



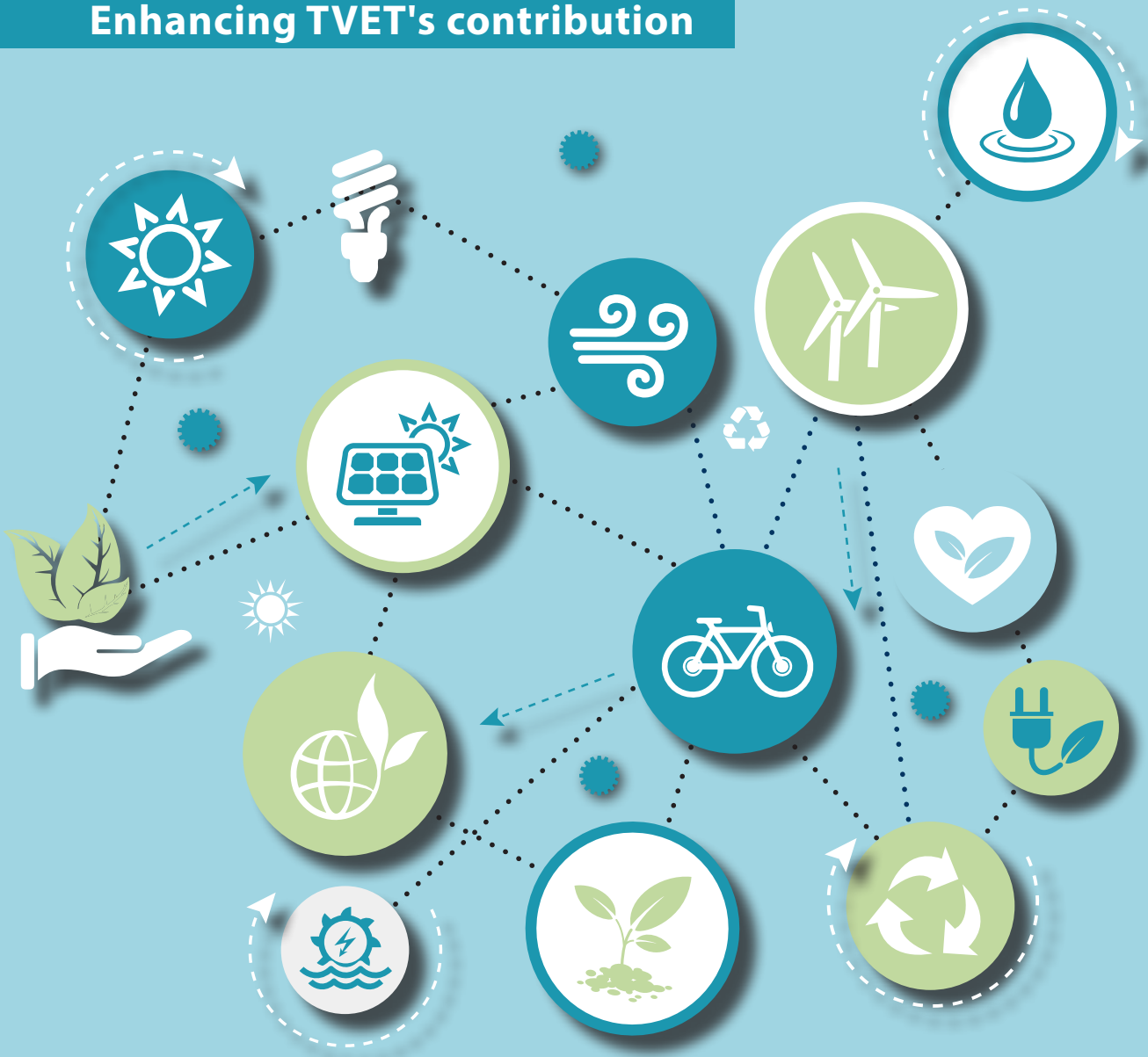
United Nations
Educational, Scientific and
Cultural Organization

UNEVOC

International Centre
for Technical and Vocational
Education and Training

Skills development and climate change action plans

Enhancing TVET's contribution



Skills development and

climate change action plans

Enhancing TVET's contribution

Published in 2021 by the
**United Nations Educational,
Scientific and Cultural Organization**
7, place de Fontenoy
75352 Paris 07 SP
France

and

**UNESCO-UNEVOC International
Centre for Technical and Vocational
Education and Training**

UN Campus
Platz der Vereinten Nationen 1
53113 Bonn
Germany

© UNESCO 2021

ISBN: 978-92-3-100438-4

This publication is available in Open Access under the Attribution-ShareAlike 3.0 IGO (CC-BY-SA 3.0 IGO) license (<http://creativecommons.org/licenses/by-sa/3.0/igo/>). By using the content of this publication, the users accept to be bound by the terms of use of the UNESCO Open Access Repository (<http://en.unesco.org/open-access/terms-use-ccbysa-en>).



The designations employed and the presentation of material throughout this publication do not imply the expression of any opinion whatsoever on the part of UNESCO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The ideas and opinions expressed in this publication are those of the authors; they are not necessarily those of UNESCO and do not commit the Organization.

Design

Christiane Marwecki

Print

Printed in Germany

Contents

5	Acknowledgements
6	Overview
8	Global action for combatting climate change
9	Bringing the global response into focus
10	Adaptation-mitigation as a focus of action
12	Priorities and vulnerabilities in CO2-emitting sectors
15	Skills shift to ward off factors of vulnerability
16	A conceptual analysis of policy and action shift for climate action
20	Policies and institutional arrangements regarding education for climate change adaptation
20	Asia-Pacific
27	Africa
31	North America
32	Europe
38	Latin America
42	Small Island Developing States (SIDS) and the Caribbean
45	Commonwealth of Independent States (CIS)
46	Arab States
48	Examples of adaptation responses through TVET
51	Skills development at the sector level
52	Meeting ecological targets
52	Skills identification is the first step
54	Perceived skill gaps in countries' highest emission sectors
55	TVET will close the perceived skill gap
58	Annex 1
60	Annex 2
64	Abbreviations
65	References

Acknowledgements

This discussion paper was developed by UNESCO-UNEVOC in collaboration with Uthpala Sankalpani, a consultant and expert in environment management and sustainable consumption and production. Ms Sankalpani also developed the methods for analysis in this paper.

The information and analysis that are contained in this paper was drawn from desk review of publicly available reports and climate action plans, the examination of key data, and based on interviews conducted between 2018 and 2019. The report initially examined twenty-five country plans of action, which was later expanded to fifty-seven countries in order to understand the general tendencies and confirm preliminary assumptions.

The development of this paper progressed with valuable information gathered from key informants from government and TVET institutions. The examination of key data on adaptation and overall climate plans would not have been possible without accessing the Nationally Determined Contributions (NDCs) submission portal, which is maintained by the Climate Change Secretariat (UNFCCC) and which provides a secure and public record of all documents submitted by Parties/ Member States.

UNESCO-UNEVOC extends its appreciation to members of UNEVOC Network who provided additional background information about TVET and training provisions, as they relate to environmental education and management areas. These countries included Armenia, Egypt, Kenya, Malta, Mexico, Seychelles and Sri Lanka. UNESCO-UNEVOC would also like to acknowledge alumni of the 2018 UNESCO-UNEVOC TVET Leadership Programme who helped to review the manuscript. Finally, this paper benefitted from peer review and feedback from Shyamal Majumdar (former Head of UNESCO-UNEVOC), Kamal Armanious and Wouter de Regt (Programme Officer, UNESCO-UNEVOC).

The paper was developed under the supervision and with contributions from Kenneth Barrientos, Programme Officer at UNESCO-UNEVOC.

Overview

This discussion paper is the result of a qualitative review of climate plans conducted between 2018 – 2019 in fifty-seven selected countries to assess the ongoing and potential contribution of technical and vocational education and training (TVET) to the realization of these plans. The climate plans are formally known as Nationally Determined Contributions (NDCs) and National Communications (NCs). NCs are submitted to the UNFCCC Secretariat every four years and report on countries' previous actions and progress in addressing climate change. NDCs are submitted every five years as part of the 2015 Paris Agreement and set out countries' future plans and commitments on emission reduction and implementation (UNESCO, 2019).¹

This paper compiles relevant information about country submissions (NDCs and NCs including national adaptation plans and policies created) and complements the national-level assessments of green skill gaps and needs with insights gained through desk research and interviews. The aim is to distil relevant information that are useful for decision-makers and vocational training providers about issues of skills supply and demand in climate change priority sectors.

Desk-based research on the countries was based on publicly available documents and statistics, and on documents and submissions that have been made available by the relevant governments. Qualitative data for this report were collected during interviews with TVET officials. Any update made on the documents after 2018 are not included in the analysis provided in this report.

As at 2018, 165 Intended Nationally Determined Contributions (INDCs) had been submitted, covering 192 Parties to the Convention, including one regional economic integration organization² (Europa union). By 2020, 186 NDCs were recorded in the UNFCCC database. The sample used in the study represents 34 per cent of the total INDCs submitted.

All parties have included an adaptation component in their INDCs. The study sample includes the adaptation components from ten African countries, thirteen Asia-Pacific States, nine European and four CIS countries, seven Latin American countries, two North American countries, five Arab State countries and seven Pacific and Caribbean islands.

In a separate study, it was suggested that 95 per cent of the 194 reporting countries have included some climate change education content in one or more documents submitted to the UNFCCC Secretariat (UNESCO, 2019). Climate change education is underpinned by the concept of engaging society to become part of the solution in reducing the impact of climate change. This requires increasing knowledge and learning regarding the causes of climate change and its impact in people's day-to-day lives, and becoming aware of society's role in this respect, including engaging in public dialogues and meaningful action (Article 6, UNFCCC).³ Thus, the inclusion of climate change education indicates that a majority of countries consider aspects of climate change education as integral to the implementation of their national action on climate change. Within the framework of climate change education, specific practical actions can be identified that embrace both formal and informal education and training, cutting across different types of learning and taking in settings from preschool classes and the seminar rooms of universities to vocational training and lifelong learning.

The analysis made through this paper has generated a set of approaches for climate change adaptation, through the education and training lens. These approaches can be used to advance the discussion in strengthening the technical and vocational skills development component in country climate adaptation plans. Transmitting the knowledge and skills needed to accelerate actions

1 <https://unesdoc.unesco.org/ark:/48223/pf0000372164>

2 The INDC of the European Union and its member States is counted as one INDC, representing twenty-nine Parties (the European Union and its twenty-eight Member States)

3 <https://unfccc.int/topics/education-and-outreach/workstreams/education-and-training>

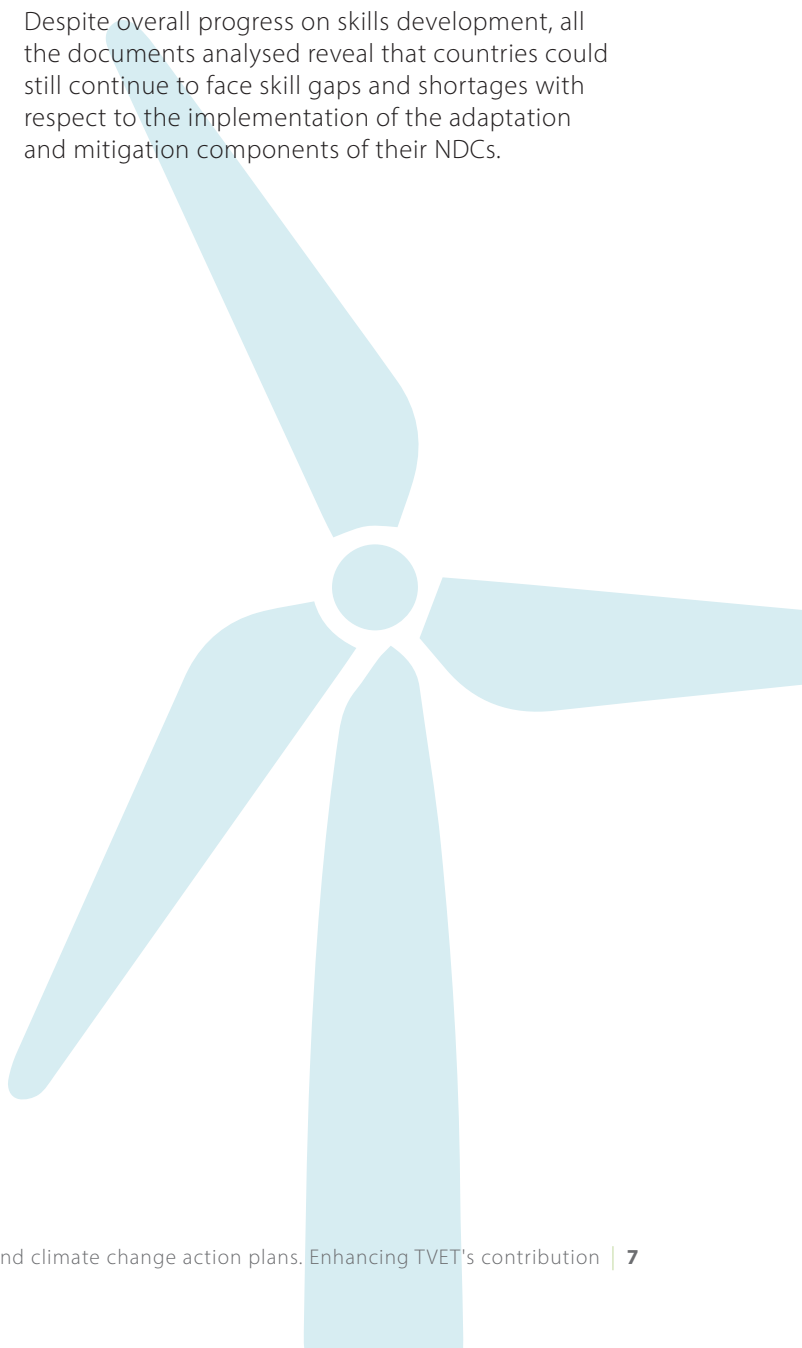
for the benefit of the climate is an important element that cannot be missed in any well-crafted national plan. This paper also presents an understanding of the present gaps between well-crafted plans and possible skill-based sustainable solutions that can be offered by a great variety of training provisions available.

In a nutshell, very few countries have paid specific attention to the technical and vocational skills development required for the climate change transition set out in their national adaptation plans. A further few countries have laid out strategies specific to skills development, technological advancements and creating a vocationally-focused workforce, recognizing the emerging demand for the skills required by a green economy. These countries appear to be actively tapping into TVET and skills development by employing a suite of approaches that may or may not produce concrete outcomes supported by TVET, namely:

1. Entering into partnerships to ensure and strengthen coherence between a country's policies and ground-level actions;
2. Synchronizing investments in jobs and skills;
3. Developing TVET policies to ensure green growth;
4. Establishing cooperation with the private sector to incorporate industry skill needs;
5. Undertaking skills needs assessments to identify nation- and sector-wide requirements.

Despite overall progress on skills development, all the documents analysed reveal that countries could still continue to face skill gaps and shortages with respect to the implementation of the adaptation and mitigation components of their NDCs.

5 https://www.environment.gov.za/sites/default/files/reports/nationalclimate_changeadaptation_strategyforcomment_nccas.pdf



Global action for combatting climate change

'Climate change' means a change in climate attributed directly or indirectly to human activity, which alters the composition of the global atmosphere and is observed over comparable time periods (UNFCCC, 1992). Both human and natural causes contribute to climate change. Burning fossil fuels, clearing forests for development activities, developing land for farms, cities and roads, and releasing greenhouse gases into the atmosphere are a few examples of human activities that cause climate change. Natural activities can also contribute to climate change (EPA, 2013).

At the current pace of such activities, climate change cannot be avoided. The tools proposed to deal with it are reduction of emissions of greenhouse gases and adaptation. Strengthening national and international awareness of and commitment to reducing the impact of climate change has become the only viable option to ensure the sustainability of life on Earth.

The Paris Agreement entered into force in 2016 with the aim of bringing all nations together in a common goal of combating climate change and adapting to its impacts. According to the Agreement, every party should submit a NDC laying out its adaptation and mitigation plans.

There is no formal interrelationship between the United Nations Framework Convention on Climate Change (UNFCCC) and the 2030 Agenda for Sustainable Development, which includes seventeen Sustainable Development Goals (SDGs) (17Goals, 2015). Thus, NDCs were set as national guidelines for achieving the SDGs. The SDGs were formally accepted by the United Nations in September 2015 as a global framework for achieving an integrated sustainable development model for 2030 among member nations.



Climate actions have been aligned with 154 of the 169 targets in examined INDCs

Northrop et al., 2016

BOX 1 Intended Nationally Determined Contribution (INDC) to Nationally Determined Contribution (NDC)

According to the Lima Call for Climate Action (UNFCCC, 2015a), an INDC is a 'contribution towards achieving the objective of the Convention as set out in its Article 2', which is a 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system' (UNFCCC, 1992; European Parliament, 2017). By December 2015, 187 out of 196 Parties had communicated their INDCs (UNFCCC, 2017a).

These contributions – as long as they are not updated or replaced – serve as NDCs under the Paris Agreement (European Parliament, 2017). By 2020, 186 Parties had already submitted their first NDCs and some had started to develop and submit their second NDCs.

Bringing global response into focus

The SDGs include 17 development goals and 169 indicators. While SDG13 directly addresses climate change (take urgent action to combat climate change and its impacts: SDSN, 2015), many of the other goals are interlinked. A recent study conducted by the World Resources Institute (Northrop et al., 2016) found that climate actions were aligned with 154 of the 169 SDG targets in examined INDCs.

Unemployment, poverty and social exclusion are the most severe consequences that follow when skills development policies fail to respond not only to socio-economic needs but also to the demands of transitioning to more sustainable development. The impact of climate change on communities poses challenges for businesses as their value chains depend on the community. In today's changing environment, the well-being of communities and business success are very much intertwined. For this reason, it is essential for any economy to enhance the knowledge and skills within communities and society to ensure their sustainable economic growth.

Even if everyone stopped emitting greenhouse gases today, the world would still have to face the impacts of climate change. According to scientists, each degree Celsius of global temperature increase can be expected to have an impact in ways that are not easy to quantify. Therefore, from economic, social and environmental perspectives, it is important for the world to adapt to climate change.

In response to this critical situation, the Paris Agreement calls upon all nations to keep the global temperature rise well below 2 degrees Celsius compared to pre-industrial levels. Nations are also invited to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius (UNFCCC, 2017b). The climate agreement therefore focuses on achieving a transformational change by accelerating the shift to green growth, low-carbon and climate-resilient development.

Countries that have ratified the Paris Agreement are to develop a clear policy framework and provide a strategic vision for both mitigation and adaptation activities that enable development aligned with climate change and resilience.

BOX 2 Climate-resilient development

Climate-resilient development means ensuring that people, communities, businesses and other organizations are able to cope with current climate variability as well as adapt to future climate change, preserving development gains and minimizing damage. Climate-resilient development is about adding consideration of climate impacts and opportunities to development decision-making in order to improve development outcomes, rather than implementing development activities in a completely new way.

Source: USAID (2014).

