work on climate change are not yet published, the forum allows young workers to discuss and strategize on a variety of issues, including climate change. **Climate change is a reality**, as verified at COSATU's Just Transition Blueprint to Structures Workshop with CYW in Johannesburg in November 2023. The rapid increase in greenhouse gas emissions from burning fossil fuels (such as coal, oil, and natural gas) leads to global warming which can disproportionately affects vulnerable and impoverished communities. **However, in the same session, there were still individuals who denied the necessity for climate action or who would defend fossil fuels at any costs.**

Just Transition

While specifics of **CYW's** work on just transition also not yet published, the YWF views the just transition as a game changer. **In Johannesburg, November 2023, CYW acknowledged that the transition is taking place, but it can only be "just" if the "just" component when the COSATU demands in the Blueprint are adequately addressed** [3]. Furthermore, if the "just" component considers young people at risk of losing their jobs and encourages them to be reskilled and upskilled as the future of work shifts to a low-carbon economy.

According to **CYW, South Africa contributes only approximately 1.5% of total carbon emissions, which is low compared to industrialized countries.** In this regard, the **CYW** voiced worry that there is no commitment to climate justice as capitalist pressures urge developing countries to accelerate their transformation. According to **CYW**, it is critical to understand that not all countries contributed equally to the current climate crisis. As a result, industrialized countries

should provide financial and technological assistance to underdeveloped countries during their energy transition, rather than loans. **And there must be a just energy revolution to guarantee that the advantages of local energy sector reforms are spread equitably, with an emphasis on youth reskilling and upskilling.**

Top six YWF demands concerning climate change and just transition

1. Accelerate a just, orderly, and equitable transition
2. Focus on people prosperity
3. Fix carbon-trade relationships
4. Fix climate finance
5. Underpin everything with full inclusivity
6. Commit to climate justice



3

Future of work trends

Global activity towards a green transition is now underway and expected to accelerate. **Traditional job and career paths from fossil-based industries are giving way to a new labour market that is more carbon and climate sensitive** hence the importance to understand to understand global trends in manufacturing, technology adoption and impact of adopted technologies on jobs.

MANUFACTURING, 2023-2027

Future of Jobs Survey (FJS) ranked technologies that are likely or highly likely to be adopted by 803 organization within the next five years

New jobs and career paths in the green economy are globally influenced by three macro trends: rising geopolitical tensions, localization of supply networks, and supply chain. East Asian countries are dominating these macro trends towards green transition. **However, these trends are expected to shift for countries as geopolitical tensions deepen and having a significant impact on supply chains driven by local beneficiation.** Supply chains are anticipated to become increasingly localized, particularly in high-emitting countries such as South Africa to reduce supply shortages impacted by global economic shocks [5].

TECHNOLOGY ADOPTION, 2023-2027

Future of Jobs Survey (FJS) ranked technologies that are likely or highly likely to be adopted by 803 organization within the next five years

In Figure 1 the FJS shows the future trends in technologies that are likely to be adopted by business by 2027 as the world shifts work toward a low-carbon economy. As in past years, digital platforms, education and workforce technologies are the top of this list. **Environmental management technologies, climate-change mitigation technology, power storage and generation, electric and autonomous vehicles** are strongly emerging with 64.5%, 62.8%, 52.1%, and 51.5% respectively. **These trends necessitate young workforce's ongoing reskilling and upskilling to match labour market supply and demands.**

Technology adotion, 2023 - 2027

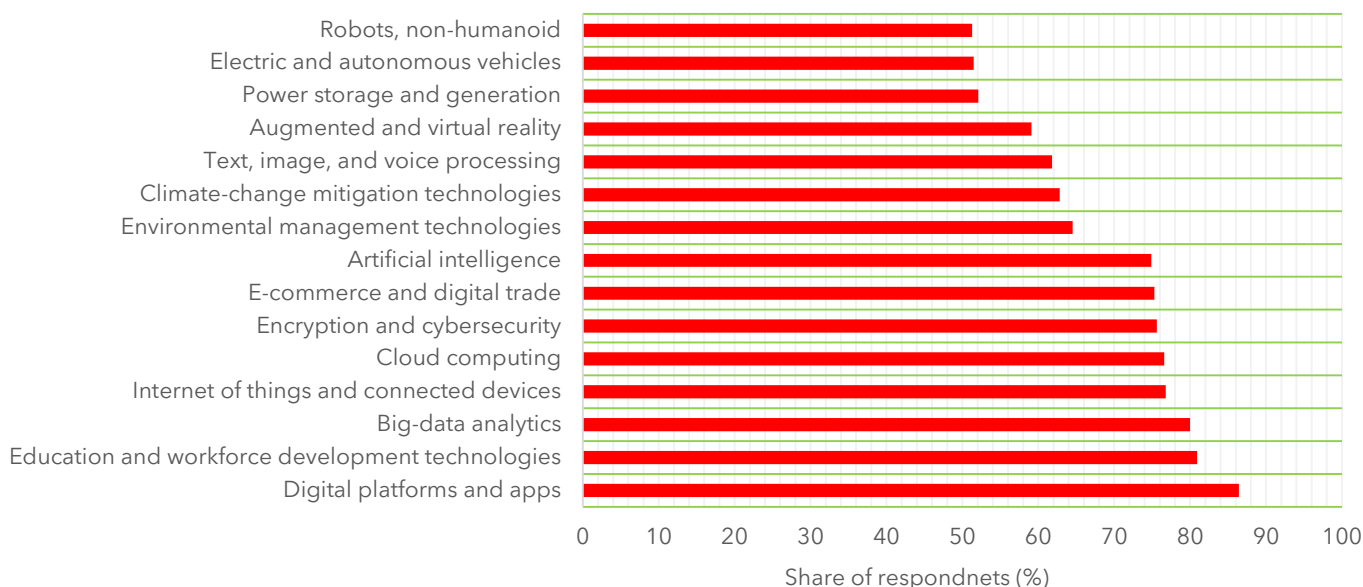


Figure 1: Technology adoption, 2023-2027 [5].



Expected impact of technology adoption on job, 2023-2027



Figure 2: Expected impact of technology adoption on jobs [6].

EXPECTED IMPACT OF TECHNOLOGY ADOPTION ON JOBS, 2023 - 2027



Future of Jobs Survey ranked the impact of technologies that are likely or highly likely to be adopted by 803 organization within the next five years

In Figure 2 big data analytics, climate change and environmental management technology, encryption and cybersecurity, and power storage and generation are significant drivers of job creators. **However, the green transition will displace many jobs in these industries, but it will also create more new jobs than it displaces.** As a result, young people should be reskilled and upskilled as soon as possible to fully capitalize on the new opportunities presented by a climate-smart future.

