



OECD Education Working Papers No. 318

Enhancing green career
guidance systems
for sustainable futures

**Young Chang,
Anthony Mann**

<https://dx.doi.org/10.1787/e6ad2d9c-en>

DIRECTORATE FOR EDUCATION AND SKILLS

Enhancing Green Career Guidance Systems for Sustainable Futures

OECD Education Working Paper No. 318

This working paper has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD

Young Chang (young.chang@oecd.org)
Anthony Mann (Anthony.mann@oecd.org)

JT03547151

OECD EDUCATION WORKING PAPERS SERIES

OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed herein are those of the author(s).

Working Papers describe preliminary results or research in progress by the author(s) and are published to stimulate discussion on a broad range of issues on which the OECD works. Comments on Working Papers are welcome, and may be sent to the Directorate for Education and Skills, OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union Member States of the OECD and the European Union.

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Kosovo*: This designation is without prejudice to positions on status, and is in line with United Nations Security Council Resolution 1244/99 and the Advisory Opinion of the International Court of Justice on Kosovo’s declaration of independence.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.

Comment on the series is welcome, and should be sent to edu.contact@oecd.org.

This working paper was realised by the Career Readiness team at the OECD with the support of the JPMorgan Chase Foundation. The views expressed in this report should not be taken to reflect the official position of the OECD member countries or the JPMorgan Chase Foundation.

www.oecd.org/edu/workingpapers

© OECD 2024

JPMORGAN CHASE & CO.

Abstract

The global challenge of the green transition, aimed at achieving net-zero emissions, is expected to reshape the labour market significantly. This shift presents both economic and redistributive challenges, with a particular concern for young people entering the job market. Education plays a crucial role in preparing students with the knowledge, skills, attitudes, and values needed for green careers. However, there is a gap in how well schools are preparing students for these opportunities. Effective career guidance systems are essential to serve as bridges between students' interests and labour market demands. This study examined 87 programmes within primary and secondary education across 20 OECD countries, aimed at enhancing students' understanding of and progression towards green careers. These programmes, though not exhaustive, provide valuable insights into the conceptualisation and implementation of green guidance programmes, which are expected to become increasingly important in the future.

Table of contents

Abstract	3
1. The Green Transition and the Labour Market	6
1.1. Green jobs and brown jobs	6
1.2. Green job growth and employment.....	12
1.3. Strategic shortages in the green transition	13
1.4. Conclusion	14
2. Green Futures	15
2.1. What does the PISA tell us about student interest in environmental matters?.....	15
2.2. What do young people think about green employment? Insights from the OECD’s PISA 2018 survey.....	19
2.3. Insights from non-OECD survey data.....	19
2.4. Conclusion	20
3. Methodology and Conceptual Approaches	21
3.1. Project methodology: How the study was conducted	21
3.2. Qualitative analysis constituted a significant part of the methodology, focusing on two questions:	22
3.3. Conceptualising green guidance	22
3.4. An OECD Framework for green guidance	23
3.5. Predictors of better employment outcomes: Exploring, Experiencing and Thinking about career development	26
3.5.1. Exploring the future	26
3.5.2. Experiencing the future	26
3.5.3. Thinking about the future.....	27
3.6. Green guidance in the context of effective career guidance: OECD Career Readiness Indicators and capitals analysis.....	27
4. Examples of Practice: Green Guidance Programmes	28
4.1. Building student environmental literacy for green careers	29
4.1.1. Examples of programmes promoting environmental literacy	31
4.2. Helping students understand green jobs	33
4.2.1. Personalised career development	34
4.2.2. Applied learning: Connecting the curriculum with green careers.....	36
4.3. Helping students progress towards green jobs.....	41
4.3.1. Offering insights into green industries that are timely and relevant	42
4.3.2. Programmes offering self-reflection, assessments and targeted opportunities to foster skills	45
4.3.3. Workplace experience: Engaging with employers	47
4.4. Green career pathway programmes	50
4.4.1. Examples of green career pathway programmes.....	50
5. Conclusion	52
Annex A	54
References	64

Tables

Table 1.1. Commonly used definitions of green jobs	10
Table 1.2. Labour market studies quantifying green employment	12
Table 3.1. Indicators of teenage career readiness	25
Table 4. Examples of green guidance	54

Figures

Figure 2.1. Student self-efficacy regarding global issues, by task	15
Figure 2.2. Students' capacity to take action	16
Figure 2.3. Students who agree or strongly agree to the statement that “looking after the global environment is important to me”	17
Figure 2.4. Young people care about climate change but often feel unable to make a difference	18
Figure 3.1. Distribution of green guidance programmes	21
Figure 3.2. Model of green guidance	24
Figure 4.1. Student environmental attitudes by proficiency in science	30
Figure 4.2. A model of green guidance: helping students understand green jobs.	34
Figure 4.3. Providers of green guidance found across 20 countries	37
Figure 4.4. A model of green guidance: Helping students progress towards green jobs	42

Boxes

Box 1.1. The impacts of climate change	7
Box 4.1. Digital versus in-person delivery of career guidance	35

1. The Green Transition and the Labour Market

One of the world's most formidable challenges expected to drive significant transformation of the current labour market is the green transition (OECD, 2023^[1]). The global environmental and climate challenges facing today's societies are urgently calling for sustainable strategies and significant reductions in emissions. In economic policy, the green transition, or sometimes referred to as the net-zero transition, is understood as the transformation of all economic sectors to net-zero emissions of greenhouse gases (Keese and Marcolin, 2023^[2]). Within the next decade, the shift towards net-zero is expected to impact industrial production, consumption patterns and energy provision on a global scale, ultimately resulting in large economic and redistributive consequences as it interacts with other important megatrends shaping the global economy (OECD, 2023^[1]). Many longstanding jobs are expected to disappear or change significantly as many new jobs emerge, and there is increasing global concern that a lack of workers with relevant skills can hold back the green transition (OECD, 2023^[1]). For young people approaching the labour market, this has important consequences. Just as with any substantive change to patterns of labour market demand, it is important that young people are helped to understand how changes in the economy might increase or reduce the likelihood of finding desirable employment. More than this, if sufficient skills are to be in place to meet the needs of the green transition, it is essential that strategically important jobs linked to the fight against climate change are well signalled to young people and that they are helped in their understanding of, and progression towards them. Studies show that youth are strongly interested in actively creating a more sustainable world but often struggle to understand how they can best contribute through their working lives. Governments are increasingly recognising these imminent challenges and increasing efforts to better anticipate and prepare for labour market transformations along within environmental policies (OECD, 2023^[1]). In this economically disruptive context, education is uniquely placed to not only prepare students through robust academic preparation, but also to foster knowledge, skills, attitudes and values required to meet the challenges and opportunities of the future labour market through effective, efficient and equitable career education and guidance.

1.1. Green jobs and brown jobs

It is widely agreed that the global response to the climate crisis will have significant impacts on patterns of demand within the labour market as the world shifts towards less environmentally damaging and more resource-efficient activities (OECD, 2023^[1]). Three main effects of the green transition on the labour market are expected:

1. New types of jobs will emerge, creating economic opportunities that do not currently exist (i.e., green jobs)
2. There will be a loss of some existing jobs, particularly those that contribute to climate change and environmental degradation (i.e., brown jobs)
3. There will be a shift in the skills and knowledge that are required for many jobs

Box 1.1. The impacts of climate change

Despite efforts to mitigate global warming, climate change has already incurred considerable costs around the world. It continues to pose a significant risk to the stability of many natural and human systems, including human health, terrestrial and aquatic ecosystems as well as food production (OECD, 2023^[3]). Climate change has also brought considerable risks to the economy by reducing productivity, disrupting business activities, damaging business equipment and infrastructure, as well as destroying jobs (ILO, 2022^[4]).

All regions of the world have suffered negative impacts from climate change (IPCC, 2021^[5]). Flooding from storm surges, combined with sea-level rise, is jeopardising the habitability and economic structures of coastal areas. The escalating average and extreme temperatures, particularly in urban settings, are leading to increased heat-related morbidity and harm to human mental health. Climate change is also fuelling extreme wildfires, threatening livelihoods, communities and causing irreversible environmental damage (OECD, 2023^[3]). Slow-onset impacts, such as desertification and soil salination, have already displaced approximately 250 million people (IPCC, 2019^[6]). Additional negative climate impacts in recent years have included droughts, land and forest degradation, ocean acidification, glacier melting and biodiversity loss.

In adherence to the 2015 Paris Agreement, signatory countries pledged to limit the average global temperature rise to below 2°C and as close as possible to 1.5°C above pre-industrial levels, meaning, circa 1800s. While progress has been made in lowering emissions, climate targets are unlikely to meet Paris goals at the current pace (OECD, 2022^[7]). According to the World Meteorological Organization (WMO), the global mean near-surface temperature was already recorded at 1.4°C above the pre-industrial average in 2023.

The commitment of OECD countries to advance environmental sustainability through education, as articulated in the 2022 Ministerial Declaration, is therefore, timely (OECD, 2023^[8]). Education, training and research have an important role in promoting the knowledge, skills, values and mindsets that can help drive scientific and technological innovations needed to mitigate and adapt to climate change (United Nations Environment Programme, n.d.^[9]). Education can catalyse broader societal and behavioural changes required to ensure a resilient green transition and empower all to act for a just, resilient and sustainable future (OECD, 2023^[8]).

Although the green transition is bringing about significant shifts in the labour market both at a local and global scale, there is still a lack of universally agreed-upon definition for a 'green job.' Definitions of green jobs vary across international organisations, governments and industries (OECD, 2023^[1]; Vandeplas et al., 2022^[10]), impeding effective policy design across various sectors. This shortcoming not only complicates understanding the full impact of the green transition on labour markets but also poses a challenge for stakeholders engaged in ensuring an effective flow of skills and human resources into strategically important fields of employment.

Empirical literature draws upon two dominant approaches for quantifying and classifying green jobs: top-down and bottom-up. See Table 1.2 for an overview of the definitions. The top-down approach identifies a subset of sectors and industries that can be considered green, considering all employment within those sectors and industries as a 'green job' (OECD, 2023^[1]; Valero et al., 2021^[11]). The identification of these sectors/industries vary significantly, ranging from a narrow focus on the renewable energy sector to a broader

focus on the environmental goods and services sector (EGSS) which can include green activities such as environmental protection or conservation (Valero et al., 2021^[11]).

The United Nations uses a top-down approach to characterise green jobs as positions within sectors that significantly contribute to the preservation or restoration of environmental quality while minimising waste production and pollution (UNEP, 2008^[12]). The International Labor Organization (ILO) also takes a sectoral approach by defining green jobs as "decent jobs across various economic sectors (e.g., agriculture, industry, services, administration) that play a role in safeguarding, revitalizing, and improving environmental quality." The ILO's interpretation encompasses two key aspects. Firstly, green jobs aid in "reducing the environmental impact of businesses and economic sectors by enhancing energy, raw material, and water efficiency; decarbonizing the economy and reducing greenhouse gas emissions; minimising or preventing all forms of waste and pollution; safeguarding or restoring ecosystems and biodiversity; and supporting adaptation to climate change effects" (ILO, 2022^[4]). Secondly, the ILO incorporates a social dimension, emphasising "decent" jobs as ones that are productive, secure and offer equitable remuneration.

The ILO also makes a distinction between 'green' and 'greening' jobs. While green jobs are directly linked to the environment and sustainable economy, greening jobs are "*professions whose purpose is not environmental, but which integrate new 'skills blocks' to take into account, in a significant and quantifiable way, the environmental dimension [of the occupation]*" (ILO, 2022^[4]). Some examples of greening jobs include farmers in organic production, lumberjacks in eco-managed forests, plumbers installing heat pumps, or masons in bioclimatic construction.

The second dominant approach, the bottom-up, uses information on occupational skills, tasks and job titles (e.g., sustainability officer) as a means to categorise green jobs (OECD, 2023^[1]; Valero et al., 2021^[11]). The most widely used bottom-up approach is the definition developed by the Occupational Information Network (O*NET) of the U.S. Department of Labor. The approach further expands what could be considered a green job, as green jobs are not limited to net-zero industries but are defined based on particular skills and tasks related to the job. This means that green jobs can be found across every industry, including those that are not traditionally considered green or even those that are usually considered 'brown' or highly polluting. For instance, employing a bottom-up approach, a lawyer can be classified as a green occupation if their duties involve performing green tasks, like drafting legislation to decrease pollution and mitigate environmental risks. Conversely, a top-down approach would designate the lawyer as a white job, irrespective of their involvement in green initiatives, since lawyers typically belong to the public administration and legal sector, which is not directly associated with achieving net-zero emissions. However, lawyers working within the Environmental Goods and Services Sector (EGSS), which is recognised as a net-zero sector, would be categorised as a green job under the top-down approach.

Other definitions use "skills" as a means of defining green jobs. The European Centre for the Development of Vocational Training (Cedefop) characterises green skills as "*the knowledge, competencies, values, and attitudes necessary for living in, promoting, and sustaining a sustainable and resource-efficient society*" (Cedefop, 2012^[13]). Having green skills means possessing the knowledge, competencies, and expertise required to effectively use and implement green technologies and processes, as well as to live in, develop and support a sustainable and resource-efficient society (UNFCCC, 2023^[14]). Examples of skills that can be considered green include a range of technical and soft skills, such as proficiency in sustainable technologies and practices, the ability to analyse and reduce environmental impacts, as well as ethical decision-making that promotes sustainability (Arthur, 2022^[15]).

The United Nations Industrial Development Organization (UNIDO) has identified four groups of work tasks, which have also been informed by the analysis of Vona, Marin and Consoli (2018^[16]) that will be important for green jobs:

- **Engineering and technical skills:** hard skills related to the design, construction and assessment of technology, typically used by engineers and technicians. These set of skills are needed for eco-buildings, renewable energy design and energy-saving research and development projects.
- **Science skills:** competencies that are broad in scope and essential to scientific innovation. These skills are in high demand in each stage of value chains and in the utility sector for basic amenities such as water, sewage services and electricity.
- **Operation management skills:** know-how related to change in organisational structure required to support green activities in business, including aspects of management, production and cooperation with external actors. These skills are particularly important for sales engineers, climate change analysts, sustainability specialists, chief sustainability officers and transportation planners.
- **Monitoring skills:** skills related to the technical and legal aspects of business activities. These refer to skills required to assess observance of technical criteria and legal standards. Examples are environmental compliance inspectors, nuclear monitoring technicians, emergency management directors and legal assistants.

In addition to these skills, UNIDO also identifies ‘soft’ skills, such as design thinking, creativity, adaptability, resilience and empathy, as important for the green transition (Arthur, 2022^[15]).

In 2021, the European Classification of Occupations, Skills and Competences (ESCO) Secretariat built a taxonomy of green skills and occupations to support progress on the 2019 European Green Deal. ESCO used a machine learning algorithm to recognise and categorise skills into green, brown, and white classifications using a large dataset from over 30 European and international studies and sources (European Commission, 2021^[17]).

The ESCO study categorises work-related activities as either environmentally sustainable (green), polluting (brown), or falling into neither category (white). For instance, “production of electricity by coal” is identified as a brown skill, while “cooling and heating from geothermal energy” is labelled as green. Following the categorisation process, the results show a total of 571 ESCO skills and knowledge concepts as green (European Commission, 2021^[17]). For example, the ESCO shows that a sustainability manager needs several essential green skills and competences, such as “evaluating company needs,” “climate change impact,” “coordinating environmental efforts” and “performing project management.” In many respects, these green skills do not necessarily differ greatly from the skills needed to thrive in a traditional economy, meaning that promoting green skills will help all learners thrive in many aspects of their lives (OECD, 2023^[8]).

Table 1.1. Commonly used definitions of green jobs

Definitions vary according to the approach. The most widely used top-down definition is the ILO's definition of green jobs. The most widely adopted bottom-up definition is the one developed by O*NET.

Approach	Organisation/Entity	Definition
Top-down		
Industries or activities that are traditionally considered or associated as green	(UNEP, 2008 ^[12])	"Positions in agriculture, manufacturing, construction, installation, and maintenance, as well as scientific and technical, administrative, and service-related activities, that contribute substantially to preserving or restoring environmental quality."
	(ILO, 2016, 2022 ^[18])	"Green jobs are decent jobs that contribute to preserving or restoring the environment by incorporating one or more of the follow aspects: improving energy and raw materials efficiency, limiting greenhouse gas emissions, minimising waste and pollution, protecting and restoring ecosystems, and supporting adaptation to the effects of climate change."
	Government of Lower Austria (Amt der NÖ Landesregierung: Bildungs- & Berufsberatung NÖ, 2023 ^[19])	Green Jobs sind Berufe, die der Natur, der gesamten Umwelt und uns Menschen guttun. Berufe mit Zukunft und für eine gute Zukunft – auch für nachfolgende Generationen. Grüne Berufe leisten bedeutsame Beiträge, wie zur Ressourcenschonung, Energiewende und Sicherung einer intakten Umwelt sowie zum nachhaltigen Leben und Wirtschaften und gesellschaftlichen Wandel. "Green jobs are professions that are good for nature, the environment as a whole and for us humans. Professions with a future and for a good future- also for future generations. Green jobs make a significant contribution to conserving resources, the energy transition and safeguarding an intact environment, as well as to sustainable living, economic activity and social change."
	(European Commission, 2021 ^[17])	Green jobs, which involve tasks aiming at reducing the impact of economic activity on the environment, ranging from waste recycling to R&D in green innovation. In the narrowest sense, green jobs can be defined as jobs in (sub)sectors that directly relate to green technologies and processes.
Based on greenhouse gas emission intensity of the industry	(Government of the United Kingdom, 2021 ^[20])	Green jobs "focus on restoring the natural environment – whether that be in companies that create green goods like electric vehicles or companies that work to reduce the use of natural resources and produce clean energy. Any career that helps the UK work towards net zero could be considered a green career."
Bottom-up		
Based on tasks, skills, knowledge and job titles	(O*NET, 2010 ^[21])	Any occupation that will be affected by greening. There are three subcategories of green jobs according to the effect that greening will have on the tasks, skills and knowledge required for the job: <ul style="list-style-type: none"> • Green Increased Demand (Green ID): existing jobs that are expected to be in high demand due to green, but do not require significant change in tasks, skills, or knowledge. These jobs are considered as indirectly green because they support green economic activity, but do not involve any specifically green tasks. • Green Enhanced Skills (Green ES): existing jobs that require significant changes in tasks, skills and knowledge as a result of greening. • Green New and Emerging (Green NE): unique jobs (as defined by worker requirements) created to meet the new needs of the green economy.
Mixed approach		
Top-down and bottom-up	(Natural Resources Canada, 2024 ^[22]) (ECO Canada, 2021 ^[23])	A green job is a job within an organization that aims to protect the environment or that is interested in delivering positive environmental outcomes. A green job can be classified as: <ul style="list-style-type: none"> • Professions that require <i>environmental skills, knowledge, experience or competence</i> to produce products or deliver services that have an environmental benefit. • Professions that may not require <i>specialised environmental skills</i> but result in an environmental benefit. • Professions that support organizations in the <i>natural resources sector</i> that work toward positive environmental outcomes.

The International Standard Classification of Occupations (ISCO) by the ILO is another widely used tool for classifying occupations. The existing ISCO definitions predominantly categorises occupations based on conventional job titles and descriptions but was last updated in 2008. Consequently, the current ISCO overlooks the nuances of green tasks embedded within different job families and sectors:

“Few occupations defined in the ISCO classification system are specifically associated with improving sustainability. Environmental professionals and refuse sorters are about the only ... classifications that are specifically green, and even jobs in refuse sorting will not be green where the work produces damaging emissions or waste, or where it fails to comply with standards for decent work. Most green jobs are in occupations that also cover non-green jobs. For example, a mechanical engineering technician working in renewable energy or waste processing may be regarded as being in a green job, while a mechanical engineering technician with broadly similar skills working in manufacturing or a fossil-based energy industry is not, unless the job is focused primarily on process improvement.”
(*Gregg, Strietska-Ilina and Büdke, 2015*^[24])

The incomplete depiction of green jobs and its intricacies within the ISCO framework poses a challenge as the green transition progresses and an increasing number of new green jobs will be created, some jobs lost, and others will be transformed to incorporate more green tasks.

Labour market studies also come to very different conclusions about global green employment, making comparisons between studies very difficult (OECD, 2023^[3]). Depending on the countries, parts of the economy, the time frames and definitions applied, studies yield results ranging from as low as 2% to as high as 55% (Table 1.2). For instance, studies by Eurostat (2021^[25]), quantify green employment in EU-27 countries at 2% (or 4.4 million jobs) in 2019, while Bowen and Hancké (2019^[26]) put the estimate at 40% in the same region between 2006-2016. Similarly, Bowen, Kuralbayeva and Tipoe (2018^[27]) estimate that green jobs made up 19.4% of employment in the United States in 2016, while Georgeson and Maslin (2019^[28]) put the estimates down to 4% in the United States around the same time period.

As the green transition progresses and labour markets are becoming greener, brown jobs are increasingly being phased out. In 2012, carbon-intensive brown jobs made up 14% of total employment in the European Union (OECD, 2012^[29]). A decade later, brown jobs made up 5% of total employment in the EU (Vandeplas et al., 2022^[10]). This is similar to the trends being seen across OECD countries where, currently, green jobs represent approximately 19% of the labour demand and polluting jobs account for 5% of vacancies (OECD, 2023^[1]). In 2021, brown jobs made up 12% of the employment share in the OECD, while green jobs made up 18%. White jobs, meaning those that are neither green nor brown, make up the majority of the work force at 71% (OECD, 2023^[1]). The OECD adopts O*NET’s bottom-up approach (e.g., task-based) to measuring and quantifying green jobs.

Table 1.2. Labour market studies quantifying green employment

Estimated green jobs and employment	Year	Country/Region	Source
Definitions top-down: based on green industries			
2% or 4.4 million (direct)	2019	EU-27	(Eurofound, 2023 ^[30])
55% (direct and indirect)	2018	United Kingdom	(Kapetaniou and Mclvor, 2020 ^[31])
4% (direct)	2015-2016	United States	(Georgeson and Maslin, 2019 ^[28])
Definitions bottom-up: based on occupation, skills and tasks			
40%	2006-2016	EU-28	(Bowen and Hancké, 2019 ^[26])
Average: 17% Up to maximum of 39%	2009-2011	United Kingdom	(Valero et al., 2021 ^[11])
Total 20% (4%: new and emerging skills 9% enhanced green skills and tasks 7% increased demand for green skills and tasks)		Former EU-15 countries	
3.8%	2020	Canada	(ECO Canada, 2021 ^[23])
Around 30%	2006-2008	The Netherlands	(Elliott et al., 2021 ^[32])
3% (direct)	2004-2016	United States	(Vona, Marin and Consoli, 2018 ^[16])
19.4% (direct and indirect)	2016	United States	(Bowen, Kuralbayeva and Tipoe, 2018 ^[27])

Source: adapted from the OECD Job Creation and Economic Development 2023: Bridging the Great Green Divide

1.2. Green job growth and employment

Quantifying the precise number of current green jobs and predicting jobs to emerge or vanish due to the green transition is a challenging and complicated task (OECD/Cedefop, 2014^[33]). The ILO forecasts that 23 million green jobs will be created globally, while 6 million brown jobs are expected to disappear, resulting in a net global growth of 18 million green jobs by 2030. Consulting company Deloitte, on the other hand, predicts a more rapid growth in the green sector, estimating that 300 million additional green jobs will be created globally by 2050 (Deloitte, 2023^[34]).

Labour market trends in the green sector have shown that the largest growth to date has been in the renewable energy sector. Globally, renewable energy added 700,000 jobs in 2020 to 2021, reaching a total of 12.7 million (IRENA and ILO, 2022^[35]). Asia had the highest share of renewable energy employment in 2021, with China in the lead with 5.4 million jobs in renewable energy. Brazil also had an estimated 1.27 million renewable energy jobs in 2021, with biofuels being the largest component of the green workforce. In the United States, there were around 923,400 renewable energy jobs in 2021. According to the U.S. Department of Labor's Bureau of Labor Statistics (2022^[36]), green jobs projected to have high growth rates over the next decade are:

- Wind turbine technicians (growth by 68%)
- Solar PV installers (52%)
- Forest fire inspectors and prevention specialists (24%)

- Environmental science and protection technicians (11%)
- Soil and plant scientists (10%)

Similarly, in Europe, green jobs are now considered to be among the fastest growing and the most resilient in the European economy. The World Economic Forum estimates growth of 4 million jobs in Europe by 2030 (World Economic Forum, 2023^[37]). Under the baseline employment growth scenario of 6.7 million new net jobs across all industries over the 2019 to 2030 period, the European Union's Fit for 55 Climate package of legislation (which aims to enhance climate action), is also expected to create an additional 204,000 green jobs by 2030 (Vandeplas et al., 2022^[10]).