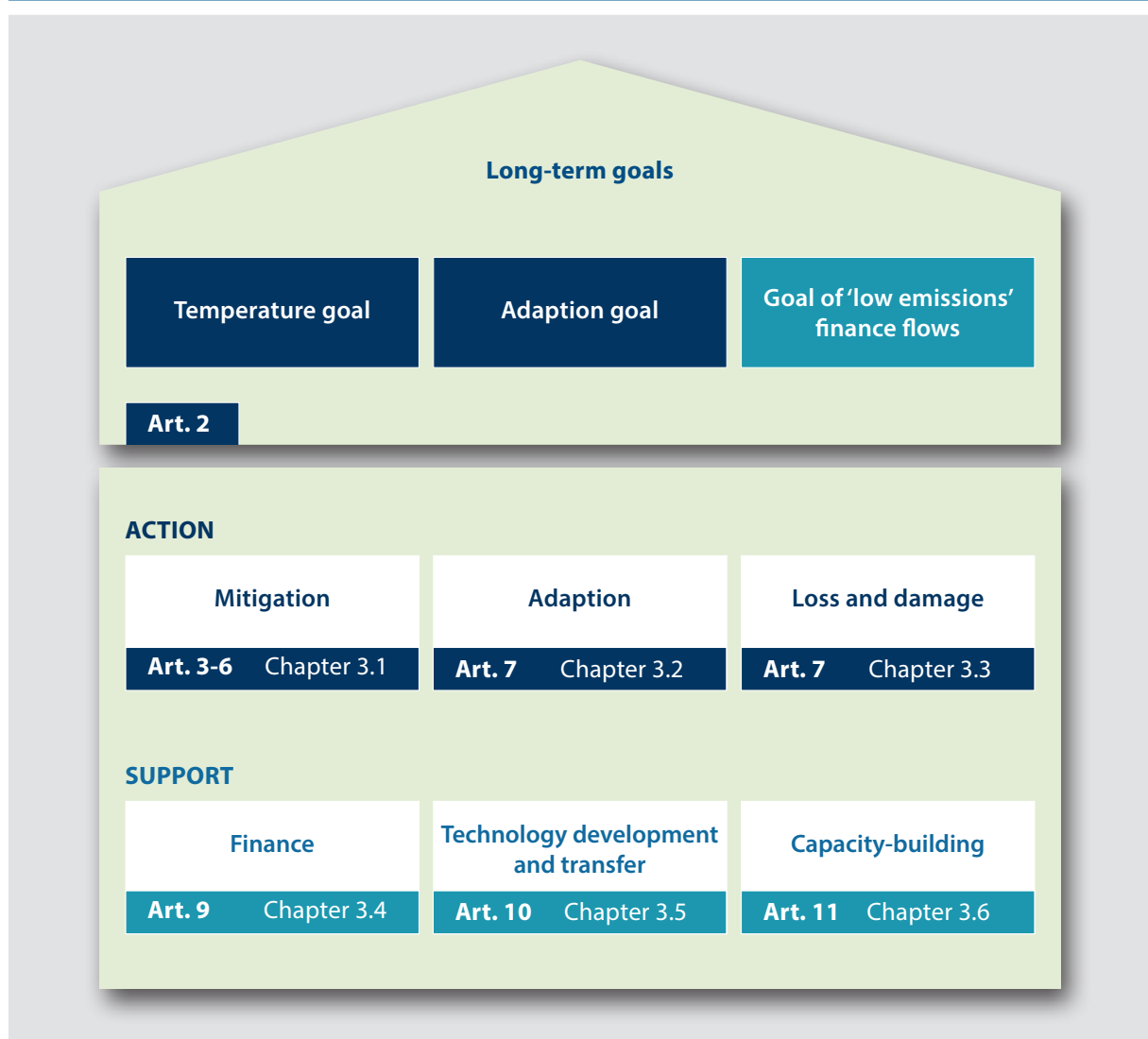


Adaptation-Mitigation as a focus of action

Adaptation is not limited to a particular area, hence it is complicated. Effective adaptation requires a comprehensively addressed and interrelated framework. Financial investments, institutional arrangements, knowledge and skills development, data and information usage, international cooperation and resource mobilization are just a few key dimensions to look into in the construction

of any adaptation framework. Figure 1 illustrates how adaptation-focused actions sit with the long-term goals of the Paris Agreement. It presents the centrality of adaptation in an integrated approach to lowering global temperature, alongside mitigation and measures for addressing loss and damage. In this integrated system, adaptation can be supported directly through capacity-building, technology development and transfer, and finance.

FIGURE 1 Adaptation and the long-term goals of the Paris Agreement



Source: Adapted from European Parliament (2017)

Mitigation and adaptation are not alternatives, whereby a focus on one removes attention from the other. Both courses need to be pursued in parallel, with a detailed focus on each. Mitigation is crucial and adaptation is inevitable. Mitigation is essential because focusing on it today will reduce the impact on future generations. Adaptation is inevitable as there are inherent uncertainties in the timing and scale of climate change impacts.

In addressing the considerations for action, there needs to be a greater understanding of what mitigation and adaptation efforts should focus on to make a meaningful impact and achieve an integrated result.

To understand many of the adaptation efforts reviewed in this paper, the adaptive capacity is an important vector that this study has also highlighted. Adaptive capacity refers to the potential, capability, or ability of a system to adapt to (make alterations to better suit) climate change stimuli or their effects or impacts. Adaptive capacity greatly influences the vulnerability of communities and regions to climate change effects and hazards (IPCC, 2001, sect. 18.5).

BOX 3 Climate change adaptation and mitigation

Climate change adaptation

Adaptation, in the simplest terms, refers to the actions that countries will need to take to respond to the impacts of climate change that are already happening, while at the same time preparing for future impacts. It refers to changes in processes, practices and structures that can reduce our vulnerability to climate change impacts, such as sea level rise or food insecurity.

Source: UNFCCC (n.d.).

Climate change mitigation

Mitigation refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy-efficient, or changing management practices or consumer behaviour.

Source: UNEP (n.d.).

Priorities and vulnerabilities in CO²-emitting sectors

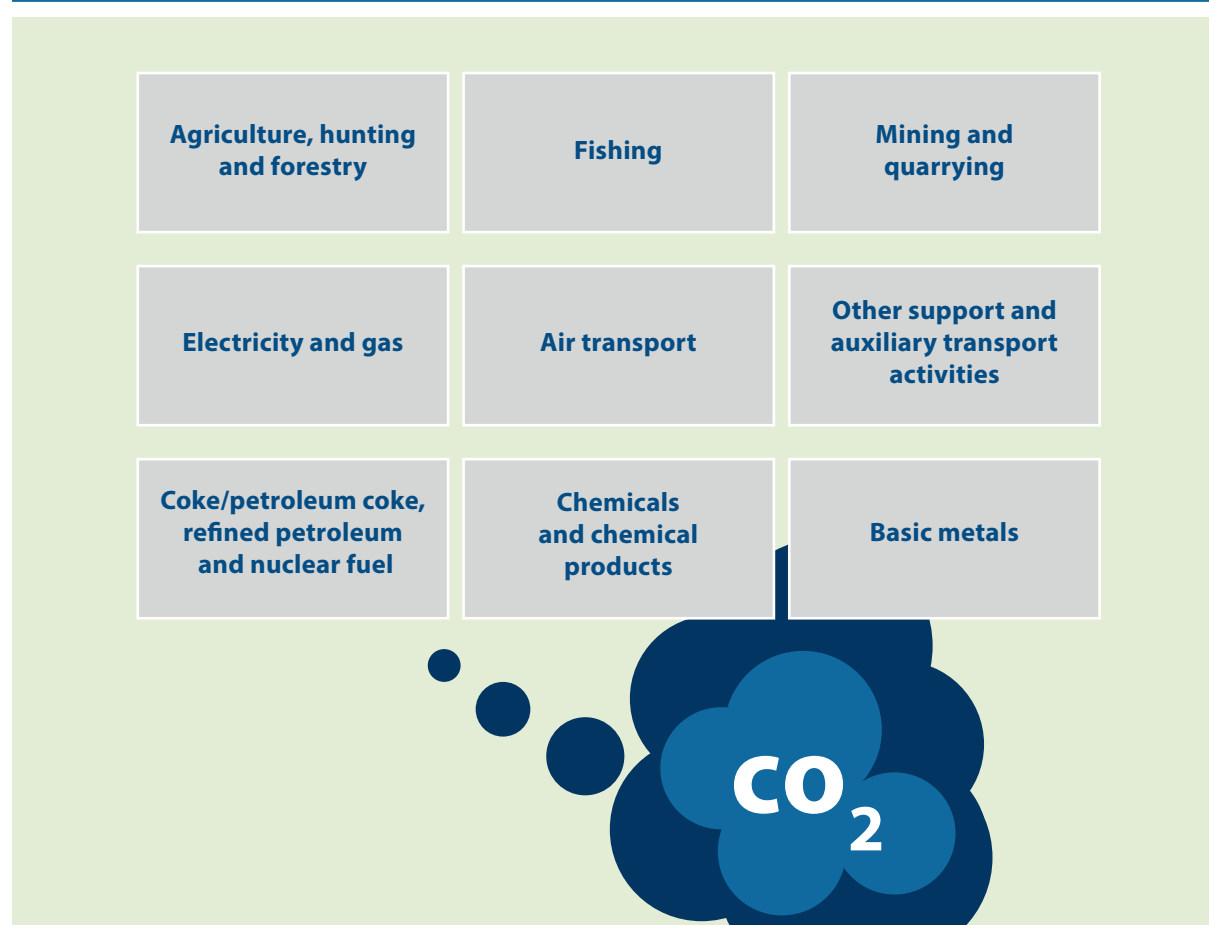
Individual countries are responsible for varying shares of the emissions that contribute to climate change. In 2012, around 90 per cent of total carbon dioxide emissions were attributable to nine sectors (see Box 4), accounting for just 16 per cent of total employment (OECD, 2012).

By 2016, the World Resources Institute (Northrop et al., 2016) had compiled data on global emissions which came mostly from end-use activities in sub-sectors that use energy, such as road transportation, and residential and commercial buildings. Emissions from those activities include both direct emissions from the combustion of fossil fuels and indirect emissions such as those from the use of electricity.

A wide range of other activities in the same high-emitting sectors collectively consume high levels of fossil fuels and electricity, and thus produce a large share of emissions.

As countries transition to a green economy, new green strategies and climate ambitions are rolled out. A shift from coal to natural gas and an increased use of renewables have been the hallmarks of green transition, causing a short-lived dip in emissions from the energy sector between 2013 and 2016, which rose again in 2017–2018 (Ge and Friedrich, 2020).⁴

BOX 4 Nine sectors that were accountable for 90 per cent of total carbon dioxide emissions in 2012



Source: OECD (2012)

⁴ <https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector>

However, it is notable that the sectors with a high potential for green growth and jobs are not the same in all regions and countries, while the level of potential also varies. The European Commission provides examples of green growth sectors, as shown in Box 5.

Correspondingly, most of the industries listed in Box 5 have been identified by various Parties in their NDCs as higher emitters. The UNFCCC COP21 Synthesis Report (UNFCCC, 2015b) indicates that most of the Parties have prioritized renewable energies, energy efficiency, transport, methane

and other non-carbon-dioxide gases, land use and forestry, and carbon capture, use and storage as mitigation measures.

An analysis of the NDCs underlines the fact that rural populations, the poorest segments of society, workers linked with resourced-based occupations, women, and young, elderly and disabled people are more vulnerable to climate impacts. It is evident that when people do not have proper access to critical livelihood resources and knowledge, their level of adaption is limited, making them still more vulnerable. The analysis also observed differentiated levels of focus on sectors in terms of prioritizing the adaptation actions of countries. Sixteen key sectors are used as the basis for recording and making a comparative analysis of priorities laid out in the different country climate plans reviewed in this paper (Figure 2).

BOX 5 Green Growth Sectors in European context

- Clean energy, including renewable energy, e.g. wind, solar, geothermal, biomass/biogas and smart grids;
- Construction and the built environment, e.g. insulation, eco-construction, new heating and cooling technologies, and the energy management of buildings
- Manufacturing, e.g. low-carbon vehicles, energy-saving products and Information and Communications Technology (ICT) solutions;
- Services, e.g. increasing the carbon literacy of workers and providing advice and low-cost installations for energy savings and renewable energy;
- Transport, e.g. low-carbon infrastructure and vehicles;
- Waste and water management;
- Recovery of raw materials and recycling.

Source: European Commission (n.d.)

FIGURE 2 Priority Sectors for Adaptation Actions

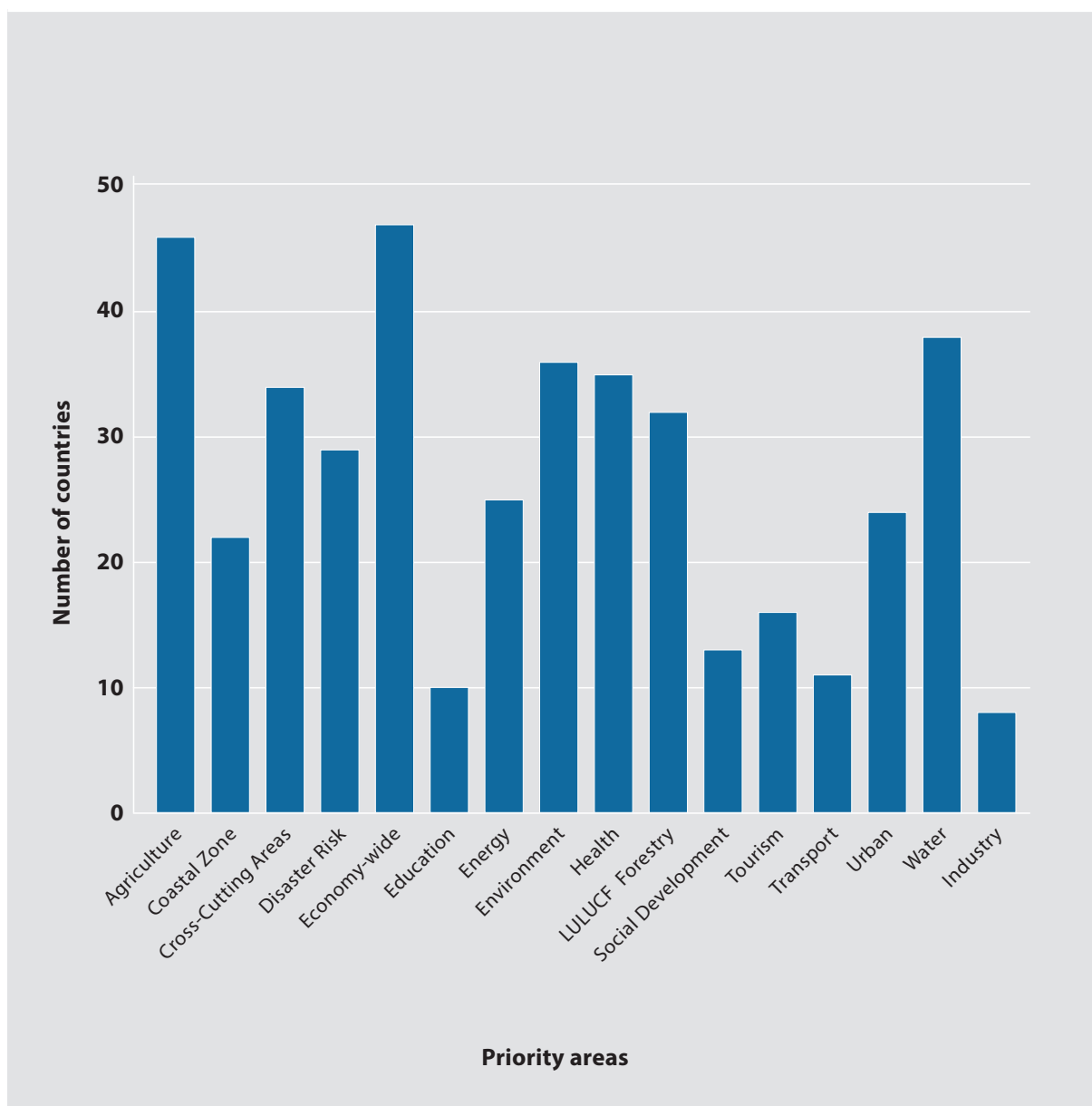


Figure 2 highlights that more countries are placing high importance on actions in sectors concerned with agriculture, water and other cross-cutting areas (capacity-building and knowledge transfer). Annex 1 presents a more detailed illustration of the priorities of countries according to sectors and sub-sectors.

The adaptation components of the NDCs constitute a representative overview of how Parties, building on progress made so far, intend to address

adaptation, loss and damage at the national level in the coming years. For many countries, adaptation is a priority issue linked to national development, sustainability and security within the reality of a changing climate. For a number of them, it is already a matter of survival (UNFCCC, 2015c). Hence, Parties express a strong interest in continuing to strengthen their adaptation efforts together with practising mitigation.

Skills shift to ward off factors of vulnerability

Moving to a green and climate-resilient economy requires a dramatic shift in the existing skills of the workforce. According to *Greening Technical and Vocational Education and Training: A Practical Guide for Institutions* (UNESCO-UNEVOC, 2017), this shift requires changes in the way jobs are performed, including both the development of skills to equip people to work in new climate-friendly occupations and the greening of existing jobs.

Possessing cross-cutting competencies for sustainability, in addition to occupation-specific skills, is important in this transition. UNESCO (2017) identifies eight competencies to advance sustainable development, which can help individuals in different complex situations that are a natural feature in any green transition. They include: (i) systems thinking competencies; (ii) anticipatory competencies; (iii) normative competencies; (iv) strategic competencies; (v) collaboration competencies; (vi) critical thinking competencies; (vii) self-awareness competencies; and (viii) integrated problem-solving competencies.

BOX 6 Defining green skills

The abilities needed to live in, develop and support a society which aims to reduce the negative impact of human activity on the environment are called green skills.

Source: Cedefop (2014).

An early investment in skills development will help to mitigate the impact of climate change, particularly on vulnerable communities. In many countries, the majority of the population is employed in the informal and traditional rural sectors, which are highly vulnerable to climate impacts (UNESCO-UNEVOC, 2015). Hence, the need arises to train workers in these sectors in climate change adaptation.

According to the International Labour Organization (ILO) and the UN Environment Programme (UNEP) (2012), eight economic sectors will play a central role in the transition to a green economy: agriculture, forestry, fishing, energy, resource-intensive manufacturing, recycling, building and transport. Transforming work in these sectors should play a major part in enabling the achievement of the SDGs, especially in the eradication of poverty through social inclusion.

Each country that has ratified the Paris Agreement has identified the need for skills development in climate change adaptation. Also, almost every country, in its NDCs and climate change policies, has acknowledged that there are clear skills gaps. However, there are differences in the degree to which and how skills development and training are factored into plans across countries and regions.

This paper finds that, despite making overall progress on skills development, all the countries analysed continue to face skills gaps and shortages with respect to the implementation of the adaptation and mitigation components of their NDCs. Specific skills gaps and needs were identified in relation to mitigation and adaptation in the areas of: (i) agriculture, (ii) forestry, (iii) ecosystems and biodiversity, (iv) water, (v) health, (vi) disaster management, (vii) energy, and (viii) waste.

A conceptual analysis of policy and action shift for climate action

Building a climate-ready adaptation society is an urgent matter that cannot be postponed. Many factors contribute to the pursuit of increasing climate resilience. Amongst other issues, having the relevant policies and institutional frameworks is essential for addressing the multiple challenges of climate change adaptation and reducing the vulnerability of people and ecosystems to climate change. According to the EU, climate change adaptation is needed across the board, at the local, regional, national and international levels. The degree of intervention varies at the regional and local levels due to the differing levels of vulnerability.

To gain an understanding of where countries are putting their focus with respect to the drive for transitioning to green economies and sectors' technology advancements, fifty-seven climate change adaptation plans were reviewed for the purpose of this discussion paper.

As the action plans revealed, countries have used different strategy and policy development tools in their approach to climate change adaptation. Most of the countries have developed national climate change plans, while some have developed sectoral plans incorporating climate goals with the use of a top-down approach.

Analysing the NDCs of the selected countries shows that the adaptation goals in African and Asian countries are set to facilitate the socio-economic development of the region, with agriculture, water resources, marine and coastal zones, and health being prioritized. In Europe, the adaptation strategy aims to keep climate risk at an acceptable level, taking advantage of any positive opportunities that arise. For instance, the European Union strategy for climate change adaptation aims to make Europe more climate-resilient, while one mitigation target is to progressively reduce greenhouse gas emissions. The adaptation strategy includes the objectives of promoting action by Member States, ensuring informed decision-making and utilizing the climate-proofing of common EU actions, while encouraging adaptation in key vulnerable sectors.