Climate smart future and what it means for the youth

Climate smart future

A climate-smart future is one in which everyone works to reduce the effects of climate change while also adjusting to existing conditions [7]. Climate change affects every country. However, it is possible to live in a "climate-smart" environment today. A climate-smart world will need to build infrastructure that can withstand changing conditions and support more people; use limited land and water resources to generate adequate food and biomass for fuel while preserving ecosystems; and rearrange the energy systems. **All of this is feasible because of the human-machine frontier, which aims to use digitalization for climate resilience as exemplified in Figure 3.**

The meaning of climate smart future to the youth

A climate-smart future is both an aspiration and a necessity. As South Africa grapples with the impacts of climate change, adopting strategies that enhance resilience, mitigate risks, and promote sustainable development becomes crucial. South Africa need investment in climate smart infrastructure in airports, highways, and hospitals; subways and railway systems; water utilities and agriculture; and power and telecommunications grids careers as the world transitions to a low carbon and climate resilient future. This provides an opportunity for the **CYW** to establish mechanisms and methods for identifying and quantifying job opportunities. **These opportunities will necessitate the need for young workers' continual reskilling and upskilling to match labour market supply and demand over the course of decades.**

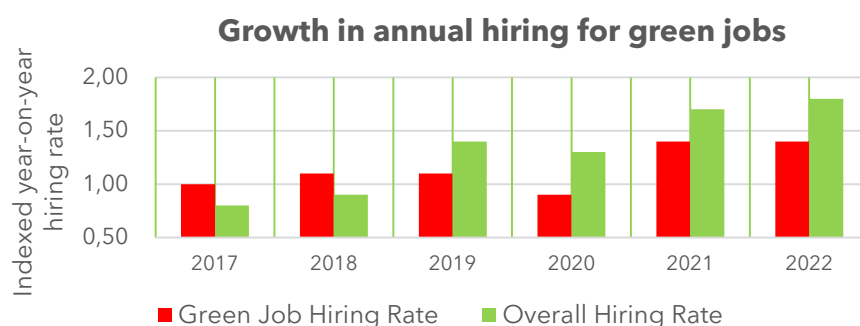


Figure 3: Growth in annual hiring rates for green jobs [8].

GREEN BY SMART

Future of Jobs Report, based on LinkedIn data

Meeting climate targets requires green jobs and a skilled workforce. This year's Future of Jobs Report, based on LinkedIn data, looked at how businesses and employees are responding to the green shift. Using specialized computer, algorithm, and data, recruitment companies have raised their green job recruitment rates, with green job growth outperforming overall hiring rate rise year after year since 2019, as shown in Figure 3. This is an example of a "climate smart future" where digitalization **(second highest job creator the following 5 years, see Figure 2)** is used to recruit workers as a means of mitigating the effects of climate change and moving toward sustainability, resilience, and equitable future.



Green jobs that contribute to adaptation strategy		Green jobs that contribute to mitigation strategy	
2023 - 2030 (Short term)	2031 - 2040 (Medium term)	2041 - 2050 (Long term)	2023 - 2030 (Short term)
<ul style="list-style-type: none"> - Actuary - Campaign Organiser - Climate Change Analyst - Climate Change Scientist - Climate Change Specialist - Climate Finance Specialist - Energy Economist - Energy Specialist - Environmental Educator - Environmental Scientist - Environmental Finance and Insurance Consultant - Investment Analyst - Policy Advisor - Policy and Planning Manager - Policy Consultant / Officer / Planner - Policy Development Manager - Public Policy Manager 	<p>Professions specified in the short term will continue to exist, together with a greater emphasis on the following:</p> <ul style="list-style-type: none"> - Communication Coordinator - Engineering Educator - Environmental Engineer - Financial Markets Practitioner - Grid Integration Manager - Grid Integration Specialist - Remuneration and Benefits Specialist - Safety, Health, Environment and Quality (SHE&Q) Practitioner - Social Scientist - Supply Chain Practitioner - Tax Professional 	<p>Professions specified in the short term will continue to exist, together with a greater emphasis on the following:</p> <ul style="list-style-type: none"> - Civil Engineer - Civil Engineering Technician - Civil Engineering Technologist - Construction Project Director - Construction Site Manager - Corporate Services Manager - Environmental Manager - Work Site Engineering 	<ul style="list-style-type: none"> - Business Development Manager - Chemical Engineer - Chemical Engineering Technician - Circular Economy Specialist - Civil Construction Worker - Civil Engineer - Civil Engineering Technician - Civil Engineering Technologist - College Lecturer - Construction Engineer - Construction Manager - Construction Project Manager - Construction Site Manager - Contract Manager - Contracts Lawyer - Contracts Officer - Control & Instrumentation Engineer - Corporate General Manager - Cost Engineer - Director (Enterprise / Organisation) - Draughtsperson - Electrical Design Engineer - Electrical Engineer - Electrical Engineering Technician - Electrical Engineering Technologist - Electrician - Employee Relations Advisor
			<p>Carry over of occupations listed in the short and medium term</p>

Table 1: Green jobs that contribute to adaptation and mitigation strategy. For more details please *appendix A*.



COSATU's Blueprint position on transitioning to a low-carbon, climate-resilient society and youth

COSATU 'Just Transition Blueprint for Workers' outlines the concept of a just transition, its implications for three key sectors (coal-energy value chain, agriculture, and transport), and strategies for workers to demand justice during the transition to a low-carbon and climate-resilient economy. **The Blueprint aims to empower workers to drive a profound economic transformation towards eco-socialism, rather than leaving them behind.**

COSATU's Blueprint position on transition to a low-carbon and climate resilience

COSATU's 2011 Policy Framework on Climate Change states that "A just transition means changes that do not disadvantage the working class". The Blueprint views the global warming and climate change, are exacerbated by capitalism accumulation for profit. The Blueprint states and unpacks this explicitly: "COSATU's vision for what a transformative and deep just transition must achieve — an eco-socialist future **articulated by five demands for a just transition: • industrial policy designed to create employment and sustainability • a Universal Basic Income Grant • reskilling and upskilling of workers • land redistribution • end austerity economic policies and instate a macroeconomic framework to deliver climate justice.**

The Blueprint builds on COSATU's 2011 Policy Framework on Climate Change, which outlined 15 principles for a just transition for workers. The 2011 Policy Framework on Climate Change identifies capitalism as the root cause of the climate catastrophe and proposes a holistic and revolutionary change. Its 15 Principles are outlined in page 4 of the Blueprint for Workers 2022 Summary Document

COSATU and youth

Youth unemployment is a significant challenge facing South Africa. According to the Quarterly Labour Force Survey (QLFS) for the first quarter of 2022, the unemployment rate was 63.9% for those aged 15-24 and 42.1% for those aged 25-34 years, significantly higher than the overall unemployment rate of 33.9% [9]. Here are some reasons for youth unemployment in South Africa:

- Limited access to education,
- Lack of job opportunities [9],
- Mismatches between the skills needed in the labour market and those provided through the educational system, and
- No equilibrium in demand and supply of labour [9].