The complexities surrounding the definition and measurement of green employment and growth also pose challenges for guidance systems. Many young individuals exhibit a keen interest in pursuing careers that contribute to environmental sustainability, but navigating this intricate terrain often creates uncertainty about where to seek reliable advice. In such circumstances, the active engagement of professionals working in relevant fields becomes ever more important for students as employers in these sectors are well placed to articulate their future recruitment needs and provide insights on green labour market trends.

1.3. Strategic shortages in the green transition

Globally, skills gaps and shortages are being recognised as bottlenecks that are constraining progress towards the green transition (Keese and Marcolin, 2023^[2]). Industries commonly classified as green, including those in renewable energy, environmental services and manufacturing, energy and resource efficiency, are at high risk of experiencing skills gaps and shortages within the next decade of the green transition (OECD, 2023^[11]). Overall, there is widespread concern that the fight against climate change might be constrained by shortages of skilled individuals (OECD, 2022^[38]; 2023^[39]).

Approximately 60% of the 803 companies surveyed in the World Economic Forum's Future of Jobs Survey (2023^[40]), collectively employing 11.3 million workers across 27 industries from 45 countries, identified the shortage of a skilled workforce as a major barrier to greening their business practices. The European Commission similarly identified green skills gaps as a major challenge to implementing the E.U. Green Deal Industrial Plan. The Commission has highlighted that labour shortages across the European continent, as proxied by the vacancy rate, doubled in sectors considered key for the green transition, such as electricity, steam, gas and air conditioning, transportation, construction and manufacturing, water supply, waste management and remediation activities, between 2015 and 2021 (Eurostat, 2021^[25]; Eurofound, 2023^[30]). Similar challenges have been identified in the United States, where the U.S. Department of Energy recorded an increase in green jobs in the renewable energy sector that outpaced employment, meaning that there were more vacancies being created than being filled, in every state (USEER, 2023^[41]). Furthermore, in 2022, the number of U.S. LinkedIn profiles with at least one green skill, which LinkedIn defines as a collection of skills needed to solve the climate crisis, such as climate action planning or sustainable procurement, grew by 8.4%, compared with a 20% rise in green job postings on the platform (LinkedIn, 2023^[42]).

These strategic shortages are not only expected to hinder progress towards global environmental objectives but also deepen divides within the local labour markets, as high-skilled and highly educated workers are better positioned to adapt in the green transition. Among OECD countries, high-skilled occupations such as senior officials and managers, professionals, technicians, and associate professions, constitute a larger proportion of green-task jobs as compared to medium or low-skilled occupations that are

predominately in polluting industries. Although future green job opportunities may extend to medium- and low-skilled occupations, current trends have shown that higher-skilled individuals have and will continue to benefit more from employment opportunities in this sector, leaving those with lower educational attainment and in medium-skilled roles at higher risk of displacement (OECD, 2023^[1]).

1.4. Conclusion

In response to the urgent demands of climate change, patterns of demand in the labour market are changing. Notably, there has been decline in employment within sectors directly linked to exacerbating climate change, often termed brown jobs, while roles supporting environmental sustainability (green jobs) are on the rise. Within the transformation of the labour market, complexities can be found. Some jobs clearly fall into either brown or green categories, such as coal mining or solar power production, but the delineation becomes less clear in other cases. In these instances, the classification of a particular occupation may fall along the spectrum of brown and green jobs depending on the definitions used, as well as the level of environmental dimension in the activities. An example is jobs in the transportation sector that may be categorised as green when powered by sustainable fuels or as brown when powered by fossil fuels that contribute to CO₂ emissions. The complexity of labour market change is accentuated by the fact that the ISCO, the primary mechanism used by most countries to classify occupations, is poorly equipped to identify green jobs and to provide young people and their advisers with simple information about their characteristics. In critical sectors vital to combatting climate change, there is clear evidence that employers worldwide are struggling to fill vacancies.

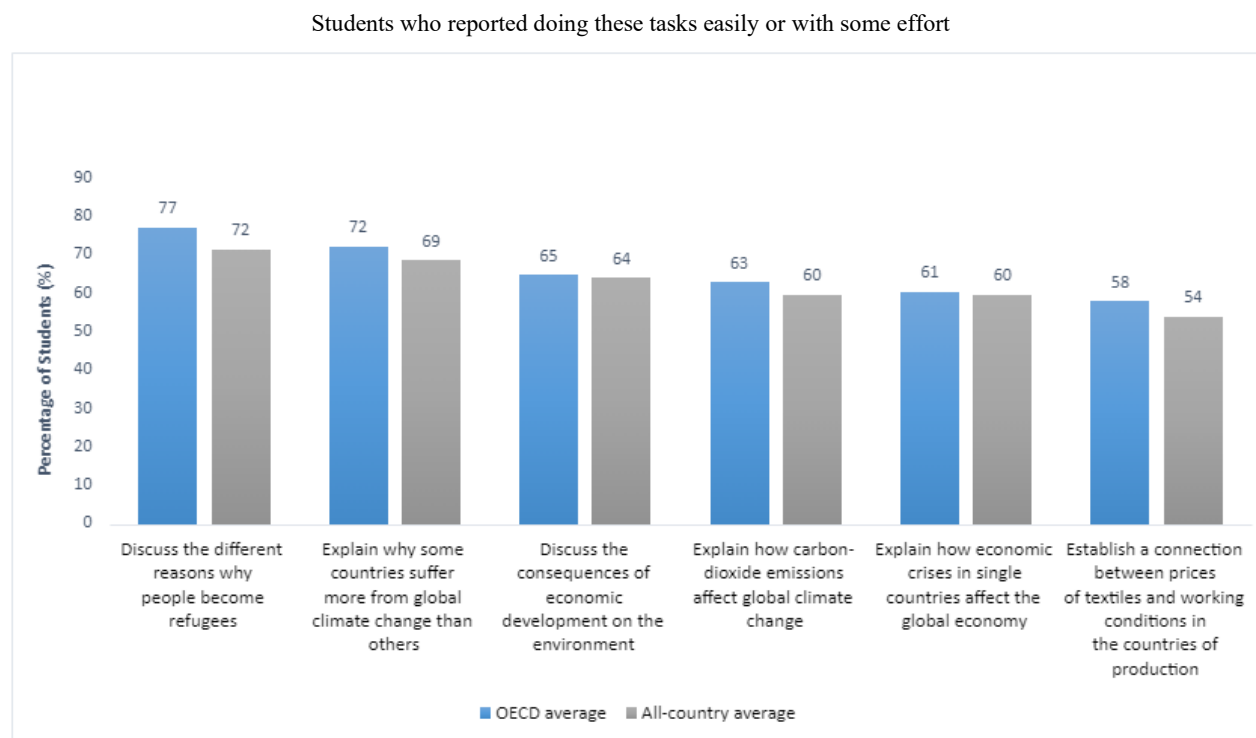
2. Green Futures

Against this backdrop of the growing demand for the labour market to support the green transition across various sectors and industries, how well are schools preparing tomorrow's workforce to contribute to building sustainable societies? On a *prima facie* basis, labour markets appear to be inadequately signalling opportunities and needs to young people. Consequently, societies can be expected to turn to career guidance systems to help young people make sense of the structural changes within the labour market, especially the evolving skills demands and qualifications required for meaningful employment. Guidance systems represent bridges between the interests and aptitudes of young people and labour market demand, helping both sides to communicate efficiently. In the case of environmental sustainability, this is especially important because international studies show consistently high levels of interest among young people in defending the natural environment.

2.1. What does the PISA tell us about student interest in environmental matters?

The concept of sustainability was an important focus in the OECD's Programme for International Student Assessment (PISA) 2018 assessment cycle. Student responses showed positive trends in attitudes and understanding of environmental issues. When it comes to environmental awareness, about 72% of students reported feeling confident in their ability to explain why some countries suffer more climate change than others; while 65% said they can discuss the consequences of economic development on the environment (Figure 2.1).

Figure 2.1. Student self-efficacy regarding global issues, by task



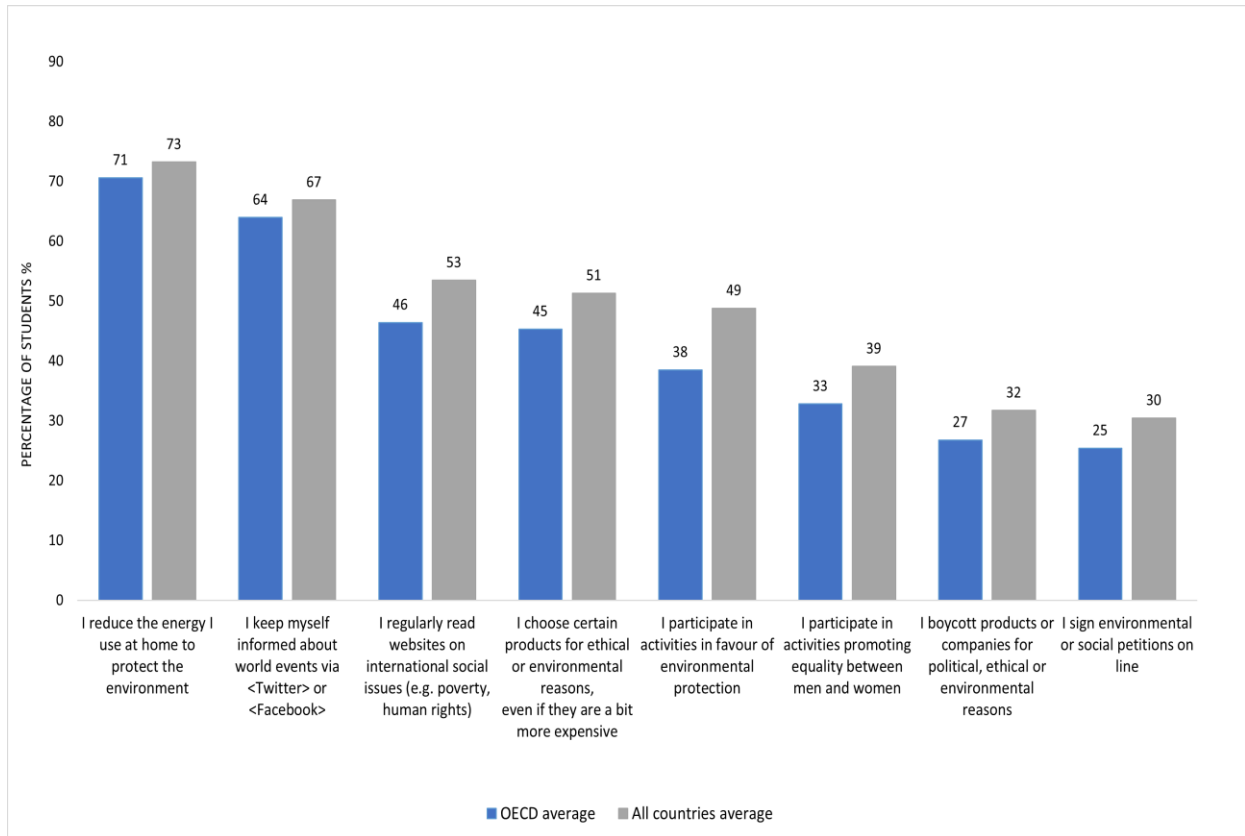
Source: OECD, PISA 2018 Database, Table VI.B1.2.4.

Across OECD countries, around eight out of ten students (78%) agreed or strongly agreed to the statement that "looking after the global environment is important to me personally." (Figure 2.2). Most students in Portugal (94%) agreed or strongly agreed with the statement, while 64% of students in the Slovak Republic agreed or strongly agreed. However, students also expressed feeling a lack of agency despite how much they care about the environment. On average across the OECD, only 57% of students reported feeling that they can do something about the global environmental challenges (Figure 2.3).

Moreover, many students reported actively engaging in environmental protection activities (Figure 2.4). On average across OECD countries, 71% of students reported reducing home energy consumption, 45% said that they make environmentally conscious product choices and 25% noted that they sign environmental petitions online.

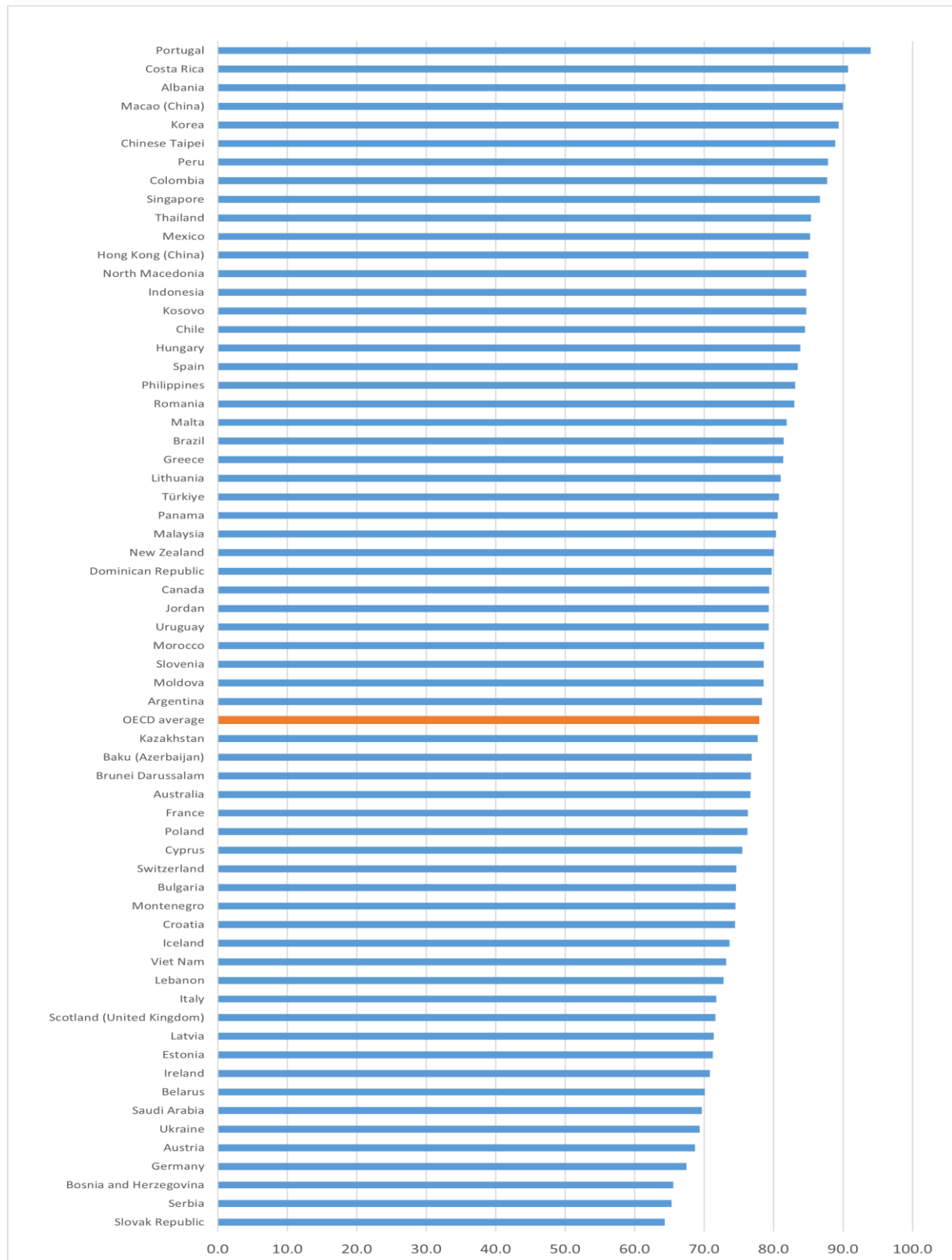
Figure 2.2. Students' capacity to take action

Students who reported that they take the following actions:



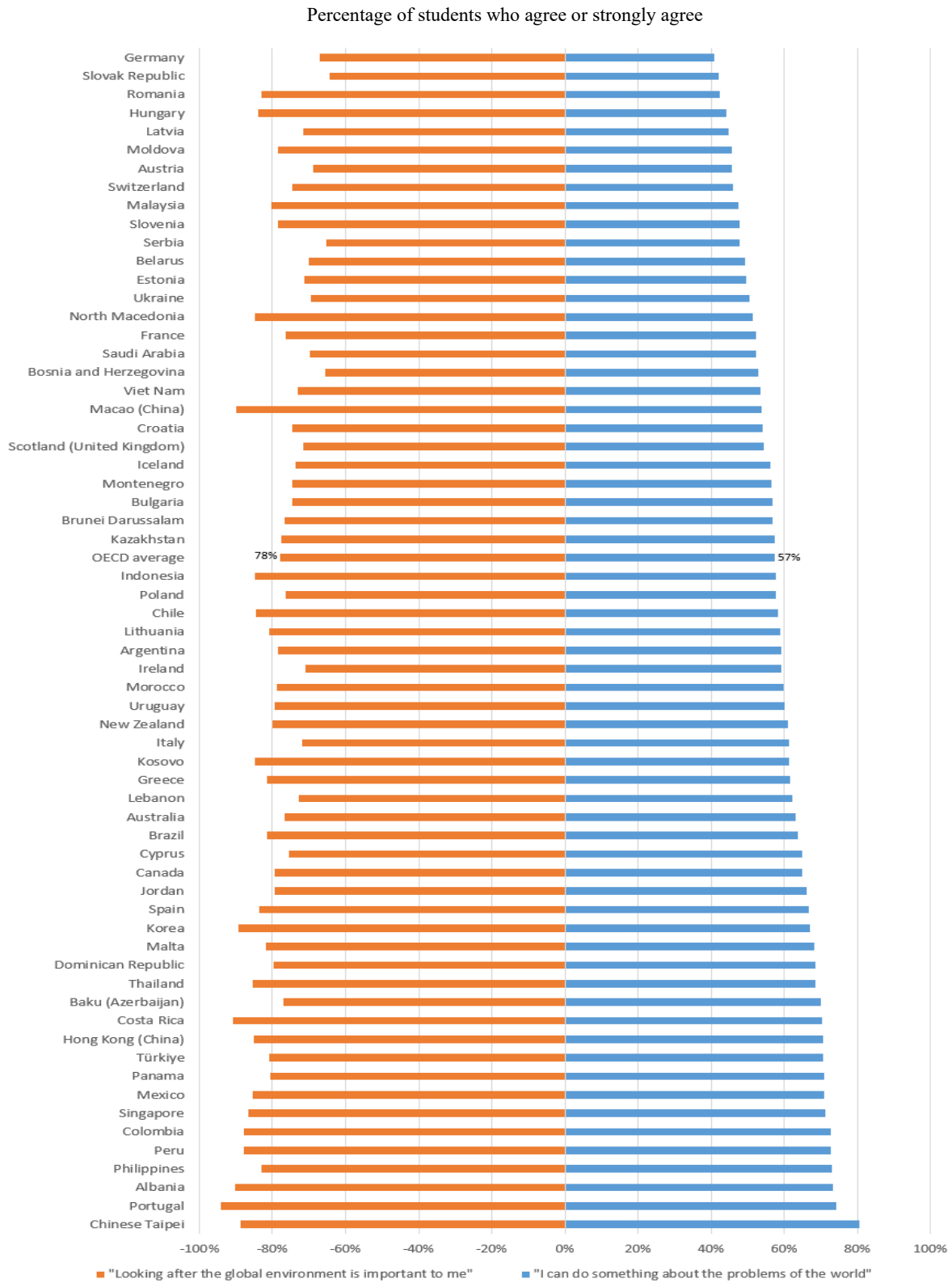
Source: OECD (2019), PISA 2018 Database, Table VI.B1.5.9

Figure 2.3. Students who agree or strongly agree to the statement that “looking after the global environment is important to me”



Source: OECD, PISA 2018 Database, Table VI.B1.5.3

Figure 2.4. Young people care about climate change but often feel unable to make a difference



Source: OECD, PISA 2018 Database, Table VI.B1.5.3

2.2. What do young people think about green employment? Insights from the OECD's PISA 2018 survey

Despite the challenges of identifying green jobs through the ISCO, focusing analysis on the engineering profession using the PISA data provides some insight into the extent to which student environmental interests have translated into occupational aspirations. As corroborated by the analysis conducted by Vona, Marin and Consoli (2018^[16]), engineering is one of the key occupations that can support the green transition. Engineers develop sustainable solutions, design renewable energy systems, create efficient transportation networks and implement technologies to mitigate the impacts of climate change (Vona, Marin and Consoli, 2018^[16]). Despite the importance for sustainable innovation, the allure of engineering, particularly among environmentally conscious youth, remains relatively low. Among OECD countries participating in the PISA 2018, the average proportion of 15-year-old boys expressing the intention to pursue engineering as a career by the age of 30 was 7.8%, while this figure was notably lower at 1.8% for girls. Only a marginal difference exists between the percentage of environmentally conscious students and those less concerned about green issues. For instance, only 4.4% of 15-year-olds who agreed strongly with the statement that “looking after the global environment is important to me personally” anticipated working as an engineer by age 30, as compared to 4.3% of students who did not agree strongly to the statement (Mann, 2022^[43]; OECD, 2020^[44]).

2.3. Insights from non-OECD survey data

While student interest in green careers from the OECD's PISA is inconclusive, non-OECD surveys show clearer and more conclusive evidence of strong interest in green careers among youth. It is important to acknowledge the constraints of the survey findings, given that specifics regarding its methodologies and sampling frameworks remain undisclosed; nonetheless, non-OECD surveys consistently reveal an upward trend in young people's interests in green jobs around the globe.

A survey of over 1,000 young people in the United Kingdom aged 18 to 34 found that 57% were interested in working for an environmentally sustainable business (Laming, 2020^[45]). This preference for a future career in the sustainability and renewable energy sector was stronger than interests in other sectors. Aspiring to a green job had higher response rates than a social media influencer (10%) or working in retail (8%). The survey also showed that brown jobs, particularly the fossil fuel industry, was the least attractive sector (6%) for youth. Similarly survey by YouthSight also from the United Kingdom, conducted online between 28 January to 1 February 2022, found similar results. Completed by 1,162 young people aged 16 to 24, the survey covered topics such as student awareness of green skills, interest in pursuing a green career, knowledge of green careers and perceived barriers to pursuing their career interests (White et al., 2022^[46]). In terms of career aspirations, four out of five young people surveyed (80%) said it was very (28%) or quite (51%) important that they work for an organisation that is committed to tackling climate change. Nearly two thirds of young people (61%) also wanted to work in a role committed to tackling climate change. Over half of young people (55%) agreed that they felt inspired to develop green skills and pursue a green career, with 10% strongly agreeing and 45% agreeing. Only 4% strongly disagreed. Amongst those who said they feel inspired to pursue a green career in the future, 71% said this was because they want to combat climate change. In addition, nearly two thirds (62%) said it was due to a passion for sustainability and a further 37% said it was because they found green skills and the prospect of pursuing a green career interesting. Notably, 16% of youth said their interests were inspired by family and friends, and 13% said they had been inspired by their teachers.

Such interests among young people are also reported around the globe. A large study involving 29,500 participants between the ages of 15 to 39 from 18 countries found that three out of four (77%) aspire to a green job within the next decade (Accenture, 2022^[47]). These 18 countries included youth from Australia, Brazil, China, France, Germany, India, Indonesia, Italy, Japan, Malaysia, the Philippines, Singapore, South Africa, Spain, Thailand, United Kingdom, United States and Vietnam. A survey conducted in France with 1030 youth by Opinion Way for the Institut Supérieur de l'Environnement in 2023 and by Céreq in 2022 provided additional insights about youth green career thinking. Two-thirds (64%) of French youth aged 18 to 24 expressed interest in working within the green sector, with 38% viewing it as a 'dream job' (OpinionWay, 2023^[48]). Youth expressed the greatest interest in green jobs related to pollution, biodiversity, water and waste management, and recycling. However, the survey revealed that while professions in the ecological transition are appealing to many, there are several barriers that hinder entry into green jobs. Reported and perceived challenges included lack of awareness about eco-related occupations, limited opportunities, and inadequate training. Particularly, 18 to 24-year-olds cited a lack of knowledge (38%) and salary concerns (28%) as primary barriers, with 26% simply lacking interest. Despite these obstacles, 66% of young adults reported that they were planning to undertake specialised environmental training, indicating a strong desire to enter the field. This French survey further emphasised the importance of schools and guidance systems in facilitating youth integration into 'green' and 'greening' jobs.