Some Latin American countries have made efforts to adapt by conserving ecosystems, setting up early warning systems and putting strategies in place to deal with droughts and floods, as well

as managing their coastal areas and providing support for their health systems. However, there is a clear lack of basic information and few systems are in place to observe and monitor poverty conditions and the settlement of populations in very vulnerable areas. Arab countries often address climate change adaptation and mitigation through national development plans. Although in some development plans 'climate' is not mentioned as an objective, within sustainable development vulnerable areas are addressed under several other objectives including 'environment'.

When it comes to education and training approaches,

...many of the countries studied show coherence with Article 6 of the UNFCCC, which emphasizes the aspiration to reduce the impact of climate change by enabling society to take part in the solution through education and training mechanisms.

In this context, countries' specific education and training directions were found to be consistent with Article 6.

Five key approaches were observed, as shown in Figure 3.

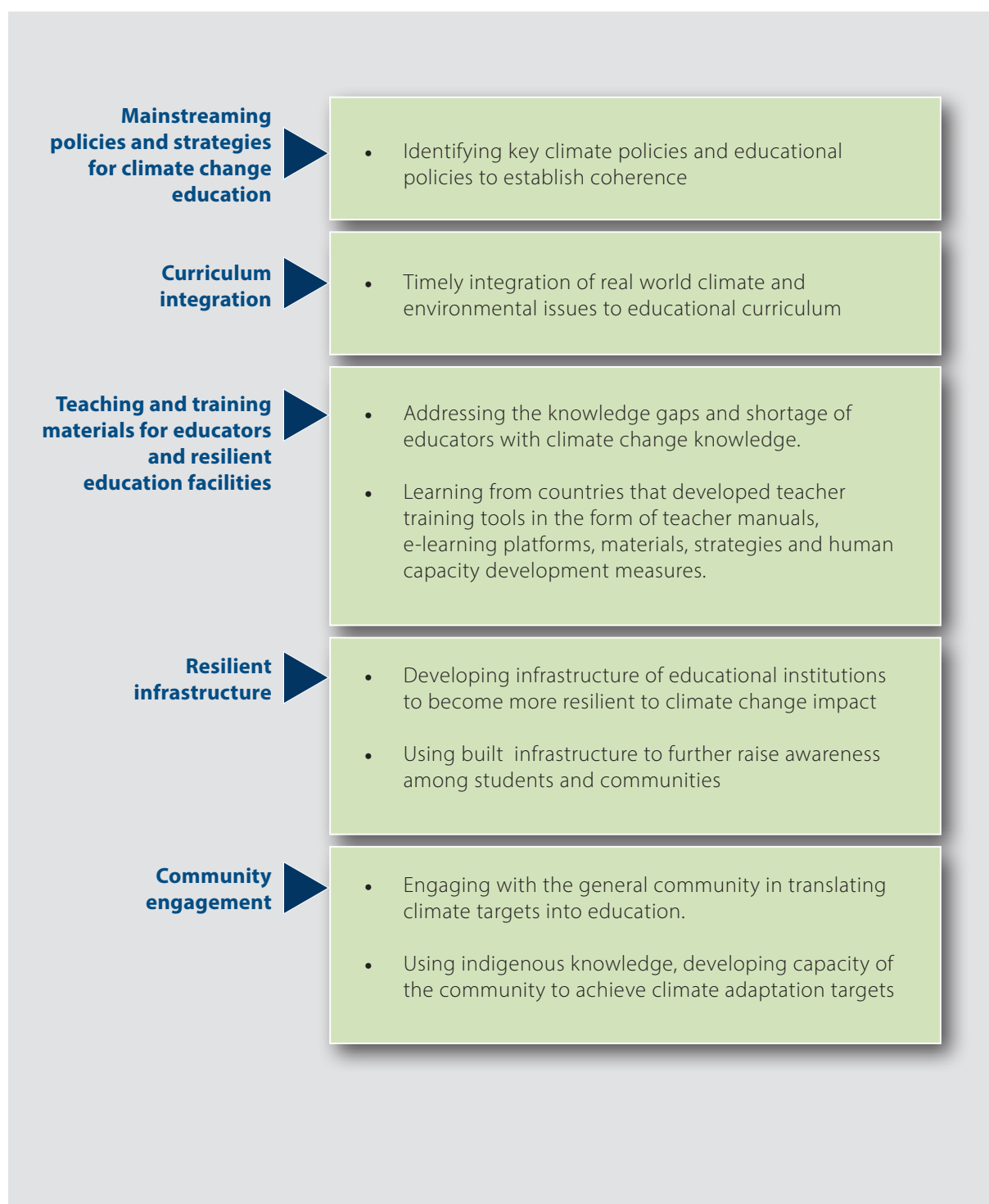
Climate adaptation goals, when translated into education, skills development and awareness, typically progress by: mainstreaming policies and strategies for climate change education; initiating curriculum integration of climate-related issues; developing teaching and training materials for educators; building resilient education facilities; and facilitating community engagement.

Figure 4 lays out further specific adaptation actions within these five areas.

FIGURE 3 Approaches for climate change adaptation



FIGURE 4 Adaptation actions in five approaches



The corresponding drive to create an appropriately skilled workforce as well as the roles of and actions around TVET were also explored in the data gathering to find out where countries stand in their current potential and where the gaps in skills requirement are. The following observations were drawn from the exercise:

- Parties highlighted their common motivation to strengthen national adaptation efforts in the context of the 2015 Agreement. Some countries, such as Mozambique, stressed that adaptation is their main priority for addressing climate change, particularly as they see it as strongly linked to national development, sustainability and security. The information provided clearly demonstrates that Parties are moving to full-scale planning and implementation of adaptation actions and strengthening and scaling up existing efforts.
 - Most Parties referred to developing nationwide adaptation plans and strategies; several Parties indicated that they are conducting a process to formulate and implement national adaptation plans and most of them foresaw completing these by 2020. These efforts on the national level are often accompanied by specific policies, measures and initiatives in almost all the key economic sectors and areas.
 - The review of the climate change policies of the studied countries show that several refer to skills development. These policies discuss resilient job creation, the integration of climate change adaptation into training and capacity-building, and increasing awareness and knowledge among community and various professional groups in vulnerable sectors.
 - The pinnacle of international governance on climate change, the Paris Agreement, emphasizes the need to build global adaptation capacity, and the IPCC highlights capacity-building as a priority for developing countries.⁵ The study shows that countries are starting to implement their (I)NDCs at different speeds and with different approaches,
- based on their political history and traditions, national circumstances and capabilities, and elaborating on earlier achievements (Clean Development Mechanism projects, nationally appropriate mitigation actions, National Adaptation Plans, etc.).⁶
 - Some countries, such as Tunisia, have included climate change in their Constitutions, while other countries have separate climate change adaptation policies and strategies, for example: the Dominica 2012–2020 Low Carbon Climate Resilient Development Strategy; the Colombian Low Carbon Development Strategy; the National Climate Change Adaptation Strategy for Sri Lanka 2011–2016; Germany’s Climate Action Plan 2050; and the Vancouver Declaration on Clean Growth and Climate Change. These policies target creating a low-carbon and climate-resilient economy to create well-paying and long-term jobs.
 - A content analysis of some of these plans revealed that adaptation policies have been developed across all levels of government, with some adaptation planning integrated into other sectors. To mention a few: Lebanon’s National Biodiversity Strategy and Action Plan for the period 2016–2030; the Bangladesh National Agricultural Policy; the National Water Policy (2013) of Zimbabwe; and the Jamaica National Energy Policy 2009–2030.
 - A few Parties intend to undertake actions with regional or global impacts as they aim to address transboundary issues. In their NDC, Egypt, where the majority of the population live near the banks of the Nile river, indicates their intention to cooperate with other Nile Basin countries to reduce water evaporation and increase river capacity.⁷ In their NDC, Vietnam, a country which shares the trans-boundary Mekong river with five other countries in East and Southeast Asia, has specified the need to strengthen cooperation in addressing transboundary water issues⁸.

5 https://www.environment.gov.za/sites/default/files/reports/nationalclimate_changeadaptation_strategyforcomment_nccas.pdf

6 Linking (I)NDCs to national development strategies and other climate plans

7 <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Egypt%20First/Egyptian%20INDC.pdf>

8 <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Viet%20Nam%20First/VIETNAM%27S%20INDC.pdf>

Policies and institutional arrangements on education for climate change adaptation

Countries included in this sample made reference in their INDCs/NDCs and national adaptation plans to how climate action plans indirectly or directly reflect adaptation priorities and variabilities. The following sections summarize how capacity-building, education, training and raising public awareness have been identified as essential vehicles to reach the climate ambitions in these documents and other secondary data sources. They also provide information on the various strategies that make use of education, training and awareness in their formal and informal contexts to advance strategies related to climate change, social engagement and improved environmental management. To some extent, information on the degrees to which countries are employing TVET and skill development processes to support their climate response, directly or indirectly, were also included to provide insights into those opportunities and potential linkages.

Important note:

The documents reviewed for obtaining the relevant information presented in this section may not be

comprehensive or up-to-date at the time of publication. It is recommended to consult the relevant document submissions directly for any specific and additional information required.

Asia-Pacific

One of the key adaptation challenges in the Asia-Pacific is the lack of capacity from top to bottom in the decision-making pyramid. Common challenges for almost every country in the region are: a lack of knowledge and skills at the government level in terms of designing and assessing adaptation projects; the need for the management and decision-making levels of companies to incorporate climate knowledge in business decisions; educators at universities and other educational institutes having to interlink and impart climate knowledge in cross-cutting areas; and the necessity for workers to apply such knowledge in their day-to-day operations. The mechanisms these countries propose to adopt in their climate change plans show both commonalities and differences.

Afghanistan

Capacity-building, education and awareness

- The Environmental Law of Afghanistan makes Nepenthe the legally responsible institution to develop and implement plans for environmental training, environmental education and environmental awareness-raising in cooperation with relevant ministries and public bodies.
- The report on 'Climate change and governance in Afghanistan' identifies education as one of the key elements in addressing climate change vulnerable areas across all sectors.
- Mass media is used in education and awareness on climate change.

Engagement of TVET

- TVET education covers some of the vulnerable sectors such as agriculture.⁹
- The government intends to develop new curricula on climate change (science, mitigation, ecosystem-based adaptation, etc.), and also mainstream climate change into existing curricula in the natural sciences, social sciences, humanities, health, and other vocational training programmes.¹⁰

9 https://unevoc.unesco.org/network/up/Afghanistan_TVET2012.pdf

10 https://wedocs.unep.org/bitstream/handle/20.500.11822/22447/Report_CC_Governance_Afghanistan_EN_v2.pdf?sequence=1&isAllowed=y

Australia

Capacity-building, education and awareness

- Australia's goal is to build national adaptation understanding and capacity.
- Tertiary education and professional associations should be enabled to create professional development and accreditation programmes for architects, planners, engineers and natural resource managers.
- A Skills for the Carbon Challenge initiative provided national leadership in building the capacity of the tertiary education sector to supply the skills needed for workers and businesses to prosper in a low-carbon economy.

Engagement of TVET

- Even though NDCs and the Adaptation Framework do not explicitly include TVET, the importance of skill development and enabling tertiary education is emphasized. Analysis shows that there are vocational education and training or further education and training institutes that have a mandate to directly address climate change. Australia is a country where VET has been instrumental in addressing climate change issues and capacity development. There were promising cases at ground level.

Bangladesh

Capacity-building, education and awareness

- The anticipated Climate Change Research and Training Institute under the Ministry of Environment, Forest and Climate Change aims to institutionalize research in and systematic observation of the climate.
- Several institutions have been identified as possessing the capacity to contribute to climate change adaptation. They include the National Agricultural Research System, Bangladesh University of Engineering and Technology, the Center for Environmental and Geographic Information Services, the Water Resources Planning Organization, the Bangladesh Institute of Development Studies, the Bangladesh Centre for Advanced Studies, Bangladesh Unnayan Parishad, the Institute of Water Modelling.
- Strengthening public education on climate change will require a review of curricula, the production of education/teaching materials and the orientation of teachers towards climate change issues.
- Several organizations, such as UNDP, Asian Development Bank, Cap-Net, the South Asian Network for Development and Environmental Economics, the Climate Action Network South Asia and the Global Water Partnership are involved in providing education and training for Bangladeshi professionals on climate change issues.

Engagement of TVET

- The aim is to enhance the population's adaptive capacity and livelihood options, and to protect the overall development of the country in its strides towards economic progress.

People's Republic of China

Capacity-building, education and awareness

- The 'National Plan for Response to Climate Change (2014–2020)' establishes the incorporation of climate change education into the national education system, in order to bring knowledge of climate change response into schools and have it widely disseminated in classrooms. In addition, enhancing the education of all citizens regarding low-carbon lifestyles, transportation and consumption, as well as the energy efficiency of products, is part of strengthening the systems that address climate change.
- Training on addressing climate change is to be intensified, so as to improve the awareness and handling capacity of government officials, enterprise managers and media professionals.
- Various colleges and universities have set up new tertiary education disciplines and research centres related to climate change. The Ministry of Education has developed online resources for creating public awareness on environmental protection and building awareness on low-carbon activities.

Engagement of TVET

- Vocational training in response to climate change is to be implemented, along with the incorporation of low-carbon-based vocational training into the national TVET system.¹¹
- The requirement to promote the broad innovative capabilities of the Chinese economy will include a focus on educational and institutional reforms that could encourage innovation.¹²

India

Capacity-building, education and awareness

- Capacity-building is to be promoted through research and in school and university education.
- The training of professionals is strongly addressed in the NDC.
- The Government has recently launched 'Skill India' with the target of providing skills training in various sectors, including sustainable development, to about 400 million people by 2022.
- A network of 127 institutions called 'INCCA' (Indian Network on Climate Change Assessment) has been set up to share knowledge and work in a collaborative manner on climate change issues.

Engagement of TVET

- There is no explicit reference to TVET in the NDC or national action plans. However, skills development is discussed in the plans. At ground level, the importance of green skills is recognized, and vocational training is taking place.

11 https://unfccc.int/sites/default/files/resource/China%20NC_English_0.pdf

12 https://energypolicy.columbia.edu/sites/default/files/file-uploads/Guide%20to%20Chinese%20Climate%20Policy_2019.pdf

Maldives

Capacity-building, education and awareness

- Capacity-building is one of the five strategic climate change policy goals identified in the Maldives Climate Change Policy Framework.
- The country's goals include: increasing public awareness on energy efficiency through labelling; expanding capacity-building among key stakeholders through implementing mitigation measures (Nationally Appropriate Mitigation Actions); using available communication tools to spread awareness; developing country-specific awareness materials to distribute and display, and including and updating climate change elements within the secondary school curriculum – tertiary and vocational education courses are listed among these strategies.

Engagement of TVET

- Tourism is one of the sectors vulnerable to climate change. Vocational training provided by the private sector, such as the Skills Training at Resorts programme initiated by the Maldives Association for Tourism Industries and TVET, offers courses in the tourism industry.¹³ Tourism is also covered by employer-based training under the Maldives TVET system.
- Community Applied Training focuses on major sectors under threat from climate change, such as tourism, fisheries and agriculture.

Mongolia

Capacity-building, education and awareness

- The INDC of Mongolia identifies a lack of technical training in climate change and the limited engagement of academic institutions as a barrier in achieving climate change adaptation goals.
- Climate change education, disaster risk reduction and education for sustainable development (ESD) in Mongolia. This includes six laws, nineteen national programmes passed by the Parliament
- The curricula in secondary level science subjects include content related to climate change and natural resources.¹⁴

Engagement of TVET

- The TVET system focuses mainly on catering to the unemployed and the poor. It lacks focus on sectors such as the environment, agriculture, energy,¹⁵ and so on.

13 https://unevoc.unesco.org/up/Maldives_Country_Paper.pdf

14 https://www.researchgate.net/publication/321945827_Research_Study_on_Climate_Change_Education_for_Sustainable_Development_in_Mongolia

15 https://unevoc.unesco.org/fileadmin/user_upload/docs/402-0002-2010_lowquality.pdf

Myanmar

Capacity-building, education and awareness

- Under the Myanmar Agenda 21, programmes are formulated for education and training on the environment. These include activities for addressing climate change, such as: (i) the development of information; (ii) creating education and communication materials; (iii) training government officials; and (iv) providing training on environmental journalism and climate change communication.
- The Climate Information Center of the Academy of Forestry Science in Yangon makes climate-related information available.

Engagement of TVET

- Access to technical and vocational education and training in Myanmar is provided by the relevant ministries and the private sector through 372 technical and vocational education and training centres.
- The Myanmar National Education Strategic Plan 2016–21 has identified the need for skilled employees in the agricultural, energy, manufacturing, infrastructure, livestock, fisheries and tourism sectors – some of which are vulnerable to climate change.¹⁶

Nepal

Capacity-building, education and awareness

- The climate change adaptation and resilience programmes include activities to implement capacity-building, knowledge dissemination and technology support initiatives aimed at vulnerable communities.

Engagement of TVET

- Sectors vulnerable to climate change such as human health and agriculture are promoted through TVET education in Nepal. The Council for Technical Education and Vocational Training has included climate change in the curriculum of general medicine as well as in a number of other programmes.¹⁷
- Agriculture education is included in the curriculum of vocational training for persons with disabilities.¹⁸

¹⁶ <http://www.tvetmyanmar.gov.mm/en>

¹⁷ <http://www.ctevt.org.np/files/Research%20Journal%202010.pdf#page=127>, pg.125

¹⁸ <http://www.ctevt.org.np/files/Research%20Journal%202010.pdf#page=127>, pg 150

New Zealand

Capacity-building, education and awareness

- The country supports the Global Research Alliance on Agricultural Greenhouse Gases through funding and the delivery of education, training and public awareness, including financing mitigation research projects and regional and international collaboration.
- New Zealand also funds educational and research programmes on climate change in other countries.
- The Government facilitates climate education through public awareness campaigns and behavioural change, providing public access to information, education and training, as well as promoting public and international engagement.
- The digital library 'the Climate Cloud', established by the Ministry for Primary Industries, has resources related to climate change in New Zealand for land managers, rural professionals and land-based businesses.
- Resources and funding are provided for climate-change-related education and training in schools, institutes and research centres, as well as industry settings.

Engagement of TVET

- In New Zealand, climate adaptation has been introduced to the TVET system through donor projects.¹⁹ On average, over 200,000 school students obtain industry-standard qualifications through TVET every year.²⁰

Philippines

Capacity-building, education and awareness

- The country is engaged in building the capacity of public sector agency personnel.
- Curricular reforms are carried out to foster innovation and creative imagination, with special attention paid to climate change.
- Capacity-development initiatives related to forest communities for watershed protection and alternative livelihoods are in place.

Engagement of TVET

- Although climate change adaptation is not directly addressed in the NDC, improving the quality of higher and technical education and research to address issues of equity and global competitiveness is a priority.
- The Philippines has its own regulation dedicated to green jobs – the 'Act for Green Jobs', which provides information on the role of different agencies and institutions. The country plans to develop a 'National Green Jobs Human Resource Development Plan' and establish a database of green careers, professions and skills, as well as a list of emerging business enterprises that generate and sustain green jobs.
- The Technical Education and Skills Development Authority is authorized to formulate the necessary training regulations for the implementation of skills training, as well as undertaking programme registration, plus assessment and certification, in support of the green economy's requirements for skilled labour.