Today, young people working in the coal-energy value chain, transportation, and agriculture feel frightened, dissatisfied, disillusioned, and misled due to a lack of reskilling and upskilling opportunities. **COSATU demands for reskilling and upskilling are critical components of a just transition so that the youth can be prepared to seize possibilities in the coal-energy value chain, transportation, and agriculture as they arise [3].**

COSATU acknowledges that empowering youth for greener jobs goes beyond symbolic gestures of inclusion; it puts the means for climate mitigation and adaptation in the hands of the next generation [4].



Transition unlocks opportunities for young workers

The future of employment is undergoing significant transition, driven by technology developments, rising demographics and environmental issues. These shifts are altering industries, redefining employment positions, and bringing both problems and opportunities to the workforce, particularly for young people who are still determining their future. It is a confusing and frightening moment for the youth. **However, in this changing context, the advent of green jobs brings promise, delivering not just economic prosperity but also a path towards environmental responsibility where new jobs will be created, new jobs absorbing laid-off workers, less jobs destroyed with high potential to relocate workers (see Figure 4).**

Jobs in demand across industries in a global energy sustainability scenario, 2030

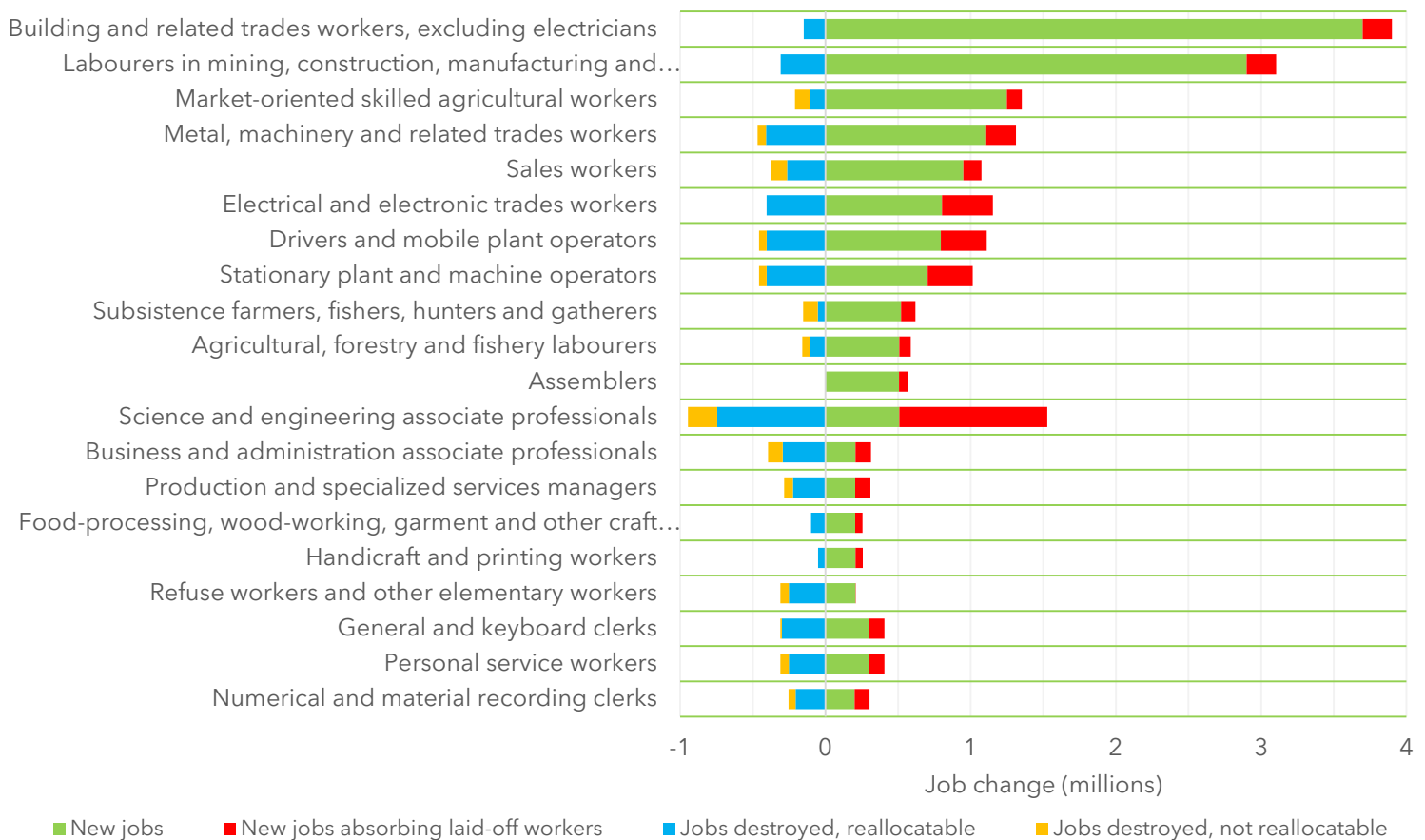


Figure 4: Occupations most in demand across industries in a global energy sustainability scenario, 2030 [5].

TRENDS IN JOB DEMAND ACROSS INDUSTRIES, 2030



Future of Jobs Survey ranked the impact of technologies that are likely or highly likely to be adopted by 803 organization within the next five years

Figure 4 shows how more jobs will be created than destroyed by 2030. Building, construction, and manufacturing are among the areas that will see strong demand. **There will be job losses throughout the transition, but there is a rising trend of reallocatable jobs, thus reskilling and upskilling are crucial to capitalizing on this opportunity and ensuring that no one falls behind.**

Opportunities the transition opens for young workers

On an international level

In 2017-19, the international labour Organization (ILO) performed research on "skills for green jobs, a global view. The analysis, examined 32 countries, including South Africa, which together account for 63% of worldwide employment, 65% of global GDP, and 63% of carbon dioxide emissions. ILO estimated the impact of the transition to energy sustainability by 2030 and beyond on employment. **This estimate indicates that almost 25 million jobs will be created and 7 million lost globally. However, 5 million jobs can be regained through labour reallocation, allowing workers who lose their jobs due to industry contraction to find other opportunities within the same country.** This indicates that between 1 and 2 million workers are expected to be in occupations where jobs would be lost without corresponding vacancies in other industries, necessitating retraining in new occupations. It also implies that substantial investment will be needed to train individuals in the skills required for over 20 million new jobs (see Figure 4) [5].