2.4. Conclusion

The intersection of education, career aspirations of young people and the labour market in fostering sustainability presents a complex landscape. Survey data on the perceptions of young people reveal that sizable numbers have a strong commitment to contributing personally to the fight against climate change. Surveys from around the globe point towards strong interest in green jobs among young people; however, there is a disconnect in how effectively education systems are aligning with this demand. There remain challenges such as a lack of awareness about green career opportunities, limited training options and uncertainty about qualifications and skills that underscore the need for more comprehensive career guidance systems and educational initiatives. Moreover, across the OECD, there is a weak relationship between strong personal interests in environmental sustainability and working as an engineer, a profession at the forefront of the global adaptation to a net-zero future. Despite these barriers, the overwhelming desire among youth to make a meaningful impact on environmental issues, as evidenced by numerous surveys, signals a promising potential for cultivating a global workforce that is committed to sustainability. It is, thus, the role of guidance systems to help young people relate their emerging conceptions of the roles that they wish to play in adulthood (as linked to their values, attitudes, skills, and interests) to actual patterns of demand in the labour market.

3. Methodology and Conceptual Approaches

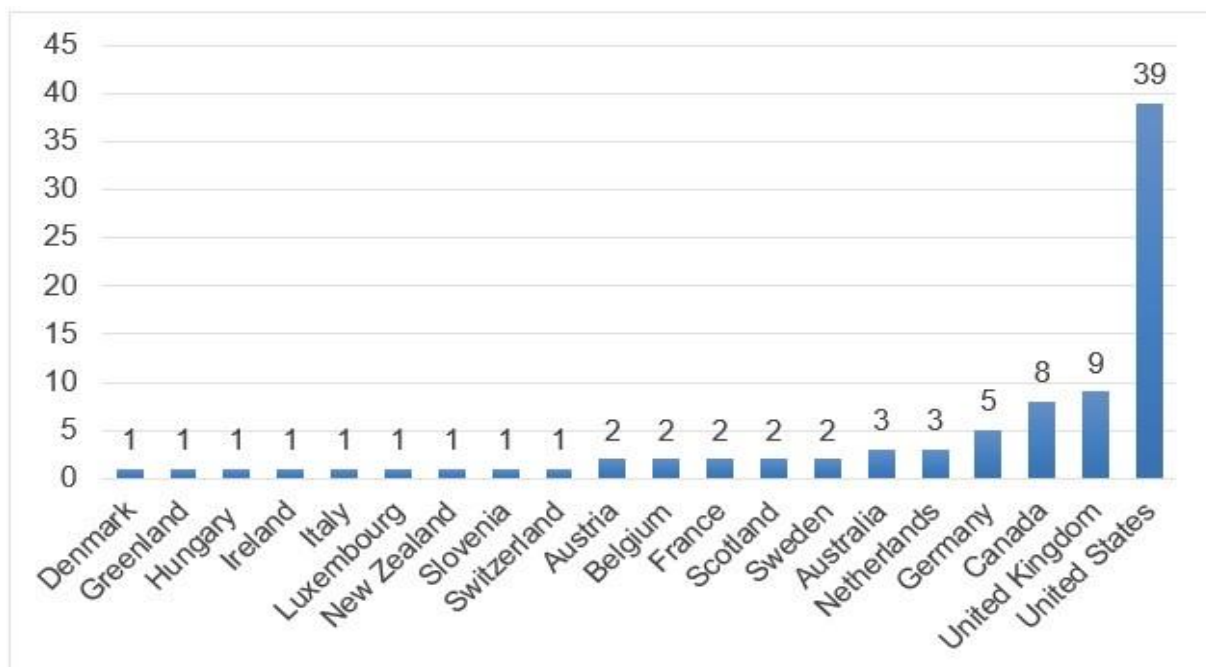
To close the gap between broad student interest in contributing to the fight against climate change and informed understanding of the characteristics of green jobs and career trajectories into them, guidance systems around the world have introduced new approaches within career provision. Reviewing such specialised programming against evidenced characteristics of effective guidance provision enables green guidance to be conceptualised as a coherent approach to enhancing student understanding and progression towards green jobs.

3.1. Project methodology: How the study was conducted

This scoping review involved an examination of 87 guidance programmes within primary and secondary education with a principal focus on enhancing student understanding and/or progression towards careers linked to environmental sustainability. Programmes were identified initially through online search. Keywords pertaining to environmental education, sustainability, green transition/economy, green jobs, green careers, career guidance, green guidance, and youth/student career development were employed to identify the most relevant programmes. Programmes catering to K-12 students (up to the age of 18) were considered. The inclusion criteria resulted in a diverse set of programmes from 20 OECD countries encompassing various educational settings and language of delivery. Whilst efforts were made to include examples of practice from a wide range of countries, with special emphasis on the language used in programme delivery, anglophone countries were the most predominately featured in the identified examples (Figure 3.1).

Figure 3.1. Distribution of green guidance programmes

Examples of green guidance programmes for K-12 students were found among 20 OECD countries



Source: Author's analysis of the 87 green guidance programmes reviewed in this study

Data collection involved gathering information on programme objectives and design, target age group, duration, the programme provider, resources, and any other relevant details. Various sources were used in the data collection, such as programme websites and podcasts, as well as conducting around 30 interviews and consultations directly with programme developers, organisers and leads, academic experts, school leaders and government officials from 20 OECD countries. This approach aimed to provide additional details, perspectives and insights of the initiatives under review.

For the purpose of the scoping review, green jobs were broadly defined as those with a direct beneficial impact on the environment. The working definition for this paper is:

A green job actively combats climate change through mitigation and adaptation strategies, ensuring environmental sustainability and the well-being of individuals and communities, as well as working to restore the environment and reduce harmful ecological impact.

3.2. Qualitative analysis constituted a significant part of the methodology, focusing on two questions:

- What are the common characteristics of green guidance interventions across different educational contexts?
- What are important considerations for governments and schools trying to develop a coherent strategy for green guidance?

The analysis was informed by academic literature and also drawn from OECD reports and research.

It is important to note the limitations of this study, particularly in the frequent absence of impact measurements for the reviewed programmes. This working paper, thus, aims to provide a descriptive, not evaluative, analysis, focusing on programme features rather than on quantitative outcomes. However, it is possible to consider guidance interventions through the lens of longitudinal data which identifies guidance-related predictors of better ultimate employment outcomes linked to ways in which students explore, experience and think about potential futures in work (Covacevich et al., 2021^[49]).

3.3. Conceptualising green guidance

In the context of the green transition, green career guidance (or 'green guidance') can be considered a form of general career guidance that focuses on helping individuals understand and progress towards green careers.

The research literature on green guidance remains notably limited, especially regarding systems tailored for students and the implementation of green guidance within school settings. While Danish academic Peter Plant (2014^[50]; 2020^[51]; 2021^[52]) stands out as a key figure in the conceptualisation of green guidance, educational research on the topic remains sparse. This scarcity is noteworthy given the increasing importance for educational institutions to equip future generations with the necessary knowledge, skills, and attitudes to navigate the complexities of a swiftly evolving green economy.

The United Nations Environment Programme outlines three key elements for effective green career guidance (UNEP, 2021^[53]):

1. Promoting a better understanding of jobs in the sectors that are directly related to sustainability

2. Bringing a green lens to any job
3. Developing competencies for young people to craft careers that do not exist yet through creativity and innovation

The UNEP elements are also well aligned with the principles of green guidance as outlined by Plant (2007^[54]; 2020^[51]). He argues that green guidance should:

- Take into account and create awareness of the environmental impact of career choices and career development.
- Play an active role in establishing training and education opportunities with a positive contribution in terms of sustainability.
- Include environmental aspects in its informational materials on career options.
- Address broad sustainability career development issues in theory and practice, in addition to individualistic approaches, with a focus on the environmental impacts of career choices.
- Be measured not only by an economic yardstick, but also by green accounting (i.e., by relating sustainability goals to guidance activities).
- Provide supports for guidance counsellors and advisors to inspect their own practice (Irving and Malik, 2005^[55]; Plant, 2020^[51]).

As articulated by Plant (2007^[54]) green guidance constitutes a multifaceted approach within the broader framework of general career guidance. However, it challenges the simplistic view of career guidance to advance the global economic growth agenda and instead, points to a wider perspective to career choices and considerations within a social justice approach. Green guidance can serve as a potential solution to furthering environmental efforts and empowering the next generation of workers to navigate their transitions into the labour market meaningfully, understanding the role and impact of their chosen career paths within wider society (Plant, 2020^[51]). Di Fabio and Bucci (2016^[56]) argue that green guidance can support individuals in constructing their own futures in alignment with their aspirations and true selves. They emphasise the importance in this regard of enabling the cultivation of personal talents and potential, fostering positive relationships with others and nurturing individual strengths.

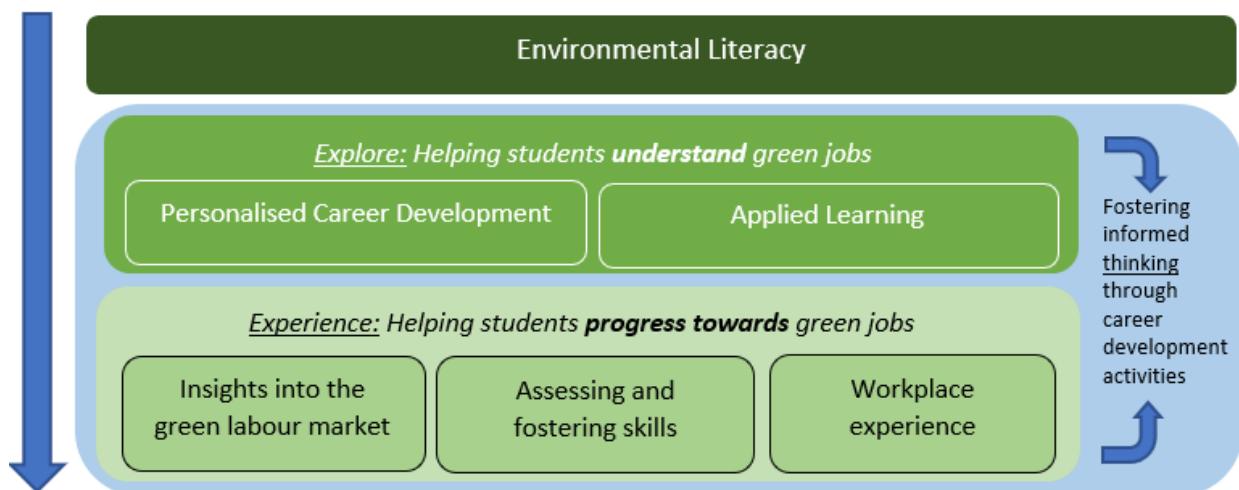
3.4. An OECD Framework for green guidance

Green guidance encompasses a diverse set of career development interventions that can actively support students in exploring the characteristics of and opportunities provided by the green transition within both their career development and applied learning journeys. Starting from a young age, it is important that students are informed about employment sectors aligned with values commonly expressed in international surveys like PISA, which hold strategic importance for societies and economies. However, effective green guidance extends beyond mere information provision. It offers interested students personalised experiences to support their understanding of and progression towards green jobs. To facilitate this process, students are encouraged to reflect on their aspirations for adult life in light of the academic opportunities available that would optimise preparation for entry into green careers. Consequently, green guidance should not be seen as a standalone form of career development isolated from wider guidance activities and schooling. The ongoing processes of exploration through which students broaden and narrow their visualisation and plans for the future depend upon constant investigation and comparison, with career

management skills acquired during secondary education remaining relevant regardless of their chosen paths.

At a foundational level, environmental literacy supports student capacity for engaging in career development opportunities that involve exploring, experiencing and thinking about green jobs. Therefore, most green guidance programmes involve a component that supports students in building environmental literacy and knowledge of environmental sciences, either formally through curricular integration or informally through the career development activity. Green guidance programmes also leverage student environmental literacy to provide personalised guidance and applied learning opportunities that lead to greater understanding of green jobs. As students build understanding and interest in green careers, green guidance programmes can help students work towards green jobs by providing timely and relevant labour market insights that can support informed thinking. Providing tools to assess key skills and values needed to enter environmentally conscious careers is also an important component of green guidance programmes. Lastly, green guidance goes beyond building theoretical knowledge by facilitating hands-on engagement with green workplaces, establishing a tangible link between educational experiences and real-world opportunities (Figure 3.2).

Figure 3.2. Model of green guidance



As well as synthesising current green guidance practices described in this paper, the conceptual model draws upon OECD analysis of longitudinal datasets that explores the relationships between teenage career development and better employment outcomes in adulthood.

The OECD's Career Readiness project draws on existing research literature and undertakes new analysis to enhance understanding of how schools can reduce student risk of unemployment and poor school-to-work transitions, especially during periods of global economic and social turbulence. It draws on the best available international evidence to understand what works in career guidance and how to optimise opportunities for young people to find fulfilling employment.

Policy provision in the field of career guidance has long been constrained by lack of relevant evidence (Hughes et al., 2016^[57]). By its very nature, effectiveness in provision is most effectively measured by exploring labour market outcomes that can be linked statistically to different forms of school-age career development. Until recently, relatively little analysis had been undertaken using longitudinal randomised control trials or of

longitudinal cohort studies. Recent OECD analysis, however, has systematically explored available datasets in multiple countries, allowing the exploration of variations in the employment outcomes of young adults that are related to teenage participation in career development. Reviewing 12 datasets comprising 67 000 students in ten countries (Australia, Canada, China, Denmark, Germany, Korea, Switzerland, United Kingdom, United States and Uruguay), the OECD study looked for evidence of whether 14 forms of career development, typically at age 15, could be linked to lower NEET rates, higher wages and/or greater job satisfaction around the age of 25 (after statistical controls were applied for gender, academic achievement, social background, migrant status and other factors that typically shape labour market success). The study confirmed 11 teenage predictors of better employment outcomes related to how students explore, experience and think about potential futures in work (Table 3.1).

Table 3.1. Indicators of teenage career readiness

Exploring the Future	Experiencing the Future	Thinking about the Future
Career conversations with career advisors, educators, industry professionals, friends and parents	Part-time working	Career certainty: the ability to name an occupational expectation
Engaging with people in work through career talks or job fairs	Volunteering	Career ambition: the expectation to work in a professional or managerial role
Engaging with people in work through workplace visits or job shadowing		Career alignment: the intention to continue studies to a level typically required for entry into anticipated profession
Application and interview skills development activities		Instrumental motivation towards school: the confidence that engaging well at school is linked to better employment outcomes
Occupationally focused short programmes (Career Pathways)		

Source: Covacevich, C., et al. (2021), "Indicators of teenage career readiness: An analysis of longitudinal data from eight countries", OECD Education Working Papers, No. 258, OECD Publishing, Paris.

The Career Readiness longitudinal analysis highlighted several critical areas for improvement in the context of career readiness and development. Many students at the age of 15 struggle to envisage their futures in work. PISA 2022 results showed that 39% were unable to articulate the type of job they expect to have around the age of 30, while 21% were misaligned in their future plans (meaning that they plan on pursuing a profession that typically requires tertiary education, but do not expect to complete this level of education). Moreover, around half of students agreed that school 'has done little to prepare me for adult life when I leave school'. These results are cause for concern, as they are predictors of poor employment outcomes in adulthood than would be expected. Additionally, PISA 2022 showed that many students do not engage in the forms of career development that can be most confidently associated with better employment outcomes by age 25. Thus, it is important that students are given time and encouragement to explore, experience and think about their futures in work, as well as to understand the link between future employment and their present interests, preferences and educational choices (Covacevich et al., 2021^[49]).

The longitudinal research underscored the importance of early, frequent, and integrated career guidance to support equitable transition of young people into the labour market.

Analysis of PISA data shows that engagement in career development activities is significantly linked to career thinking that is positively associated with better employment outcomes (Covacevich et al., 2021^[49]). However, student agency to navigate through transitions into employment was found to be constrained by social and economic backgrounds (Covacevich et al., 2021^[49]; OECD, 2024^[58]). And while many education and training systems expect students to demonstrate agency as they advance through their schooling, the PISA career questionnaire suggests many young people lack the resources they need to make informed career decisions and draw connections between educational provision and their employment outcomes (Covacevich et al., 2021^[49]). Overall, the study raised concerns on equitable access to labour market information and opportunities that would lead to fulfilling employment (Mann, Denis and Percy, 2020^[59]).

3.5. Predictors of better employment outcomes: Exploring, Experiencing and Thinking about career development

3.5.1. Exploring the future

Analysis of national longitudinal databases reveal that providing students with opportunities to explore their future is one of the key elements of building career readiness among adolescents (Mann, Denis and Percy, 2020^[59]). Frequent and direct interactions with working professionals grant students access to authentic and reliable information that can help question and enhance interests and expectations (Covacevich et al., 2021^[49]). However, the PISA 2022 revealed that, on the whole, student engagement in career development activities involving exploration of opportunities needs to be substantially deepened in many countries. On average across the OECD, fewer than half of 15-year-olds report having visited a workplace or having taken part in a job fair, and one-third say that they have not spoken with a career advisor either in or out of school.

Participation rates in career development activities also vary considerably across PISA countries. In the context of green guidance, exploration of green job opportunities is an important aspect of helping young people develop critical thinking about the green labour market and their potential roles within it. Opportunity exists for targeted green guidance programmes ensuring that students are regularly exposed to such important forms of employment.

3.5.2. Experiencing the future

Participation in activities offering direct exposure to the labour market facilitates the development of knowledge and skills, as well as developing the social capital of young people (Mann, Denis and Percy, 2020^[59]). Longitudinal research shows that first-hand engagement in the labour market, which involves performing tasks under guidance and supervision of mentors in a workplace setting, is strongly associated with improved employment outcomes later in adulthood. As well as providing the opportunity for skills development, such experiences allow students to clarify and confirm career plans and to develop social networks of value (Covacevich et al., 2021^[49]). However, many education systems still need to better acknowledge the importance of student involvement in activities that provide direct experiences with the labour market and establish mechanisms to provide access to such activities. PISA again reveals disparities among countries in student engagement rates. On average across the OECD, fewer than half of students have worked part-time in relatively formal work settings, volunteered, or completed internships (Covacevich et al., 2021^[49]).

Extensive literature and research (Michael, 2006^[60]; OECD, 2023^[61]; Sawyer, 2006^[62]) on the impacts of engaging in active learning opportunities have also shown that practical

experiences can holistically foster and further develop student knowledge, skills and attributes that can contribute to positive labour market and employment outcomes. Consequently, effective forms of green guidance will enable students to gain first-hand experience of working environments linked to green jobs.

3.5.3. *Thinking about the future*

Longitudinal data also show a strong association between teenagers' career thinking and their employment outcomes in adulthood. The analysis shows what and how students think about their future of work is closely associated with adult labour market outcomes (Mann, Denis and Percy, 2020^[59]). Specifically, adults who experience less favourable outcomes in the labour market at age 25-30 were often those who had, as students, had low career aspirations, had not recognised the value of education, and/or had expressed uncertainty and confusion about their future occupational and educational plans (Covacevich et al., 2021^[49]; Mann, Denis and Percy, 2020^[59]). Both PISA 2018 and 2022 highlight how young people's view of the labour market is often heavily influenced by social economic backgrounds, gender and migrant status (OECD, 2024^[58]). Over recent years, career uncertainty, misalignment and confusion have also risen among youth. In the PISA 2022, two in five students across the OECD report being uncertain, as compared to one in four students in PISA 2018. Among those who are able to articulate career aspirations, approximately two-thirds of students focused on a narrow segment of the labour market: the professions, encompassing roles such as doctors, engineers, lawyers and teachers; however, approximately 20% of these students did not expect to pursue tertiary education.

Insights from neuroscience underscores the importance of encouraging students to participate in activities that prompt self-reflection and their future possibilities in the workforce. Studies have shown that teenagers are susceptible to short-term thinking and present-biased preferences (Hofer, Zhivkovikj and Smyth, 2020^[63]; Lavecchia, Liu and Oreopoulos, 2014^[64]). Neuroimaging indicates that the brain's executive function, responsible for forming self-perception and understanding of interactions with the surrounding world, reaches full development typically between the ages of 25 and 30 (Ferguson, Brunson and Bradford, 2021^[65]). This means that while parents can help mitigate their children's deficiencies in executive functioning to an extent, schools, including career guidance systems, can also help foster the enhancement of self-control, perseverance, and other non-cognitive skills that can positively impact students' thinking and decision-making processes related to their education and futures (Koch, Nafziger and Nielsen, 2015^[66]). Indeed, analysis of PISA 2018 data shows that when students actively engage in exploring and experiencing career development activities, they can be expected to demonstrate more beneficial career thinking (Covacevich et al., 2021^[49]).

While it can be argued that increasing student participation in career development activities can enhance employment outcomes for youth in general, this will not necessarily mean that students would automatically enter green jobs. Instead, students would benefit from targeted intervention throughout schooling, namely in the form of green guidance, to develop enhanced understanding of and progress towards green jobs.

3.6. Green guidance in the context of effective career guidance: OECD Career Readiness Indicators and capitals analysis

Amidst career uncertainty, confusion and concentration of career choices becoming more commonplace across the OECD, societies can turn to career guidance to help students visualise, plan and begin progressing towards their future lives in employment. 'Career guidance for youth' refers to a set of services and supports that help students explore and

experience the world of work, gaining the necessary knowledge and skills to activate their human capital in ways that can inform and develop thinking about their future to maximise their chances of fulfilling their career ambitions (OECD, 2021^[67]; 2024^[58]). Across the globe, various terms for career guidance are used, including “career development”, “career counselling”, “educational and vocational guidance” and “vocational psychology” (OECD, 2021^[67]).

The overall functions of career guidance can be highly varied and dependent on the context and target audience. Generally, however, career guidance systems aim to disseminate information on educational, training and employment prospects; assist in accessing and interpreting relevant and up-to-date labour market information; assess knowledge and competencies; encourage self-reflection of strengths, interests and preferences; and help students develop the skills needed to transition into the labour market as well as match individuals with job opportunities (OECD, 2004^[68]).

Accessible career guidance supports students in navigating the complexities of the labour market and make informed choices about their futures. Various studies have shown three interconnected facets of capital (human, social and cultural) that individuals can leverage in the competition and readiness for work (Brown, Hooley and Wond, 2020^[69]; Tomlinson et al., 2022^[70]). These aspects carry strong implications for the structure and implementation of career guidance systems, including for green guidance. A growing body of literature has been making use of capital development to analyse the capacity of guidance systems to better enable successful transitions for young people from education into employment (Jones, Mann and Morris, 2015^[71]; Lehmann, 2005^[72]; Mann, Denis and Percy, 2020^[59]; Norris, 2011^[73]; OECD, 2024^[58]; Raffo and Reeves, 2000^[74]; Stanley and Mann, 2014^[75]). In such studies, students can be seen to gain in human capital (securing qualifications, skills and experience relevant to desirable employment), social capital (accessing trusted information and new forms of personal support in career development) and cultural capital (enabling confident and informed senses of personal agency to drive decision-making) (OECD, 2024^[58]).

Incorporating green guidance as part of general career guidance serves the individual student and contributes to the broader goals of creating a sustainable workforce for the future. Aligning career guidance with sustainable practices can help enhance the three types of capital as they relate to emerging green employment. For instance, encouraging students to explore environmentally conscious career paths can contribute to the development of cultural capital by fostering a sense of purpose, while also aligning with the global movement toward sustainability. Building social capital in the green sector involves establishing connections with like-minded individuals and organisations, creating a network that goes beyond traditional employment ties. Additionally, the focus on environmental awareness and responsibility in green guidance contributes to the development of human capital by nurturing skills that are increasingly relevant in a world where sustainable practices are becoming integral to many industries. Thus, effective green guidance must be built upon effective career guidance for all, ensuring that individuals are equipped to make meaningful contributions to a sustainable and greener future.

4. Examples of Practice: Green Guidance Programmes

In the ongoing global commitment to a greener and more sustainable future, many governments and schools around the world are developing and implementing guidance initiatives and programmes to support young people in understanding and progressing towards green careers. There has been greater recognition in the role of youth in the green

transition, driving efforts to leverage and prepare youth for a greener future and green careers. For instance, The Green Jobs for Youth Pact, created as a legacy initiative of the International Meeting of the Stockholm+50 in June 2022 (ILO, UNEP, UNICEF, 2022^[76]), is an example of a collaborative initiative that brings together key stakeholders of member states, employers, worker organisations, educators and researchers to offer meaningful green career opportunities for youth by 2030.