19 <https://www.mfat.govt.nz/assets/Aid-Prog-docs/Research/Climate-Change-and-DRR-Synthesis-Report-Final-v6.4.pdf>

20 <https://www.itf.org.nz/industry-training>

Sri Lanka

Capacity-building, education and awareness

- Several institutes related to agriculture and fisheries conduct research on climate change impacts and adaptation, and apply potentially effective measures to current practice, e.g. distributing rice varieties suitable for particular areas and their available water content.
- The Climate Change Secretariat, the Agriculture Faculties of Universities and the Ministry of Education, as well as other relevant ministries involved in conducting training programmes for stakeholders (government officers, civil society organizations and private sector employees) on climate change adaptation, incorporate and further strengthen climate-change knowledge through formal education (school and university curricula) and by establishing a media space to discuss climate change impacts and adaptation.

Engagement of TVET

- Engagement in the TVET system accounts for only around 22% (2017) of the students in tertiary education.²¹ TVET provides training in vulnerable sectors such as health, agriculture, infrastructure and industry.²² Although such courses do not directly address climate change, they contribute by preparing a skilled workforce in these vulnerable sectors through TVET provision.

Vietnam

Capacity-building, education and awareness

- The National Action Plan to Respond to Climate Change includes increasing awareness of and the capacity to adapt to climate change, developing pathways for greenhouse gas emission reduction, and creating a low carbon economy through research and planning programmes.

Engagement of TVET

- With the development of the 'Green Growth Strategy', the Vietnamese government has acknowledged the need to address environmental and socio-economic challenges by focusing on sustainable economic development.
- TVET has been recognized as an important component in developing a competent workforce capable of meeting the requirements of a green economy in Vietnam. TVET aims to develop the training competencies needed to apply resource- and energy-efficient, environmentally friendly production processes and technologies.²³

21 <https://www.dhammadownload.com/lk/>

22 http://220.247.221.26/Insreg_Home/Insreg_Institute_Select_Search_Results.php?prv=&dist=&gsd=&srch=2&own=&ins=&pnum=&ind=&coun=&sort=REG&sr_status=All

23 <https://www.tvet-vietnam.org/en/topic/388.greening-tvet.html>

Africa

Every country in this group identifies the importance of developing capacity-building, awareness, education and institutional arrangements for climate change in its NDCs and adaptation plans. Also highlighted is the need for multi-sectoral collaboration in the implementation of various projects and programmes. There is a further requirement for capacity-building, research and planning in terms of disaster risk management, as well as the need to harmonize policies. It is also vital that the existing information on climate change and adaptation becomes more accessible to local and national institutions, government agencies, non-governmental organizations (NGOs), urban and rural communities, and other stakeholders.

Dissemination is key in supporting and strengthening stakeholder efforts. Furthermore, policy-makers need additional institutional support and training in local and global climate change science, impacts and vulnerabilities, to support their decisions and policy-making.

Based on the review conducted here, it is noteworthy that the identification of specific skills development and training requirements for climate change adaptation remains largely unfocused over the region.

Kenya

Capacity-building, education and awareness

- The adaptive capacity and resilience of the informal private sector needs to be enhanced.
- Education, training, public awareness and participation, and general access to information on climate change adaptation should be strengthened across the public and private sectors.

Engagement of TVET

- Even though it does not directly mention TVET, the country's plan acknowledges that training young Kenyans in relevant careers and imparting new skills to those already in the workforce or who are unemployed will build national resilience to climate change while aiding the country's economic development.

Madagascar

Capacity-building, education and awareness

- One of the objectives in the National Policy for climate change is the integration of climate change at all levels to promote research and technology transfer (in the process, ensuring the accountability of relevant institutions in the fight against climate change; strengthening the integration of climate change into sectoral plans; and disseminating information, education and communication on climate change).
- Under the Madagascar Strategic Programme for Climate Resilience, the aim is to strengthen the institutional and technical capacity of the Government of Madagascar to mainstream climate change resilience within key economic sectors through education and skills development.
- In addition, projects are being implemented by small organizations in the areas of eco-tourism, the sustainable management of fisheries, solid waste and waste water management, and promoting mariculture, etc.

Engagement of TVET

- Agriculture is one of the vulnerable sectors in Madagascar and vocational training programmes are available in Agricultural and Rural Training.²⁴

24 <https://www.ifad.org/en/web/operations/project/id/1100001516/country/madagascar>

Malawi

Capacity-building, education and awareness

- The government has identified the need for further awareness-raising, training and incorporating climate education into institutions as well as into the primary, secondary and tertiary education systems.
- Technology transfer programmes are carried out by the Industrial Research and Technology Development Centre. These projects include: (i) improved biomass stoves, which have been reported to achieve energy savings of up to 55%; (ii) micro hydro-power plants in the northern region capable of supplying up to 10 kW; (iii) briquette pressing machines; and (iv) a bee-keeping technology strategy for supporting sustainable livelihoods in Mulanje.
- The Universities of Malawi and Mzuzu conduct short courses and research related to the environment and climate change issues.

Engagement of TVET

- Malawi's commitment to addressing climate change is demonstrated through a number of policy documents. This includes TVET engagement in the Climate Change Learning Strategy.

Mozambique

Capacity-building, education and awareness

- The country's mission is to increase resilience in communities and the national economy, including the reduction of climate risks, and promote low-carbon development and the green economy through the integration of adaptation and mitigation in sectoral and local planning (Mozambique, n.d.).
- The financial and technological resources needed must be mobilized, at both the national and international level, and the nation's technical and institutional capacities strengthened.

Engagement of TVET

- The Government of Mozambique is prioritizing investment in human capacity-building through education and training, with the aims of reducing poverty, improving the quality of life for its citizens and upgrading their scientific and technical skills.

Nigeria

Capacity-building, education and awareness

- The government has identified as a priority the ability of pre-primary, primary, secondary and tertiary level institutions to support training, research, capacity-building and public awareness on climate change adaptation and mitigation.
- It also aims to raise public awareness through media coverage.

Engagement of TVET

- TVET does not always appear to be a significant part of Nigeria's education system.²⁵ Issues such as the gaps between TVET policies and practices, inadequate facilities, insufficient funding, and the poor use of technology and skills development in the curriculum²⁶ need to be addressed to ensure that TVET becomes a beneficial tool for climate change adaptation and mitigation in Nigeria.

25 <https://oapub.org/edu/index.php/ejes/article/view/638/1785>

26 <https://files.eric.ed.gov/fulltext/EJ1089786.pdf>

Senegal

Capacity-building, education and awareness

- Senegal aims to establish partnership, coordination and participation platforms for climate change planning and programming.
- The country will focus on its capacity to integrate climate change issues into regional development plans and actions.
- A climate change policy and investment package will be developed, with the lessons learned and best practices established to be disseminated among the relevant authorities and social communities.
- Policy-makers require additional institutional support and training on local and global climate change science, as well as the ensuing impacts and vulnerabilities, to support decision- and policy-making.

Engagement of TVET

- Adaptation planning at the national level and initiatives undertaken and implemented provide answers to emergency situations and require planning at the macro level.
- The ongoing development of the NAP will integrate an approach to long-term planning in the future initiatives of Senegal.

South Africa

Capacity-building, education and awareness

- The country aims to improve basic education on climate change.
- South Africa needs to build the necessary institutional capacity for climate change response planning and implementation for the period 2020 to 2030.
- It plans to communicate its investments in adaptation for the purposes of education and building awareness, as well as to promote international recognition.

Engagement of TVET

- The government plays a key role in building skills for national development through the NPC and other national plans.

Uganda

Capacity-building, education and awareness

- Uganda's goals are to carry out research on climate-resilient crops and livestock, implement programmes to promote better hygiene in the general population, enhance climate change education, training and public awareness, and develop capacity through communication, training, information and knowledge.

Engagement of TVET

- The National Strategy and Action Plan, which aims to strengthen human resources and skills in order to advance green, low-emission and climate-resilient development in Uganda in the period 2013–2022, mentions the strategic plan of harmonizing climate change learning within business, technical, vocational education and training.²⁷

27 https://www.uncclearn.org/sites/default/files/uganda_national_cc_learning_strategy_final_oct_2013.pdf

Zimbabwe

Capacity-building, education and awareness

- The Curriculum Development Unit in the Ministry of Primary and Secondary Education has developed materials on climate change which are being incorporated into the school curriculum.
- The new curriculum includes climate change topics and themes in all areas of learning for Early Childhood Development. At primary school (Grades 3–7), aspects of climate change are mainly covered in Agriculture, Science and Geography lessons and are further incorporated into the teaching of languages. For Forms 1–4, climate change matters are covered in general in the lessons on Agriculture, Engineering, Crop Science, Animal Science and Horticulture. At Forms 5 and 6, there are proposals to offer a more detailed coverage of climate change education.
- Curriculum audits are carried out in terms of the content and processes of climate change.
- National workshops are arranged to fully integrate climate change into the school curriculum.
- In-service training workshops are conducted for educators on the integrated climate change curriculum.
- The teaching and learning of climate change is monitored and evaluated.

Engagement of TVET

- Ad hoc projects are carried out in Zimbabwe to strengthen the greening of TVET provision. Green enterPRIZE is a project being implemented by the International Labour Organization in collaboration with the Government of Zimbabwe, the Employers' Confederation of Zimbabwe and the Zimbabwe Congress of Trade Unions, with support from the Government of Sweden.
- The first component of the project seeks to strengthen the capacity of TVET and professional training institutions, as well as community-based skills development initiatives, to design and implement programmes that provide business and technical skills for green jobs. As a result, young people can take an active role in greening the Zimbabwean economy, becoming more employable in the process.



28 <https://www.greenenterprize.org/about/>

North America

The countries of North America have adopted strong policies and institutional arrangements for climate change adaptation. An active dialogue among stakeholders and political institutions has the potential to clarify the opportunities for adapting to the changing climate in this region. Integrating perspectives on climate change into legislation and regulations has the potential to promote or constrain adaptive behaviour.

High adaptive capacity, which is present in most of North America, should be an asset for coping with or benefiting from climate change. Capacity, however, does not ensure positive action, or indeed any action at all. Societal values, perceptions and levels of cognition shape adaptive behaviour (Schneider, 2004). In the region, information about climate change is usually not 'mainstreamed' or explicitly considered in the overall decision-making process. Conversely, the degree to which education is factored in differs between the countries in this region. A major challenge is the need for efficient technology and knowledge transfer.

Canada

Capacity-building, education and awareness

- Canada's focus is on bringing scientific information and traditional knowledge together.
- Capacity-building is required to improve risk management, support land-use planning, help safeguard investments, and strengthen emergency planning, response and recovery.

Engagement of TVET

- In the NDC, there is no particular acknowledgement of vocational training. The Sixth National Communication elaborated on the importance of skills development, starting at primary school level.
- In the Pan-Canadian framework, the need for skill development in adaptation is acknowledged.
- At ground level, TVET organizations are working to develop green skills, not only in Canada but also in other countries.

United States

Capacity-building, education and awareness

- The second adaptation principle includes prioritizing the most vulnerable and emphasizing the importance of involving all sections of society.
- Training and outreach are more focused on building the capacity of the staff engaged in the programmes.
- Adaptive capacity is mainly focused on staff engaged in the programmes and vulnerable communities.

Engagement of TVET

- TVET is not explicitly specified.

Europe

At the EU level, the European Commission has an European Union (EU) adaptation strategy to support action by promoting greater coordination and information-sharing between Member States, and by ensuring that adaptation considerations are addressed in all relevant EU policies. On a larger scale, the EU created the European Green Deal in 2019, setting out its ambition to become climate neutral by 2050. The European Green Deal lays down a roadmap for all countries in the continent to focus on building a sustainable economy and assures support for regions that rely on carbon-intensive activities through the 'Just Transition Mechanism', including access to reskilling programmes and employment.

The creation of new mechanisms in the EU took place well after the drafting of the observations for this review. However, the one common factor among the European countries studied was that climate education seems to be more integrated with school and university education than with TVET. There are a number of research projects on mitigation measures, conducted by research centres, government institutions and universities. However, it could be argued that integrating green technologies, green economic concepts and green skills into jobs by incorporating them within TVET education offers

a better opportunity to achieve real change. Moving forward, further plans in the EU to launch a new Skills Agenda, including the Pact for Skills, which will help articulate the role of VET in boosting the skills and competence transfer to make the green economy a reality, is expected to anchor many climate plans and skills strategies in the region to achieve better coherence.

Germany and Malta are two of the countries in the region that have clearly acknowledged the issues around climate adaptation and mitigation and reflected them in skills development processes and learning discourses. This seems to be less the case in Italy, where TVET institutions ('Scuola professionale') that offer training in agricultural technologies do not specifically mention 'climate change' in their curricula.²⁹ In Austria, courses are offered in relevant subject areas.

The review considers that Europe remains ahead in the discussion of 'greening TVET' and developing 'green skills'. However, there is still a huge potential in the region to further embed climate change adaptation within specific skills strategies and mandates.

Austria

Capacity-building, education and awareness

- Austria has established web portals in order to raise awareness and involve the general public in climate decision-making (Austria, n.d.a, n.d.b).
- A regular newsletter is published.³⁰
- An 'Eco-labelling' programme is conducted for schools and teacher-training institutes in order to enhance the environmental commitment of children and young people.
- Austria is currently reforming its education system to adopt national policies (European Union, 2016).

Engagement of TVET

- Although there are training courses in priority areas (such as agriculture and industry), no clear statement is available on incorporating green skills, green technology or green economic concepts.
- The Federal Ministry of Agriculture, Forestry, Environment and Water Management promotes green jobs and green technology.³¹

²⁹ See for instance www.itagaribaldi.it/

Finland

Capacity-building, education and awareness

- Climate change issues are included in education, given that sustainable development is part of Finland's compulsory basic education system. The present National Core Curriculum for Basic Education was set by the Finnish National Agency for Education in 2014. Many school subjects deal with sustainable development and climate change, which are also addressed as a cross-curricular theme. In addition, beyond the basic education level, climate change issues are included in upper secondary curricula.

Engagement of TVET

- The National Core Curriculum for Upper Secondary Vocational Education defines sustainable development as a key skill among many. It is included in the qualification modules with a field-specific emphasis and is assessed as part of vocational skill demonstrations and/or other competences.
- Education providers are required to carry out measures to promote sustainable development. Sustainable development must also be visible in quality management issues.

France

Capacity-building, education and awareness

- France practises a policy in which schools, colleges, lycées and apprenticeship training centres can have ESD incorporated into their pedagogical mission.³²
- Environmental and sustainable development education has been on the timetable in French schools since 2004.
- The topics of climate and energy were introduced into secondary schools in 2009. The theme of climate change is also gaining ground in higher education establishments (France, 2013).
- In 2008 and 2011, the French government re-launched a national energy management and climate change awareness campaign.

Engagement of TVET

- Science and Technology for Industry and Sustainable Development is offered as a subject in the technological baccalauréat at technological high schools.
- According to France's *Sixth National Communication* (2013), numerous training courses on building, energy, agriculture and town and country planning have been facilitated to help trainees acquire the new skills necessary to steer their trade in a green direction.
- TVET institutes provide conversion courses for employees from sectors experiencing economic problems.

30 See www.klimawandelanpassung.at/ms/klimawandelanpassung/de/newsletterregistrierung/kwa_archiv/

31 See <https://www.bmlfuw.gv.at/greentec.html>

Germany

Capacity-building, education and awareness

- Germany has a number of programmes related to energy transition, adapting to climate change and raising awareness, as well as targeting sustainable development for ecosystems, the economy and society.
- Information, advice and training is provided to businesses and companies.
- Climate action is promoted at all levels in the form of a 'societal project'. Research and development projects are developed to serve as models for societal awareness and behavioural change (e.g., Efficiency House Plus).

Engagement of TVET

- Germany aims to establish an on-going process of developing a strong knowledge base for high-efficiency technologies, and to make this knowledge available through TVET and university courses as well as through continuous professional development (CPD) and training.
- A further goal is to make use of TVET, CPD and adult education to teach climate competence in relation to people's personal and professional lives, which allows for testing, practical applications and updating the knowledge and competence gained.
- At the national and international levels, supporting initiatives are proposed to help continue environmental and social improvements along supply chains (e.g. the sustainable cocoa forum) and reduce climate impact at the local level.

Italy

Capacity-building, education and awareness

- Training programmes are to be established in the renewable energy sector.
- Italy is committed to the promotion of green jobs in female-dominated sectors as well as jobs for women in the energy sector (Cedefop, 2012).
- In August 2017, the Ministry of Environment, Land and Sea called for public consultation on the first draft of the 'National Adaptation Plan to Climate Change' (CMCC, 2017).
- The National Programme for Environmental Education, Information and Training, coordinated by IMELS and the regions, has promoted a number of educational interventions.
- Several NGOs conduct awareness-raising initiatives among the general public.
- Some regional and provincial agencies for environmental protection, with the collaboration of other organizations and universities, promoted specific training initiatives between 2010 and 2013.

Engagement of TVET

- Training programmes for skills development are offered in the thematic laboratories on 'Mitigation and Adaptation to Climate Change' conducted by the Ministry of Environment, Land and Sea.

32 See for instance the statement on 'Education for Sustainable Development' of Académie Reims, www.ac-reims.fr/cid79145/education-developpement-durable-edd.html

Malta

Capacity-building, education and awareness

- Malta has incorporated climate education and sustainable development into schools' curricula, and conducts awareness sessions and research for schoolchildren and teachers.
- Specific courses are offered on sustainable developmental areas at university level (Malta, n.d.; EkoSkola, Malta, n.d.).
- The National Climate Change Adaptation Strategy proposed establishing an Education and Communications Unit in the Climate Change Division of the Malta Resources Authority and implementing sustained education and awareness campaigns and communications.

Engagement of TVET

- Examples show that courses offered by government-run TVET institutions have incorporated green skills and sustainable work practices.

Norway

Capacity-building, education and awareness

- An awareness of issues related to sustainable development and climate change has long been embedded in the Norwegian education system.
- In 2017, the Solberg Government decided to create a new section of the curriculum in primary and secondary education that would be broader in scope and define important values and principles for Norwegian schools. Respect for nature and sustainability are key values included in this new part of the curriculum.
- The 'Sustainable Backpack' is an initiative established by the Ministry of Education and Research and the Ministry of Climate and Environment in order to better embed sustainable development into mainstream education in schools. It has been developed in close cooperation with a number of NGOs.³³

Engagement of TVET

- There was no sufficient information accessible from the documents reviewed.

Poland

Capacity-building, education and awareness

- Various forms of education, promotion and information in the field of climate protection are offered by public administrations, scientific institutions and ecological NGOs. Much of this activity is carried out by the Ministry of the Environment or under ministerial powers, with the aim of raising awareness so that every citizen may have an impact on the reduction of greenhouse gas emissions.

Engagement of TVET

- In the curricula of vocational schools in Poland, there is a great deal of emphasis on the effectiveness of instruction in the natural sciences – in line with the priorities of the Lisbon Strategy. Apart from offering vocational qualifications, these schools are intended to equip graduates with a basic general knowledge.

³³ https://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/529371_norway-nc7-br3-1-nc7_-_br3_-_final.pdf

Sweden

Capacity-building, education and awareness

- In Sweden, preschools, schools and adult education institutes have a clear remit to understand the requirements for sustainable development formulated in the Education Act, curricula and syllabuses. In-depth teaching on climate issues is common at the upper secondary level. Teaching manuals adapted for compulsory schooling and a wide variety of films and other teaching materials on climate issues and climate-friendly consumption, energy and transport are produced by government agencies and non-government actors. The permanent exhibition 'Mission: Climate Earth' has been up and running since 2005.

Engagement of TVET

- Sweden is looking at how TVET can be carried out to help society move towards sustainability.
- The essential concepts of Strategic Sustainable Development and ESD are being introduced.