At a national stage

C40 Cities conducted research that found climate action may generate and support over 1.8 million green employments in South Africa by 2030. Roughly close to the 2.2 million COSATU members. **A 1.1 million of those jobs would be in the buildings, power, and sustainable transportation sectors, with almost 674,000 of those jobs** and 58% being generated and maintained inside the cities [17]. Such data present an opportunity for young workers to be reskilled and upskilled with skills aligned with data presented by C40 Cities.

Greening existing careers

Green jobs are decent jobs that contribute to the preservation or restoration of the natural environment. They can be found in both traditional (mining, manufacturing, and construction) and emerging green industries (renewable energy, energy efficiency). **Greening jobs improve energy and raw material efficiency, limit greenhouse gas emissions, reduce waste and pollution, protect, and restore ecosystems.** While greening current jobs can have positive outcomes, it is also important to address potential adverse consequences, such as:

- 1. Job displacement:** As South Africa transitions to greener industries, certain jobs in fossil-fuel-based sectors might be lost. Workers in coal mine or oil extraction, for example, may lose their jobs as renewable energy sources become more prevalent hence it is critical to balance job losses in environmentally unfriendly businesses with job growth in green sectors [10].
- 2. Skill mismatch:** As part of the transition, workers must adapt to new skills and technologies. If the workforce lacks the requisite skills or adaptability, others may struggle to find job in the changing landscape [11].
- 3. Short-term disturbances:** While greening programs aim to provide long-term advantages, there may be short-term disturbances. For example, certain climate change actions may result in temporary job losses. However, effective measures can limit the detrimental repercussions [10].
- 4. Economic shifts:** As the economy evolves, certain regions or communities may suffer economic changes. It is critical to resolve inequities and provide a fair transition for all workers [11].



To summarize, while green careers promote sustainability and environmental well-being, the government of South Africa must carefully control potential negative implications to ensure a balanced and equitable transition that is youth sensitive.

Other implications of climate change on careers

Climate change has far-reaching implications for various careers as indicated in the previous section. There are other implications that are equally important to opportunities in the transition and greening existing careers, they include:

1. **More job expectation:** Climate change poses significant challenges to sectors such the coal-energy value chain, transportation, and agriculture. However, these challenges can generate economic transformations that represent a significant threat to job security. As a result, South Africa should respond quickly to climate change through mitigation and adaptation policies. **These policies should create not just jobs, but more jobs than the industry in question. i.e. coal and other fossil fuels [12].**
2. **Fast response to climate change:** Investment in climate action is already generating jobs. For instance, the US solar business added jobs twenty times faster than the total economy, while China has the world's largest renewable energy job market, with 3.4 million people employed in the sector. In Germany, 370,000 people work in renewable energy, the highest number in Europe as proved by Organisation for Economic Co-operation and Development (OECD) research in Figure 5 [13]. **South Africa must adapt to climate change now by preparing its young workers to prevent market failure and monopolies from the international capitalism for the next 15 to 50 years.**

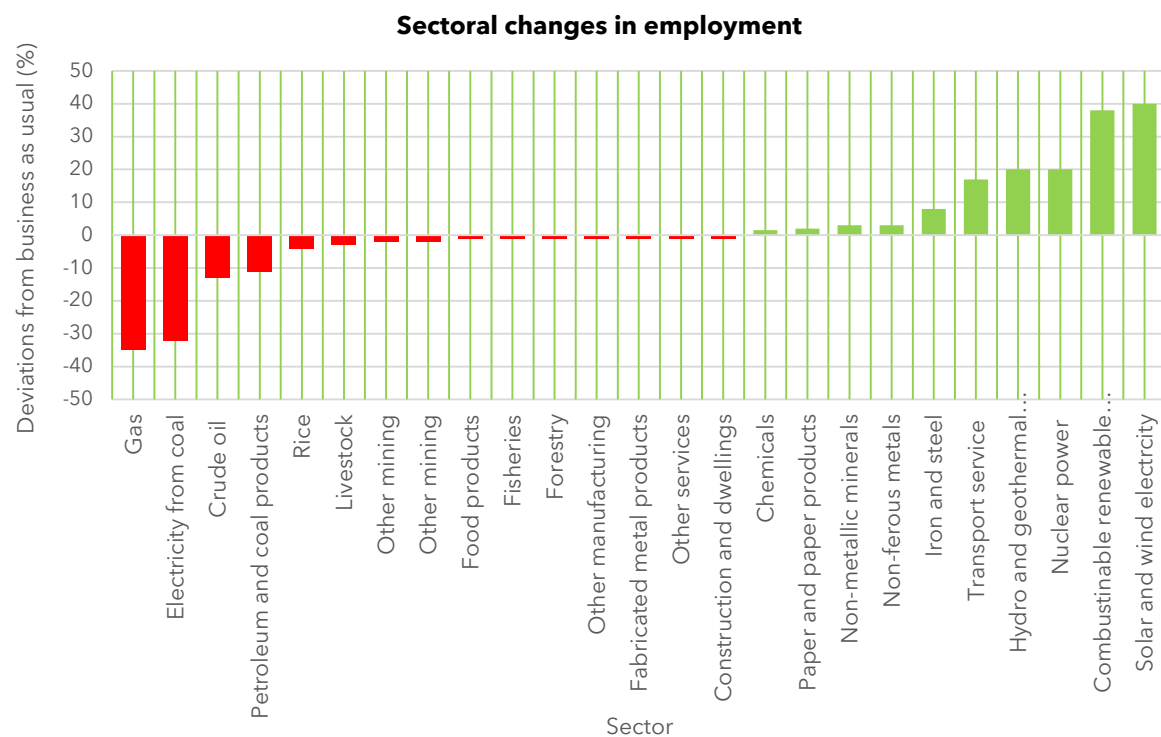


Figure 5: Sectoral changes in employment with ambitious climate change mitigation policies, OECD countries. In % deviation from the business-as-usual (BAU) scenario in 2030 [13].