Reviewing guidance programmes designed to help young people understand and/or progress towards jobs linked to environmental sustainability provides a practical insight into how green guidance is conceptualised. The present scoping study explores a total of 87 programmes, all designed for K-12 education. These programmes include self-contained short-term activities lasting two weeks to more extensive provision spanning over many months or years. The majority of programmes are offered in the summer months, although some are designed to complement the national curricula. Providers are diverse, with governments acting as the primary supporters and funders. The initiatives serve a heterogeneous cohort of students, including those from socially disadvantaged backgrounds, Indigenous communities, students with a passion for environmental matters and individuals disinterested or unaware of environmental issues. Learning takes place in various settings, including outdoors in natural conservation areas, traditional classroom settings and through virtual platforms. The pedagogical approaches varied from experiential, active learning formats to more passive, curriculum-driven approaches that were mainly delivered by subject teachers, specialised environmental educators and guidance counsellors.

The 87 programmes outlined in this report are by no means an exhaustive list of all the initiatives in this field but represents a first international review of an area that is anticipated to experience growing demand and importance in the near future.

4.1. Building student environmental literacy for green careers

Career guidance can help shape the trajectories of individuals as they navigate the complexities of the labour market. The OECD's comprehensive reviews (Covacevich et al., 2021^[49]; Hofer, Zhivkovikj and Smyth, 2020^[63]; Mann, Denis and Percy, 2020^[59]; OECD, 2024^[58]) draws upon extensive research to delineate the essential characteristics of effective practice applicable to all forms of career guidance, including provision specifically designed to enable understanding and progression towards green jobs. The studies underscore the pivotal role of guidance in actively enabling all students to explore, experience and think about their potential futures in work.

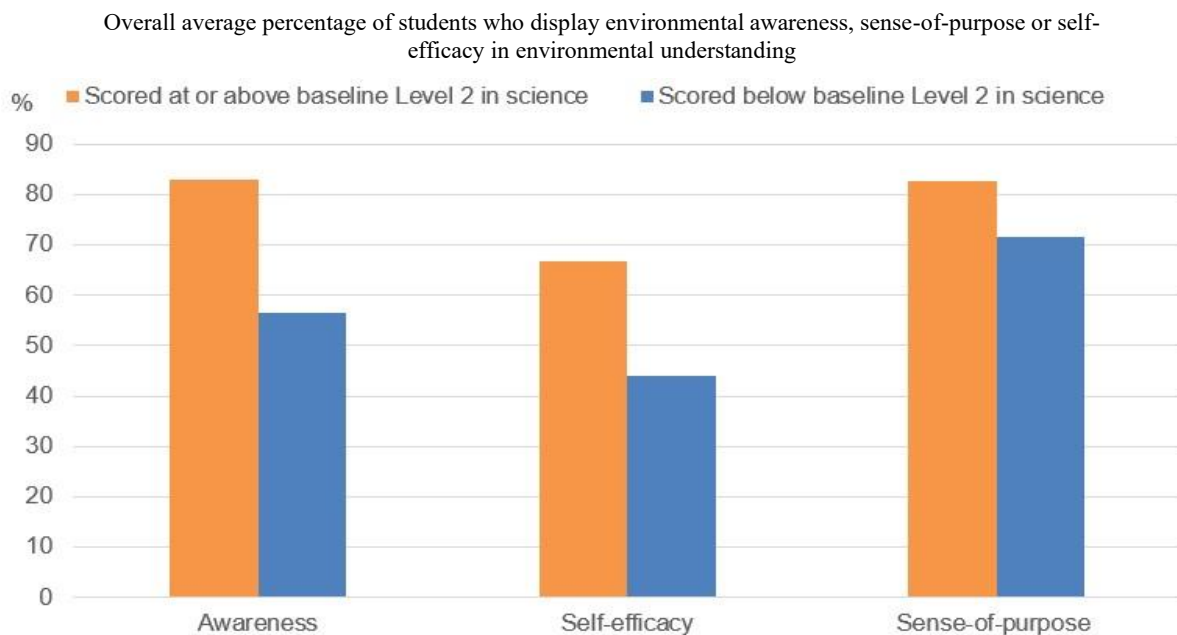
Green guidance by necessity must build on a foundational environmental literacy that enables students to make sense of ecological challenges and responses to them. Environmental literacy encompasses knowledge of ecological principles, a sense of personal responsibility about the state of the planet, willingness to take action to maintain natural resources and an understanding of the interconnectedness between human activities and the environment (OECD, 2022^[38]; 2023^[31]). It supports student understanding of the broad implications of their career choices on the environment and planet (Plant, 2020^[51]) and serves as a foundation upon which students can meaningfully engage with green career development activities.

The OECD's findings from the PISA 2018 indicate that student proficiency in environmental science and sustainability shapes pro-environmental attitudes, values, and behaviour (OECD, 2022^[38]). Other studies have also noted that a solid foundation of environmental sciences, particularly in relation to ecological challenges and opportunities, helps to foster student empowerment for climate issues. Rahmaningtyas et al. (2023^[77])

found that climate change awareness and environmental literacy are strong predictors of environmentally oriented competencies that are currently in demand by the green industry, such as being able to identify challenges and problems in the global environment, promoting environmentally friendly products, and adapting green technologies for more sustainable practices.

The PISA 2018 results showed that students with a strong grasp of climate change science, coupled with knowledge of effective solutions and adaptation strategies, and a belief in the feasibility and importance of making a positive environmental impact, were more likely to respond actively and responsibly to environmental challenges (OECD, 2022^[38]). On average, 15-year-olds who displayed one, two or three environmental attitudes (environmental awareness, self-efficacy in environmental understanding and sense of purpose) performed higher in the PISA science assessment than students who do not display any environmental attitudes. PISA defines a student’s sense-of-purpose as personal values and goals (or “what is important to me”). Whereas environmental awareness and self-efficacy are the student’s perception of their knowledge and skills regarding environmental issues (OECD, 2022^[38]). As shown in Figure 4.1, environmentally enthusiastic students performed substantially higher in science (by 27 percentage points) than environmentally indifferent students across participating countries and economies.

Figure 4.1. Student environmental attitudes by proficiency in science



Note: differences between students who scored in science at or above baseline Level 2 in science and students who scored below baseline proficiency Level 2 are all statistically significant
Source: OECD, PISA 2018 Database, Tables B.3.2, B.3.4 and B.3.6.

Other studies show a strong relationship between an individual’s attitudes, values and past experiences and their ultimate career choices (Akosah-Twumasi et al., 2018^[78]; Caldera et al., 2003^[79]; Cheung and Arnold, 2014^[80]; Edwards and Quinter, 2011^[81]; Howard et al., 2009^[82]), underscoring the importance of student environmental literacy as a basis for cultivating pro-environmental attitudes and environmentally responsible actions. The PISA 2018 also showed that students who demonstrated strong environmental literacy were also more likely to hold a growth mindset (by 10 percentage points). A growth mindset, as

compared to a fixed mindset, is important for fostering a sense of agency and empowering students to effect change in the world and combat the climate crisis (OECD, 2022^[38]). PISA 2018 students who scored at science proficiency levels 5 and 6 (“top performers”) were, thus, 1.36 times more likely to take environmental action such as reducing the energy they use at home than students who score at proficiency levels 1 or below (“low performers”). At the same time, environmental literacy and scientific knowledge alone do not automatically translate to environmentally responsible actions. Rather, it is a combination of science proficiency and pro-environmental attitudes that is most conducive to action (OECD, 2022^[38]; 2023^[8]). This means that for students to aspire to green careers and contribute meaningfully to advancing global environmental efforts, they must be able to access career development opportunities that help to put environmental literacy into practice.

Among the green guidance programmes in this scoping review, 59 out of 87 programmes (68%) had an active component for building or deepening foundational student environmental literacy and knowledge of the environmental sciences. Out of the total 87 programmes, the remaining 28, especially those tailored for upper-secondary level students, exhibited a less active component for environmental literacy. Instead, these programmes aim to offer career development activities that build more deeply upon existing prior knowledge and current levels of proficiency of environmental sciences.

4.1.1. Examples of programmes promoting environmental literacy

[UNESCO Associated Schools](#) is an example of a global network of K-12 schools that prioritise environmental literacy. With a worldwide network that includes 12 000 schools from 182 countries, UNESCO ASPnet focuses on the advancement of the 17 sustainable development goals, many of which include environment and sustainability competences. Collège Vincent Van Gogh in the Lorraine region of France is an example of an UNESCO ASPnet school that uses an interdisciplinary and whole-school approach to encourage lower secondary students to explore and problem-solve issues of climate change. To help students develop a multidimensional understanding of environmental issues, the school’s environmental programme includes a series of inquiry-based projects that connect to real-world situations. These projects combine life and earth sciences, physics, chemistry, technology, English, French and visual arts to produce concrete outputs such as a monthly publication of a school environmental magazine, a radio show discussing environmental issues hosting interviews with climate activists or adults working in the green sector, and a school-wide food-waste reduction initiative that involves designing the school cafeteria menu in partnership with chefs, nutritionists, farmers and healthcare workers. Another example of UNESCO’s ASPnet school is Tamadaiichi Elementary School in Tokyo, Japan where fostering environmental literacy involves community partners. Students across grades and classes work with local businesses to collaborate on solving local environmental problems, such as renewable energy or pollution. Students then present and showcase their ideas and findings to the community through public events, raising awareness of key climate issues and inviting the entire community to participate in pro-environmental initiatives and adopt more environmentally conscientious behaviours such as recycling or reducing plastic.

The Strategic Energy Innovation (SEI), a non-profit organisation based in the **United States**, partners with 230 schools and over 22 000 students, from kindergarten to grade 12, to provide sustainability education and environmental action projects. Their flagship programme, called [Energize Schools](#), supports schools to deliver holistic environmental education that focuses on student green career awareness and skills. The programme provides support and resources in four areas:

- [Sustainability curriculum](#): this curriculum is aligned with wider learning requirements of the Common Core, Next Generation Science Standards and the California Career Technical Education. To help students effectively build environmental literacy, the Energize School’s Sustainability Curriculum leverages both teacher-centred and student-centred pedagogical approaches. Units that are more teacher-led include introductory programmes on climate change, energy auditing, renewable energy and focused provision on fields such as air quality and ecological economics. The main goal of teacher-led delivery is to provide students with a solid understanding of the environment. Students then put their environmental literacy to practice and hone pro-environmental attitudes and values when they engage in experiential, hands-on projects in areas such as waste management and water conservation. The Sustainability Curriculum is also designed to help strengthen understanding of green careers via the [Career Connections Toolkit](#), which guides students in their initial exploration of green career options before providing practical support for transitions in relation to job application materials, interview skills and networking. Students in upper-secondary also have the option of completing additional programmes that awards completion certificates, such as the Sustainability Specialist or the Energy Specialist, to enhance their job application profiles.
- [Environmental competitions](#): Middle and high school students participate in environmental competitions throughout the year, such as the People and Planet Challenge, to develop leadership skills and inspire sustainable change in their communities. Environmental literacy is again an important component of these competitions, as students learn about air quality, waste management, and renewable energy, and put their knowledge into practice to advance sustainable goals of the challenge. The competition is divided into three parts and winners can win prize money. The first part of the competition requires students to build environmental knowledge and select a sustainability topic they are passionate about. In the second part, students apply their knowledge and put green skills to practice, such as measuring and analysing air quality in their communities or auditing energy consumption. The final part of the competition requires students to act as sustainability leaders to communicate the lessons they have learned and help enhance sustainability in their communities.
- [Teacher training](#): Training is provided to teachers to help build their capacity to deliver the sustainability curriculum effectively. Training is provided virtually, in-person and in hybrid formats over the course of the school year and aims to ensure that teachers are well-equipped to integrate sustainability topics into their lessons. Such supports include helping students make connections between the curriculum and potential green careers.
- [Zero waste schools](#): A whole-school activity to sustainability that involves partnership with the wider community to build a culture of environmental stewardship. By participating in these greater community initiatives that require partnerships with employers, students gain greater exposure to green industries and engage with green employers. Hands-on experiences are designed to enhance student understanding of sustainable practices and to help students build valuable connections with the green job market. Since 2015, the programme has been active in Marin County, California with 20 schools and 11 000 students involved in the programme.

[Eco-Schools](#) is a large **global** network of K-12 schools with a strong focus on environmental education and sustainability. The network includes schools from over 81

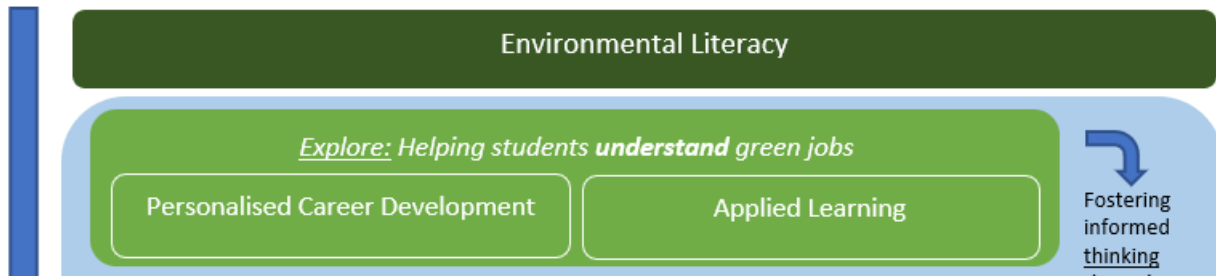
countries with a commitment to prioritising environmental education within their curricula. Eco-Schools uses a whole-school approach involving the participation of the wider school community, including parents and community leaders to implement the sustainability curriculum and to help students make clearer connections to green careers. For instance, Eco-school's [Green Education and the Young Reporters for the Environment Programme \(YRE\)](#), includes a component where students engage with community leaders that requires students to act and think like environmental scientists, journalists, educators, and activists. Students promote sustainable practices within their communities, raise awareness about environmental issues, and disseminate more sustainable practices, such as recycling or reducing plastic. Teachers at Eco-schools are expected to discuss career opportunities arising from their subject and to ensure that students are given opportunities to apply the curriculum to job situations. For example, students explore ways in which environmental issues can be addressed by jobs in different subject areas such as: biology (conservationists), mathematics and science (renewable energy engineers), social sciences (environmental lawyers), computer science (green data analysts), arts and mathematics (architecture) and business (sustainable transport technicians).

A whole-school green guidance approach is also used by [Ökolog schools](#) in **Austria** to help students apply their learning to green career situations. Ökolog is a network of 700 schools (over 150 000 students and 16 000 teachers) with a central focus on environmental and sustainable learning. The network has partnerships with 13 post-secondary institutions, aiming to widen student perspectives on post-secondary options and to facilitate smooth transitions from primary school, to secondary through to higher education. The Ökolog network provides all students, from kindergarten to grade 12, with both hands-on and theoretical learning experiences that involve developing student competencies and attitudes for creating a sustainable society, such as waste management and reduction, and environmental conservation. For example, upper secondary students are required to take Geography and Economic Studies which focuses on the present and future lives of young people. The programme has a strong focus on self-reflection, involving assessing and understanding the civic and environmental impact of future chosen careers. Students explore human-environment relationships and their global dimensions, develop and plan their own repertoire of actions reflecting sustainability concepts (which includes a strong green career component), and deepen understanding of the vulnerability, resilience, and adaptability of geo-ecosystems.

4.2. Helping students understand green jobs

Helping students understand green jobs consists of providing diverse opportunities to explore green careers. Exploration enables young people to develop critical thinking about the labour market and their potential roles within it (Mann, Denis and Percy, 2020^[59]). Green career programmes provide personalised career development and applied learning opportunities as a means to support young people's exploration and serious thinking about career interests and expectations (Figure 4.2).

Figure 4.2. A model of green guidance: helping students understand green jobs.



4.2.1. Personalised career development

Effective and equitable career guidance will personalise provision in recognition of the individual character of career development and barriers and constraints that can hinder effective transitions (The Gatsby Charitable Foundation, 2014^[83]; OECD, 2024^[58]). Some of the ways in which green guidance programmes can provide personalised career development to students include:

- Customised advice: providing relevant advice and recommendations that align with the student’s career goals and plan
- Individual goal setting and planning: students are supported in setting career goals and create a roadmap towards the goal
- Regular check-ins: responsive programming that involves ongoing communication and support throughout the student’s educational journey as goals and circumstances evolve
- Tailored resources: access to resources, such as job search tools, networking opportunities, educational materials that suit individual needs, as well as directed towards career development activities that support students to work towards a green career
- Focused provision: more intense or additional supports, including in small group and one-to-one, that are offered to students in greatest need.

Moote and Archer (2017^[84]) and Devlin et al., (2013^[85]) underscore the role of digital technologies in making career guidance more personalised and relevant. Digital tools enhance accessibility, particularly for students in schools lacking dedicated guidance programmes or with limited access to a guidance counsellor, as well as those from disadvantaged backgrounds (Holland and Mann, 2020^[86]). However, online tools are widely seen as most effective when they complement rather than substitute for the expertise of qualified career guidance practitioners (Cedefop, 2018^[87]; Hofer, Zhivkovikj and Smyth, 2020^[63]). The most effective programmes provide a variety of approaches, including both a mix of digital and in-person services.

Box 4.1. Digital versus in-person delivery of career guidance

The OECD's 2020 Survey of Career Guidance for Adults (SCGA) found that adults receiving in-person support in addition to a range of digital services achieved positive education and employment outcomes compared to adults who had only accessed digital career services independently. The SCGA is an online OECD survey that was conducted in 2020 in Argentina, Australia, Brazil, Canada, Chile, France, Germany, Italy, Mexico, New Zealand and the United States. The findings from the survey hold relevant implications for green guidance tailored for students in K-12 education. The observed positive associations of hybrid delivery and education and labour market outcomes are particularly important for governments and schools considering developing a holistic green career strategy.

While digital platforms contribute to cost-effectiveness and wider accessibility, the OECD's studies of adult users (15 430 adults aged 25 to 64) show that positive impact can be maximised when combined with personalised counselling and career development activities in face-to-face format. The in-person guidance element may be particularly important for students in younger grades and those from disadvantaged backgrounds, whose sense of agency to navigate and explore digital career services independently can be limited (Mostafa, Echazarra and Guillou, 2018^[88]; Tharayil et al., 2018^[89]). Thus, the personalisation of guidance shaped by a combination of both digital and in-person services allows for wider accessibility, bypassing the limitations of a one-size-fits-all approach, and enables for greater alignment of student interests, skills, and values with the rapidly evolving green job market.

Source: OECD (2021) Career Guidance for Adults in a Changing World of Work, Getting Skills Right, OECD Publishing, Paris

Examples of personalised green guidance

"[Bildungsberatung NÖ](#)," is part of Bildungsberatung Österreich, an initiative of the Austrian Federal Ministry of Education, Science and Research and the federal states funded by the European Social Fund and national co-financing. Bildungsberatung NÖ is organised as a network of eight advisory services that provides users (including for students from age 15 to adults up to age 65) with diverse channels for accessing green guidance and labour market information. Operating on a budget of 1.2 million euros per year, the programme provides 10,000 consultations annually on matters related to education and careers. The programme's services are provided virtually (distance) or in-person (face-to-face). Distance counselling is offered via telephone, video, email and chat while face-to-face consultations take place in over 90 locations across **Lower Austria**. Counselling services are also offered in multiple languages. In 2021, Bildungsberatung NÖ developed and implemented the "[Green Jobs for You](#)" with the specific aim to inform, sensitise and motivate young people about ecologically sustainable professions. The initiative offers free workshops to schools, consisting of two teaching units that leverage specially developed target group-specific methods and online tools. During these workshops, trained youth advisors help students explore the potential of green jobs for their individual career paths and the global green transition. One method youth advisors use to gather information on student interests, career aspirations and needs is through the website's [interactive quizzes](#). These quizzes help students discover green jobs that align with their preferences and interests. There are three quizzes designed for different age groups and needs: students ages 13 to 15, students ages 16 to 18, and those seeking apprenticeships. Additionally, a card

game allows students to match their skills and values with potential green jobs, providing detailed descriptions of job roles, work environments, and the required education and skills. Using these resources, counsellors and teachers can guide students in assessing their interests and skills, helping them make informed decisions about green career paths. Starting in 2025, students participating in these workshops will also have the opportunity to visit green companies in Lower Austria.

The [Climate Action Pathways for Schools \(CAPS\)](#) partners with under-resourced schools in California, **United States**, to help reduce greenhouse gas emissions and advance climate literacy of schools and communities. This project-based programme is implemented across four school districts (a total of 82 schools and over 55 000 students aged 15 to 18) with a particular focus of providing green career education and workforce readiness to high school students. The programme provides personalised career development activities that help students explore, experience and think about green careers, including activities such as career panels, career fairs, career coaching, application and interview skills development activities, internships and work-based learning. Student agency and empowerment are important elements of the CAPS, as students develop and lead hands-on, experiential projects that align with their school district's climate action plan and help lower greenhouse gas emissions, conserve energy, reduce waste, and create greener campuses. Students receive mentoring and professional training, as well as an opportunity to develop relevant skills and to plan individual career goals and educational pathways (especially post-secondary options). The CAPS programme also supports teachers to help students less interested in experiential learning to connect environmental literacy to potential green careers using readings and desk research. Moreover, CAPS further personalises delivery by helping students understand their interests, strengths and skills through coaching with guidance counsellors and industry professionals through a holistic approach to green career guidance.

The [Delaware State Parks Youth Conservation Corps \(DSPYCC\)](#) is an outdoor education and experiential learning programme that offers tailored green career development, providing young people aged 14 to 26 with a summer employment opportunity intertwined with environmental stewardship. Participating students engage in environmentally focused activities, such as improving wildlife habitats, stream restoration, or nature area clean ups, as well as opportunities for personal growth that helps them progress towards green careers. The programme offers personalised career development activities designed to foster green and employability skills. Students gain greater confidence, learn about teamwork and improve their sense of responsibility and environmental stewardship. The aim of the DSPYCC is not only to help youth contribute to the preservation of public lands and communities but also to gain valuable skills that would endure beyond the programme. The DSPYCC programme is structured so that students are immersed in practical job experiences that are aligned to their interests, constituting 75% of their time, which includes conservation activities and educational outreach efforts. Approximately half of all educational outreach efforts are dedicated to focused green career exploration and awareness. The remaining 25% is dedicated to outdoor learning, where participants engage in environmental education, leadership training, and recreational activities like hiking and wildlife observation, depending on their interests and personal preferences.

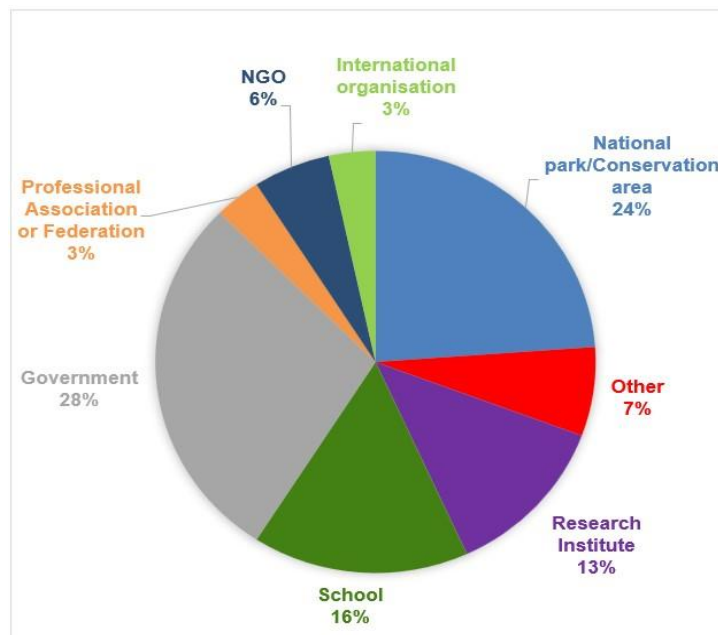
4.2.2. Applied learning: Connecting the curriculum with green careers

For students, theoretical knowledge alone is often insufficient to develop a comprehensive understanding of the realities of the workplace (Mann, Denis and Percy, 2020^[59]). Opportunities in green guidance for students to apply knowledge of environmental sciences and sustainability can, therefore, bolster capacity for informed career thinking and

exploration. Among the green guidance programmes identified, applied learning is a core component of 67 programmes (78%). Of these programmes, 22 include a formal component of applied learning within the school environment, meaning that subject teachers and guidance counsellors are responsible for relating green careers to their teaching and the standardised curriculum. In the remaining 45 programmes, provision is informal and less driven by a standardised curriculum as delivery often occurs beyond the confines of traditional classrooms and/or outside the school academic year. In these contexts, applied learning is not constrained by curricular expectations, although students continue to undertake career development activities that require applying their knowledge of environmental sciences and sustainability.