Ukraine

Capacity-building, education and awareness

- Ukraine was the first country in Central and Eastern Europe to adopt a 'Concept of environmental education and upbringing', approved by the Collegium of the Ministry of Education and Science of Ukraine.
- In accordance with this concept, the formation of an ecological culture for individuals and society as a whole and the generation of environmental skills and outlook in the population were proclaimed as the main goals of environmental education in Ukraine.
- The provision of environmental education in primary schools is carried out both as part of the fixed programmes for elementary school classes on natural history (under the topic 'Me and Ukraine') and in lessons on the basics of health, as well as forming part as the variable lessons set by the regions. The Ministry of Education and Science and the Institute of Innovative Technologies and Educational Content have developed and prepared for publication programmes for specialized education such as: 'Ecology. Grades 10–12 (Standard Level. Academic Level)' and 'Ecology. Grades 10–12 (Core Level)'.³⁴

Engagement of TVET

- Vocational education is very well recognized by the education system in Ukraine. However, neither the NDC nor the NC provides a clear path for engaging vocational skill development in climate change adaptation.
- The country is in the process of learning about production technologies that reduce energy consumption and the skills to apply them in practice. The acquisition of this knowledge will require updating courses at the level of vocational, higher and postgraduate education.

34 <http://www.seia.gov.ua/seia/doccatalog/document?id=638134> (28p)

Latin America

Although climate change involves many uncertainties, a broad set of policies has been proposed to address climate change vulnerability areas. Primary actions under this initiative will be the strengthening of national plans for vulnerable areas in countries' policies and institutional arrangements.

Every country in the region identifies the need for developing capacity-building, awareness, education and institutional arrangements in its NDCs and climate change adaptation plans. This also indicates

the links between the current policy structures and TVET structures that are needed to ensure effective capacity-building, education and awareness in the Latin American region.

The study found a strong link between Latin American countries' development strategies and TVET. At the national level, the importance of skills development for climate change adaptation has been identified. However, the potential for countries to further involve TVET in the process is high.

Brazil

Capacity-building, education and awareness

- Brazil has made efforts to expand education, public awareness and training on issues related to climate change.
- In particular, initiatives like the Brazilian Forum on Climate Change (FBMC [acronyms reflect the Portuguese]) and the work of the Brazilian Panel on Climate Change (PBMC), as well as disclosure and public awareness via the Ministry of Science, Technology and Innovation's webpage are key.

Engagement of TVET

- The Ministry of Environment began an association with the National Programme of Access to Technical Education and Employment in 2014 with the intention of increasing the supply of professionally-oriented education in areas linked to environmental policies. The initiative provides training scholarships ('Bolsa Formação'), offering free Initial and Continuing Education (FIC) or professional training for those enrolled in or having already completed high school, in three major programmes:
 1. Environmental PRONATEC ('PRONATEC Ambiental'), with the objective of supporting sustainable production chains and meeting specific labour market demand in environmental areas;
 2. Extractivist Sector PRONATEC ('PRONATEC Bolsa Verde – Extrativismo'), aimed at strengthening the productive chain of extractivist activities, in order to promote sustainable practices (e.g. introducing more sustainable practices into the extraction of forest-based products such as rubber and Brazil nuts) and simultaneously reducing rates of illiteracy and increasing the uptake of formal education ('schooling') in these populations, usually settled in remote areas;
 3. Waste Collector PRONATEC ('PRONATEC Catador'), with the objective of improving professional qualifications among recyclable material collectors and recognizing their latent skills, together with developing their knowledge of social technologies (ILO, 2018, p. 23).

Chile

Capacity-building, education and awareness

- Chile is committed to the creation of forecast models that it can share and distribute nationally and internationally, both through individual efforts and jointly with other countries determined to take action.
- Seminars are organized in conjunction with other countries willing to provide training and coaching support to nations that require it, through the preparation and reporting of their planned national contributions, greenhouse gas emission inventories, national communications, biennial update reports, and nationally appropriate mitigation actions (NAMAs).
- Instruments are prepared to promote research and capacity-building at the national and subnational levels, strengthening the response capacity of communities and local governments in order to reinforce the national adaptation capacity through institutional development and capacity-building in the groups and sectors most vulnerable to the impacts of climate change (Chile, 2015).
- Possible implementation synergies for use in the technological response to climate change adaptation and mitigation are to be identified.

Engagement of TVET

- National policy is continuously developing, and a reform of the TVET system is currently underway that started with the creation of the National Council for TVET and which set an agenda for the period 2010–20 (Agenda de Innovación y Competitividad 2010–2020). This reform aims to develop competitiveness through innovation, establish better relations between the educational sector and industry, strengthening private–public cooperation, and create an inter-ministerial, interdisciplinary and multifocal point of view (UNESCO-UNEVOC, n.d.b.).

Colombia

Capacity-building, education and awareness

- Colombia seeks to generate awareness about the potential risks and opportunities associated with climate change and variability.
- The aim is to reduce the vulnerability of socio-economic and ecological systems to climate events (Rojas-Laserna, 2014).
- Inter-institutional and interdisciplinary spaces are created to enable working together for common goals, exchanging experiences and developing adaptation measures.

Engagement of TVET

- The TVET structure in Colombia follows a strategic model. It contributes to the country's competitiveness by increasing the productivity of enterprises and the regions, and by improving the social inclusion of vulnerable individuals and communities through comprehensive training, employment and entrepreneurship, the development of a national system of knowledge, and institutional strengthening (UNESCO-UNEVOC, n.d.a).

Costa Rica

Capacity-building, education and awareness

- The country has carried out different actions regarding education and raising awareness of the issue, such as climate change firmware, radio broadcasts, and film and television productions, as well as holding lectures and training for teachers, farmers, local government officials and the general public, and developing written and electronic outreach materials.
- According to Third National Communication, it is imperative to create a National Strategy for Education and the Development of Communication on Climate Change, which will integrate all the various efforts in this area and lead to establishing a process for generating reflection and social transformation, requiring changes in people's daily practices and their interpretation of reality.³⁵

Engagement of TVET

- The Instituto Nacional de Aprendizaje has trained population groups ranging from operators and managers to supervisors. Additionally, community groups, such as Administrative Associations for Aqueducts and Sewers, and entrepreneurial projects favour centres for collecting recyclable materials. However, there seems to be a huge skill shortage as the country's environmental 'boom' continues to grow, with a special focus on carbon neutrality and ecological footprints.³⁶

Grenada

Capacity-building, education and awareness

- At the primary school level (average age range: 4–11), students may have been exposed to climate change topics as an option. However, in 2016, under the Integrated Climate Change Adaptation Strategies ICCAS project, a Climate Change Toolkit for Primary Schools entitled How to Become a Greenz Climate Champion was launched to facilitate the integration of climate change into primary school learning. The development of the toolkit was a joint initiative of the Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment, the Ministry of Education and GIZ.
- At the secondary school level, greater exposure to these issues may be acquired by students who are undertaking specific subjects at the Caribbean Secondary Education Certificate (CSEC)[®] level. Instruction for students pursuing the more advanced Caribbean Advanced Proficiency Examination (CAPE)[®] certificates and the CXC[®] Associated Degree, also administered by CXC, is delivered by the T. A. Marryshow Community College (TAMCC) in Grenada. TAMCC also confers Associate Degrees that include an optional climate change element.
- A Grenada-specific climate change teaching kit has been completed. Forty-nine schools participated in the development of the 'Greenz Climate Champion Toolkit' and 900 children have received their climate change passports.

Engagement of TVET

- The Grenadian government considers the inclusion of an environmental component in TVET to be essential for the transition to a new, green economy.
- The Skills to Access the Green Economy Program has helped the Caribbean region, including Grenada, become more resilient by supporting demand-driven TVETs in key economic sectors associated with climate change in the Caribbean.³⁷

35 <https://unfccc.int/sites/default/files/resource/crinc3.pdf>

36 https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_706936.pdf (18p)

37 <https://www.collegesinstitutes.ca/what-we-do/international/education-for-employment/skills-to-access-the-green-economy-sage/>

Mexico

Capacity-building, education and awareness

- Building knowledge and awareness around climate change is seen as extremely significant and requires ongoing dedication from the different actors in government, academic institutions (e.g. universities and research networks), the private sector and society as a whole.
- The training of professionals who understand and act on climate change requires a transformation of the courses and programmes of study used by public and private universities, technical colleges and other educational institutions.

Engagement of TVET

- The aim is to enhance the links between the TVET system, the labour market and the economy, based on an understanding of climate change vulnerability areas.

Paraguay

Capacity-building, education and awareness

- A variety of different projects have been carried out by the Paraguay Government in conjunction with international organizations. The Environment Secretariat of Paraguay is currently executing a project implemented by UN Environment (2017–2020) to reduce the vulnerability of food security to the impacts of climate change. One key activity under the project is capacity development and awareness raising to carry out and upscale effective implementation of adaptation measures at the national and local level.³⁸

Engagement of TVET

- Access to education and training for green jobs is still limited in Paraguay.
- Fundacion Paraguaya, with support from the TVET Academy and UNESCO-UNEVOC, has made a number of videos aimed at enhancing green agricultural skills as part of the vocational education curriculum.³⁹

38 <https://www.adaptation-fund.org/project/ecosystem-based-approaches-reducing-vulnerability-food-security-impacts-climate-change-chaco-region-paraguay/>

39 <https://unevoc.unesco.org/go.php?q=Supporting%20rural%20youth%20to%20acquire%20green%20skills%20and%20realise%20their%20ideas>

Pacific and Caribbean Islands

These countries share a common factor in having clear targets set out in their NDCs related to institutional arrangements, policies, capacity-building, awareness, and education and training for climate change adaptation. Small-scale TVET systems are established on some small islands offering short courses and training programmes for island residents in climate adaptation and mitigation areas.

In these countries, it is significant that courses in awareness-raising and training for climate resilience as well as skills development for engaging in sustainable agriculture, aquaculture and other livelihoods, are offered through NGOs and international NGO projects.

UNESCO's support for small island developing states (SIDS) through its SIDS Action Plan (UNESCO, n.d.a) brings into focus certain priority areas in education

that are seen as particularly significant in addressing the human and institutional capacities that will better equip these states to overcome sustainability and climate-related issues:

- Policy development, including equity measures;
- Integrating education for sustainable development (ESD) into formal and non-formal education;
- Teacher education and professional development;
- Transforming and marketing TVET.

As a highly vulnerable group, SIDS could use TVET to help develop climate-resilient economies. The study observed some promising ongoing projects and initiatives in SIDS, in collaboration with other regions, to enhance the role of TVET in climate change adaptation.

Bahamas

Capacity-building, education and awareness

- The country's plan emphasizes sensitization to and education on climate change mainly as it impacts health.
- In the NDC submitted, vocational skills development is not acknowledged.

Engagement of TVET

- In its second communication, the Bahamas has principally identified skills development as a means to reduce vulnerability.

Dominica

Capacity-building, education and awareness

- The country's aims are to inform and educate its population to increase knowledge about the anthropogenic causes of climate change as well as its effects.
- In addition, people need to be made aware of the individual and collective responsibilities involved in the mitigation of climate change through a reduction in greenhouse gas emissions, and in adapting to climate change more generally (Dominica, 2012).

Engagement of TVET

- An advocacy platform is required for integrating sustainable principles into regional TVET policies, practices and programmes.
- Policy development which focuses on modernized TVET skills and involvement should be further facilitated.

Fiji

Capacity-building, education and awareness

- The National Disaster Management Office is responsible for formulating, developing and conducting formal training on disaster risk and risk reduction at the national, divisional, district and community levels, according to the needs and gaps in each area.
- The country's National Climate Change Policy aims to: (i) increase awareness and understanding of climate-change-related issues across all sectors and at all levels in Fiji; and (ii) integrate climate change into schools' curricula, tertiary courses, and non-formal education and training programmes.

Engagement of TVET

- Under the NCCP, Objective 4, Fiji plans to review and update vocational education courses to ensure the inclusion of local, accurate and current climate change information, and to encourage student research around the issue of climate change, subject to review and assessment by the Curriculum Development Unit.

Haiti

Capacity-building, education and awareness

- The country's plans focus on the production, communication and dissemination of knowledge related to climate change, including migrations, in primary and secondary schools and universities.
- Awareness-raising at the national level on the causes and effects of climate change and adaptation strategies is seen as important.
- The Climate Change Directorate of the Ministry of the Environment will be strengthened.

Engagement of TVET

- There are private organizations that provide vocational training in priority areas such as agriculture and sustainable building practices, etc.⁴⁰

Jamaica

Capacity-building, education and awareness

- Jamaica's Ministry of Water, Land, Environment and Climate Change plans to: (i) develop and implement educational and public awareness programmes on climate change and its impacts; (ii) introduce climate change issues into the academic curriculum at the secondary and tertiary levels; (iii) provide proactive public access to information on climate change impacts and national strategies; and (iv) develop research, technology, training and knowledge management.

Engagement of TVET

- The Human Employment and Resource Training Trust is the responsible organization for financing and regulating training programmes with the objective of producing a skilled, certified workforce consistent with the needs of the economy and the labour market. It is currently engaged in reorienting TVET to support SDGs.⁴¹

40 Moun Pou Moun (MPM) <http://www.mpmhaiti.org/vocational-education.html>

41 Abstract, 3rd International Conference on Technical, Vocational Educational and Training in the Caribbean, imprint <https://drive.google.com/file/d/0B6lFa9lMhc-zNkdjMnZJRC00dHM/view>

Seychelles

Capacity-building, education and awareness

- The University of Seychelles has established a 'Blue Economy Research Institute', which is to be strengthened and funded to function as a hub for climate-change-related research.
- Programmes have been conducted to educate the public about the causes and impacts of climate change and mitigation efforts. It is hoped to extend these to cover stakeholder groups.
- Many government and civil society partners have contributed to an ongoing climate change education programme targeting schools, the general public, artists and professionals from diverse sectors. For instance, the University of Seychelles has partnered with local and overseas institutions to develop its Environmental Science degree programme.

Engagement of TVET

- Although the Seychelles plan comprehensively addresses the involvement of education and skills development, it does not specifically mention TVET participation. However, ground-level activities on climate change adaptation are undertaken by different TVET institutions.

Vanuatu

Capacity-building, education and awareness

- National Advisory Committee on Climate Change has implemented a project on Capacity Building for the Development of Adaptation Measures Project.
- Vanuatu National Adaptation Programme of Action has identified that awareness-raising at all levels, capacity-building (including institutional capacity and research and development), the promotion of appropriate traditional knowledge and practices, technology transfer, and education and training are relevant to all priority areas and should be a fundamental part of any proposed activities on climate change.

Engagement of TVET

- There was no sufficient information accessible from the documents reviewed.



Commonwealth of Independent States (CIS)

Environmental protection in the CIS region needs to be mainstreamed with national policies and strategies. The fragmentation of environmental powers between ministries and agencies has to be overcome to allow for more effective, coordinated and timely decision-making on environmental matters. In this regard, the capacity of schools, universities and vocational training institutes and

their overseeing authorities needs significant strengthening. Information, analysis and data availability on the environment must be improved to enable timely and informed decision-making. The regular preparation of high-quality and widely available documentation on the state of the environment would help in this regard.

Armenia

Capacity-building, education and awareness	<ul style="list-style-type: none"> • The country aims to involve the scientific and business community in sectors that are more vulnerable to climate change. • Programmes need to be developed on climate change issues, science, education, personnel training and public awareness, including hydrometeorology and climatology in professional training. • There is a focus on building capacities in rural communities.
Engagement of TVET	<ul style="list-style-type: none"> • TVET is mentioned in the NDC with respect to closing the gaps in technical knowledge.

Uzbekistan

Capacity-building, education and awareness	<ul style="list-style-type: none"> • Uzbekistan aims to strengthen institutional and human capacity and its knowledge transfer system. • The development of scientific studies in the areas of agriculture adaptation to climate change and the use of water and land resources is seen as important.
Engagement of TVET	<ul style="list-style-type: none"> • There is no specific mention of TVET in the NDC or national action plans.

Arab States

Adaptation to climate change is an economic and social imperative for this region. Actions are needed now, and adaptation and risk management has been identified as a central element in the development of planning strategies for these countries.

Of the studied countries, some have given special attention to capacity-building, awareness, education and institutional arrangements for climate change adaptation and mitigation. Special attention is also apparently given to the energy sector.

Egypt

Capacity-building, education and awareness

- The Egyptian authorities are currently focusing on building institutional capacities for the comprehensive collection and analysis of geographic data.
- In addition, they are creating capacities for using regional water circulation models.
- Increasing the awareness of stakeholders regarding energy and water utilization is an important part of Egypt's strategy.
- Building the capacity within Egyptian society to adapt to climate change and its associated risks and disasters is seen as essential.

Engagement of TVET

- Within Egypt's economic context, its INDC aims to create an enabling infrastructure for the development of micro, small and medium enterprises, as well as providing substantial support for vocational education and training.
- The mandate for skills development through education and training in Egypt is shared between many ministries. However, there is an absence of representation by the Ministry of State for Environmental Affairs, which clearly reduces the prospects that these mechanisms will address skills development in relation to environment and sustainability issues. On the operational level, an institutional arrangement for the early identification of skills requirements, labour market forecasting and the transfer of the findings into occupational profiles and curricula does exist. However, none of the existing labour market forecasting mechanisms in Egypt had addressed or analysed skills for green jobs until early 2010.⁴² In 2015 the UNEP conducted a Green Economy Scoping Study for Egypt, in which it clearly mentions the importance of including climate-sensitive subjects in vocational schools.⁴³

Iraq

Capacity-building, education and awareness

- Iraq has identified water as a key adaptation area which has severe effects on other economic sectors. In its 2016 submitted National Communication, raising awareness, capacity-building and technical training were identified as priority measures to combat climate change.

Engagement of TVET

- One key engagement of TVET is seen in the Reforming TVET in Iraq project.⁴⁴ In addition, the UNESCO sectoral report focusing on agriculture⁴⁵ describes how the UNESCO Office for Iraq has developed competency-based training for this sector to develop knowledge and practical skills for sustainable, integrated farming practices.

42 https://www.ilo.org/wcmsp5/groups/public/---africa/---ro-abidjan/---sro-cairo/documents/publication/wcms_243765.pdf

43 https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Green_Economy_Scoping_Study_Egypt_UNEP.pdf

44 <https://en.unesco.org/fieldoffice/baghdad/tvet>

45 <https://unesdoc.unesco.org/ark:/48223/pf0000371370>

Kingdom of Saudi Arabia

Capacity-building, education and awareness

- The country's focus is on capacity-building through research in schools and universities, research institutes and private sector education.
- Upgrading skills at the individual and systemic levels to support implementation is regarded as important.

Engagement of TVET

- No specific involvement of TVET is mentioned in the INDC.

Lebanon

Capacity-building, education and awareness

- Since December 1994, when Lebanon ratified the UNFCCC, the government has been involved in climate-change awareness-raising, building institutional capacity and mainstreaming climate change into various policies.
- The Lebanese Cleaner Production Center provides assistance to SMEs in adopting cleaner production measures and sustainable industrial production modes that will reduce the consumption of water, energy and other inputs, and decrease pollutant emissions, effluent loads and waste.
- The Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon promotes energy efficiency and renewable energy through awareness-raising, capacity-building, offering market incentives for energy efficiency, renewable energy installations, and research and development activities.

Engagement of TVET

- There is no specific reference to TVET in the INDC (Lebanon, 2015). This is probably owing to TVET's low level of attractiveness to individuals and enterprises.

Tunisia

Capacity-building, education and awareness

- Tunisia is one of the few countries that includes climate change in its Constitution. The Government of Tunisia recognizes the threat that climate change poses, and climate change is explicitly discussed in the country's Constitution.
- The Tunisian Ministry of Environment has adapted various plans to address the impacts of climate change. For example, the Ministry has participated in the OECD Programme for International Student Assessment, which aims to promote environmental education through curricula and clubs in schools.