Case studies of climate-smart jobs

RELEVANT UNION	CASE STUDY	KEY THEMES
AFADWU	Africa and the near East - using remote sensing to monitor water productivity [14]	Development of locally relevant ICT applications to monitor climate hazards and their impact on agriculture and farmers • Technology: Agriculture technologies and digital platforms • Jobs: Electronics, computer engineering, process control technicians civil engineering (technologist, technician, construction), and college lecturer
CWUSA	Communication strategies for building climate-smart farming communities [15]	Social behaviour change communication techniques for subsequent adoption • Technology: Agriculture technologies and digital platforms and apps • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist
DENOSA	Nurses Climate Challenge [16]	Educate health professionals and patients about the health impacts of climate change • Technology: Health and care technologies • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist and college lecturer
NEHAWU	Building climate-smart schools for a sustainable future [17]	Establishing climate-smart schools in East Africa that empower climate-resilient communities • Technology: Health and care technologies • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist, Electronics, computer engineering, process control technicians civil engineering (technologist, technician, construction), and college lecturer
NUM	Mining sector leads renewable drive [18]	Seriti a coal producer is currently building Africa's largest wind farm in Mpumalanga • Technology: Storage and power generation; and climate change mitigation technologies• Jobs: Electrical engineer, civil engineer, electrician, relations advisor, energy storage specialist, environment specialist, finance manager, mine oversee, lawyer, grid integration manager
POPCRU	Greening justice [19]	Interfacing criminal, social and ecological justice • Technology: Storage and power generation; and climate change mitigation technologies • Jobs: Electrical engineer, civil engineer, electrician, relations advisor, energy storage specialist, environment specialist, finance manager, lawyer, environmental scientist, environmentalist, finance and insurance consultant, and green economy specialist
SACCAWU	Embracing sustainability: green hotel renovation strategies [20]	Climate change awareness increasing, people are increasingly adopting more sustainable practices • Technology: Storage and power generation; and climate change mitigation technologies • Jobs: Electrical engineer, civil engineer, electrician, relations advisor, energy storage specialist, environment specialist, finance manager, lawyer,
SACTWU	Fashion and textiles case studies [21]	Textile, new business models and products cut carbon emissions much further and faster • Technology: Climate change mitigation technology, digital platforms and apps, environmental; management technologies • Jobs: Investment advisor, investment analyst, lawyer, civil engineer, finance manager, operations manager (production), administrator /

		coordinator / officer, procurement manager, programme or project manager, proposal engineer, campaign specialist, corporate communication manager, digital media designer, digital media specialist
SADNU	Nurses Climate Challenge [16]	Educate health professionals and patients about the health impacts of climate change • Technology: Health and care technologies • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist and college lecturer
SADTU	Building climate-smart schools for a sustainable future [17]	Establishing climate-smart schools in East Africa that empower climate-resilient communities • Technology: Education and workforce development technologies • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist, Electronics, computer engineering, process control technicians civil engineering (technologist, technician, construction), and college lecturer
SAEPU	Education, training, and public awareness initiatives for disaster risk reduction and adaptation [22]	Response strategies and prevention measures and identify lessons about success in disaster risk reduction and climate change adaptation • Technology: Health and care technologies • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist and college lecturer
SAMA	Tuberculosis innovations and health systems strengthening project (TBIHSS) [23]	Project to examine the intersection between TB and climate change, specifically air quality • Technology: Health and care technologies • Jobs: Medicine, campaign specialist, corporate communication manager, digital media designer, digital media specialist and college lecturer, environment specialist, finance manager, lawyer, environmental scientist, environmentalist, finance and insurance consultant, and green economy specialist
SAMWU	Kuala Lumpur as a climate-smart and low carbon city [24]	Urban planning in Kuala Lumpur today works to create a city that can withstand the effects of climate change and reduce risks from disasters • Technology: Education and workforce development technologies, Climate change mitigation technology, digital platforms and apps, environmental; management technologies • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist and college lecturer, environment specialist, finance manager, lawyer, environmental scientist, environmentalist, finance and insurance consultant, and green economy specialist, electronic engineering technician, climate specialist, energy efficiency manager , energy specialist
SASBO	Climate finance in action: case studies [25]	Interventions that have been successful in relation to specific areas of the principles of good climate finance • Technology: Education and workforce development technologies, Climate change mitigation technology, digital platforms and apps, environmental; management technologies • Jobs: Campaign specialist, corporate communication manager, digital media designer, digital media specialist and college lecturer, environment specialist, finance manager, lawyer, environmental scientist, environmentalist, finance and insurance consultant, and green economy specialist

How can young workers be capacitated and positioned for new jobs emerging?

Young workers have an important role in developing the future workforce. To prepare and equip them for the future green economy, it is critical to routinely explain and discuss prospects for professional advancement and methods to ensure they realize their potential growth during the transition. Establishing trust and rapport between young workers and the federation is critical in encouraging leadership, decision-making, and learning about avenues for professional advancement and development. Here are some strategies that can be adopted by YWF to capacitate its members and position them for new jobs emerging for building a sustainable and environmentally conscious workforce:

1. **Consortiums:** Develop consortiums in energy, climate, or sustainability through its member unions to set realistic goals and foster systems to facilitate green training for young workers, preparing them for sectoral mobility, common ownership, and entrepreneurship. **These consortiums can be accompanied by framework agreements guided by NEDLAC for social impact and the national innovation system to support the flow of skills, information, technology, and knowledge spillovers between labour, business, academia, and government which is key to the upskilling and reskilling process at the national level.** These consortiums aim to establish the framework for YWF's commitment to climate action by focusing on identifying green opportunities as highlighted in page 5.
2. **Green training:** Target education and research institutions that can equip young people with employable skills specifically tailored for green jobs. This includes Green Skills, SETA, SANEDI, National Cleaner Production Centre South Africa (NCPC) and Small-Scale Embedded Generation (SSEG), for technical, financial, and business model skills (such as renewable energy technologies, efficiency, electric vehicles, battery storage, conservation, and sustainable agriculture) and CSIR Innovation Leadership and Learning Academy (CILLA) for core skills (like communication, problem-solving, and teamwork).
3. **Funding: Establish new unionized or use existing funding mechanism** such as SETA, NRF, Green Card or Green Skills for skills development, knowledge spillovers and placement of young workers.
4. **Green entrepreneurship:** Encourage youth entrepreneurship to adopt green, circular, and sustainable business models. Form industry partnerships with the likes of Technology Innovation Agency (TIA) or National Advisory Council on Innovation to unlock financial support, non-financial support, and funding instruments supporting startups and businesses that align with environmental goals.
5. **Green empowerment and youth engagement:** Involve young workers in environmental policy advocacy and decision-making. Their opinions and thoughts are critical to effective solutions. For example, movements that function in a capitalistic industry but advocate strong eco-socialism to promote collective ownership of the means of production and generate chances for youth.