Programming is delivered by a wide range of providers, diversifying the contexts in which green guidance can be delivered. Examples of providers include schools, public employment services, public career guidance agencies, non-governmental organisations and private companies (Figure 4.3). It is also not uncommon for several providers to partner together to deliver green guidance programmes. For instance, the [Youth Engaged in Sustainable Systems \(YESS\)](#) programme in the **United States** is provided through a partnership between the US National Greenway Trust, the Pacific Education Institute (a research institute) and two local school districts. Overall, green guidance is strongly predicated on a partnership model, meaning that it relies on collaborative efforts with organisations that are closely associated with environmental sustainability for effective delivery.

Figure 4.3. Providers of green guidance found across 20 countries



Note: Other includes a private education technology company, a charity organisation, a national body, and an educational resources developer.

Examples of applied learning in formalised educational contexts

The [Centres of Excellence](#) from New Brunswick, **Canada** uses an applied learning model to deliver green guidance programming in schools. The provincial government of New Brunswick has established five Centres of Excellence, each of which focuses on an important and growing sector in the province. The sectors include Skilled Trades and

Manufacturing, Energy, Health, Entrepreneurship and Digital Innovation. The Centres are not physical buildings, but rather a wide network of virtual partnerships connecting the education system, community and industry. Each Centre offers students a range of career development opportunities that are strongly connected to the province's curriculum, particularly to the province's [Career Connected Learning K-12](#) and Global Competence Framework. There are five components to each Centre, which are Learning Activities, Experiential Learning, Career Profiles, Speaker Series and Industry Partners. The two Centres with the strongest emphasis on green careers are the Centre for Excellence Energy and Centre of Excellence Skilled Trades and Manufacturing. For instance, within the Centre for Excellence Energy, one of the featured green learning activities is the [Wind Energy Challenge](#) for grades 6 to 8 (ages 11 to 13). Like all activities provided through the Centre, there is a clear lesson outline and learning objectives for the activity, resources and additional supports for teachers, as well as the specific provincial curricular expectations to be met and connected to jobs, extension ideas (such as a speaker series and webinars to enrich career thinking), global competencies to be addressed through the activity and a [career connections reflection tool kit](#). The activities range widely in format and delivery depending on the topic, but often include an active learning component that integrates digital technologies.

Teachers can use the career connections toolkit to support student self-reflection and career thinking that makes a direct connection between the curriculum and potential future green careers. The reflection activities include questions such as:

- What knowledge and skills have you gained through this activity that could be applied outside of the classroom? Explain.
- Reflect on the knowledge and skills you have gained through this activity. How might they contribute to your success in your desired career field (or preferred future)?
- How has this learning experience helped to strengthen your Global Competency Skills? How could those skills be beneficial to you as you move towards your preferred future and/or career goals?

Each of the five Centres for Excellence also leverages employer engagement to inform the learning activities and enrich the experiential learning components, ensuring that expert knowledge can be delivered to all students in New Brunswick's education system.

The [See It, Be It](#) Green Jobs Intervention Series are accessible online resources developed in the **United Kingdom** that provide a hybrid approach to green career development and learning. The resources provide teachers with supports to connect the subjects that they teach with green jobs. This is done using short video documentaries and lesson plans. The videos include testimonies from professionals in the green sector and may feature the person performing specific green job tasks on camera, giving students a glimpse of the real-life working environment, or may feature an interview or discussion of their personal experiences and professional journey, encouraging students to engage in self-reflection of their interests and values. The videos are accompanied by interactive lesson plans that go deeper into the person featured in the documentary, the job and the industry. Every lesson contains a short independent thinking task, discussion in pairs, groups and whole-class, structured tasks with differentiated worksheets on the job and industry, metacognitive tasks, as well as a consolidation task to synthesise the key lessons and a plenary to build on the lesson. See It, Be It is currently featured on the OECD's [Observatory on Digital Technologies in Career Guidance for Youth](#) (ODiCY), as an example of practice that supports the provision of career education and guidance in K-12 schools.

Another example that supports teachers to connect the curriculum with green careers is [Circonopoly](#), an educational game developed in Flanders, **Belgium**, by POM West-Vlaanderen. This game, aligned with the national school curriculum, is designed for classroom use to educate students from third grade to upper-secondary students in General Secondary Schools (ASO) and Technical Secondary Schools (TSO) about the principles of the circular economy. In Circonopoly, players run a company and choose among various strategies to maintain profitability while minimising environmental impact. The game's investment cards present different scenarios, such as using renewable materials, investing in solar panels, or engaging in waste management practices. Each card details the cost and potential revenue or savings, illustrating the economic and ecological trade-offs in business decisions. For example, a card might suggest using renewable materials instead of finite resources, detailing the cost and the impact on profitability and environment. This approach is designed to help students connect curricular content with the complexities and trade-offs involved in making businesses sustainable. When learning about the different renewable materials, the teacher's manual provides links to various educational possibilities within those career fields, facilitating student understanding of green jobs. Furthermore, the game promotes interdisciplinary thinking across the curricula. For instance, in language subjects like Dutch, Circonopoly encourages skills such as discussion, listening, and reading. In economics, the game's objective of creating a circular business model helps students think like an economist by addressing practical economic problems. The game also addresses other subjects like geography, presenting the circular economy as a solution to resource scarcity and environmental challenges.

In **France**, as part of the Ministry of Education's initiatives to broaden and deepen student career thinking, teachers are encouraged to help students discover careers linked to the subjects that they teach. At College Simone Veil in Montpellier, [Nicolas Marco](#) teaches Life and Earth Sciences. When introducing a new study topic, he requires students (aged 12 to 13) to research jobs linked to what they will be studying. For example, when introducing class work on water, he gives students a list of occupations that relate to the water supply industry. Students must choose one of the occupations and research it, answering a series of questions about the job:

- What does the job consist of?
- What types of tasks have to be performed in the profession?
- Work conditions: Is the occupation practiced outdoors or indoors? Is it a sedentary profession? What are the hours? Is it necessary to work on weekends? Do people in the profession work alone or in a team?
- What is the salary at the start and at the end of this career?
- What level of education and training does the job require?
- What are the main stages of training and qualifications needed to get into the profession?
- What opportunities are there for promotion?

Students are also asked to reflect on two questions:

- What skills do you think are necessary to practice the profession?
- Would you see yourself doing the job?

Students who are most enthusiastic about the jobs they have researched related to the teaching topic are then invited to present the results to the whole class. For Monsieur

Marco, the exercise is designed to help students realise that the knowledge and skills that they develop in school will also serve them well in the future as adults. The exercise aims to give meaning to teaching and improves student engagement. Additionally, it fosters the development of skills necessary for initiating job research and exploring various types of websites that provide useful labour market and careers information. By engaging in this activity, students at College Simone Veil are better equipped to articulate their career aspirations and draw connections between classroom learning and who they might want to become as a professional in adult life. As a result, Monsieur Marco observes enhanced academic ambition among his students.

Examples of applied learning in informal educational contexts

NatureScot, **Scotland's** Nature Agency funded by the Scottish Government's Environment and Forestry Directorate, engages with youth through the [YoungScot programme](#) which aims to increase access and participation of young people in nature. The programme has several projects and initiatives that provide students from ages 11 to 18 with diverse outdoor learning opportunities linking strongly with green careers. The programme also supports teachers with activities and resources for use with early years, primary and secondary students that take advantage of the outdoors and informal learning contexts, as well as professional training on how to implement active project-based environmental education. Teachers also have the opportunity to enhance their students' applied learning through the video library which showcases young NatureScot alumni and green professionals. These featured individuals who share their experiences and offer personal advice on pursuing a career in the green sector, encouraging career thinking and helping to bridge the gap between classroom learning and real-world experiences.

Another example of a programme that helps students, from ages 8 to 18, understand green jobs through applied learning is called [VITOpolis](#). This applied learning programme based in **Belgium** leverages partnerships with green industries for student workplace visits at [VITOpolis](#), the first deep geothermal power plant in Flanders built by the Flemish Institute for Technological Research. The power plant serves as a learning centre for geothermal energy and heat networks. Since 2015, GoodPlanet has been organising tours of this learning centre, attracting over 7 000 students and their teachers. During half-day visits to the geothermal power plant, students engage in a guided tour, where they explore an underground model, participate in an interactive quiz, and use augmented reality to learn about geothermal energy. They also visit a demonstration house connected to the heating network. For full-day programmes, activities include a "Geothermal Energy in Experiments" workshop where students explore various aspects of geothermal energy through different academic lenses, and a "Sustainable City of the Future" workshop, where students role-play as researchers to explore sustainable heating, water and waste management, and air quality in an urban setting. The experience is designed to help students better understand sustainable energy production and the jobs that are associated with the green energy sector. Complementing these on-site experiences, VITOpolis and GoodPlanet also offer an array of [resources](#) to support teachers, as well as interactive modules focused on key green themes such as [geothermal energy](#), [CO₂](#), [plastics](#), [indoor air quality](#), and [earth observation](#) that students can use to further explore the topics.

[The Sustainable Futures Programme](#), tailored for 14 to 18-year-olds, from the **United Kingdom**, offers students opportunities for applied learning in both formal and informal contexts. The programme, mainly designed for delivery by teachers, career advisors and counsellors, promotes student environmental literacy and draws strong connections to green industries, helping students gain greater understanding of green jobs and their career trajectories. To support applied learning in a formalised school context, the

programme provides the [Sustainable Futures Education Pack](#). The resource comprises of three modules organised into 30-minute learning units that can be integrated into the school curricula or be offered as extra-curricular activities. The modules, covering topics such as sustainability literacy (*What is Sustainability?*), *Sustainable Business* and personal agency for sustainability (*Sustainable Me*), are aligned with the [Gatsby Benchmarks of good career guidance](#). Throughout the modules, students are encouraged to engage in [introspection](#), evaluating their own skill sets and values, and reflect on how their attributes intersect with potential green employment opportunities. The programme also offers immersive interactions with professionals and employers who showcase sustainability in practice. These engagements, whether virtual or in-person, offer a diverse array of workplace activities that vary in duration, all with sustainability threaded throughout, so that students can gain first-hand experience of the workplace and learn about the different occupations in the green sector. These engagements range from employees delivering career talks or career events at a school, to employers hosting career insight days and work experience placements where students have access to workplaces to meet a variety of employees and work on a real sustainability challenge associated with that business or industry. The shortest workplace activity is “Insight day” which is one-day tour of a green workplace. “Block placements” last a few days or up to 2 weeks. “Workplace shadowing,” allows students to shadow an employee for a day, and “Extended placements“ are designed for students to engage one day a week over the academic term. Beyond the confines of formal education, these applied learning experiences provide students with first-hand insights into the application of sustainable principles in real-world contexts while also building employability skills and broadening potential career paths.

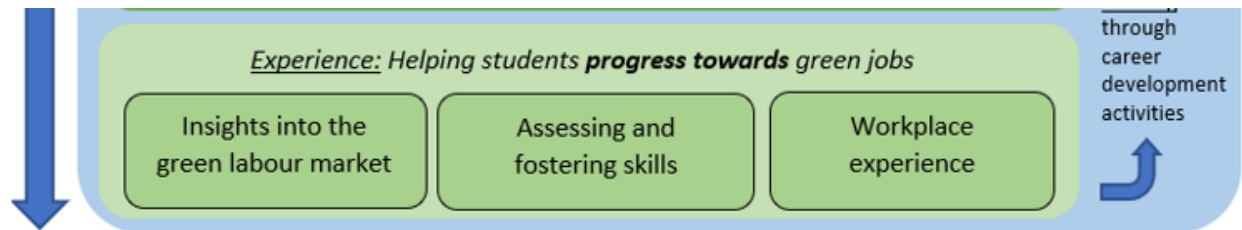
Another example of a green guidance programme that provides applied learning in informal contexts is the [Hutton Junior Fisheries Biology Program](#), established by the American Fisheries Society. The programme offers a summer internship opportunity for eligible (16-year-old) students from across the **United States, Puerto Rico, Canada, Mexico**, and the **Pacific Islands** with an immersive, applied learning experience spanning eight weeks. Throughout the internship, Hutton Scholars engage in diverse outdoor activities tailored to their interests and skill areas, encompassing fieldwork, laboratory analysis, and office-based tasks. From conducting fish population surveys and electrofishing to examining specimens under microscopes, data collection and water quality testing, students are expected to gain and build first-hand insight into careers in fisheries research and management. The programme requires students to commit to 32 to 40 hours per week, over the eight-week duration, and are paid a stipend of \$3000. The internship ends with a cumulative project, the [Hutton Summit](#), where participants engage in a three-day programme featuring experts and industry professionals, as well as opportunities for project presentation and networking, enriching understanding of fisheries science and career paths within the field.

4.3. Helping students progress towards green jobs

Green guidance programmes can help students progress towards green jobs through gaining relevant experience of work tasks undertaken with supervision within appropriate sectors (Figure 4.4). The concept of a young person's capacity to aspire, as elucidated by Appadurai (2004_[90]), underscores the importance of accessing relevant information and resources to critically evaluate career aspirations and facilitate smooth transitions into the workforce. Central to this notion is the opportunity for students to immerse themselves in workplace environments while still in the educational system. Green guidance programmes can facilitate student progress towards green jobs by providing insights into the green labour market, fostering green skills and creating access to workplace experiences as a means for

students to envision prospective career trajectories. For students, experiencing the future is an important element to career development as it forges beneficial social connections and helps to hone both technical and interpersonal skills crucial for future employability.

Figure 4.4. A model of green guidance: Helping students progress towards green jobs



4.3.1. Offering insights into green industries that are timely and relevant

A role of green guidance systems is to serve as gateways to current and emerging industries linked to environmental sustainability. By providing insights into the latest developments, innovations and job opportunities within the green sector, students can develop more informed thinking about their education and career paths. Guidance systems collect and disseminate labour market information (LMI) in various ways, including through surveys of employers, labour force participants or graduates, administrative data, online vacancy data, forecasts or foresight exercises, and sectoral or occupational studies (OECD, 2021^[67]).

High-quality labour market information is objective and grounded in evidence, timely and regularly updated in response to the changing labour market, sufficiently granular at local and regional level data so that advisors can provide tailored advice, with input from relevant stakeholders (OECD, 2016^[91]). Hofer, Zhivkovikj and Smyth (2020^[63]) note that for students, effective guidance systems would provide labour market information that can help students think more expansively about their career choices and aspirations. In the context of green guidance, this means helping students to consider the following:

- What are the possible green jobs for me?
- What will it be like to do this job?
- What additional skills or educational qualifications would I need?
- What career development activities should I engage in to learn more about green jobs?
- What salary can I expect?
- Would I have to move somewhere else?

While quantified understanding of the character and expected growth of green jobs may be compromised by definitional issues, substantial data is available to students and their advisers on recent and projected trends in green employment expectations. Effective systems will combine access to LMI with more personal interactions between students and the labour market. This approach can facilitate individuals to make better sense of online data and navigate the complexities of an occupational area where it is possible to undertake a green job in a brown sector. Direct engagement with employers, recruiters and people undertaking jobs of interest represents a further means of enabling access to labour market information related to pay levels, employment prospects and entry recruitment requirements. Direct engagement, which is perceived as authentic and trustworthy by students, presents a form of social capital that serves to broaden and deepen student

understanding of potential futures in work. Longitudinal studies highlight strong long-term employment benefits that link with teenage participation in career talks with guest speakers (OECD, 2023^[61]).

Offering students timely and relevant insights into current and emerging green industries is a critical element of effective green guidance that can help to align skill sets and aspirations with the evolving needs of the labour market. **The United Kingdom** has several green guidance programmes that provide timely insights into the green labour market. For example, “Green Careers Week” is a nationwide virtual career fair held over one week, aimed at students in lower and upper-secondary schools, parents, teachers, guidance professionals, representatives from tertiary institutions as well as employers from green industries. Examples of partners that support and attend [Green Careers Week](#) include The World Wildlife Foundation, UK Space Agency, Environment Agency, Natural History Museum and the MET Office. Green Career Week offers diverse career development events such as sharing and exploring resources and materials on green jobs, attending green career skills workshops, and learning about the green industry. However, an important overall aim of the fair is to provide timely and relevant insights to the green labour market to participants. Green Careers Week achieves this through active employer engagement with students, whereby students receive direct information from employers on green job vacancies, learn about the various career paths to green businesses, listen to testimonies from employees and have career conversations with the recruiters.

A similar approach to providing timely and relevant labour market information is applied to a green guidance programme called “[Canopy: Green Careers Series](#)” in the **United States**. Canopy was initially created in 1996 to support urban forest programmes in Palo Alto, California, but the organisation now involves volunteers, students and partner organisations to plant and maintain trees, educate the community on environmental issues and to work towards developing more eco-friendly sustainable cities. Canopy’s Green Careers Series provides a virtual platform for upper-secondary students to engage with industry professionals about their careers as they begin to plan their own. The programme provides relevant green labour market information to students through their extensive employer networks. A range of panellists, composed of professionals from the green sector, discuss their work in fields such as environmental justice advocacy, landscape architecture, materials recycling, STEM research, and environmental education. Students receive labour market insights directly from the panellists as they learn about workdays, likes and dislikes of the job, current and emerging opportunities in the field, and what steps and educational paths the panellists took to be in their current positions.

The [Green Careers Hub](#), established by the Institute of Environmental Management and Assessment (IEMA) in **the United Kingdom**, is an online platform that provides accessible and up-to-date labour market information on green careers for upper-secondary students and adults. To compile this data, the Hub relies on data sources incorporating administrative data, online vacancy data, forecasting exercises, and sectoral or occupational studies. Beyond statistical information, the website features a range of resources, including case studies, job profiles, and career stories from IEMA members, offering users first-hand insights into the intricacies of the green labour market. According to the latest updated labour market information, The Hub anticipates a surge in green jobs, forecasting approximately 480,000 positions in the United Kingdom by the year 2030.

In **Canada**, the Government of Alberta’s [career portal](#) also serves as a resource hub, offering detailed insights into the province’s labour market landscape. Central to its functionality is the [OCCinfo](#) page, providing all users with timely and relevant regional labour market information. Self-assessment tools, such as the [Find Your Fit Quiz](#) which has a green jobs component, provide students with opportunities for reflection and possible

alignment of interests with emerging environmental trends. This includes job descriptions, educational requirements, and current job postings, enabling users to make informed career decisions. The website's Quicklinks section also facilitates access to additional information, such as occupations in demand, [emerging roles](#), and [apprenticeships](#), streamlining navigation for students with diverse aspirations. Multimedia elements, including occupational videos and reports, provide valuable first-hand witness accounts as well as relevant labour market information. Over 120 professions are showed through “day in the life” videos, while occupation profile reports offer detailed information categorised by title, industry, and 2006 NOC (National Occupational Classification for Statistics by Statistics Canada) codes. The portal also offers user how-to-guides that can help students utilise labour market information effectively for [career planning](#). News articles covering labour market trends and career development opportunities, such as interviewing skills or on how to research potential employers are easily accessible and navigable under the [labour market information](#) section. Interconnectivity is also a key feature, with the portal linking to the Government of Canada's Job Bank, expanding access to employment opportunities beyond provincial borders. The portal caters to various demographics, including youth, career advisors, parents, lower and upper-secondary students, and international exchange students.

Launched in 2008 by the Ministry of Education and Science in Ireland, [Careers Portal](#) is a resource designed to guide users, including secondary school students, their parents, career guidance professionals and adults, through the intricacies of career development. Students can explore 33 employment sectors, each of which includes interactive materials, resources (such as videos and employee insights), career interviews, associated courses, skills assessments, and skills development opportunities. Three sectors, [Farming, Horticulture & Forestry](#); [Earth & Environment](#); [Biological, Chemical & Pharmaceutical Science](#), are dedicated to the green economy, underscoring the significance of green jobs by highlighting opportunities in sustainability and environmental conservation. Each sector has four important links where students can further explore careers and gain insights into the labour market. For instance, the Earth & Environment sector page shows:

- [Explore Sector](#): includes background information and the main labour issues facing the sector, such as the consequences of climate change and global warming, latest career news in the sector, advice from experts, and a deeper dive into sub-sectors (environmental science, sustainable energy, protecting the environment, earth science, climate change and planning).
- [Careers](#): presents labour market information including a general overview of the kinds of green career opportunities that are expected to emerge, detailed information on green jobs that are in demand which includes salary information as well as experience levels for entry, apprenticeships opportunities and insights from professionals. Students can make use of video materials and career interviews for deeper exploration, as well as reviewing the career choices made by people in work in relation to their educational choices, in order to help foster alignment between academic pursuits and future career aspirations.
- [Courses](#): Helps users find relevant courses for entry into green jobs. The course database can be filtered using location, type (level depending on the amount of preparation and knowledge/skills required for the job) and post-secondary institutions. Currently, there are 85 courses on offer ranging from 1 to 4 years.
- [Live Jobs](#): A live occupational database lists green job vacancies in Ireland. The information is granular up to local and regional level data, so that students, parents and guidance counsellors can easily access the information. The database

streamlines information from various popular job sites across Ireland, including Monster, Indeed, Jobsireland.ie, Publicjobs.ie, LinkedIn, Jobs.ie, and irishjobs.ie. The Live Jobs page also presents green jobs that are in the highest demand, as informed by the Irish Government's National Skills Bulletin, which currently includes positions such as Ecologist, Geo-technician, Environmental Health Officer and Data Analyst.

The portal also provides substantial resources for parents/guardians and guidance professionals to support students in making informed career and college decisions, as well as tools that support the delivery of guidance, along with notices for upcoming CPD training and guidance-related news and events available nationally.

4.3.2. Programmes offering self-reflection, assessments and targeted opportunities to foster skills

An important aspect of student career readiness involves the task of assessing and understanding individual values, attitudes, skills, and knowledge (VASK). This self-awareness can help students form a basis for making informed decisions about potential career paths. Students who possess a clear understanding of their attitudes and values are better equipped to identify career paths that resonate with their intrinsic motivations, which can contribute to greater job satisfaction and success in labour market outcomes in the long term (Morgan, Isaac and Sansone, 2001^[92]). Moreover, recognising and leveraging one's skills and knowledge is essential for matching individual capabilities with the demands of different professions. In this context, students' interests and preferences serve as guiding factors, influencing decision-making and steering them towards careers that not only align with their abilities, but which can also fulfil their aspirations.

To support students' self-awareness of their VASK for entering the green labour market, many green guidance programmes incorporate assessment activities. These often take the form of interactive quizzes, questionnaires, and self-reflective exercises, providing students with tools to envision the potential alignment of their traits with their educational achievements. Approximately 41% (36 out of 87) of reviewed green guidance programmes offer these assessments, with around one-third offering online quizzes (10 out of 87).

[JobDD: Métiers Engagé](#) developed by the government of **France**, has an interactive multiple-choice quiz that asks students from 12 to 18-years-old about their interests, occupational preferences and perceived skills. The quiz then matches student responses with the 17 United Nations Sustainable Development Goals (SDGs). The results show the affinity that the individual student has towards each of the SDGs and suggests occupations that correspond to the SDG and combines different fields of interest. The interactive assessment has a strong focus on the environment, with response options such as “I want to protect the planet” ('je veux protéger la planète') or “I dream of working in the great outdoors” ('je rêve de travailler en pleine nature'). The quiz allows students to learn more about themselves and progress towards green jobs by identifying their areas of deepest interest and skills.

[My World of Work](#) is **Scotland's** career information and advice website. It includes a strong focus on green jobs. It offers four different online tests:

- [About Me](#) tool: to match the individual's personality with diverse career options, many of which also includes green jobs.
- [Strengths](#) tool: to identify jobs that match individual strengths
- [Skills Explorer](#) tool: to identify needed skills and learn about jobs that match with the individual's current skill set

- [Option Choices](#) tool: to get a better sense of educational paths (from secondary into higher education) that are required for jobs of interest. Both vocational and academic programmes are provided.

My World of Work also has a dedicated section on [Green Careers](#), where students can explore 75 different green careers such as environmental consultants, food scientists or farm managers to broaden their understanding of and progress towards green jobs.