Engagement of TVET

- While Tunisia has recognized the necessity of transitioning to a sustainable economy, it has not identified the means and measures required to do so. However, an analysis shows that the shift towards a green economy will create significant employment opportunities. As an example, the 'Plan Solaire Tunisien (PST): Tunisian Solar Plan' will generate 27,000 jobs in solar energy by 2030. The current vocational training system can create the required level of specialists by providing vocational education with suitable modifications to the existing curriculum.⁴⁶
- In their report, the OECD (2015) emphasizes the importance of reviewing vocational curricula and inserting green aspects into them.

46 https://read.oecd-ilibrary.org/social-issues-migration-health/investing-in-youth-tunisia_9789264226470-en#page220

Examples of adaptation response through TVET

A slow yet steady progression towards policy coherence in climate change adaptation and skills development is visible in some countries. The climate change policies of countries such as Dominica, France, Germany, India, the Philippines, Vietnam, South Africa and Australia reference skills development for transitioning to green economies and sectors. Amongst these countries, some have strategies to address skills development, technological advancements and the availability of a TVET skilled workforce, recognizing the emerging demand for the skills appropriate to a green economy.


Dominica's 2012–2020 Low Carbon Climate Resilient Development Strategy aims at facilitating the country's continued transformation to a green economy while ensuring the survival of its productive and export sectors. At another level, the Government is consciously seeking to integrate green principles into national economic planning. Dominica's strategy is based on four principles:

- Accessing appropriate low carbon and climate resilient technologies to support the country's continued transformation into the greenest economy in the Caribbean region;
- Building national capacity to support Dominica's continued transformation to a green economy;
- Attracting a broader range of direct foreign investments in new green business opportunities;
- Providing training to upgrade the skills of Dominica's workforce to fully exploit business opportunities (local and regional) in the green economy.

In 2018, **Canada's** Colleges and Institutes of Canada (CICan), under the Skills to Access the Green Economy Program, began sharing Canadian expertise in technical and vocational education with regard to the green economy and addressing climate change. Dominica is one of the six countries that will receive support from the Skills to Access the Green Economy Program under the funding of Global Affairs Canada. The programme aims to train youth, women and indigenous people for employment in the green and blue economies, and to respond to the effects of rising ocean levels, global warming and the degradation of land and water resources. The programme will focus on

BOX 7 Cooperation with the private sector in Kenya

Kenya's economic growth is insufficient to create the necessary employment opportunities for the growing young population. One of the major reasons for Kenya's high youth unemployment and lack of qualified workers is the mismatch of TVET with actual labour market demand. Companies across various sectors are struggling to find suitable candidates for job vacancies because often the TVET courses offered at various training institutions do not meet the requirements of the private sector. Underlying reasons for this are a general lack of practical training elements in TVET courses, the low level of involvement of enterprises in the training offer, outdated equipment and infrastructure in training institutions, and the lack of well-trained teachers. The Kenyan-German Vocational Training Initiative aims to establish the programme 'Sustainable Economic Development – Promotion of Youth Employment and TVET (2017/2018)' as a new priority area of cooperation between Kenya and Germany. The project focuses on supporting labour-market-oriented TVET, in which the private sector plays a crucial role as a partner. One major focus will be the adaptation of the respective professional standards and curricula for demand-oriented training courses. The initiative further promotes the development of curricula for cooperative training models, whereby theoretical training is mainly provided in educational institutions, while practical training is chiefly conducted in workplace settings.



developing new TVET courses and updating teacher capacity, as well as creating on-the-job training models. This will help unemployed youth, women and indigenous people acquire the skills they need to work in the emerging climate change mitigation and adaptation fields, as well as other key economic sectors.⁴⁷

The **Philippines** recently launched their Development Plan 2017–2022,⁴⁸ which identifies increasing the adaptive capacities and resilience of ecosystems as one of the key areas for action. The country's focus is on increasing competitiveness and innovation, while strengthening the resilience of industry and the service sector through the full implementation of its Green Jobs Act. This Act represents a pioneering approach in institutionalizing labour and employment dimensions within the policy framework for addressing climate change issues, and provides for the development of the human capital required to enable and sustain the transition to a greener economy. The Development Plan emphasizes the strategy of engaging TVET to increase global competitiveness through the supply of high-quality skills in all areas of the economy.

In **Vietnam**, activities to adapt to climate change and reduce greenhouse gas emissions are carried out in combination with socio-economic development. One of the specific targets in Vietnam's national strategy on climate change is to turn the concepts of a low-carbon economy and green growth into the main orientations for sustainable development.⁴⁹ To this end, the country is aligning its vocational training with the demands of a green and sustainable economy in order to

help increase the proportion of trained workers by 23% (from its current position of 32%) by the year 2020.⁵⁰ In recognition of TVET's ability to achieve the goals of the Green Growth Strategy through developing the training competencies that are needed in order to apply resource- and energy-efficient, environmentally friendly production processes and technologies,⁵¹ the National Institute for Vocational Training in Vietnam, the German Federal Institute for Vocational Education and Training and GIZ are conducting a programme to reform vocational training. Together they are working towards establishing TVET institutes that offer high-quality and practical vocational training. Some selected TVET institutes offer practice-orientated advanced training for teachers and skilled trainers as well as advisory services for school managers while developing and testing new educational training measures in cooperation with the business sector.⁵² Graduates of such programmes can then be employed to guarantee food security, energy security, water security, poverty reduction, gender equality, social security and public health, as well as protecting natural resources within the context of climate change.

India's climate change strategy is interlinked with its environmental policy, which is anchored in the Constitution. The National Action Plan on Climate Change provides a sharper focus on required interventions. Currently, the National Action Plan on Climate Change is implemented through eight National Missions, outlining priorities for mitigation and adaptation to combat climate change. In 2015, the Ministry of New and Renewable Energy and the Confederation of Indian Industry established the Skills Council for Green Jobs.

47 <https://www.collegesinstitutes.ca/news-centre/news-release/canadian-colleges-and-institutes-to-support-the-caribbean-green-economy/>

48 http://www.neda.gov.ph/wp-content/uploads/2018/01/Abridged-PDP-2017-2022_Updated-as-of-01052018.pdf

49 <http://www.chinhphu.vn/portal/page/portal/English/strategies/strategiesdetails?categoryId=30&articleId=10051283>

50 <https://www.giz.de/de/weltweit/18739.html>

51 <https://www.tvet-vietnam.org/en/topic/388.greening-tvet.html>

52 <https://www.giz.de/en/worldwide/18723.html>

BOX 8 Build Up Skills in Germany

Between 2011 and 2016, within the framework of the EU-funded Build Up Skills initiative, vocational education and training (IVET and CVET) in the building sector was undertaken in Germany. The project partners were the German Confederation of Skilled Crafts (ZDH) [Zentralverband des Deutschen Handwerks], the BIBB, the German Energy Agency (DENA) [Deutsche Energieagentur], the German Building Association (ZDB) [Zentralverband des Deutschen Baugewerbes] and three institutes specializing in the crafts sector: FBH [Forschungsinstitut für Berufsbildung im Handwerk], HPI [Heinz-Piast-Institut für Handwerkstechnik] and ZWH [Zentralstelle für Weiterbildung im Handwerk].

The objectives of the first project phase were to analyse and project to 2020 the supply of and demand for skilled workers, and, on this basis, to develop an NSDR, integrating all the important sectoral players. One key activity of the second phase was the establishment of a VET early warning system that unifies and links existing activities in different sectors and institutions to facilitate climate change adaptation.

Since 2010, the main focus of green policies in **Germany** has been on climate protection (Cedefop, 2018). The country's deeply rooted vocational education system and TVET's engagement in economic activities are reflected in the country's plans for transitioning to a green economy. The Climate Action Plan 2050 explicitly recognizes the role of education with reference to vocational skill development. According to the Plan, the government will improve climate education along the entire educational chain; integrate training and education about climate action into funding lines; and promote community participation in climate actions. The country has different programmes focusing on the development of the TVET sector with the assistance of diverse institutions.

Australia is one of the countries which strongly acknowledges skills development for climate change. In November 2009 the Council of the Australian Government entered into the Green Skills Agreement, an agreement made by the Australian Government in collaboration with employers and industry and community organizations. With the execution of this agreement, training in the development of green skills is deemed a necessary part of the education system; this green element is particularly important in technical and vocational training, graduates of which are required in industry.⁵³ The Agreement focuses on up-skilling VET practitioners so they can provide effective training in the skills required for sustainability, as well as implementing strategies to reskill vulnerable workers in the transition to a low-carbon economy. The recently published Environmental Sustainability Skills Cross-Sector Project report⁵⁴ discusses current and emerging developments in skills needs – the creation of a VET system to provide the professional skills needed for a green economy, and coherent policy change across the economic, environmental and training sectors.

53 https://www.researchgate.net/publication/322739025_Exploring_Green_Skills_A_Study_on_the_Implementation_of_Green_Skills_among_Secondary_School_Students

54 <https://www.skillsimpact.com.au/site/skillimpactmedia/uploads/2018/07/CFC.EnvironmentalSustainabilitySkills171130.pdf>

Skill development at the sector level

In **South Africa**, a coherent policy framework is available for transitioning to a green economy and skills building. The country's national climate change adaptation strategy (2017) and National Development Plan (NDP) 2030 are both mainstreamed, while the NDP articulates the need for skills-building in regard to developing resilience to climate change. The Plan states that national, provincial and local government must identify and implement appropriate policies and measures. This emphasis on strengthening the individual and institutional skills base is mirrored in the National Climate Change Response Policy, the Environmental Sector Skills Plan and the Long Term Adaptation Scenarios sector reports. It is also indicated in South Africa's provincial and local climate change strategies. The availability of a TVET skilled workforce for a green economy is highly valued by different institutions, as seen in the following initiatives: the greening of colleges launched in May 2013 by the Department of Higher Education and Training; the Environmental Sector Skills Plan under the Department of Environmental Affairs; and the Greening TVET Colleges Initiative in South Africa: From Individual Competence Development to Institutional Change (2017), with guidance from GIZ.

However, most of the climate policies of these countries establish significant relationships between skills development and climate change adaptation. **Mali, China** and **Costa Rica** are some of the countries which have comprehensive climate change policies but with no links to skills development.

Apart from having overarching policies for climate change and skills development, most of the countries studied have mainstreamed these goals into sectoral policies and strategies. India, Lebanon, Bangladesh, Zimbabwe and Jamaica have included climate change adaptation in different sectoral plans with special reference to skills development.

Lebanon has already made progress in mainstreaming climate change adaptation into its work in relation to biodiversity via the National Biodiversity Strategy and Action Plan (NBSAP, 2015). Climate change is one priority area in the Plan and a number of vulnerable issues have been prioritized too (e.g. invasive alien species). The Ministry of Agriculture Strategy (2015) highlighted that ministry professionals generally lack the ability to effectively identify and run the regulations. Accordingly, it focuses on developing such skills in order to adapt climate change effects. Even though the National Water Sector Strategy (2012) and the National Forest Plan (2015) have mainstreamed climate change adaptation, they make no special reference to skills development.

The **Indian** NDC prominently features the importance of skills development to achieve a sustainable economy, and special reference is made to the 'Skill India' mission. Agroforestry is a key vulnerable sector in India, as addressed in the NDC. Accordingly, the National Agroforestry Policy (2014) has mainstreamed climate change within its goals. In line with the Skill India mission, the Ministry of Environment, Forest & Climate Change, utilizing its vast network and expertise, has taken up an initiative for skills development in the environment and forestry sector called the Green Skill Development Programme, which aims to enable young people to obtain gainful employment and/or self-employment. The programme endeavours to develop green-skilled workers with technical knowledge and a commitment to sustainable development, which will help in the attainment of the NDCs and National Biodiversity Targets.

55 http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Green_skills_and_environmental_awareness_in_vocational_education_and_training_CEDEFOP.pdf

Meeting ecological targets

Water is a core development issue in **Zimbabwe**, a mostly semi-arid country with limited water resources. The integration of water and climate change policies is essential for the country. The National Water Policy of Zimbabwe (2013) has mainstreamed climate change in its strategy and activities. The Policy recognizes the potential impact of climate change on planning for future investments and in ensuring the resilience of existing investments. While the climate plans of the country make exclusive reference to skills development, it is evident that sectors such as water have adopted the same goal in executing sectoral policy.

The transition towards a green economy requires greening jobs/professions, yet the content analysis of climate policies and strategies shows that countries lack a common definition of what a green job is. However, within different contexts, various countries have adopted a range of approaches to achieve a green economy, for example: Green Jobs (Green Jobs Act of Philippines, 2016); Decent Work (Canada: Thirgood, Mcfatridge, Marcano & Ymeren, 2017; Turkey: ILO, 2015); Job Creation (USA: Bruyère & Filiberto, 2013). Irrespective of the ambiguous terminology, successful cases were visible in the content analysis.

Delivering climate plans enables the transitioning of economies, which will create the need for different skills. Skills can be difficult to define and measure at an aggregate level because they are a socially constructed concept, intangible and often unobservable.⁵⁶ Different analyses have been carried out to quantify skill requirements and identify the qualitative skills need landscape – determining in which form and contexts skills development has been conducted to enable the construction of a green economy.

The analysis of countries' experience revealed that skill shortages and gaps already constrain the transition to a greener and climate-resilient economy. Designing and creating new jobs and changing the skills requirement of existing jobs are areas that countries find problematic. Whilst many countries address the skill issues at the policy level, achieving coherence with climate change plans remains a barrier throughout the world. Every job has at least a tiny potential to be green. Perceived skill gaps and the job sectors that have the highest carbon emissions are discussed in subsequent sections.

Skill identification is the first step

Content analysis reveals that the countries under review are more geared towards identifying skill requirements for job changes in the context of the transition to a green and climate-resilient economy.

⁵⁶ <http://www.irena.org/publications/2017/May/Renewable-Energy-and-Jobs--Annual-Review-2017>



Some countries regularly conduct surveys to identify skill demands in particular sectors.

The International Renewable Energy Agency estimates that renewable energy, excluding large hydropower, employed 9.8 million people around the world in 2016.⁵⁶ As India faces rising fuel demand, threats to energy security and the impacts of climate change, renewable energy offers

a critical solution. At the same time, job creation and skills development are deeply rooted in the agenda of the Indian Government. Therefore, skill development in the renewable energy area creates an immense opportunity for India to achieve its green economic targets. According to NEDC and CEEW (2016), skills need for the solar sector have been identified as shown in Table 1.

TABLE 1 Skills needed for the solar sector

Function	Educational Skill and Qualification Level	Key skills	Number of Trained Personnel to Achieve 40 GW of Rooftop Solar (Projected by 2022)	Number of Trained Personnel to Achieve 60 GW of Utility Scale Solar (including solar parks) (Projected by 2022)	Training and/or Degrees Required
Manufacturing*	Highly Skilled	Research and product development	-	-	Photovoltaics engineering
Business Development	Highly Skilled	Tracking the market, Drafting bids, Land selection, Project Finance	15,200	2400	Masters degree or diploma in business administration
Design & Pre Construction	Highly Skilled	Plant design engineering	18,400	10,200	Engineering degree In civil, mechanical or electrical engineering
Construction & Commissioning	Highly Skilled	Site engineering	154,000	28,200	Engineering degree in civil, mechanical or electrical engineering
	Semi and Low Skilled	Electricals training and PV installing	338,400	286,200	
Operation & Maintenance	Highly Skilled	Performance data monitoring	48,000	33,000	Engineering in electrical systems
	Semi and Low Skilled	-	92,400	90,000	

Source: NEDC and CEEW (2016)

The Institute for Employment Research in Germany conducts a representative survey of firms on a regular basis to measure labour demand and analyse recruiting processes.

Environmental employment was addressed for the first time in 2016, targeting employees whose task is to: (1) ensure that energy and material are used efficiently; (2) produce environmental goods; and (3) provide environmental services. In addition, the skills requirements for those occupations were gathered through the survey (Cedefop, 2018).

Perceived skill gaps in countries' highest emission sectors

Viewed globally, most parts of the renewable energy sector are still in the early stages of development and, proportionate to the current low base, are growing rapidly. IRENA's analysis suggests that jobs in this sector could rise from 9.8 million in 2016 to 24 million in 2030. Furthermore, the sector will create jobs across the entire value chain, from equipment manufacture, project development, construction and installation, to operations and maintenance. Most of the countries (Canada, the EU, India) have reported skills gaps in this sector. The renewable energy sector is already experiencing shortages in technical occupations, while 'new' and priority skills related to innovation may be needed, such as problem-solving and working with stakeholders. India's renewable energy sector (especially solar) has reported that some of the skills which are particularly challenging to find are not in the most technical areas, rather they are basic construction and commissioning skills.

In Nepal, for example, in one district that has traditionally been almost exclusively agricultural, training providers do not offer programmes related to manufacturing skills, even though industry is now becoming established in the area. The children of local agricultural labourers are taking manufacturing jobs, but their base level of skills to perform the work is very low, which severely hampers productivity and frustrates further industry investment. TVET provision has not kept pace with industry needs, nor has it adapted or changed to reflect new economic conditions.⁵⁷

According to Cedefop (2015), Germany has a significant skills shortage in relation to the profession of environmental engineers, as well as a lack of transport vehicle emissions inspectors, electricians and insulation workers. The report further indicates that members of Germany's ageing workforce are hesitant to enter the unappealing occupation of insulation worker, even though the construction industry pays one of the highest training allowances in the country. On the other hand, no skill shortage is reported in terms of energy auditors, as the demand for this remains low, and there is little evidence of skill shortages in the refuse collector category, with employers apparently able to fill such vacancies very quickly (Cedefop, 2015).

In Finland and Germany there are minor skill shortages in relation to vehicle inspection, which is not considered to be an attractive job and commands low levels of pay. In Italy, there are no significant skill shortages in the occupation of solar photovoltaic installer, mostly because the construction sector has slumped due to the economic downturn. In Finland, the market for SPV panels is as yet relatively undeveloped so there is limited demand for labour in this area.

There are few significant skill shortages in relation to the occupation of insulation worker, although there are some minor shortages in Finland, mainly because the work is considered to be hard and dirty. There is also no formal vocational training in this field, which makes remedying skill shortages more challenging. A shortage of specialist skills is one of the biggest challenges facing the agricultural sector in South Africa, as well as in linked fields such as manufacturing, retail and water. The skills requirements for the agricultural value chains vary from skilled managerial and professional occupations to fairly low-level competencies for agricultural labourers and entry-level workers. There is a particular shortage of technical specialists in the sector. For example, agricultural engineers, scientists and agricultural technicians are listed as occupations in high demand, making it easy for these specialists to secure working visas for South Africa.⁵⁸

57 <https://blogs.adb.org/blog/skills-asia-shortages-gaps-and-mismatch>

58 <http://www.greenskills.co.za/wp-content/uploads/2017/08/Green-Skills-in-WC-CSA-Final-report-July-2017.pdf>

One solution to skill shortages among environmental engineers tried in Germany has been to create interest among children in schools and day-care centres through visits to universities and 'hands on' technology centres. Other efforts have included raising salaries and recruiting workers who are not German nationals.

TVET will close the perceived skill gap

While global discussions mostly focus on strengthening green skills for climate change mitigation, skills development for adaptation remains largely unaddressed. Adapting to climate change can be done in different ways. It can be addressed simply through changing behaviour, for example by moving people from a vulnerable area. It can also be dealt with through the formation of new skills and the development of people's capacities to face vulnerabilities. But often skills development needs to be technologically focused because adaptation can also be achieved through employing different forms of technology; for example, introducing a new irrigation system or a climate-resilient seed will be a technological transformation which requires a new set of skills. Irrespective of the country and regardless of the occupation, technological orientation acts as an enabling factor for effective climate change adaptation.