RECENT CONSORTIUM



Battery Energy Storage Systems (BESS) Consortium

United Nations Climate Change Conference (COP28), the Global Leadership Council (GLC) of the Global Energy Alliance for People and Planet (GEAPP) announced a groundbreaking initiative: the Battery Energy Storage Systems (BESS) Consortium. This consortium brings together 12 countries expressing interest. Their shared goal is to secure 5 gigawatts (GW) of battery energy storage systems by the end of 2024 [23]. **This consortium facilitates sectoral mobility, common ownership, and entrepreneurial state.**

By focusing on these five pillars and collaborating across sectors, YWF can pave the way for a just transition to a sustainable economy and meaningful opportunities for youth by **2030**.



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<https://briefly.co.za/37078-youth-unemployment-south-africa-current-sa-unemployment-rate-types-unemployment-consequ>," 2019. [Online]. Available: <https://briefly.co.za/37078-youth-unemployment-south-africa-current-sa-unemployment-rate-types-unemployment-consequences-economy.html>.
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Appendix A

Trend: Climate Change: Adaptation jobs that contribute to resilient and adaptable energy systems

Time horizon	2023-2040
Impact on the world of work	<ul style="list-style-type: none"> - Climate change and environmental degradation pose economic growth and employment challenges, and risks will become more significant in the medium- to long-term. However, if appropriately managed and mitigations are put in place, climate change and the associated impacts can create new work opportunities, and secure current jobs. - Occupations in the energy sector will be required to develop and implement disaster risk and adaptation strategies and interventions, including integration into current plans. This includes review of current infrastructure, risk management, strategic thinking and problem solving, forecasting and modelling, and actuarial analysis at all levels of government. - Current and future infrastructure plans (including smart cities, urban design and spatial planning) will require individuals to adequately review plans to ensure infrastructure is resilient and can withstand climatic shocks e.g. droughts and floods. - To ensure adequate buy-in to mitigation strategies and interventions, personnel and stakeholder awareness will be critical, and requires education practitioners to undertake this role. - In addition to the above a core component of resilience will be a shift towards more renewables and adopting energy efficiency practices (see the climate change: Achieving net zero carbon emissions by 2050 trend).
Minor occupation groups	<ul style="list-style-type: none"> - Managing Directors and Chief Executives - Physical and Earth Science Professionals - Mathematicians, Actuaries and Statisticians - Life Science Professionals - Engineering Professionals - Architects, Planners, Surveyors and Designers - University and Higher Education Teachers



- Finance Professionals

Types of priority occupations required for the transition

2023 - 2030 (Short term)	2031 - 2040 (Medium term)	2041 - 2050 (Long term)
<ul style="list-style-type: none"> - Actuary - Campaign Organiser - Climate Change Analyst - Climate Change Scientist - Climate Change Specialist - Climate Finance Specialist - Energy Economist - Energy Specialist - Environmental Educator - Environmental Scientist - Environmentalist - Finance and Insurance Consultant - Investment Analyst - Policy Advisor - Policy and Planning Manager - Policy Consultant / Officer / Planner - Policy Development Manager - Public Policy Manager - Remote Sensing Technicians - Resource Economist - Risk / Planning / Review / Analyst - Statistical Modeller - Trade Union Official - Urban and Regional Planner 	<p>Professions specified in the short term will continue to exist, together with a greater emphasis on the following:</p> <ul style="list-style-type: none"> - Communication Coordinator - Engineering Educator - Environmental Engineer - Financial Markets Practitioner - Grid Integration Manager - Grid Integration Specialist - Remuneration and Benefits Specialist - Safety, Health, Environment and Quality (SHE&Q) Practitioner - Social Scientist - Supply Chain Practitioner - Tax Professional 	<p>Professions specified in the short term will continue to exist, together with a greater emphasis on the following:</p> <ul style="list-style-type: none"> - Civil Engineer - Civil Engineering Technician - Civil Engineering Technologist - Construction Project Director - Construction Site Manager - Corporate Services Manager - Environmental Manager - Work Site Engineering Technician

Trend: Climate change: Mitigation jobs that contribute to achieving net zero carbon emissions by 2050

Time horizon	2023-2050
<p>Impact on the world of work</p>	<ul style="list-style-type: none"> - A transition to low- and net zero carbon will require a change in the country's energy mix, new technologies, new energy pathways and revised cohesive plans, aligned policy, new operating and integration models and new employment pathways. This will present new work opportunities, likely an increase in jobs (estimated 180,000 jobs by 2035 and 468,000 jobs by 2050 via decarbonisation of the energy sector), but also timing and employment risks. Long-term transition planning, guidance and financing is critical and requires up to date, aligned and clear vision and policy e.g. Integrated Resource Plan (IRP). - This significant shift will require a detailed review of current education and skills provisioning in the country and how it aligns with short-, medium- and long-term skills demands. This is likely



to result in the refinement and development of new education programmes, courses, research and curricula.

Shift from fossil fuels / decarbonisation

- A shift away from and reduction in use of fossil-fuels will result in reduced employment and affect local communities associated with coal mining and logistics, and most likely the oil and gas sectors.
- The shift away from coal is estimated to result in significant job losses in the sector - 48% by 2050. This shift will affect management and professional, process operators, maintenance personnel and artisan, truckers and clerical personnel working in these sectors. While most of these occupations listed are likely to find alternative employment outside these sectors, coal miners and process operators will be the most affected and/or unlikely to find like-for-like positions. Approximately 80,000 coal miners and 120,000 value chain jobs are at risk. This is compounded by 80% of the coal workforce having a matric or less. Therefore education, upskilling and reskilling will be critical to ensure e.g. coal miners can easily move into other sectors.
- This shift will also have an impact on the localisation of jobs e.g. from Mpumalanga to Northern Cape (solar PV). There is a need to ensure no one is left behind e.g. alternative job provisioning in current location, or relocation is considered, well planned and targeted in communities that are impacted
- Skills will be required in labour force and community stakeholder engagement and negotiation to realise a just transition for this sector of the workforce and associated communities.
- Decommissioning or retrofitting of coal-fired plants will require unique skills and knowledge, as well as upskilling of the current coal-fired power workforce.

Renewable energy (solar, wind, biomass)

- The growth of the renewable energy sector will require the necessary jobs and skills to fulfil the sector's growth potential, including jobs in planning and strategy, research and development (R&D), technology manufacture, installation and construction, operations, management and maintenance, sales and marketing, and associated clerical and technical work. Increasing the share of renewables will increase employment opportunities with this demand partially substituting the decline in coal-related jobs. While predictions for renewable energy job



creation numbers vary, the following have been suggested:
Wind (130,000 direct and in-direct up to 2030).