Another example of a green guidance programme that provides self-reflection and assessment tools to help students progress towards green jobs is “[Project Learning Tree](#)”, an educational charity organisation in Canada funded by the Canadian federal government (Natural Resources Canada). Project Learning Tree provides environmental education and helps youth find employment in the forest and conservation sectors. The programme initially began with the primary aim to incentivise employers to hire youth through subsidies and help youth job seekers find green jobs; however, the programme has since evolved to encompass more career guidance and development activities such as internships, mentorships, career webinars and green career fairs. Since 2018, Project Learning Tree has placed youth aged 15 to 30 in 3,488 green jobs across Canada’s 12 provinces and territories. The programme offers two assessments that help students match green jobs to their VASK, interests and preferences:

- [Personality Quiz](#): this quiz helps students assess their preferences (e.g., “I prefer to work alone”), interests (e.g., “I like doing research”), values (e.g., “I value collaboration and teamwork”) and attitudes (e.g., “I am very compassionate towards others”) and produces a list of matching green jobs based on student responses.
- [Skills Assessment Worksheet](#): a self-assessment worksheet that helps students to analyse their soft skills, such as leadership, as well as their technical skills in science, technology, engineering and maths (STEM). The results are then matched with green jobs in STEM fields.

The assessment outcomes are sent to students via email in PDF format, facilitating easy sharing with guidance counsellors, teachers and parents/guardians. These quizzes are designed to prompt students to engage in conversations about career goals and future plans that can foster informed thinking about green jobs.

[Relay Education](#) is another Canadian green career programme that provides an online assessment tool for students. The programme is funded by the Government of **Canada** and has three streams: [School Programs](#), [Indigenous Programs](#) and [Green Careers](#). The main aims of the programme are to build student environmental literacy, help students understand green jobs and support students in progressing towards green careers via experiential activities such as internships and apprenticeships. The [Green Career Quiz](#) matches student interests and personal skills to a green job using three questions. The first question asks students to select the three topics, out of 20 options, where they have the greatest interest. For instance, these areas might be environment, entrepreneurship, or art/creativity. The second question asks students to identify their three top personal skills, out of 15 choices, to complete the sentence: “I am a...” Examples include critical thinker, problem solver or builder. The third question asks students about their top three desirable work environments, out of nine places, such as small businesses, non-profit or corporate office. The results of the quiz are then ranked to identify the student’s top three green careers. Examples of green jobs highlighted in the quizzes may be environmental educator, conservation and fisheries officer, environmental campaigner, energy efficiency advisor or community investment manager.

In **Germany**, students aged 12 to 18 have access to a comprehensive self-reflection and assessment tool, called [Gesucht-Gefunden: Ich!](#), through the [Planet-Beruf](#) career portal. A notable feature of the [Gesucht-Gefunden: Ich!](#) is that it unfolds through a narrative involving two characters- a boy and a girl- guiding test takers through a series of 12 mini quizzes, each probing aptitudes, interests, preferences and attitudes. These assessments cover a wide spectrum, from technical skills to socio-emotional competencies. For instance, students can play a multiple-choice game that assesses technical hands-on skills, such as selecting the correct option to questions such as “You want to hammer a nail into the wall. Where is the best place to hold a hammer to maximise momentum?” which helps students identify any skills gaps and offers them ways they can improve missing skills. Other quizzes focus on assessing student general literacy, numeracy, and sector-specific knowledge that span industries from construction to energy (including green energy), health care and agriculture. The results offer an extensive overview of the test taker’s strengths, presenting tailored career development opportunities such as apprenticeships and internships, along with up-to-date training offers and relevant courses of study. The quizzes are also tailored to match the needs of specific age groups. For instance, [quizzes](#) that are tailored to primary school (grades 4 to 6) focus on helping young students explore different occupational sectors based on their interests. Some green sectors that feature in the primary school quizzes include natural and earth sciences, electricity and energy and agriculture. For younger students, greater emphasis is placed on exploring and understanding of green jobs through self-reflection and assessment.

4.3.3. Workplace experience: Engaging with employers

First-hand workplace experiences help young people envision a potential future, begin building valuable social capital that brings potential future economic benefits (Mann and Percy, 2013^[93]), and hone the technical and social employment skills that give future employers confidence in their employability (OECD, 2021^[94]). Research in this area suggests positive outcomes for young people from career activities enriched by employer engagement and workplace experiences, including reduced likelihood of being NEET, higher earnings if in full-time work by age 25, and higher career satisfaction (Covacevich et al., 2021^[49]). For students enrolled in secondary education, time spent in a workplace presents a chance to cultivate knowledge and skills and to experience work climates that schools may find challenging to foster or replicate (Stanley, 2014^[95]). As students get older, more personalised career development activities and first-hand encounters with the workplace helps confirm career thinking and enable progression (Covacevich et al., 2021^[49]). When a guidance programme leverages engagement with employers to offer workplace experiences to students as part of its provision, students have more opportunity to build practical expertise that can only be acquired from interacting with professionals, using real-life equipment and being exposed to real-life situations and problems in the workplace (Barrera-Osorio, 2020^[96]; Deming, 2017^[97]; Musset, 2019^[98]). For green guidance programmes, offering workplace experiences not only deepens understanding of environmental principles but also provides holistic insights into the challenges and opportunities associated with pursuing emerging careers in the rapidly evolving green sector, helping students to progress towards green jobs. Work-based experiences can be accessed through part-time employment, volunteering in the community and short work placements such as internships.

[The Clean Foundation](#) is a non-governmental environmental charity that promotes green solutions in Canada. The aim of the organisation is to provide knowledge, tools and supports to encourage actions that lead to positive environmental change. As part of its programme of work, the Clean Foundation engages with employers across the eastern

provinces of Canada (mainly, Nova Scotia and Prince Edward Island) to offer students workplace experiences that help them progress towards green jobs:

- [The Clean Leadership Summer Internship Program](#): Provides paid employment opportunities for youth (ages 15 to 30), looking to work in Nova Scotia and Prince Edward Island's growing clean economy. Emphasis is placed on developing leadership skills, providing opportunities for career exploration in the form of mentoring, career conversations, workplace visits and employment experiences. The programme launches yearly with the Clean Leadership Conference, offering virtual and in-person workshops and training sessions to all its 150 interns. The conference attracts employers from 85 organisations who participate as speakers, recruiters and facilitators of workplace visits. Approximately 60 out of the 150 interns participate in these workplace visits in-person, while all 150 interns participate in virtual site visits. Interns are assigned to work on environmental projects in locations across either province that are both rural and urban to gain first-hand workplace experiences that help with progressing towards green careers.
- [Science Horizons Internship Program](#): Provides short-term employment opportunities for students aged 15 to 30 in the clean economy. The programme is funded by Environment and Climate Change Canada and provides subsidies to employers that incentivise recruiting young Canadians to learn and experience first-hand the environmental fields that combat climate change.
- [Green Jobs Internship Program](#): Provides employment opportunities for youth who are not in education, employment or training (NEET) in the natural resources sector with the ultimate goal of re-entering education upon programme completion. Funded by Natural Resource Canada, the Green Jobs Internship Program provides wage subsidies to help green employers in energy, forestry, mining and earth science hire youth and help them progress towards green jobs. The programme provides interns with opportunities for professional networking, career exploration (such as receiving mentoring or engaging in career conversations with employers and professionals in the field), and green skills training. The Clean Foundation subsidises up to 75% of an intern's salary, up to a maximum of \$30,000 for Indigenous youth, youth with disabilities and youth from rural and remote communities, as well as up to a maximum of \$24,000 for women and racialised youth. To date, the programme has provided 244 employment opportunities, of which 30% were for Indigenous youth, youth with disabilities and youth from rural and remote communities and 75% of interns from underrepresented groups. Many students who have undergone the internship programmes report that their experiences of the green sector workplace helped clarify or validate the career path they had been thinking about (Clean Foundation, 2023).

Supported by the Pinkerton Foundation, [Brooklyn College Now Program](#) at the Brooklyn College in New York, **United States of America**, implements a tailored approach to furnish students with substantive workplace experiences, fostering their trajectory towards green careers in Science, Technology, Engineering, and Mathematics (STEM). A pivotal component of this initiative is the annual pre-college urban aquatic ecology course, accommodating a cohort of twenty-five participants. Under the guidance of science professionals and undergraduate mentors, secondary school students engage in a comprehensive exploration of the scientific method, encompassing literature reviews, laboratory and field research, and meticulous data collection and analysis. The course is structured to instil a foundational understanding of scientific inquiry, but also to provide a realistic workplace experience in STEM fields so that students can progress toward these careers. For students who wish to pursue the subject areas more deeply, further experiential

learning can be undertaken during the summer months as laboratory research interns. Spanning six weeks, this intensive internship programme places students within laboratory research teams at Brooklyn College, affording more hands-on academic science experience and first-hand insights into green STEM careers. Beyond the experiential component, summer interns are remunerated with a \$1000 stipend and given access to additional STEM presentations, college-related events, and a supportive professional network instrumental in navigating subsequent STEM-related academic and professional pursuits. Students are accepted to the programme based on their applications, comprising of their high school transcripts and individual interviews, with priority given to eleventh graders (ages 16 to 17) from demographically underserved schools.

An innovative workplace experience is provided through the [Adapting Futures Program](#), supported by [Careers in Energy](#) which makes use of virtual reality (VR) technology to immerse students into **Canada's** energy sector. Through a series of virtual reality experiences, students from ages 15 to 18 can explore diverse work environments and worksites within the energy industry. The programme features an immersive tour of a petrochemicals plant, providing insights into the cleantech innovation life cycle, the sustainable growth of solar, wind, and geothermal energy, and the integration of automation for routine tasks in the green energy sector. Participants can also take part in the “[Take the Challenge](#)” module, aligning skills with qualifications for ten distinct roles in the energy industry, and can receive customised career recommendations. The Challenge is an extended reality experience comprised of mini-games designed to help students and adult participants explore potential careers, including many green energy careers such as environmental technicians, environmental engineers, and hydrologists. The games aim to foster and evaluate skills needed in the jobs, such as adjusting equipment values, conducting worksite hazard assessments, drilling and shooting seismic charges. The Adapting Futures virtual reality experience is also supplemented by additional career development resources and events to facilitate youth in progressing towards green careers. These events include workshops for students to interact with energy professionals, fully funded courses to address individual skills and knowledge gaps, timely and relevant labour market information and outlooks, webinars on current energy industry topics, podcasts providing insights into the industry with energy professionals and a database of 568 energy careers, of which 250 are green jobs.

Thompson Island Outward Bound's [Green Ambassador Program](#), in the **United States**, is designed to provide Boston high school students with summer employment opportunities in the green job sector over a three-year period. This programme integrates paid work with structured outdoor learning on Thompson Island, where participants between the ages of 15 to 18 from the Boston area become Green Ambassadors. The programme comprises of diverse experiential learning opportunities alongside an active exploration of green career opportunities leveraging employer partnerships, encouraging and enabling entry into environmental studies and green careers. All activities of the Green Ambassadors programme are undertaken outside the classroom on the 204-acre Thompson Island under the guidance and mentorship of environmental professionals, offering diverse natural features for applied, real-world learning and direct first-hand experiences of green careers. Over the three-year period, Green Ambassadors engage in a range of environmental activities such as working outdoors in all weather conditions; practicing trail maintenance; habitat preservation; invasive species removal; scientific monitoring and data collection; collaborations and interactions with professionals in the field, such as marine scientists, environmental scientists, environmental educators, and National Park staff; and exploration of urban agriculture to actively progress toward green jobs. The programme also emphasises the importance of developing essential employability skills, including timeliness, goal setting, decision-making, communication, and leadership. Direct

partnerships with the Department of Conservation and Recreation and the National Park Service help Green Ambassadors stay engaged with employers and informed about emerging environmental trends and labour market information.

Another green guidance programme that provides workplace experiences is the [Green Jobs Internship Program](#), coordinated by the University of Delaware Water Resources Center (UDWRC) and overseen by the City of Wilmington's Department of Parks and Recreation in the **United States**. The internship offers students aged 14 to 16 with a six-week workplace opportunity. Participants engage in hands-on outdoor environmental work, delving into career exploration and gaining exposure to pressing environmental issues. Tasked with working 25 hours per week, interns receive coaching and are overseen by a Summer Counsellor who guides them through various indoor and outdoor activities across Wilmington's green areas. Through collaborative efforts with host organisations, such as the Delaware Nature Society, interns not only learn about building cleaner, greener cities but also deepen their understanding of local ecosystems and their individual roles in environmental stewardship. A cornerstone of the programme is the completion of a work-based learning project, culminating in a final presentation. This project helps students hone essential employability skills such as public speaking, teamwork, and communication while also reinforcing commitment to environmental advocacy and career development.

4.4. Green career pathway programmes

Career Pathways encompass structured programmes within general secondary education institutions aimed at enhancing student employment outcomes by integrating career development opportunities to general education (Herdman, Mann and Burke, 2024^[99]). Career Pathways include such programmes as Career Academies in the **United States**, Foundation Apprenticeships in **Scotland** and School-based Apprenticeships and Traineeships in **Australia**. These programmes are typically offered to students at upper-secondary level, commonly at ISCED 3. While sharing fundamental characteristics with green guidance programmes, career pathways are characterised by their intensive and inclusive nature to comprehensive career and academic preparation (Herdman, Mann and Burke, 2024^[99]). Career Pathways focus on sectors of broad economic activity, frequently in strategically significant vocational fields with a high demand for new labour, particularly evident for green jobs during the green transition. These programmes offer students opportunities to explore potential future employment avenues, accumulate relevant knowledge and experience, and engage with professionals in related fields, all while maintaining flexibility in post-secondary pursuits (Herdman, Mann and Burke, 2024^[99]).

4.4.1. Examples of green career pathway programmes

Green Tech Academy

An exemplar green Career Pathway programme is the [Green Tech Academy](#), situated within Olathe West High School in Olathe, Kansas. Studies conducted by the MDRC, a policy research organisation based in New York City, have found evidence of enduring positive impact on student green employment upon completion of Green Tech Academy (Klein, 2023^[100]). The Green Tech Academy draws on learning Career and Technical Education (CTE) learning programmes offered to all students and is designed to equip students with extensive knowledge on renewable energy and sustainable agriculture. The Academy's programme consists of linked courses delivered over four years. Provision is underpinned by project learning, industry partnerships and community engagement. By integrating intense vocational training within mainstream, general schooling, students are

provided with considerable opportunity to develop understanding of green employment while gaining skills and experience designed to enable easy and relevant transitions after completion of secondary education. Alongside participation in the Green Tech Academy, students complete their High School Diploma, keeping their options open for the future. Currently, the Academy serves a cohort of 106 students and operates as one of the 10 CTE academies within Olathe Public Schools. In 2023, three-quarters of the 20 graduating seniors expressed an intention to pursue a green career or further education related to the green sector.

The Green Tech Academy offers two initial pathways – Introduction to [Energy](#) and [Agricultural Explorations](#) – before students advance to specialise in the last two years of high school. Each pathway encompasses an array of courses relevant to individual interests and career aspirations, culminating in a senior capstone project and advanced placement courses. Examples of such courses include Sustainable Resource Management, Plant and Animal Science, and Energy Industry Fundamentals. Complementing the academic requirements, students must complete 200 “eHours” dedicated to energy and sustainable agriculture-related activities outside the classroom. These extra hours are designed to help students explore a wider range of environmental topics, such as Engineering or Ecology, nurturing the requisite skills for the evolving green, climate-ready workforce, and ensuring that they have applied, real-world learning experiences.

Green Tech Academy also leverages robust partnerships with 27 local industries, offering students personalised career development opportunities ranging from workplace visits to internships. For instance, students can gain employment experience and labour market insights through visits to wind farms, solar arrays, and hydroelectric power plants, or complete internships conducting audits of buildings’ energy use. Students can also obtain industry-recognised certifications such as OSHA 10, a ten-hour workplace safety course, enhancing their employability in the green sector. Green Tech Academy’s partnerships also extend to local post-secondary institutions, opening avenues into tertiary education or to obtain credits for tertiary programmes. Furthermore, the Academy’s sustainable agriculture pathway collaborates with other high schools in western Kansas that have agricultural programmes for students to collaborate and share innovative ideas. Through this multifaceted approach, the Green Tech Academy empowers students to understand and navigate towards green jobs.

Green Energy Pathway

Another notable illustration of a career pathway that supports students to acquire relevant work skills for green job sectors while preparing them for post-secondary education is the [Green Energy Pathway](#) at Skyline High School in Oakland, California. This green career pathway is aligned with California's [Energy, Environment, and Utilities \(EEU\) Industry-Sector Program](#), designed by the California Department of Education to provide foundational knowledge and skills in careers related to energy, environment, and utilities. The Green Energy Pathway currently serves 420 students from grades 9 to 12 (ages 14 to 19). The student body is comprised mostly of those who are eligible for free or reduced-price lunch and from underrepresented minority groups.

The Green Energy Pathway strongly emphasises sustainability in its whole-school approach, offering numerous opportunities at each grade level to integrate a sustainability theme into subject study. Central to the Academy’s programming is a project-based curriculum that focuses on science-based solutions for addressing global warming, as well as an integrated curriculum that intertwines core academic courses with sequenced CTE. Students are provided with personalised career development activities and opportunities to apply their learning. For instance, students engage in a range of work-based learning

activities, including workplace visits, community-based projects like the 11th grade "Classroom of the Future" project, and short internships. These experiences culminate in a capstone project in 12th grade, where students are expected to apply their knowledge to tackle environmental challenges within their community. Noteworthy is the programme's emphasis on engagement and partnerships with diverse external stakeholders, such as the involvement of community leaders from green industries and green focused organisations and institutions, who attend and evaluate the senior year final presentations, fostering real-world connections. The Green Energy Pathway also partners with the Oakland Unified School District to offer internships that can provide district-wide access to paid work-based learning experiences. Interns undertake projects tailored to their interests, skills and knowledge, such as analysing green homes in Oakland, participating in solar-panel installations with the local green energy company or undertaking opportunities with local organisations and employers. Additionally, partnerships with local post-secondary institutions provide Green Energy Pathway students with dual-enrolment opportunities and exposure to more environmental programmes beyond the academy.

5. Conclusion

If the global response to climate change is to be effective, a significant change can be expected in the character of work and the availability of labour market opportunities. While there is disagreement over the extent and anticipated growth of green jobs, it is clear that such employment will be profoundly important within the fight for environmental sustainability. Employers are already signalling substantial concern that they will not find workers with the interest, skill and knowledge needed to address ecological challenges, despite many young people expressing strong interest to work in green occupations. Career guidance systems have an essential role to play in enabling student understanding of, and progression towards, green jobs. The role of guidance is especially important because the rapid pace of change in the labour market makes it more difficult for students to access advice and guidance on such professions through their informal networks. More than this, complexities exist in the identification of green jobs. Occupations in many sectors can be green, white or brown.

Reviewing existing green guidance programmes from 20 OECD countries in light of scientific understanding of more effective forms of guidance provision provides the basis for a new conceptual framework for shaping provision. Analysis of longitudinal studies highlight the central importance of guidance systems encouraging and enabling students to actively explore, experience and think about potential futures in work. In such a way, schools can facilitate ongoing student dialogues between their emerging understanding of their own interests, capabilities and constraints and potential futures in work. Building on foundational environmental literacy, schools can help students draw connections between academic provision and the real world. They can facilitate students to understand the range of green jobs, what they have to offer and what they need to do within education to prepare for green labour market entry. As students get older, schools can provide means that will help students progress towards desirable employment, building social capital through regular engagements with people who work in relevant professions and human capital by providing work-based experiences. This way, students can be expected to build more confident and informed senses of personal agency, building their understanding of working cultures of relevance to them individually.

PISA 2022 shows that in many OECD countries, student participation in key guidance activities is too limited. Increasing provision can be expected to broaden student understanding of, and preparation for, the labour market. However, given the urgency of

climate change and the clear gap that exists between student interest in related occupational fields and the capacity of employers to recruit, it is important for education systems to recognise green guidance as a form of general guidance that requires and merits significantly greater attention.

This paper highlighted 87 examples of practice from across the OECD and provided a framework, drawing on the best available scientific understandings of effective practice to build stronger systems. In monitoring impact, key questions relate to the extent to which systems enable students to review employment opportunities in light of personal environmental concerns, schools to access relevant resources and to engage directly with relevant employers and people in work, and employers to liaise easily with school systems. Effective provision will begin with a comprehensive foundation that can equip students with formal or informal mechanisms for smooth transitions, which, following the completion of secondary education, would lead into green employment or relevant post-secondary studies.

Annex A

Table 2. Examples of green guidance

Country	Name of Programme	Target Group	Description of Initiative
Australia	Seek Volunteer	Ages 15-25	SEEK Volunteer is Australia's largest free online source of volunteer opportunities across many industries, including in the green sector. Diverse opportunities are offered and range in duration, age group and particular purpose.
Australia	Royal Botanical Gardens Victoria	Ages 15-18	This workplace visit programme helps students to explore the historical, cultural and botanical significance of the Melbourne Gardens whilst also learning about the career paths that exist within the botanic gardens industry. During the visit, students engage in various learning activities that help to understand and progress towards green jobs.
Australia	Careers for Net Zero Fair	Ages 15-65	Career fair designed to help individuals find out more about how their knowledge and skills can make a difference across the clean economy. The target audience are students, educators, career advisors, policy makers, migrant workers and people already on their career journeys. Participants have access to a wide range of career development activities and networking opportunities through the fair.
Austria	Bildungsberatung NÖ	Ages 15-65	Funded by the Federal Ministry of Education, Science and Research, the Government of Lower Austria and Austrian Chamber of Labour, Lower Austria provides green career counselling to Austrians aged 15-65. The programme offers various counselling options, hot lines, and events to create awareness and information on green careers. For students aged 13-18, there are specific workshops on green jobs and an online platform that also provides materials and supports for career counsellors.
Austria	Ökolog Schools	Ages 3-19 (K-12)	Ökolog encourages and motivates schools in Austria to become active in the area of environmental education. Beyond the 700 schools that are part of this school network are also 13 universities that support the programme. The main aim of the Ökolog Schools network is to help all students foster green skills necessary to thrive and contribute to sustainable societies and develop positive attitudes towards the environment and sustainability.
Belgium	Circonopoly	Ages 15-18	Circonopoly is an online educational game designed for high school students, particularly in upper-secondary education. It immerses players in the world of circular economy, specifically within the textile and plastic sectors. The game aims to educate students about sustainable material use, consumption behaviour, and to stimulate their entrepreneurial spirit as well as provide career related information.
Belgium	Vitopolis	Ages 8-18	The Vitopolis project by GoodPlanet Belgium focuses on deep geothermal energy as a key component of the renewable energy mix. It includes online webinars for students, educational tours at VITO's geothermal power plant in Mol, Belgium, where students can experience a 4m high underground model, participate in interactive quizzes, and explore augmented reality features.