It is undoubtedly evident that TVET can support countries to achieve their climate and development targets through vocational training and skills development. TVET institutions can learn from the case studies presented in the previous section and, where possible, replicate them according to needs and contexts. Almost all the NDCs that were analysed failed to identify skills gaps in the country context. However, they did give indications regarding job sectors and climate plans. Table 2 summarizes skills gaps and related job sectors as perceived by the author and UNEVOC. TVET can provide support in reducing the perceived skills gaps, particularly in areas where skill gaps can be filled by adequate training of green skills and improving practices in job tasks, to become more sustainable and compliant with the environmental measures.

When selecting sectors for recommendations, the study focused on the mitigation and adaptation priorities most often chosen by the countries under review (UNFCCC, 2015c). Accordingly, gaps were identified in the areas of agriculture, forestry, ecosystems and biodiversity, water, health, disaster management, energy and waste.

As countries continue to update and submit their NCs and NDCs, this paper offers some insights into skill components that are critical to achieve sector priorities and adaptation and mitigation targets, and which can be further strengthened.

Actors in TVET sector can provide concrete input to identify and provide guidance on skill pathways to any national climate plans. Harnessing a dynamic synergy and exchange between sector actors is a useful step to adapt skill interventions and further develop training provisions in areas where skills are projected to be in high demand and jobs are anticipated to be transformed over a period of time. The dynamic inter-ministerial and cross-sectorial coordination is expected to eventually help close the gaps.



TABLE 2 Perceived skill and technological gaps, and recommendations for TVET

Sector	Key vulnerable groups (VG)/ key emitters (KE) ⁶⁷	Required modification	Perceived skill/ technological gaps	
			In climate change mitigation	In climate change adaptation
Agriculture	Farmers (VG, KE) Enteric fermentation (KE) Manure management (KE) Rice cultivation (KE) Agricultural soils (KE) Prescribed burning of savannas (KE) Field burning of agricultural residues (KE) Liming (KE) Urea application (KE) Other carbon-containing fertilizers (KE)	Improving crop and livestock production Promoting low-carbon agriculture Promoting organic agriculture Promoting disaster-resilient crop management	Farmer communities lack skills on: • sustainable/ low carbon agricultural practices • irrigation management • crop management for low greenhouse gas emissions • fertilizer application.	Farmer communities lack skills on: • rainwater harvesting • flood meadows • buffer strips • crop management • soil management to prevent soil erosion (plant winter cover) • cultivation of drought-resistant seeds • pest control • use of brackish water, line canals, drip irrigation to improve water use and avoid erosion.
Forest, ecosystems and biodiversity	Deforestation (KE) Forest communities (KE, VG) Rural communities (VG, KE) Poorer communities with low geographic mobility (VG) Logging companies (VG, KE)	Promotion of integrated forest fire systems Forest restoration and rehabilitation Promotion of selecting appropriate species for use in planted forests Removing invasive species and addressing pest and disease threats Sustainable forest management Improving the resilience of ecosystems	Communities lack skills on: • sustainable use of timber • sustainable use of forest services • sustainable use of ecosystems.	Communities lack skills on: • tree nursery management • rehabilitation after forest fires • forest fire early warning systems • commercial forestry • bee keeping • fruit tree management • indigenous forest management techniques • eco system defence.
Water management	Industries (KE, VG) Households (KE, VG) Other establishments (KE, VG)	Promotion of water efficiency Promotion of climate-resilient water management Promotion of water reuse technologies Promotion of sustainable water management	Communities lack skills on: • efficient use of water • wastewater treatment and discharge.	Communities lack skills on: • pump and pumping equipment manufacture • development and manufacture of water filtration and reuse technologies • supporting efficient water management actions in urban areas • sewer water system construction and rehabilitation • irrigation engineering • sustainable/climate-proof water use management • rainwater management • reverse osmosis technologies.
Health	Elderly people (VG) Women especially pregnant mothers (VG) Poorer communities (VG) Differently abled people (VG) Young people (VG)	Reduction in local air pollution and resulting benefits for health Preparation for extreme weather event stresses Improved air conditioning	Communities lack skills on: • pollution prevention technological implementation	Communities lack skills on: • vaccinations • vector control • hygienic behaviour • resource-efficient hospitals • air-conditioning.
Disaster risk management	Elderly people (VG) Women especially pregnant mothers (VG) Poorer communities (VG) Differently abled people (VG) Young people (VG)	Improve early warning systems Improve disaster management schemes Promote ecosystem defence		Communities lack skills on: • coastal and marine defence • early warning system development and utilization • landscape design • urban planning (sustainable drain management).
Energy	Energy industries (KE, VG) Manufacturing industries and construction (KE, VG) Transport (KE, VG) Households (KE, VG)	Improved access to energy Promotion of energy-efficient technologies Selection of energy-efficient lifestyles Promotion of renewable energy	Communities lack skills on: • energy audits • energy-efficient equipment installation and maintenance • renewable energy-equipment installation and maintenance	Communities lack skills on: • climate-resilient energy equipment installation and maintenance • adaptive hydropower plant design and maintenance • designing small-scale energy technologies • design and maintenance of waste to energy technologies • energy-efficient technologies.
Waste	Solid waste disposal (KE) Biological treatment of solid waste (KE) Incineration and open burning of waste (KE) Wastewater treatment and discharge (KE)	Establishing waste management and recycling programmes as well as waste-to-energy facilities.	Communities lack skills on: • waste minimization • waste reuse and recycling • waste-to-energy techniques.	Communities lack skills on: • waste entrepreneurship • waste-to-energy design and maintenance.

Source: Author/UNEVOC.

Annex 2

List of policy documents and institutional arrangements providing information on climate action plans and adaptation plans for climate change

Country	Policy/institutional arrangements for climate change adaptation, as reflected in the NDCs
Australia	<ul style="list-style-type: none"> National Climate Change Adaptation Framework Renewable Energy Target Scheme
Bangladesh	<ul style="list-style-type: none"> Outline of the Perspective Plan: Vision 2021 with Mitigating the Impact of Climate Change The Bangladesh Climate Change Strategy and Action Plan (BCCSAP)
China	<ul style="list-style-type: none"> National Response Leading Group on Climate Change (NRLGCC) headed by the Chinese Premier National Strategy for Climate Adaptation
India	<ul style="list-style-type: none"> National Action Plan on Climate Change: 2008–2017 Constitution of India, Article 48-A National Environment Policy (NEP) 2006 National Action Plan on Climate Change (NAPCC) State Action Plan on Climate Change (SAPCC) by 32 States and Union Territories Energy Conservation Act National Policy for Farmers Integrated Energy Policy (IEP) National Agroforestry Policy (NAP) National Mission on Sustainable Agriculture (NMSA) National Initiative on Climate Resilient Agriculture (NICR)
Afghanistan	<ul style="list-style-type: none"> Afghanistan's National Priority Programmes (NPPs), which include the adaptation capacity to climate change and natural disasters⁵⁹ National Climate Change Committee (NCCC)
Maldives	<ul style="list-style-type: none"> Maldives Climate Change Policy Framework (MCCPF), adopted in 2015⁶⁰
Mongolia	<ul style="list-style-type: none"> Green Development Policy, 2014 (2014–2030) National Action Programme on Climate Change (NAPCC), 2011 (2011–2021) State Policy on Energy, 2015 (2015–2030) National Agriculture Development Policy, 2010 (2010–2021) State Policy on Forests, 2015 (2016–2030) Millennium Development Goals (MDGs) based on the Comprehensive National Development Programme, 2008 (2008–2021) Law on Renewable Energy, 2015 Law on Energy, 2015 and State Policy on Industry, 2015
Myanmar	<ul style="list-style-type: none"> The National Environment Policy, Myanmar Agenda 21

⁵⁹ https://wedocs.unep.org/bitstream/handle/20.500.11822/22447/Report_CC_Governance_Afghanistan_EN_v2.pdf?sequence=1&isAllowed=y

⁶⁰ <http://extwprlegs1.fao.org/docs/pdf/mdv172920.pdf>

Nepal	<ul style="list-style-type: none"> • Climate Change Policy, 2011 • National Adaptation Programme of Action (NAPA) • Local Adaptation Plans for Action (LAPAs) • Community Adaptation Plans of Action (CAPAs)
New Zealand	<ul style="list-style-type: none"> • New Zealand Energy Strategy (2011–2021) • Energy Efficiency and Conservation Act 2000 • New Zealand Energy Efficiency and Conservation Strategy (NZEES) (2017–2022)
Philippines	<ul style="list-style-type: none"> • Medium-Term Philippine Development Plan (MTPDP): 2017–2022 (Philippines, 2017) • Green Jobs Act, no. 10771, 2016
Sri Lanka	<ul style="list-style-type: none"> • National Adaptation Plan for Climate Change Impacts in Sri Lanka 2016–2025
Vietnam	<ul style="list-style-type: none"> • National Strategy on Climate Change (2011) • National Target Programme to Respond to Climate Change (2008) • Action Plan Framework for Adaptation and Mitigation of Climate Change of the Agriculture and Rural Development Sector 2008–2020 (2008) • National Action Plan on Climate Change 2012–2020 (2012) • Climate Change Adaptation and Low Emission Development Strategy (2013) (provides policy framework)
Bahamas	<ul style="list-style-type: none"> • National Climate Change Adaptation Policy • National Energy Policy • National Forestry Act • The Bahamas SimClim Model
Canada	<ul style="list-style-type: none"> • Vancouver Declaration • Pan-Canadian Framework • Working Groups under the Government of Canada’s Adaptation Platform
USA	<ul style="list-style-type: none"> • EPA’s Climate Change Adaptation Plan (President’s Climate Action Plan and Executive Order 13653, Preparing the United States for the Impacts of Climate Change)
Austria	<ul style="list-style-type: none"> • Policies under the Federal Ministry of Agriculture, Forestry, Environment and Water Management • Department for Environmental Impact Assessment and Climate Change
Finland	<ul style="list-style-type: none"> • Finland’s climate policy is based on international agreements – the UNFCCC, the Kyoto Protocol and the Paris Agreement – as well as the common policies of the European Union, such as the EU 2020 and 2030 Climate and Energy Framework • Finland’s National Climate Change Adaptation Plan 2022 • The National Climate Change Adaptation Plan 2022 updated the National Adaptation Strategy 2005
France	<ul style="list-style-type: none"> • Paris Climate Action Plan • Policies under the Ministry of Ecological and Solidarity Transition (Ministère de la transition écologique et solidaire)

Germany	<ul style="list-style-type: none"> • Climate Action Plan 2050: Principles and Goals of the German Government's Climate Policy • Policies under the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety and the Competence Centre on Climate Impacts and Adaptation (KomPass) at the Federal Environment Agency
Italy	<ul style="list-style-type: none"> • Policies under the Ministry of Environment, Land and Sea (IMELS), the Euro-Mediterranean Centre on Climate Change (CMCC), the Ministry of Defence/Aeronautical Weather, and the Ministry of Agriculture, Food and Forestry (MPAAF)
Malta	<ul style="list-style-type: none"> • National Climate Change Adaptation Strategy
Norway	<ul style="list-style-type: none"> • Norway submitted its updated NDC on 7 February 2020 • NVE's strategy for climate change adaptation 2015–2019^{61, 62} • The first White Paper on Climate Change Adaptation (CCA)
Poland	<ul style="list-style-type: none"> • National Adaptation Strategy (NAS) 2020
Sweden	<ul style="list-style-type: none"> • Policy for Climate and Energy (Prop. 2008/09:162) • Climate change adaptation policy defined at the national level by the Ministry of the Environment and Energy
Ukraine	<ul style="list-style-type: none"> • Policies aligned to the European climate change policies⁶³
Brazil	<ul style="list-style-type: none"> • National Climate Change Plan, National Climate Change Policy • National Policy institutional instruments
Chile	<ul style="list-style-type: none"> • National Climate Change Action Plan 2016–2021 (Chile, 2010) • National Energy Agenda • National Sustainable Construction Strategy
Colombia	<ul style="list-style-type: none"> • Colombian National Adaption Plan • Colombian Low Carbon Development Strategy • Reduction in Emissions from Deforestation and Forest Degradation National Strategy • Disaster Financial Protection Strategy
Costa Rica	<ul style="list-style-type: none"> • National Climate Change Plan • Adaptation to Climate Change component in the National Contributions National Development Plan (NDP) 2015–2018, which includes the National Climate Change Strategy (ENCC) • Carbon Neutrality Strategy for 2021
Grenada	<ul style="list-style-type: none"> • National Climate Change Policy 2017–2021 • National Climate Change Adaptation Plan (NAP) 2017–2021 • National Growth and Poverty Reduction Strategy (2014–2018), the National Agriculture Plan, the Strategic Health Plan (2016–2025) and internal planning processes of the Ministry of Agriculture
Mexico	<ul style="list-style-type: none"> • Mexico's Climate Change Mid-Century Strategy
Paraguay	<ul style="list-style-type: none"> • National Law on Climate Change no. 5875

61 <https://www.nve.no/climate-change-adaptation/>

62 <https://www.oecd.org/env/resources/Norway.pdf>

63 http://d2ouvy59p0dg6k.cloudfront.net/downloads/2_danube_delta_adaptation_strategy.pdf

Dominica	<ul style="list-style-type: none"> • National Land Use Policy and National Physical Development Plan (which will incorporate climate change) • 2012–2020 Low Carbon Climate Resilient Development Strategy
Fiji	<ul style="list-style-type: none"> • National Climate Change Policy (NCCP) • National Climate Change Adaptation Strategy (NCCAS)
Haiti	<ul style="list-style-type: none"> • National Adaptation Action Plan (PANA) • National Policy on Climate Change • Climate Loss and Response Plan • Territorial Development Plans by region and National Forest Policy
Jamaica	<ul style="list-style-type: none"> • Climate Change Policy Framework and action plan • National Energy Policy 2009–2030 • Jamaica’s Vision 2030 Jamaica – National Development Plan
Seychelles	<ul style="list-style-type: none"> • Seychelles National Climate Change Strategy • Seychelles Strategic Plan (2015) • Seychelles Biodiversity Strategy and Action Plan (2015–2020)
Vanuatu	<ul style="list-style-type: none"> • Disaster Risk Reduction (NAB) • Government’s Priority Action Agenda Policy • National Adaptation Program of Action (NAPA)
Armenia	<ul style="list-style-type: none"> • Third national communication on climate change 2015
Russia	<ul style="list-style-type: none"> • Sixth national communication on climate change of Russia under the UNFCCC • Russia Climate Strategy • Kyoto Protocol
Uzbekistan	<ul style="list-style-type: none"> • Climate Change Adaptation Strategy • National greenhouse gas emissions reduction strategy/National Strategy on Sustainable Development (1999)
Egypt	<ul style="list-style-type: none"> • Egypt lacks a comprehensive legal framework for climate change adaptation and mitigation, and implementation of climate policies is split among multiple institutional bodies. However, Egypt has taken several actions towards both climate mitigation and adaptation through isolated projects, such as an effort to transition El Gouna City to carbon neutrality, and through several strategies and institutions dedicated to climate adaptation.
Lebanon	<ul style="list-style-type: none"> • Policies under the MoE, which oversees climate-change-related activities
Saudi Arabia	<ul style="list-style-type: none"> • Saudi Arabia National Development Plan (2015–2019) (Saudi Arabia, n.d.)
Tunisia	<ul style="list-style-type: none"> • Tunisia is one of the few countries that includes climate change in its Constitution • Tunisia National Determined Contributions
Iraq	<ul style="list-style-type: none"> • National Environmental Strategy and Action Plan for Iraq (NESAP) (2013–2017)

Abbreviations

ESD	Education for sustainable development
EU	European Union
ICT	Information and Communications Technology
ILO	International Labour Organization
INDCs	Intended Nationally Determined Contributions
NCs	National Communications
NDCs	Nationally Determined Contributions
NGOs	Non-governmental organizations
SDGs	Sustainable Development Goals
TVET	Technical and vocational education and training
UNEP	UN Environment Programme

References

- 17Goals. 2015. How the Paris Agreement and the SDGs work together. <http://17goals.org/paris-agreement-sdgs/> (accessed 4 November 2017).
- ACER (Australian Council for Educational Research). 2015. *Research into the Financing of Technical and Vocational Education and Training (TVET) in the Pacific: Vanuatu Country Report*. http://research.acer.edu.au/cgi/viewcontent.cgi?article=1025&context=transitions_misc (accessed 7 November 2017).
- African Union. 2014. Draft African Strategy on Climate Change. https://www.un.org/en/africa/osaa/pdf/au_cap_draft_aclimatestrategy_2015.pdf (accessed 7 November 2017).
- Australia. n.d. What is the Green Army? Fact sheet. <http://www.environment.gov.au/system/files/resources/4e352647-c8cf-4321-8aa6-e71a94c4b4a2/files/green-army-training-fact-sheet.pdf> (accessed 7 November 2017).
- Austria. n.d.a. Anpassungsstrategie [Adaptation strategy]. Federal Ministry of Agriculture, Forestry, Environment and Water Management.
- . n.d.a. Informationsportal Klimawandel. Central Institute of Meteorology and Geodynamics. https://www.bmlfuw.gv.at/umwelt/klimaschutz/klimapolitik_national/anpassungsstrategie (accessed 6 November 2017).
- Berrisford, K. 2012. SEKEM's sustainable business model creates benefits for climate change, water scarcity, food security & sustainable livelihoods in Africa. *Green Africa Directory*, 14 November. www.greenafricadirectory.org/sekems-sustainable-business-model-creates-benefits-for-climate-change-water-scarcity-food-security-sustainable-livelihoods-in-africa/ (accessed 7 November 2017).
- Besada, H. and Sewankambo, N. K. (eds). 2009. *Climate Change in Africa: Adaptation, Mitigation and Governance Challenges*, CIGI Special Report. Waterloo, Ont., Centre for International Governance Innovation.
- Bruyère, S.M. & Filiberto, D. 2013. The green economy and job creation: Inclusion of people with disabilities in the USA. *International Journal of Green Economics*, Vol. 3, No. 3, pp. 257-275.
- Canada. n.d. Canadian development assistance in Senegal. http://international.gc.ca/world-monde/issues_development-enjeux_developpement/priorities-priorites/where-ou/senegal.aspx?lang=eng (accessed 7 November 2017).
- Cedefop. 2012. Green skills and environmental awareness in vocational education and training, Research Paper 24. https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Green_skills_and_environmental_awareness_in_vocational_education_and_training_CEDEFOP.pdf (accessed 6 November 2017).
- . 2014. *Terminology of European Education and Training Policy*. <https://www.cedefop.europa.eu/en/publications-and-resources/publications/4117> (accessed 6 November 2017).
- . 2015. *Green skills and environmental awareness in vocational education and training*. https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Green_skills_and_environmental_awareness_in_vocational_education_and_training_CEDEFOP.pdf (accessed 6 November 2017).
- . 2018. *Germany country report*. http://www.cedefop.europa.eu/files/germany_country_report_2018.pdf (accessed 10 August 2020).
- Chile. 2010. *National Climate Change Action Plan*. <http://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Resources/Climate-Change-Laws-of-the-World/Chile-National%20Strategy.pdf> (accessed 7 November 2017).
- . 2015. Intended nationally determined contribution of Chile towards the Climate Agreement of Paris 2015. <https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Chile/1/INDC%20Chile%20english%20version.pdf> (accessed 7 November 2017).
- China. 2018. *The People's Republic of China. Third National Communication on Climate Change* (Unofficial translation) https://unfccc.int/sites/default/files/resource/China%203NC_English_0.pdf (accessed 6 July 2020).
- Climate-Adapt. n.d.a. Adaptation options. <http://climate-adapt.eea.europa.eu/knowledge/adaptation-information/adaptation-measures> (accessed 6 November 2017).
- . n.d.a. Network. <http://climate-adapt.eea.europa.eu/network> (accessed 6 November 2017).