- Currently there is a scarcity of specialist renewable energy technical and managerial skills. This will require the education, training and upskilling of e.g. engineers and technicians to shift into.
- There is likely to be a shift away from corporate monopolies to privatisation and decentralisation. More responsibility will fall on local municipalities to procure, negotiate and set tariffs, trade and manage the electricity generated within their jurisdictions (see the Evolving Energy Markets trend below).

Clean energy (automotive, industry, green hydrogen, nuclear)

- Clean energy, such as efficiency, new technologies and automotive will require new roles or upskilling of the existing workforce in industry to manufacture, procure, install, maintain and monitor low-emission products e.g. electric vehicles, appliances and technologies e.g. green hydrogen.

Minor occupation groups

- Legislators and Senior Officials
- Managing Directors and Chief Executives
- Business Services and Administration Managers
- Sales, Marketing and Development Managers
- Manufacturing, Mining, Construction and Distribution Managers
- Life Science Professionals
- Engineering Professionals
- Architects, Planners, Surveyors and Designers
- University and Higher Education Teachers
- Vocational Education Teachers
- Finance Professionals
- Sales, Marketing and Public Relations Professionals
- Legal Professionals
- Social and Religious Professionals
- Physical and Engineering Science Technicians
- Mining, Manufacturing and Construction Supervisors
- Process Control Technicians
- Sales and Purchasing Agents and Brokers
- Regulatory Government Associate Professionals
- Sheet and Structural Metal Workers, Moulders and Welders
- Machinery Mechanics and Repairers
- Electrical Equipment Installers and Repairers
- Mining and Construction Labourers



Types of priority occupations required for the transition

<p>2023 - 2030 (Short term)</p>	<p>2031 - 2040 (Medium term)</p>	<p>2041 - 2050 (Long term)</p>
<p>Shift from fossil fuels / decarbonisation:</p> <ul style="list-style-type: none"> - Benefits Manager - Business / Community /Disability Liaison Officer - Campaign Organiser - Climate Change Analyst - Climate Change Scientist - Communication Coordinator Corporate Communication Manager - Economic Advisor - Economic Consultant - Education Specialist - Education Training and Skills Development Manager - Employee Relations Advisor - Employment Relations Officer - Energy Economist - Energy Specialist - Environmental Scientist - Environmentalist - Finance and Insurance Consultant - Green Economy Specialist - Human Resource Manager - Journalist - Labour Dispute Enforcement Agent - Lawyer - Local Economic Development Manager - Local Economic Development Specialist - Mine Overseer (Projects) - Mineral Resources Manager Mining Engineer - Mining Manager - Policy and Planning Manager - Policy Consultant / Officer / Planner - Policy Development Manager 	<p>Carry over of occupations listed in the short term, plus an increased focus on the following:</p> <p>Shift from fossil fuels / decarbonisation:</p> <ul style="list-style-type: none"> - College Lecturer - Environmental Educator - Mine Closure Engineer - Mine Closure Manager - Programme Evaluator - Research and Evaluation Analyst - TVET Educator - University Lecturer 	<p>Carry over of occupations listed in the short and medium term.</p>



<ul style="list-style-type: none"> - Principal Disputes Referee - Programme or Project Manager - Public Policy Manager - Risk / Planning / Review / Analyst - Skills Development Strategist - Social Scientist - Statistical Modeller - Trade Union Official - Urban and Regional Planner 		
<p style="text-align: center;">Renewable energy (solar, wind, biomass, marine)</p> <ul style="list-style-type: none"> - Business Consultant - Business Development Manager - Chemical Engineer - Chemical Engineering Technician - Circular Economy Specialist - Civil Construction Worker - Civil Engineer - Civil Engineering Technician - Civil Engineering Technologist - College Lecturer - Construction Engineer - Construction Manager - Construction Project Manager - Construction Site Manager - Contract Manager - Contracts Lawyer - Contracts Officer - Control & Instrumentation Engineer - Corporate General Manager - Cost Engineer - Director (Enterprise / Organisation) - Draughtsperson - Electrical Design Engineer - Electrical Engineer - Electrical Engineering Technician - Electrical Engineering Technologist - Electrician - Employee Relations Advisor - Energy Economist - Energy Specialist - Energy Storage Advisor - Energy Storage Engineer - Energy Storage Technician - Environmental Engineer - Environmental Manager - Environmental Scientist - Finance Director - Finance Manager - Financial Business Analyst - Financial Markets Investment Advisor - Financial Markets Practitioner - Fossil Power Plant Process Controller - Grid Integration Manager 	<p style="text-align: center;">Renewable energy (solar, wind, biomass, marine)</p> <p>Carry over of occupations listed in the short term, plus an increased focus on the following:</p> <ul style="list-style-type: none"> - Biochemical Engineer - Biochemical Engineer - Biofuels Processing technicians - Biofuels Production Manager - Biofuels/Biodiesel Technology and Product Development Managers - Compliance Officer - Engineering Educator - Environmental Educator - Maintenance Planner - Maintenance Technologist - Marine Engineer - Marine Engineering Technologist - Marketing Practitioner - Property Portfolio and Asset Manager - Sales and Marketing Manager - Sales Representative - Science Educator - Waste Management Practitioner - Wave Energy Specialist 	<p style="text-align: center;">Renewable energy (solar, wind, biomass, marine)</p> <p>Carry over of occupations listed in the short and medium term, plus an increased focus on the following:</p> <ul style="list-style-type: none"> - Biomass Power Plant Manager - Bioprocess Engineer



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- Human Resource Manager
- Independent Power Producer (IPP) Specialist
- Instrument Mechanician (Industrial Instrumentation & Process Control)
- Investment Advisor
- Investment Analyst
- Lawyer
- Mechanical Engineer
- Mechanical Engineering Technologist
- Operations Manager (Production)
- Pipe Fitter
- Policy Consultant / Officer / Planner
- Pollution and Waste Manager
- Power Distribution Engineer
- Power Generation Operations Manager
- Power Systems Engineer
- Power Transmission Engineer
- Process Design Engineer
- Procurement Administrator / Coordinator / Officer
- Procurement Manager
- Programme or Project Manager
- Proposal Engineer
- Quantity Surveyor
- Regulatory Affairs Officer
- Renewable Energy Engineer
- Renewable Energy Manager
- Renewable Energy Specialist
- Renewable Energy Technologist
- Research and Development Manager
- Research Consultant
- Risk / Planning / Review / Analyst
- Safety, Health, Environment and Quality (SHE&Q) Practitioner
- Social Scientist
- Solar Business Development Manager
- Solar Photovoltaic Engineer
- Solar Photovoltaic Installer
- Solar Photovoltaic Specialist
- Solar Photovoltaic Technologist
- Statistical Modeller
- TVET Educator