Canada	Project Learning Tree Canada	Ages 15-30	Supported by the Federal Government of Canada, Project Learning Tree serves youth ages 15-20. The programme aims are to enhance environmental education, forest literacy, and career pathways using trees and forests as windows of the world. Alongside environmental education, the programme also provides skills assessments, job matching and mentorships for students.
Canada	Clean Foundation	Ages 15-30	The Green Jobs Internship program, funding by Natural Resource Canada, provides employment opportunities for youth in the natural resources sector. Program wage subsidies help Canadian employers in relevant sectors, including energy, forestry, mining and earth sciences, hire the talent they need to grow and innovate.
Canada	Career Launcher	18+	Colleges and Institutes Canada (CICan) created the Career Launcher program in 2015 to help transition highly skilled students and grads to future-ready employment. Over the past few years, Career Launcher has branched out to include additional offerings and is now a platform for a range of CICan's programs. They offer information on three streams: internships, apprenticeships and supportive care.
Canada	Generation Power Youth	18+	Developed by and for Indigenous youth in Canada, Generation Power's purpose is to empower Indigenous communities to be at the forefront of the climate change conversation. The programme provides two pathways: youth-led pathway (which provides a 4–12-month internship) and match-based pathway (for a full-time position).
Canada	Alberta Alis Careers	Ages 15-18+	A career portal hosted by the Government of Alberta, Canada is a comprehensive resource hub for careers, including in the emerging green sector. The portal provides timely and relevant labour market information, links to job banks and guiding questions for reflection, all of which are tailored to the needs of diverse audiences.
Canada	Relay	Ages 15-19	Relay delivers renewable energy and environmental education and training programmes in schools and communities, particularly in the rural and remote areas. The Green Careers programme provides opportunities for youth to explore and build careers in sustainability, energy and environmental industries. Green guidance is also delivered through workshops, internships, work-place programming, mentoring, the Green Chair Podcast, and Green Careers resources.
Canada	New Brunswick	Ages 3-19 (K-12)	Under the umbrella of Future New Brunswick, the Centres of Excellence are designed to prepare students to enter priority economic areas: skilled trades and manufacturing, health, energy, language learning, entrepreneurship, digital innovation. Each Centre provides resources to enrich the delivery of the provincial curriculum in many subject areas with content based on authentic practices, opportunities for experiential learning, remotely connecting learners and experts, and exploring current and emerging issues. The Centre acts as an intermediary to connect schools with the economic community.
Canada	Careers in Energy	Ages 15-18	Careers in Energy provides career development events and resources for individuals seeking careers in Canada's energy sector. It provides workshops, webinars, podcasts for individuals (including students in upper-secondary to higher ed) to meet and interact with professionals in the sector. Additionally, there is an extensive database of careers in the energy sector, many of which are in green energy, as well as labour market information. Careers in Energy also runs Adapting Futures programme, which provides VR technology to immerse individuals into the energy workplace and to explore energy careers.
France	France: Jobs and careers in science class	Ages 12-13	Nicolas Marco is a teacher at College Simone Veil who asks his students to research jobs linked to any new topic introduced in his Life and Earth Science class. Students choose one of the occupations and research it, answering a series of questions about the job. The exercise helps students become more engaged in learning while building their agency for career exploration, experiencing and thinking for green careers.
France	JobDD	Ages 12-18	JobDD is an innovative web platform that helps students think about possible future careers in relation to the 17 SDG goals. An interactive quiz helps students discover the SDGs that are most meaningful and important to them and provides suggestions of relevant jobs, including those related to environmental protection.

Germany	Ehrensachen Natur	Ages 3-19 (K-12)	A youth volunteering programme of the Nationalen Naturlandschaften (National Natural Landscapes - national parks, nature parks and biosphere reserves). The programme offers the opportunity for students to get involved in nature conservation and environmental education projects across Germany.
Germany	planet-beruf.de	Ages 12-18	An initiative of the Federal Agency for Labour in Germany. This career portal is designed for students to find information about jobs (including those with a green dimension) and take numerous tests to identify their interests and skills. Students can also find more information about internships, apprenticeships, and workplace visits through the portal.
Germany	BOOM Feriencamps	Ages 14-25	The "BOOM Feriencamps" is a German initiative aimed at youth, focusing on integrating sustainable practices into various skilled trades. Students engage in hands-on activities across themes like construction, energy, and nutrition, emphasising the potential for every job to be green. The programme, delivered at student summer camps near Cologne/Bonn and at Edersee, encourages young people to actively shape their future by learning and applying sustainable practices in different professions.
Germany	Netzwerk Bildung für Ressourcenschonung und Ressourceneffizienz (BilRess)	Ages 12-25	A German network initiative aimed at strengthening resource education across various educational sectors, focusing on connecting key stakeholders, developing resource-efficient educational materials, and promoting sustainable practices.
Germany	Netzwerk Grüne Arbeitswelt	Guidance practitioners	Founded in 2017, the network brings together more than 100 stakeholders who are committed to career orientation in the green world of work – including companies and associations, schools and extra-curricular educational institutions as well as specialist institutions, vocational schools, universities of applied sciences and universities, but also career guidance providers, trade fair providers and the media. With the Green Working World Network, members are supported in contributing their commitment to their future professional lives within 16 green occupational fields.
Hungary	Fenntarthatósági Témahét (Sustainability Theme Week)	Ages 6-18	The Sustainability Theme Week takes place in April 2024 and focuses on 5 sustainability/environmental themes (this year, the themes include: air and wildlife, leisure, waste, circular farming, conscious consumption). Schools register to participate in a large range of events, including competitions, volunteering, conferences, and research projects. Teachers and schools are supported with educational materials as well as training on sustainability and environmental sciences.
Ireland	Careers Portal	Ages 15-18	Launched in 2008 by the Ministry of Education and Science in Ireland, Careers Portal serves as a comprehensive resource guiding users of all demographics through the intricacies of career development. Students can explore 33 employment sectors (of which three are dedicated to the green economy). Each section dedicated to an employment sector includes interactive materials, resources (such as videos and employee insights), career interviews, associated courses, skills assessments, and skills development opportunities.
Italy	Excelsiorienta - Risparmio energetico e sostenibilità ambientale	Ages 12-18	Excelsiorienta is an online career portal aimed at providing career guidance to students in lower- and upper-secondary schools. Excelsiorienta offers tools including a self-assessment quiz (OrientaGame), information about professions and career paths (Career Guide), advice for those that want to start their own business (Entrepreneurship Guide), and labour market data to help students in decision-making about their educational and professional futures. The page on green careers is designed to help students with an interest or aptitude in environmental issues explore careers that contribute positively to the planet.
Luxembourg	Digital Challenge	Ages 15-18	The Digital Challenge is an immersive learning day hosted by IMS Luxembourg and CARE Luxembourg. The aim is to offer the opportunity for companies and young people to meet and collaborate creatively in a challenge that is related to digitalisation, evolution of digital skills and sustainable development. This opportunity also helps youth network and further expand career development opportunities with the employers beyond.

Netherlands	Leren voor morgen	Ages 3-19 (K-12)	The cooperative Leren voor Morgen (Learning for Tomorrow) consists of a network of organisations dedicated to integrating sustainability. The network takes on a broad view of sustainability, using the Sustainable Development Goals (SDGs) as a framework, and focuses not just on environmental aspects but also on the social dimensions of sustainability, including equality and inclusivity. Leren voor Morgen has green career development initiatives such as SDGs on Stage and the Circular Skills programme.
Netherlands	Vereniging Buitengewoon Groen	Ages 12-18	Vereniging Buitengewoon Groen is a network of schools dedicated to providing training and education that lead to green VET jobs. There are 36 schools across the country with approximately 2,000 students undertaking green training within the network of VGB schools.
Netherlands Belgium	Energie(k) Onderwijs (Border region project)	Ages 15-25	Energie(k) Onderwijs (Energetic Education) is a project focused on training and upskilling individuals for roles in energy during the green transition, addressing the increasing demand for technical personnel in the energy sector. It involves developing new educational programs in secondary and higher education, retraining and in-service training programs, and promoting national and regional cooperation between education, government, and industry. The project is funded by the European Regional Development Fund.
New Zealand	Green Schools	Ages 6-18	Green schools is a global network of schools in Bali, New Zealand and South Africa, committed to making the world sustainable through education. The curriculum is heavily focused on environmental sustainability and empowering students to take action for the climate.
Scotland	NatureScot	Ages 8-25	NatureScot, Scotland's Nature Agency funded by the Scottish Government's Environment and Forestry Directorate, engages with youth through the YoungScot programme which aims to increase access and participation of young people in nature. The programme has several projects and initiatives that link strongly with green careers. The programme also supports primary and secondary students to fully engage in outdoors and informal learning contexts and provides teacher professional training on active project-based environmental education.
Scotland	Green Careers	Ages 15-18+	My World of Work is hosted by Skills Development Scotland (SDS) and is a career information and advice website. The portal provides information on green careers, green career pathways, and tools for assessing skills and opportunities, and is tailored to diverse audiences and supports their professional growth and career.
Slovenia	DOPPS – BirdLife Slovenia	Ages 15-18+	DOPPS-Birdlife Slovenia is a non-profit, non-government organisation established in 1979 that works in areas of nature conservation, environmental protection, and research. The institute boasts participation from over 1000 members, volunteers and nature lovers from all across Slovenia, including many youths. DOPPS also employs over 24 experts from a variety of backgrounds to provide training and education to young people on the protection of birds and their habitats.
Sweden	Naturbruksgymnasium	Ages 12-18+	This network of "natural resources" schools train students to specialise in studies of agriculture, forestry, and other environmentally related fields. The schools (a mix of green VET or green career pathways programmes) provide 2 to 4-year specialised education and training, mostly in the form of internships and apprenticeships, for green careers in agriculture and forestry.
Sweden	Jobba Grönt	Ages 15-25	Jobba Grönt is an initiative that aims to inspire and guide individuals towards education and careers in the green sector. It addresses the areas of agriculture, forestry, gardening, and rural environments, offering a wide range of career and educational pathways for those interested in technology, nature, environment, and animals.
Switzerland	Réseau d'écoles21 (Schools21 Network)	Ages 12-18	School Network21 is the Swiss network of healthy and sustainable schools. Over the past 25 years, it has grown steadily and currently brings together 2000 schools from the four language regions. It is the largest network of schools in Switzerland. In total, nearly 350,000 students benefit from green education that equips them with the skills necessary to enter green careers and contribute to a sustainable society.
United Kingdom	Real World Learning	Ages 3-19 (K-12)	The Real World Learning Network allows students to explore successful approaches to outdoor learning that increase action for sustainable development. The network engages several partners from European countries to provide opportunities for young people to engage with nature and build skills for green careers.

United Kingdom	Green Careers Week	Ages 12-18+ Parents	A new initiative launched last year in the UK to provide young people with an insight into careers that specifically protect the environment and help to achieve the UK's pledge of reaching Net Zero by 2050. Led by National Careers Week in partnership with organisations such as STEM.org.uk and the UK Space Agency.
United Kingdom	See it, Be it	Ages 12-18	The See it, Be it supports teachers to connect the subjects they teach with future 'green' jobs by providing short, captivating documentaries about real people in the workplace. This is used as the basis of a lesson, which connects specifically to the film the students watch. Each lesson delves deeper into the person, the job, and the industry as well as exercises that relate to each student's own uniqueness and set of skills.
United Kingdom	Green Careers Hub	18+	Green jobs portal created by the Institute of Environmental Management and Assessment (IEMA) to provide reliable, up-to-date information on green careers, green career paths and labour market information on green jobs. The portal serves job seekers from any sector or background and aims to help users understand the importance and role of each individual in greening the UK economy.
United Kingdom	Green Careers Hour	Ages 12-18	Hosted by the Careers & Enterprise Company, the virtual Green Careers Hour features employers from across the economy that provide opportunities in the green sectors. The aim of the programme is to demystify what is meant by "green jobs" (both for young people and those advising them) and to inspire students to consider the different pathways and future careers options, including pursuing tertiary education, technical and apprenticeship routes.
United Kingdom	Green careers guide	Ages 3-19+	Online guide that provides visitors of all ages in the UK with information about green careers. The information is organised into formats that are easily accessible to a wide range of audiences including as: Green Careers Alumni Videos, Green Careers webinars and Green Careers Directory.
United Kingdom	Sustainable Futures	Ages 14-18	Free careers programme for UK secondary school and college students to equip them with skills to thrive in a green economy. The programme provides resources to educators and students so that they can be well informed and inspired to enter green careers. The programme also connects schools with business role models and employers, so students can consider how sustainable approaches can be embedded into businesses.
United Kingdom	Neon	Ages 7-18+	Neon is a repository that brings together UK's engineering and technology resources. It provides careers resources to help teachers bring STEM to life with real-world examples of engineering and technology. A wide range and variety of careers resources are provided for teachers to match the needs and age groups of their students. As well, students have access to interactive quizzes that help them find out their skills and passions that could lead to a job in STEM.
United Kingdom	Greenpeace UK	Ages 7-18+	Greenpeace provides online resources to students from ages 7 to 18+ to foster environmental literacy, stewardship, and activism. As part of this active learning process, Greenpeace also provides an online resource package that includes information on green careers.
United States	Energize Schools	Ages 3-19 (K-12)	Energize Schools Program provides holistic services to engage and empower K-12 students to become environmental leaders, green their campus and community, and develop green career awareness and skills through hands-on, experiential learning. The programme supports teachers with a project-based curriculum, teacher training, and direct instructional support to build student awareness and skills for energy and sustainability leadership and careers.
United States	Grades of Green	Ages 3-19 (K-12)	Grades of Green offers five streams of programming that are free for students, schools, districts, and parents. Its aims include Providing environmental project-based programs for students in every grade level, building and empowering environmental leaders, and bringing students around the globe together to work toward transformative solutions.
United States	NEEF grants	Ages 12-18	NEEF's Greening STEM projects engage students in STEM (science, technology, engineering, and math) activities to explore real-world challenges outside of the classroom. By establishing partnerships and guiding collaboration with local school districts, community groups, land management agencies, and funders, NEEF helps provide educators with the resources they need to give all students a meaningful learning experience.

United States	Green Energy Academy-Skyline High School	Ages 12-18	Green Energy Pathway at Skyline High School in Oakland, California serves approximately 420 students spanning grades 9 through 12 (ages 14 to 19). This four-year career pathway programme implements a project-based curriculum that focuses on innovative science-based solutions for addressing global warming, as well as an integrated curriculum that intertwines core academic courses with sequenced Career and Technical Education (CTE).
United States	Green Tech Academy	Ages 12-18+	As part of the Olathe West High School network in Olathe Kansas, students at the Green Tech Academy undergo a four-year career pathways programme dedicated to a rigorous academic education that also develops green skills and knowledge in energy, agriculture and sustainability that would prepare them for the world of green jobs. The academy currently serves 106 students, many from underprivileged backgrounds.
United States	Green Ambassador Program	Ages 15-18	Thompson Island Outward Bound's Green Ambassador Program is designed to provide Boston high school students with paid summer employment opportunities in the green job sector over a three-year period. This programme integrates paid work with structured outdoor learning on Thompson Island, where participants between the ages of 15-18 can undertake professional career development, technical job training and natural resource management.
United States	Urban Assembly School for Green Careers	Ages 12-18	A green career pathway programme that provides rigorous academic programming complemented by CTE. The school focuses on critical environmental issues and aims to foster a deep commitment to equity and social justice. UA schools provide disadvantaged students with individualised support and guidance that they need to maximise their potential and succeed in their post-secondary academic and green career paths.
United States	Carolina Wildlife Center - Summer Junior Volunteer Program	Ages 15-18	Carolina Wildlife Center provides volunteer opportunities to students interested in biology, wildlife conservation and veterinary medicine in their Summer Junior Volunteer Program. Junior volunteers work closely with CWC staff and experienced volunteers providing hands-on care for a variety of wildlife at the centre. The Junior Volunteer Program gives students an opportunity to explore careers in wildlife conservation and environmental science.
United States	Alaska Songbird Institute	Ages 15-18	ASI's high school internship programme is an opportunity for students ages 14-18 who are interested in exploring research, wildlife, and conservation-related career paths. Students receive training in basic field research techniques including nest monitoring, bird banding, and recording and managing data.
United States	Climate Action Pathways for Schools	Ages 15-18	The Climate Action Pathways for Schools (CAPS) programme is a project-based learning programme that prepares students for green jobs. The programme is designed to help students develop and execute projects that mitigate climate change and contribute to building more equitable, resilient, and sustainable schools and communities. CAPS also provides paid internships and work-based learning programmes.
United States	Student Conservation Association	Ages 12-18	The Student Conservation Association (SCA) is the largest provider of hands-on environmental conservation programmes for youth and young adults. Programme participants gain first-hand career experience by learning about protecting and restoring national parks, marine sanctuaries, cultural landmarks, and community green spaces.
United States	Delaware State Parks Youth Conservation Corps	Ages 14 to 21	The Delaware State Parks Youth Conservation Corps (DSPYCC) programme provides high-quality summer jobs and environmental opportunities for young people, aged 16 to 21, as well as training for environmental leaders aged 20 to 26. Corps members conduct outdoor environmental focused activities as a means of achieving personal growth that can then lead to green careers.
United States	City of Wilmington Green Jobs Summer Program	Ages 14 to 20	The Green Jobs Summer Program exposes youth to environmental issues, careers, and professional development through its 6-week environmentally focused paid internship programme. Employed youth work 25 hours/week for minimum wage and the programme is funded by the city of Wilmington. Each year, 14 to 16 students are selected to take part, some without previous interest or knowledge of green jobs, and programming involves close partnerships with local green industries.

United States	Canopy	Ages 15-18	Canopy virtual speaker series features a diverse group of professionals in the environmental sector for high school students to hear from and ask questions of industry professionals about their careers as they begin to plan their own. A range of panellists talk about their work in fields such as environmental justice advocacy, landscape architecture, materials recycling, research, and education. Students hear first-hand accounts about workdays, likes and dislikes of the field, and what steps professionals took to get to where they are today.
United States	Mountains to Sound Greenway National Heritage Area: Burien Green Teens	Ages 13-21	Mountains to Sound Greenway National Heritage Area: Burien Green Teens is a paid internship experience for 15 to 21-year-olds who live within the Highline School District (Washington) and want to learn about conservation careers. Interns work primarily in Salmon Creek Ravine while learning valuable job skills and networking with environmental professionals. Interns are paid \$800 for the duration of the internship.
United States	Brooklyn College STEM Research Academy & Internship	Ages 15-18	The Brooklyn College STEM Research Academy primarily serves 10th and 11th graders from schools underserved by STEM initiatives and opportunities. The course includes hands-on research experience, mentorship, opportunities for presentations, and attendance at events hosted by the American Museum of Natural History. Students who complete the spring course successfully can then apply for a summer internship, working as part of a laboratory research team at Brooklyn College for six weeks. Summer interns receive a \$1000 stipend and have access to additional STEM presentations and college-related events.
United States	Baltimore Connecting Children to Nature	Ages 14-21	As part of the Baltimore Connecting Children to Nature Strategy, the Nature-Based Career Exploration programme aims to improve youth's relationship with nature by supporting their engagement and ability to 'learn and earn' via green career training programmes. The programme provides opportunities for students between the ages of 14-21 in finding summer jobs with green industries (private, non-profit and city/state government employers throughout Baltimore) and hosts a monthly speaker series called Career and Technology Education (CTE) Fridays from green professionals.
United States	Linc Summer High School Program	Ages 15-18	The LINC Summer Program by the Golden Gate National Parks Conservancy is a dynamic six-week opportunity for Bay Area high schoolers. It blends environmental science with outdoor activities, professional development, and a \$2,400 scholarship. From habitat restoration to kayaking and camping, students engage in meaningful work and play, all while learning valuable life and job skills.
United States	Mountains to Sound Greenway National Heritage Area: Burien Green Teens	Ages 15-21	The Burien Green Teens program offers a paid two-week internship for 15–21-year-olds in the Highline School District, Washington, focusing on conservation and environmental careers. Participants work in Salmon Creek Ravine, gaining job skills and networking with professionals. Interns receive a \$1,200 stipend and a set of restoration gear. The programme, a collaboration between the Greenway Trust, Burien PaRCS, and Dirt Corps, runs during the summer months.
United States	Mountains to Sound Greenway National Heritage Area: Youth Engaged in Sustainable Systems (YESS)	Ages 15-18	The Youth Engaged in Sustainable Systems (YESS) programme is a 6 to 7-week paid internship for high school students from the Highline and Riverview School Districts, focusing on ecological restoration and conservation. Participants join a restoration crew, replacing invasive plants with native species and explore careers in natural resources, conservation, and land management. Interns receive a \$1,800 stipend, 1 graduation credit, transportation, and safety gear. The programme is delivered in partnership with the Pacific Education Institute and local school districts.
United States	New York City Department of Parks & Recreation: Ranger Conservation Corps Internship	Ages 15-18	The Ranger Conservation Corps Internship by the New York City Department of Parks & Recreation offers NYC high school students an urban environmental experience. During this 8–10-week programme, participants engage in environmental restoration efforts alongside Urban Park Rangers. Interns gain valuable hands-on and outdoor experience, accumulate community service hours, and enhance their college applications. Sessions are designed to fit school schedules, running one afternoon per week.
United States	Northwest Youth Corps: Youth Corps Camping	Ages 15-18	The Youth Camping programme in Oregon, Washington, and Idaho offers an outdoor experience for 16 to 18-year-olds interested in conservation and the environment. This residential programme combines education, job skills training, and outdoor adventure, where participants work on conservation projects like tree planting and trail construction. Youth earn a weekly stipend, potential high school credit, and professional references. With a tuition fee and potential scholarships available, the programme provides uniforms, rustic camping experiences, and food.

United States	Conservation Corps: Youth Conservation Crews	Ages 15-18	Conservation Legacy offers a dynamic range of paid internships for young people aged 15 to 18 through its various Conservation Corps programmes across the United States. Participants engage in community-based service projects that aim to protect, restore, and enhance the natural areas and parks. With a mission rooted in national and community service, Conservation Legacy aims to foster future leaders in environmental conservation through hands-on, impactful work.
United States	United States Youth Conservation Corps	Ages 15-18	The U.S. Youth Conservation Corps (YCC) offers a summer employment programme for individuals aged 15 and older. Participants work on conservation projects in various settings such as national forests, parks, wildlife refuges, and fish hatcheries. The programme, which ranges from 3 to 10 weeks, involves tasks like trail building, historic preservation, invasive species removal, and environmental education. YCC provides educational and career exploration activities alongside the work experience. Opportunities are mostly local, requiring daily commuting, though some camping programs are available.
United States	Vermont Youth Conservation Corps	15+	The Vermont Youth Conservation Corps (VYCC) offers paid outdoor employment for teens aged 15 and older, focusing on conservation and agriculture. Participants engage in projects to enhance forest and waterway health, grow organic vegetables for local communities, and build trails and outdoor structures. VYCC provides a hands-on opportunity for young people to learn about environmental stewardship and develop practical skills while contributing positively to their communities.
United States	Lamont-Doherty Earth Observatory's Secondary School Field Research Program (SSFRP)	Ages 15-18	The Lamont-Doherty Earth Observatory's Secondary School Field Research Program (SSFRP) is a six-week summer opportunity for high school and undergraduate students, as well as science teachers, to engage in field and laboratory research at the Lamont campus. Participants collaborate on scientific projects, focusing on ecological and physical processes. The programme includes forming research teams, developing and executing sampling plans, and conducting experiments on various environmental topics. It culminates in a symposium where findings are presented.
United States	Hutton Junior Fisheries Biology Program	Ages 15-18	The Hutton Junior Fisheries Biology Program offers high school students an 8-week paid summer internship to explore fisheries and aquatic science. Sponsored by the American Fisheries Society, it pairs students with mentors for hands-on experience in conservation and management, emphasising the importance of aquatic ecosystems and career exploration. Participants receive a \$3,000 stipend and a trip to the Hutton Scholars Summit.
United States	Morton Arboretum: Research Technician Fellowship	Ages 15-18	The Morton Arboretum offers a Research Technician Fellowship for high school students to gain hands-on experience in scientific research, particularly focusing on tree science. This paid internship provides mentorship by experts, involving laboratory work, data analysis, and field research. It's aimed at encouraging students, especially those from underrepresented groups in STEM or schools with limited research opportunities, to explore environmental science fields and contribute to studies on climate change, biodiversity, and sustainable urban living.
United States	Pepperwood Foundation: TeenNat	Ages 15-18	TeenNat at Pepperwood is a free summer programme for high school students in grades 10-12, focusing on conservation science and field research. Participants explore a 3,200-acre reserve, gaining skills in data collection, species identification, and hiking safety. The programme includes interaction with scientists and exposure to STEAM careers, culminating in a biodiversity project. TeenNat offers a practical introduction to environmental science, encouraging participants to apply their learning to real-world conservation efforts.
United States	State University of New York Oneonta – Biological Field Station: Internships for High School Students	16+	The Summer Research Internship Program offers both college and high school students, with a strong interest in environmental or natural sciences, a valuable experience for future academic and career pursuits. The high school internships, open to New York State residents aged 16 or older, last 9 weeks and work on a variety of projects, including field work, laboratory analysis, and data management, under the guidance of faculty and staff. They also have the chance to present their findings in seminars and technical reports.