<ul style="list-style-type: none"> - University Lecturer - Wind Energy Operations Manager - Wind Energy Specialist - Wind Turbine Engineer - Wind Turbine Technologist 		
<p>Clean energy (automotive/ transportation, industry, green hydrogen, gas/ nuclear):</p> <ul style="list-style-type: none"> - Business Consultant - Business Development Manager - Circular Economy Specialist - Contract Manager - Contracts Lawyer - Contracts Officer - Corporate Communication Manager - Corporate General Manager - Cost Engineer - Electrical Design Engineer - Electrical Design Technicians - Energy Economist - Environmental Engineer - Environmental Manager - Environmental Scientist - Finance Director - Finance Manager - Financial Business Analyst - Financial Markets Investment Advisor - Financial Markets Practitioner - Green Hydrogen Analyst - Green Hydrogen Specialist - Health and Safety Officer / Coordinator / Professional - Human Resource Manager - Investment Advisor - Investment Analyst - Lawyer - Mineral Economist - Nuclear Energy Engineer - Nuclear Energy Technologist - Nuclear Engineering Technicians - Nuclear Physicist - Nuclear Power Plant Process Controller - Nuclear Power Plant Process Operator - Operations Manager (Production) 	<p>Clean energy (automotive/ transportation, industry, green hydrogen, gas/ nuclear):</p> <p>Carry over of occupations listed in the short term, plus an increased focus on the following:</p> <ul style="list-style-type: none"> - Automotive Engineer - Automotive Engineering Technician - Civil Construction Worker - Compliance Officer - Construction Engineer - Construction Project Manager - Construction Site Manager - Electrical Educator - Electrical Engineer - Electrical Engineering Technician - Electrical Engineering Technologist - Electrician - Engineering Educator - Engineering Manager - Fuel Cell Engineer - Fuel Cell Technician - Green Hydrogen Business Development Manager - Logistics Manager - Maintenance Technologist - Marketing Practitioner - Pipe Fitter - Power Systems Engineer - Procurement Administrator / Coordinator / Officer - Procurement Manager - Programme or Project Manager - Quality Assurance / Systems Auditor - Safety, Health, Environment and Quality (SHE&Q) Practitioner - Sales and Marketing Manager - Sales Representative - Social Scientist - Supply Chain Practitioner 	<p>Clean energy (automotive/ transportation, industry, green hydrogen, gas/ nuclear):</p> <p>Carry over of occupations listed in the short and medium term, plus an increased focus on the following:</p> <ul style="list-style-type: none"> - Electric Vehicle Station Attendant - Electric Vehicle Station Manager - Green Hydrogen Marketing Practitioner



<ul style="list-style-type: none"> - Policy Consultant / Officer / Planner - Process Design Engineer - Process Design Technician - Proposal Engineer - Radiation Control/ Nuclear Monitoring Technician - Radiation Protection Expert - Regulatory Affairs Officer - Renewable Energy Specialist - Research and Development Manager - Research Consultant - Risk / Planning / Review / Analyst 		
<p style="text-align: center;">Energy efficiency</p> <ul style="list-style-type: none"> - Air-conditioning and Refrigeration Mechanic - Auditor - Boiler and Pipe Insulation Worker - Boilermaker - Business Consultant - Campaign Specialist - Climate Change Analyst - Climate Change Scientist - College Lecturer - Control & Instrumentation Engineer - Corporate Communication Manager - Diesel Mechanic - Digital Media Designer - Digital Media Specialist - Electric Power Generation Engineer - Electric Power Plant Operator - Electrical Educator - Electrical Engineer - Electrical Engineering Technician - Electrical Engineering Technologist - Electrical Foreman - Electrician - Electronic Engineering Technician - Energy Efficiency Manager - Energy Efficiency Specialist - Energy Efficiency Technician Energy Engineer - Energy Engineering Technologist - Energy Specialist - Engineering Educator - Engineering Maintenance Manager 	<p style="text-align: center;">Energy efficiency</p> <ul style="list-style-type: none"> - Air-conditioning and Refrigeration Mechanic - Auditor - Boiler and Pipe Insulation Worker - Boilermaker - Business Consultant - Campaign Specialist - Climate Change Analyst - Climate Change Scientist - College Lecturer - Control & Instrumentation Engineer - Corporate Communication Manager - Diesel Mechanic - Digital Media Designer - Digital Media Specialist - Electric Power Generation Engineer - Electric Power Plant Operator - Electrical Educator - Electrical Engineer - Electrical Engineering Technician - Electrical Engineering Technologist - Electrical Foreman - Electrician - Electronic Engineering Technician - Energy Efficiency Manager - Energy Efficiency Specialist 	<p style="text-align: center;">Energy efficiency</p> <p>Carry over of occupations listed in the short term.</p>



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| <ul style="list-style-type: none"> - Engineering Manager - Engineering Teacher - Environmental Manager - Environmental Scientist - Facilities Manager - Finance Director - Finance Manager - Financial Business Analyst - Fossil Power Plant Process Controller - Fossil Power Plant Process Operator - Fossil Power Plant Process Technician - Graphic Artist - Instrument Mechanician (Industrial Instrumentation & Process Control) - Insulating Contractor - Insulation Installer - Internal auditor - Machine Operator - Maintenance Planner - Maintenance Technologist - Mechanical Engineer - Mechanical Engineering Technologist - Metre Technician - Millwright - Operations Manager (Production) - Power Station Attendant - Procurement Administrator / Coordinator / Officer - Procurement Manager - Programme or Project Manager - Quality Assurance / Systems Auditor - Safety, Health, Environment and Quality (SHE&Q) Practitioner - TVET Educator - University Lecturer | <ul style="list-style-type: none"> - Energy Efficiency Technician - Energy Engineer - Energy Engineering Technologist - Energy Specialist - Engineering Educator - Engineering Maintenance Manager - Engineering Manager - Engineering Teacher - Environmental Manager - Environmental Scientist - Facilities Manager - Finance Director - Finance Manager - Financial Business Analyst - Fossil Power Plant Process Controller - Fossil Power Plant Process Operator - Fossil Power Plant Process Technician - Graphic Artist - Instrument Mechanician (Industrial Instrumentation & Process Control) - Insulating Contractor - Insulation Installer - Internal auditor - Machine Operator - Maintenance Planner - Maintenance Technologist - Procurement Administrator / Coordinator / Officer - Procurement Manager - Programme or Project Manager - Quality Assurance / Systems Auditor - Safety, Health, Environment and Quality (SHE&Q) Practitioner - TVET Educator - University Lecturer | |
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