United States	University of Chicago – Marine Biological Laboratory: Blue Economy Internship Program	16+	The Blue Economy Internship Program (BEIP) at the Marine Biological Laboratory offers paid internships to students from Massachusetts public high schools, state colleges & universities, and community colleges. These internships provide practical experience in life sciences, technology, and the Blue Economy, helping students build professional skills and knowledge. Opportunities vary from educational outcomes research and CRISPR genome editing to research in molecular genetics and financial services department projects. Interns work on real-world tasks under professional guidance, gaining experience in scientific research, data analysis, and administrative functions.
United States	University of Georgia – College of Agricultural & Environmental Sciences: Young Scholars Internship Program (YSP)	16+	The Young Scholars Program (YSP) offers a five-week paid internship for high school students at the University of Georgia, focusing on agricultural, food, and environmental sciences. Participants conduct research under faculty guidance, attend workshops, and explore agricultural careers. The programme ends with students presenting their findings at a research conference. Eligible applicants must have completed their sophomore year, be at least 16 years old, and have an interest in the program's focus areas, along with one completed science course and algebra.
United States	Teen Research and Education in Environmental Science (TREES) Program	Ages 15-18	The TREES program offers high school students a summer opportunity to engage in environmental science research under professional mentorship. Participants learn laboratory skills, design, and conduct research projects, and present their findings. The programme includes seminars, field trips, and workshops on various topics, including college admissions and career exploration. Hosted by the Center of Excellence in Environmental Toxicology, TREES aims to enhance students' research skills and interest in environmental science.
United States	Wildlife Conservation Society – Bronx Zoo: Project TRUE (Teens Researching Urban Ecology)	Ages 15-18	Project TRUE (Teens Researching Urban Ecology) is a high school paid internship programme focused on urban ecology research, facilitated by the Wildlife Conservation Society's Bronx Zoo Education team in collaboration with Fordham University. The programme includes hands-on data collection, analysis, and science communication training, culminating in presentations to both the scientific community and the public. Interns work closely with mentors from Fordham University and WCS, conducting research on wildlife and ecosystems.
United States	Mill River Park Collaborative: Mill River Stewards	Ages 15-18	The Mill River Stewards programme offers a summer-long paid internship for Stamford high school students, focusing on urban park stewardship, environmentalism, and conservation careers. Through field-based activities, students enhance their environmental literacy by engaging in green tasks such as riverbank erosion control, soil health improvement, and managing invasive species to maintain native habitats. In addition to hands-on environmental work, students receive career preparation through mentorship, workshops on resume building, interviewing skills, and meetings with business leaders, exploring the wide range of careers in the environmental field.
United States	Mountains to Sound Greenway National Heritage Area: Clean Water Ambassadors Internships	16+	The Clean Water Ambassadors Internship is a paid summer programme for high school students 16 and older, focusing on environmental issues and clean water careers. Run by the Mountains to Sound Greenway Trust and King County Wastewater Treatment Division, it includes field trips, workshops, and skills development in environmental justice, communication, and water management. The internship runs from July 17 to August 18 in downtown Seattle, with a weekly commitment of 28 hours. Participants earn \$18.43 per hour and receive ORCA cards for transport.
United States	Henry Hall Fellowship	Ages 15-18	The Henry Hall Fellowship offers high school students from Baltimore City and County an opportunity to engage in urban conservation and environmental justice. The programme includes educational sessions, field experiences, and projects from October to July, focusing on climate change, pollution, and waste management to advocate for a healthier Baltimore.
United States	Youth Ocean Advocates	Ages 15-18	The Youth Ocean Advocates programme is designed for high school students in NYC interested in marine conservation. Participants advocate for marine wildlife, engage in conservation campaigns, and gain insights into environmental policies. The programme includes organising conservation events, offers over 90 hours of training, and provides opportunities to develop leadership and public speaking skills. Participants receive a stipend of \$400 upon completion.

United States	Audubon Youth Leaders (High School Internship)	Ages 15-18	The Audubon Youth Leaders Internship (AYL) offers high school students unique leadership development in outdoor settings, focusing on conservation and native ecology. The programme aims to develop leadership skills, team collaboration, and conservation projects. Activities include workshops on communication, goal setting, native ecology, and conservation strategies.
United States, Greenland, Denmark	The Joint Science Education Project (JSEP)	Ages 15-18	The Joint Science Education Project (JSEP) offers a field-based programme in Greenland for students from Greenland, the U.S., and Denmark, and a remote, data-focused experience for U.S. students. Funded by the Government of Greenland and the U.S. National Science Foundation, JSEP aims to nurture the next generation of polar and STEM professionals through an intergenerational mentor-mentee model. This approach connects high school students with undergraduate and graduate mentors to explore polar environments and the impacts of Arctic change. Initiated in 2007, the programme encourages scientific inquiry and cross-cultural collaboration among students and teachers from the participating countries.
Worldwide	UNESCO Associated Schools	Ages 3-19 (K-12)	ASPnet is a large network of 11,500 schools across 182 countries that focus on education for sustainable development. The Network operates at international and national levels with three clear priorities: education for sustainable development, global citizenship education and inter-cultural and heritage learning. Their approach means that students, teachers, principals, school staff, parents, local citizens, community organisations and the private sector work together to embed sustainability and prioritise climate action.
Worldwide	Eco-Schools	Ages 3-19 (K-12)	Eco-Schools is one of the largest global sustainable school programmes where education for sustainable development is central to the core curricula. Students of all ages are actively engaged in opportunities with the community for action-based learning. Eco-Schools operate in 100 countries across the globe.

Source: Author's summary

References

- (IZA), I. (ed.) (2021), *Eco-Innovation and Employment: A Task-Based Analysis*, IZA Discussion Papers. [32]
- Accenture (2022), *More youth seek out “green” jobs*. [47]
- Akosah-Twumasi, P. et al. (2018), “A Systematic Review of Factors That Influence Youths Career Choices—the Role of Culture”, *Frontiers in Education*, Vol. 3, <https://doi.org/10.3389/feduc.2018.00058>. [78]
- al., M. (ed.) (2014), *A theoretical framework for understanding employer engagement*, Routledge, London. [75]
- Amt der NÖ Landesregierung: Bildungs- & Berufsberatung NÖ (2023), *Green Jobs for You*. [19]
- Appadurai, A. (2004), *The Capacity to Aspire: Culture and the Terms of Recognition*, Stanford University Press. [90]
- Arthur, C. (2022), *What are Green Skills?*, United Nations Industrial Development Organization, <https://www.unido.org/our-focus-cross-cutting-services-green-industry/green-industry-initiative>. [15]
- Barrera-Osorio, F. (2020), “Hard and Soft Skills in Vocational Training: Experimental evidence from Colombia”, *National Bureau of Economic Research*, <https://www.nber.org/papers/w27548.pdf>. [96]
- Bowen, A. and B. Hancké (2019), *The Social Dimensions of ‘Greening the Economy’: Developing a taxonomy of labour market effects related to the shift toward environmentally sustainable economic activities*. [26]
- Bowen, A., K. Kuralbayeva and E. Tipoe (2018), “Characterising green employment: The impacts of ‘greening’ on workforce composition”, *Energy Economics*, Vol. 72, pp. 263-275, <https://doi.org/10.1016/j.eneco.2018.03.015>. [27]
- Brown, C., T. Hooley and T. Wond (2020), “Building career capital: developing business leaders’ career mobility”, *Career Development International*, Vol. 25/5, pp. 445-459, <https://doi.org/10.1108/cdi-07-2019-0186>. [69]
- Caldera, Y. et al. (2003), “Intrapersonal, familial, and cultural factors in the commitment to a career choice of Mexican American and non-Hispanic White college women.”, *Journal of Counseling Psychology*, Vol. 50/3, pp. 309-323, <https://doi.org/10.1037/0022-0167.50.3.309>. [79]
- Cedefop (2018), *Handbook of ICT practices for guidance and career development*, <http://dx.doi.org/10.2801/368695>. [87]
- Cedefop (2012), *Green skills and environmental awareness in vocational education and training*, European Centre for the Development of Vocational Training, https://www.cedefop.europa.eu/files/5524_en.pdf. [13]

- Cheung, R. and J. Arnold (2014), “The Impact of Career Exploration on Career Development Among Hong Kong Chinese University Students”, *Journal of College Student Development*, Vol. 55/7, pp. 732-748, <https://doi.org/10.1353/csd.2014.0067>. [80]
- Covacevich, C. et al. (2021), “Indicators of teenage career readiness: An analysis of longitudinal data from eight countries”, *OECD Education Working Papers*, No. 258, OECD Publishing, Paris, <https://doi.org/10.1787/cec854f8-en>. [49]
- Deloitte (2023), *An overview of green job growth*, <https://action.deloitte.com/insight/3340/an-overview-of-green-job-growth>. [34]
- Deming, D. (2017), “The Growing Importance of Social Skills in the Labor Market”, *Quarterly Journal of Economics*, Vol. 132/4, pp. 1593-1640. [97]
- Devlin, A. et al. (2013), “The Role of the “Inter-Life” Virtual World as a Creative Technology to Support Student Transition into Higher Education”, *Creative Education*, Vol. 04/07, pp. 191-201, <https://doi.org/10.4236/ce.2013.47a2025>. [85]
- Di Fabio, A. and O. Bucci (2016), “Green Positive Guidance and Green Positive Life Counseling for Decent Work and Decent Lives: Some Empirical Results”, *Frontiers in Psychology*, Vol. 7, <https://doi.org/10.3389/fpsyg.2016.00261>. [56]
- ECO Canada (2021), *From Recession to Recovery: Environmental Workforce Needs, Trends and Challenges - Updated Labour Market Outlook to 2025..* [23]
- Edwards, K. and M. Quinter (2011), “Factors influencing students career choices among secondary school students in Kisumu municipality, Kenya.”, *Journal of Emerging Trends in Educational Research and Policy Studies*, Vol. 2/2, pp. 81-87, <https://hdl.handle.net/10520/EJC135714>. [81]
- Eurofound (2023), *Fit for 55 climate package: Impact on EU employment by 2030*, Publications Office of the European Union, Luxembourg. [30]
- European Commission (2021), *Green Skills and Knowledge Concepts: Labelling the ESCO classification*, <https://esco.ec.europa.eu/en/publication/green-skills-and-knowledge-concepts-labelling-esco-classification> (accessed on 15 January 2024). [17]
- Eurostat (2021), *Environmental economy: statistics on employment and growth*. [25]
- Ferguson, H., V. Brunson and E. Bradford (2021), “The developmental trajectories of executive function from adolescence to old age”, *Scientific Reports*, Vol. 11/1, <https://doi.org/10.1038/s41598-020-80866-1>. [65]
- Georgeson, L. and M. Maslin (2019), “Estimating the scale of the US green economy within the global context”, *Palgrave Communications*, Vol. 5/1, <https://doi.org/10.1057/s41599-019-0329-3>. [28]
- Government of the United Kingdom (2021), *Green Jobs Taskforce Report*. [20]
- Gregg, C., O. Strietska-Ilina and C. Büdke (2015), *Anticipating skill needs for green jobs: A practical guide*, International Labour Office, Geneva, https://webapps.ilo.org/wcmstp5/groups/public/---ed_emp/--ifp_skills/documents/publication/wcms_564692.pdf. [24]
- Herdman, P., A. Mann and A. Burke (2024), *Innovation in career development: A comparative review of Career Pathway development in five countries*, Forthcoming. [99]

- Hofer, A., A. Zhivkovikj and R. Smyth (2020), “The role of labour market information in guiding educational and occupational choices”, *OECD Education Working Papers*, No. 229, OECD Publishing, Paris, <https://doi.org/10.1787/59bbac06-en>. [63]
- Holland, K. and A. Mann (2020), “How Estonia is delivering online career guidance during the coronavirus crisis”, *OECD Education and Skills Today*, <https://oecdedutoday.com/estonia-online-career-guidance-during-coronavirus-crisis/> (accessed on 8 December 2023). [86]
- Howard, K. et al. (2009), “The relation of cultural context and social relationships to career development in middle school”, *Journal of Vocational Behavior*, Vol. 75/2, pp. 100-108, <https://doi.org/10.1016/j.jvb.2009.06.013>. [82]
- Hughes, D. et al. (2016), *Careers education: international literature review*, Educational Endowment Foundation. [57]
- ILO (2022), *How to work in the green economy? Guide for young people, job seekers and those who support them*, ILO Publishing, Geneva, https://webapps.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_856666.pdf. [4]
- ILO (2016, 2022), *What is a green job?*, <https://www.ilo.org/resource/article/what-green-job>. [18]
- ILO, UNEP, UNICEF (2022), *Green Jobs for Youth Pact*, <https://enb.iisd.org/green-jobs-youth>. [76]
- IPCC (2021), *Climate Change 2021 – The Physical Science Basis, Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, <https://doi.org/10.1017/9781009157896>. [5]
- IPCC (2019), *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land*, <https://www.ipcc.ch/site/assets/uploads/2019/11/SRCCL-Full-Report-Compiled-191128.pdf>. [6]
- IRENA and ILO (2022), *Renewable Energy and Jobs- Annual Review 2022*, International Renewable Energy Agency Abu Dhabi and International Labour Organization, Geneva, <https://www.irena.org/publications/2022/Sep/Renewable-Energy-and-Jobs-Annual-Review-2022>. [35]
- Irving, B. and M. Beatriz (eds.) (2005), *Critical Reflections on Career Education and Guidance: Promoting social justice within a global economy*, RoutledgeFarmer, http://file:///C:/Users/Chang_Y/Downloads/10.4324_9780203356951_previewpdf.pdf. [55]
- Jones, S., A. Mann and K. Morris (2015), “The ‘Employer Engagement Cycle’ in Secondary Education: analysing the testimonies of young British adults”, *Journal of Education and Work*, Vol. 29/7, pp. 834-856, <https://doi.org/10.1080/13639080.2015.1074665>. [71]
- Kapetaniou, C. and C. McIvor (2020), *Going green: preparing the UK workforce for the transition to a net-zero economy*, <https://www.nesta.org.uk/report/going-green-preparing-uk-workforcetransition-net-zero-economy/>. [31]
- Keese, M. and L. Marcolin (2023), “Labour and social policies for the green transition: A conceptual framework”, *OECD Social, Employment and Migration Working Papers*, No. 295, OECD Publishing, Paris, <https://doi.org/10.1787/028ffbeb-en>. [2]
- Klein, S. (2023), “Can High Schools Prepare Students for Green Jobs? How a Career Academy Is Training Students for the Sustainable Economy”, *The Future of Career and Technical Education*, <https://www.mdrc.org/work/publications/can-high-schools-prepare-students-green-jobs> (accessed on 24 January 2024). [100]

- Koch, A., J. Nafziger and H. Nielsen (2015), “Behavioral economics of education”, *Journal of Economic Behavior & Organization*, Vol. 115, pp. 3-17, <https://doi.org/10.1016/j.jebo.2014.09.005>. [66]
- Laming, J. (2020), *How two young people found a green job at Good Energy*, Good Energy, <https://www.goodenergy.co.uk/blog/how-two-young-people-found-a-green-job-at-good-energy/>. [45]
- Lavecchia, A., H. Liu and O. A (2015), *Behavioral Economics of Education: Progress and Possibilities*, Institute for the Study of Labor (IZA), Bonn Germany. [101]
- Lavecchia, A., H. Liu and P. Oreopoulos (2014), *Behavioral Economics of Education: Progress and Possibilities*, National Bureau of Economic Research, Cambridge, MA, <https://doi.org/10.3386/w20609>. [64]
- Lehmann, W. (2005), “Choosing to Labour: Structure and Agency in School-Work Transitions”, *Canadian Journal of Sociology*, Vol. 30/3, pp. 325-350. [72]
- LinkedIn (2023), *Global Green Skills Report 2023*, LinkedIn, <https://economicgraph.linkedin.com/research/global-green-skills-report>. [42]
- Mann, A. (2022), *Career Readiness and “green” career choices*, Euroguidance Austria, <https://epale.ec.europa.eu/en/blog/career-readiness-and-green-career-choices>. [43]
- Mann, A., V. Denis and C. Percy (2020), “Career ready? : How schools can better prepare young people for working life in the era of COVID-19”, *OECD Education Working Papers*, No. 241, OECD Publishing, Paris, <https://doi.org/10.1787/e1503534-en>. [59]
- Mann, A. and C. Percy (2013), “Employer engagement in British secondary education: wage earning outcomes experienced by young adults”, *Journal of Education and Work*, Vol. 27/5, pp. 496-523, <https://doi.org/10.1080/13639080.2013.769671>. [93]
- Michael, J. (2006), “Where’s the evidence that active learning works?”, *Advances in Physiology Education*, Vol. 30/4, pp. 159-167, <https://doi.org/10.1152/advan.00053.2006>. [60]
- Moote, J. and L. Archer (2017), “Failing to deliver? Exploring the current status of career education provision in England”, *Research Papers in Education*, Vol. 33/2, pp. 187-215, <https://doi.org/10.1080/02671522.2016.1271005>. [84]
- Morgan, C., J. Isaac and C. Sansone (2001), , *Sex Roles*, Vol. 44/5/6, pp. 295-320, <https://doi.org/10.1023/a:1010929600004>. [92]
- Mostafa, T., A. Echazarra and H. Guillou (2018), “The science of teaching science: An exploration of science teaching practices in PISA 2015”, *OECD Education Working Papers*, No. 188, OECD Publishing, Paris, <https://doi.org/10.1787/f5bd9e57-en>. [88]
- Musset, P. (2019), “Improving work-based learning in schools”, *OECD Social, Employment and Migration Working Papers*, No. 233, OECD Publishing, Paris, <https://doi.org/10.1787/918caba5-en>. [98]
- Natural Resources Canada (2024), *Green Jobs for Hiring Organizations*, <https://natural-resources.canada.ca/climate-change/canadas-green-future/green-jobs/green-jobs-for-hiring-organizations/23757> (accessed on 14 February 2024). [22]
- Norris, E. (2011), *Not enough capital? Exploring education and employment progression in further education*, RSA, <https://www.thersa.org/globalassets/pdfs/blogs/rsa-education-not-enough-capital1.pdf>. [73]

- O*NET (2010), *Green Task Development Project*, <https://www.onetcenter.org/reports/GreenTask.html> [21]
(accessed on 19 September 2023).
- OECD (2024), *Challenging Social Inequality Through Career Guidance: Insights from International Data and Practice*, OECD Publishing, Paris, <https://doi.org/10.1787/619667e2-en>. [58]
- OECD (2023), “Career talks with guest speakers: A guide to delivering an effective career development activity”, *OECD Education Policy Perspectives*, No. 69, OECD Publishing, Paris, <https://doi.org/10.1787/93594cb3-en>. [61]
- OECD (2023), *Education Policy Outlook 2023: Empowering All Learners to Go Green*, OECD Publishing, Paris, <https://doi.org/10.1787/f5063653-en>. [8]
- OECD (2023), *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*, OECD Publishing, Paris, <https://doi.org/10.1787/21db61c1-en>. [1]
- OECD (2023), *Net Zero+: Climate and Economic Resilience in a Changing World*, OECD Publishing, Paris, <https://doi.org/10.1787/da477dda-en>. [3]
- OECD (2023), *OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition*, OECD Publishing, Paris, <https://doi.org/10.1787/27452f29-en>. [39]
- OECD (2022), *Are Students Ready to Take on Environmental Challenges?*, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/8abe655c-en>. [38]
- OECD (2022), *Climate Tipping Points: Insights for Effective Policy Action*, OECD Publishing, Paris, <https://doi.org/10.1787/abc5a69e-en>. [7]
- OECD (2021), *Career Guidance for Adults in a Changing World of Work*, Getting Skills Right, OECD Publishing, Paris, <https://doi.org/10.1787/9a94bfad-en>. [67]
- OECD (2021), “Experiencing the workplace: The importance and benefits for teenagers”, *OECD Education Policy Perspectives*, No. 45, OECD Publishing, Paris, <https://doi.org/10.1787/b679d759-en>. [94]
- OECD (2020), *PISA 2018 Results (Volume VI): Are Students Ready to Thrive in an Interconnected World?*, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/d5f68679-en>. [44]
- OECD (2016), *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*, Getting Skills Right, OECD Publishing, Paris, <https://doi.org/10.1787/9789264252073-en>. [91]
- OECD (2012), *OECD Employment Outlook 2012*, OECD Publishing, Paris, https://doi.org/10.1787/empl_outlook-2012-en. [29]
- OECD (2004), *Career Guidance and Public Policy: Bridging the Gap*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264105669-en>. [68]
- OECD/Cedefop (2014), *Greener Skills and Jobs*, OECD Green Growth Studies, OECD Publishing, Paris, <https://doi.org/10.1787/9789264208704-en>. [33]
- OpinionWay (2023), *Les Français et les métiers de la transition écologique*. [48]
- Plant, P. (2021), “Utopia revisited: Green guidance”, *Journal of the National Institute for Career Education and Counselling*, Vol. 47/1, pp. 53-58, <https://doi.org/10.20856/jniccc.4708>. [52]

- Plant, P. (2020), "Paradigms under pressure: Green Guidance", *Nordic Journal of Transitions: Careers and Guidance*, Vol. 1, pp. 1-9. [51]
- Plant, P. (2014), "Green Guidance", *Handbook of career development: International perspectives.*, pp. 309-316. [50]
- Plant, P. (2007), "An inconvenient truth: Green guidance.", *Newsletter of the International Association for Vocational and Educational Guidance*, Vol. 58, pp. 1-3. [54]
- Raffo, C. and M. Reeves (2000), "Youth Transitions and Social Exclusion: Developments in Social Capital Theory", *Journal of Youth Studies*, Vol. 3/2, pp. 147-166, <https://doi.org/10.1080/713684372>. [74]
- Rahmaningtyas, W. et al. (2023), "Building a Sustainable Future: Unraveling the Link between Environmental Awareness and the Cultivation of Employability and Green skills-A Literature Review", *IOP Conference Series: Earth and Environmental Science*, Vol. 1248/1, p. 012021, <https://doi.org/10.1088/1755-1315/1248/1/012021>. [77]
- Sawyer, R. (2006), "Educating for innovation", *Thinking Skills and Creativity*, Vol. 1/1, pp. 41-48, <https://doi.org/10.1016/j.tsc.2005.08.001>. [62]
- Stanley, J. (2014), *Introduction*, Routledge. [95]
- Tharayil, S. et al. (2018), "Strategies to mitigate student resistance to active learning", *International Journal of STEM Education*, Vol. 5/1, <https://doi.org/10.1186/s40594-018-0102-y>. [89]
- The Gatsby Charitable Foundation (2014), *The Good Career Guidance Report*, <https://www.gatsby.org.uk/uploads/education/reports/pdf/gatsby-sir-john-holman-good-career-guidance-2014.pdf>. [83]
- Tomlinson, M. et al. (2022), "Developing graduate employability for a challenging labour market: the validation of the graduate capital scale", *Journal of Applied Research in Higher Education*, Vol. 14/3, pp. 1193-1209. [70]
- U.S. Bureau of Labor Statistics (2022), , <https://www.bls.gov/careeroutlook/2022/data-on-display/green-growth.htm>. [36]
- UNEP (2021), *Global Guidance for Education on Green Jobs: Connecting Higher Education and Green Opportunities for Planetary Health*, United Nations Environment Programme, <https://wedocs.unep.org/20.500.11822/35070>. [53]
- UNEP, I. (2008), *Green Jobs: Towards Decent Work in a Sustainable, Low Carbon World*. [12]
- UNFCCC (2023), *Why Are Green Skills Important for Youth?*, UN Climate Change, <https://unfccc.int/news/why-are-green-skills-important-for-youth#:~:text=Green%20skills%20include%20technical%20knowledge,and%20processes%20in%20professional%20settings>. [14]
- United Nations Environment Programme (n.d.), *Green economy*, <https://www.unep.org/pt-br/node/23750> (accessed on 31 October 2023). [9]
- USEER (2023), *United States Energy and Employment Report 2023*, U.S. Department of Energy, <https://www.energy.gov/sites/default/files/2023-06/2023%20USEER%20REPORT-v2.pdf>. [41]
- Valero, A. et al. (2021), *Are 'green' jobs good jobs? How lessons from the experience to-date can inform labour market transitions of the future*, <https://cep.lse.ac.uk/pubs/download/special/cepsp39.pdf>. [11]

- Vandeplass, A. et al. (2022), *The possible implications of the green transition for the EU labour market*, European Commission. Directorate-General for Economic and Financial Affairs. [10]
- Vona, F., G. Marin and D. Consoli (2018), “Measures, drivers and effects of green employment: evidence from US local labor markets, 2006–2014”, *Journal of Economic Geography*, Vol. 19/5, pp. 1021-1048, <https://doi.org/10.1093/jeg/lby038>. [16]
- White, J. et al. (2022), *Skills for a net-zero economy: Insights from employers and young people*, WorldSkills UK, https://www.worldskillsuk.org/wp-content/uploads/2022/06/GreenSkillsReport-2022_v3b.pdf. [46]
- World Economic Forum (2023), , <https://www.weforum.org/events/world-economic-forum-annual-meeting-2023/>. [37]
- World Economic Forum (2023), *Future of Jobs Report*, <https://www.weforum.org/publications/the-future-of-jobs-report-2023/>. [40]