- CMCC (Euro-Mediterranean Centre on Climate Change). 2017. Public consultation on National Adaptation Plan to Climate Change launched, 4 August. <https://www.cmcc.it/article/pnac> (accessed 6 November 2017).
- Colombia. *National Climate Change Action Plan*. <http://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Resources/Climate-Change-Laws-of-the-World/Chile-National%20Strategy.pdf> (accessed 6 November 2017).
- Commonwealth. n.d. Malta. <http://thecommonwealth.org/our-member-countries/malta> (accessed 7 November 2017).
- Dominica. 2012. *Second National Communication of the Commonwealth of Dominica under the United Nations Framework Convention on Climate Change 2012*. <http://unfccc.int/resource/docs/natc/dmanc2.pdf> (accessed 7 November 2017).
- Egypt. n.d.a. Intended nationally determined contributions as per United Nations Framework Convention on Climate Change. <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Egypt%20First/Egyptian%20INDC.pdf> (accessed 7 November 2017).
- . n.d.b. *Sustainable Development Strategy: Egypt's Vision 2030*. <http://sdsegypt2030.com/economic-dimension/2673-2/?lang=en> (accessed 7 November 2017).
- EkoSkola, Malta. n.d. Climate change. <https://www.ekoskola.org.mt/project-types/climate-change/> (accessed 6 November 2017).
- ENID (Egypt Network for Integrated Development). n.d. Recommendations for technical and vocational education and training in Egypt, Policy Brief no. 4. www.enid.org.eg/uploads/pdf/PB4_TVET.pdf (accessed 7 November 2017).
- EPA (US Environmental Protection Agency). 2013. *America's Children and the Environment*, 3rd edn. https://www.epa.gov/sites/production/files/2015-06/documents/ace3_2013.pdf (accessed 4 November 2017).
- EuropeAid. 2009. Climate change in Latin America. http://ccsl.iccip.net/climate_change_in_latin_america_en.pdf (accessed 6 November 2017).
- European Commission. n.d. Potential for climate action. Examples of how to mainstream climate action and the potential for doing so. European Social Fund 2014–2020. https://ec.europa.eu/clima/sites/clima/files/docs/05-climate_mainstreaming_fact_sheet-esf_en.pdf (accessed 10 August 2020).
- European Parliament. 2017. *Implementing the Paris Agreement: New Challenges in View of the COP 23 Climate Change Conference*. [https://www.europarl.europa.eu/RegData/etudes/STUD/2017/607353/IPOL_STU\(2017\)607353_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2017/607353/IPOL_STU(2017)607353_EN.pdf) (accessed 4 November 2017).
- European Union. 2016. *Education and Training Monitor: Austria*. https://ec.europa.eu/education/sites/education/files/monitor2016-at_en.pdf (accessed 6 November 2017).
- Field, C. B., Mortsch, L. D., Brklacich, M., Forbes, D. L., Kovacs, P., Patz, J. A., Running, S. W. and Scott, M. J. 2007. North America. In: M. L. Parry et al. (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK, Cambridge University Press, pp. 617–52.
- France. 2013. *The Sixth National Communication of France to the United Nations Framework Convention on Climate Change*. https://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/nc6_fra_english.pdf (accessed 6 November 2017).
- . 2019. The Value for Climate Action (report). Report to the Commission chaired by Alain Quinet. <https://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs-the-value-for-climate-action-final-web.pdf>
- Ge, M. and Friedrich, J. 2020. Greenhouse gas emissions by countries and sectors. World Resources Institute. <https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector> (accessed 10 August 2020).
- Germany. 2011. Adaptation Action Plan of the German Strategy for Adaptation to Climate Change adopted by the German Federal Cabinet on 31 August 2011. www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/aktionsplan_anpassung_klimawandel_en_bf.pdf (accessed 6 November 2017).
- . 2016. Climate Action Plan 2050: Principles and goals of the German government's climate policy. https://www.bmu.de/fileadmin/Daten_BMU/Pool/Broschueren/klimaschutzplan_2050_en_bf.pdf (accessed 6 July 2020).
- Global Mechanism and IFAD (International Fund for Agricultural Development). n.d. Climate change impacts in the Asia/Pacific region. <https://www.ifad.org/documents/10180/88baa1cf-4661-4077-9292-84dfff5253f0> (accessed 6 November 2017).
- Gray, A. n.d. Essay on *The Impact of Climate Change in Vanuatu*. <http://www.andrewgray.com/essays/climatevanuatu.htm> (accessed 12 November 2017).

- ILO (International Labour Organization). 2018. *Skills for Green Jobs in Brazil*. Geneva, ILO.
- . 2015. Decent work in the green economy. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_375698.pdf (accessed 12 November 2017).
- ILO (International Labour Organization) and UNEP (UN Environment Programme). 2012. *Working Towards Sustainable Development: Opportunities for Decent Work and Social Inclusion in a Green Economy*. Geneva, ILO.
- IPCC (Intergovernmental Panel on Climate Change). 2001. *Report of the Sixth Session of the IPCC Working Group II*, Geneva, 13–16 February 2001. <https://www.ipcc.ch/working-group/wg2/?idp=650> (accessed 6 November 2017).
- . 2014. Africa. *Fifth Assessment Report: Climate Change 2014, Impacts, Adaptation, and Vulnerability*, ch. 22. https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap22_FINAL.pdf (accessed 6 November 2017).
- Khoday, K. 2016. The nexus of climate change and conflict in the Arab region. UNDP. <https://www.undp.org/content/undp/en/home/blog/2016/10/12/The-nexus-of-climate-change-and-conflict-in-the-Arab-region.html> (accessed 7 November 2017).
- Kreft, S., Eckstein, D. and Melchior, I. 2016. Global Climate Risk Index 2017: Who suffers most from extreme weather events? Weather-related loss events in 2015 and 1996 to 2015. Briefing paper, Germanwatch.org. <https://germanwatch.org/de/download/16411.pdf> (accessed 4 November 2017).
- Lebanon. 2015. Lebanon's intended nationally determined contribution under the United Nations Framework Convention on Climate Change, September. www4.unfccc.int/submissions/INDC/Published%20Documents/Lebanon/1/Republic%20of%20Lebanon%20-%20INDC%20-%20September%202015.pdf (accessed 7 November 2017).
- . n.d. Country Energy Efficiency & Renewable Energy Demonstration Project for the Recovery of Lebanon (CEDRO). Republic of Lebanon Ministry of Environment. <http://www.moe.gov.lb/Public-Sector-Greening/Country-Energy-Efficiency-renewable-Energy-Demonst/Country-Energy-Efficiency-renewable-Energy-Demonst.aspx> (accessed 7 November 2017).
- Lioubimtseva, E. and Henebry, G. M. 2009. Climate and environmental change in arid Central Asia: impacts, vulnerability, and adaptations. *Journal of Arid Environments*, Vol. 73, No. 11, pp. 963–77.
- Maclean, R., Jagannathan, S. and Sarvi, J. 2013. *Skills Development for Inclusive and Sustainable Growth in Developing Asia-Pacific*. New York (et al.), Springer.
- Malta. 2012. *National Climate Change Adaptation Strategy*. Ministry for Resources and Rural Affairs. <http://msdec.gov.mt/en/Document%20Repository/Malta%20Climate%20Change%20Adaptation%20Strategy/National%20Adaptation%20Strategy.pdf> (accessed 7 November 2017).
- . n.d. *Greening Our Economy: Achieving a Sustainable Future*. Ministry for Sustainable Development, the Environment and Climate Change (MSDEC). <https://www.gov.mt/en/Government/Press%20Releases/Documents/pr152171a.pdf> (accessed 6 November 2017).
- Malta Resources Authority. n.d. Adaptation to climate change. <http://mra.org.mt/climate-change/adaptation-to-climate-change/> (accessed 7 November 2017).
- Martin, T., Hemstock, S. H., Jacot Des Combes, H. and Pierce, C. n.d. Capacity development and TVET: accredited qualifications for improving resilience of coastal communities – a Vanuatu case study. https://www.nab.vu/sites/default/files/documents/Building%20Resilience%20in%20Coastal%20Communities%20_Vanuatu_EU%20PacTVET.pdf (accessed 7 November 2017).
- Mexico. 2015. *Cambio Climático: Informe de la Situación del Medio Ambiente en México 2015* [in Spanish]. https://www.gob.mx/cms/uploads/attachment/file/161446/Cap_CC_completo.pdf (accessed 7 November 2017).
- Mozambique. n.d. Intended nationally determined contribution (INDC) of Mozambique to the United Nations Framework Convention on Climate Change (UNFCCC). www4.unfccc.int/submissions/INDC/Published%20Documents/Mozambique/1/MOZ_INDC_Final_Version.pdf (accessed 6 November 2017).
- National Academies. 2011. Warming the world: impacts by degree. http://dels.nas.edu/resources/static-assets/materials-based-on-reports/booklets/warming_world_final.pdf (accessed 4 November 2017).
- NEDC and CEEW. 2016. *Filling the skills gap in India's clean energy market: Solar energy focus*. <https://www.nrdc.org/sites/default/files/renewable-energy-solar-skill-gap.pdf> (accessed 4 November 2017).
- Northrop, E., Biru, H., Lima, S., Bouye, M. and Song, R. 2016. Examining the alignment between the intended nationally determined contributions and Sustainable Development Goals, working paper, World Resources Institute. www.wri.org/sites/default/files/WRI_INDCs_v5.pdf (accessed 4 November 2017).
- OECD (Organisation for Economic Co-operation and Development). 2012. The jobs potential of a shift towards a low-carbon economy: Final report for the European Commission, DG Employment, June. <https://www.oecd.org/els/emp/50503551.pdf> (accessed 4 November 2017).

- . 2015. *Investing in Youth: Tunisia*. <https://www.oecd.org/social/investing-in-youth-tunisia-9789264226470-en.htm> (accessed 7 November 2017).
- Ouranos. 2004. *Adapting to Climate Change*. Montreal, Canada, Ouranos.
- Philippines. 2017. *Philippine Development Plan 2017–2022*. Pasig City, Philippines, Government of the Philippines National Economic and Development Authority.
- RECP (Africa–EU Renewable Energy Cooperation Programme) and EUEI (EU Energy Initiative). n.d. Country mapping: Senegal. http://www.euei-pdf.org/sites/default/files/field_publication_file/TVET_Country_Mapping_-_Senegal.pdf (accessed 7 November 2017).
- Rojas-Laserna, M. 2014. Adaptation to climate change in Colombia: effective institutional arrangements for NAP formulation and implementation. Paper for NAP Expo 2014. https://unfccc.int/files/adaptation/application/pdf/colombia___mariana_rojas_laserna_session_3.pdf (accessed 7 November 2017).
- S4S (Sustainability for Seychelles). 2016. Water conservation and rain water harvesting: Water Warriors. <http://www.s4seychelles.com/water-projects.html> (accessed 7 November 2017).
- Sandalow, D. 2019. *Guide to Chinese Climate Policy*. Center on Global Energy Policy. Columbia SIPA. 2019, New York. https://energypolicy.columbia.edu/sites/default/files/file-uploads/Guide%20to%20Chinese%20Climate%20Policy_2019.pdf
- Saudi Arabia. 2015. The intended nationally determined contribution of the Kingdom of Saudi Arabia under the UNFCCC, November. www4.unfccc.int/ndcregistry/PublishedDocuments/Saudi%20Arabia%20First/KSA-INDCs%20English.pdf (accessed 7 November 2017).
- . n.d. *Objectives of the Tenth Development Plan (2015–2019)*. <https://www.google.it/url?sa=t&rct=j&q=&esrc=s&source=web&cd=15&ved=0ahUKEwjG0L7OoPPWAhXKtBoKHWr7BcsQFghx-MA4&url=https%3A%2F%2Fims.undg.org%2FdownloadFile%2F03a165922738bcde2cadd76b65b3adf666a1a75ff8855d077539fd1fa73e7280&usq=AOvVaw2up6Eqf7o8loKbHWG1-Q8V> (accessed 7 November 2017).
- Schneider, S. H. 2004. Abrupt non-linear climate change, irreversibility and surprise. *Global Environmental Change*, Vol. 14, pp. 245–58.
- SDSN (Sustainable Development Solutions Network). 2015. Getting started with the Sustainable Development Goals: a guide for stakeholders. <http://unsdsn.org/wp-content/uploads/2015/12/151211-getting-started-guide-FINAL-PDF-.pdf> (accessed 4 November 2017).
- Seychelles. 2015. Intended nationally determined contribution (INDC) under the United Nations Framework Convention on Climate Change (UNFCCC), September. www4.unfccc.int/submissions/INDC/Published%20Documents/Seychelles/1/INDC%20of%20Seychelles.pdf (accessed 7 November 2017).
- . 2016. New water conservation programme launched. Ministry for Youth, Sports and Culture. <http://www.pfsr.org/national-highlights/new-water-conservation-programme-launched/> (accessed 7 November 2017).
- Skills for Economic Growth. 2015. Independent evaluation of the Vanuatu Technical and Vocational Education and Training Sector Strengthening Program. <http://dfat.gov.au/about-us/publications/Documents/vanuatu-tvet-independent-evaluation.pdf> (accessed 7 November 2017).
- Third International Conference. 2017. Abstract, Third International Conference on Technical, Vocational Educational and Training in the Caribbean, 10–12 May 2017. <https://drive.google.com/file/d/0B6lFa9Imhc-zNkdjMnZJRC00dHM/view> (accessed 7 November 2017).
- Thirgood, J., S. Mcfatridge, M. Marcano & J. Ymeren. 2017. *Decent work in the green economy*. <https://munkschool.utoronto.ca/mowatcentre/decent-work-in-the-green-economy/> (accessed 6 August 2020).
- UNDP (UN Development Programme). n.d.a. Climate change adaptation: Senegal. <https://www.adaptation-undp.org/explore/western-africa/senegal> (accessed 7 November 2017).
- . n.d.b. Ecosystem based adaptation in Seychelles. <http://adaptation-undp.org/projects/af-seychelles> (accessed 7 November 2017).
- . n.d.c. Climate change adaptation: Egypt. <https://www.adaptation-undp.org/explore/northern-africa/egypt> (accessed 7 November 2017).
- UNEP (UN Environment Programme). 2010. *Green Economy Developing Countries Success Stories*. Geneva, UNEP.
- . 2011. www.unep.org/greeneconomy/sites/unep.org/greeneconomy/files/field/image/green_economyreport_final_dec2011.pdf (accessed 11 November 2017).
- . n.d.a. Mitigation. www.unep.org/climatechange/mitigation (accessed 4 November 2017).

- . n.d.b. Climate change. www.unep.org/africa/regional-programmes/climate-change (accessed 11 November 2017).
- UNESCO. 2010. Climate change education for sustainable development. <http://unesdoc.unesco.org/images/0019/001901/190101E.pdf> (accessed 7 November 2017).
- . 2011. From green economies to green societies: UNESCO's commitment to sustainable development. <http://unesdoc.unesco.org/images/0021/002133/213311e.pdf> (accessed 4 November 2017).
- . 2017. Education for Sustainable Development Goals. Learning Objectives. UNESCO. Paris. <https://unesdoc.unesco.org/ark:/48223/pf0000247444> (accessed 10 August 2020).
- . 2019. *Country Progress on Climate Change Education, Training and Public Awareness. An Analysis of Country Submissions under UNFCCC*. UNESCO Paris. <https://unesdoc.unesco.org/ark:/48223/pf0000372164> (accessed 10 August 2020).
- . n.d.a. *SIDS Action Plan (2016–2021)*. <http://www.unesco.org/new/en/natural-sciences/priority-areas/small-island-developing-states/sids-action-plan-2016-2021/> (accessed 7 November 2017).
- . n.d.b. Technical and vocational education and training, UNESCO New Delhi Office. www.unesco.org/new/en/newdelhi/areas-of-action/education/technical-vocational-education-and-training-tvet/ (accessed 4 November 2017).
- UNESCO-UNEVOC. 2013. *Greening TVET for Sustainable Development: Report of the UNESCO-UNEVOC Online Conference, 22 October–2 November 2012*. https://unevoc.unesco.org/fileadmin/user_upload/docs/e-Forum_Synthesis_report_Greening_TVET.pdf (accessed 6 November 2017).
- . 2015. *UNESCO TVET Strategy 2016–2021: Report of the UNESCO-UNEVOC Virtual Conference, 28 September–03 October 2015*. <https://unesdoc.unesco.org/ark:/48223/pf0000243932> (accessed 4 November 2017).
- . 2017. *Greening Technical and Vocational Education and Training: A Practical Guide for Institutions*. https://unevoc.unesco.org/up/Greening%20technical%20and%20vocational%20education%20and%20training_online.pdf (accessed 4 November 2017).
- . n.d.a. World TVET Database: Colombia. https://unevoc.unesco.org/wtdb/worldtvetdatabase_col_en.pdf (accessed 7 November 2017).
- . n.d.b. World TVET Database: Chile. https://unevoc.unesco.org/wtdb/worldtvetdatabase_chl_en.pdf (accessed 7 November 2017).
- . n.d.c. World TVET database: Lebanon. https://unevoc.unesco.org/wtdb/worldtvetdatabase_lbn_en.pdf (accessed 7 November 2017).
- . n.d.d. World TVET Database: Kenya. https://unevoc.unesco.org/wtdb/worldtvetdatabase_ken_en.pdf (accessed 7 November 2017).
- . n.d.e. World TVET Database: Malta. https://unevoc.unesco.org/wtdb/worldtvetdatabase_mlt_en.pdf (accessed 7 November 2017).
- . n.d.f. World TVET Database: Mexico. https://unevoc.unesco.org/wtdb/worldtvetdatabase_mex_en.pdf (accessed 7 November 2017).
- . n.d.g. World TVET Database: Egypt. www.unevoc.unesco.org/wtdb/worldtvetdatabase_egy_en.pdf (accessed 7 November 2017).
- UNFCCC (UN Framework Convention on Climate Change). 1992. *UN Framework Convention on Climate Change*. https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf (accessed 4 November 2017).
- . 2006. Technologies for adaptation to climate change. http://unfccc.int/resource/docs/publications/tech_for_adaptation_06.pdf (accessed 4 November 2017).
- . 2010. Spurring climate change adaptation in Seychelles schools through rainwater harvesting. http://unfccc.int/secretariat/momentum_for_change/items/6635.php (accessed 7 November 2017).
- . 2014. Thematic Report: Institutional arrangements for national adaptation planning and implementation. Adaptation Committee. https://unfccc.int/files/adaptation/application/pdf/adaption_committee_publication_-_web_high.pdf (accessed 6 November 2017).
- . 2015a. Report of the Conference of the Parties on its twentieth session, held in Lima from 1 to 14 December 2014. Addendum Part two: Action taken by the Conference of the Parties at its twentieth session. <http://unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf> (accessed 4 November 2017).

- . 2015b. Synthesis report on the aggregate effect of the intended nationally determined contributions: Note by the secretariat for the 21st Conference of the Parties. <https://unfccc.int/resource/docs/2015/cop21/eng/07.pdf> (accessed 4 November 2017).
- . 2015c. Synthesis report on the aggregate effect of the intended nationally determined contributions: Overview. https://unfccc.int/files/focus/indc_portal/application/pdf/synthesis_report_-_overview.pdf (accessed 6 November 2017).
- . 2017a. INDCs as communicated by Parties. www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx (accessed 4 November 2017).
- . 2017b. The Paris Agreement. http://unfccc.int/paris_agreement/items/9485.php (accessed 4 November 2017).
- . n.d. Summary of the Paris Agreement. <http://bigpicture.unfccc.int/#content-the-paris-agreement> (accessed 4 November 2017).
- UN Global Compact, UNEP, Oxfam and World Resources Institute (WRI). 2011. *Adapting for a Green Economy: Companies, Communities and Climate Change*. http://pdf.wri.org/adapting_for_a_green_economy.pdf (accessed 6 November 2017).
- UNHCR (UN High Commissioner for Refugees). 2016. Frequently asked questions on climate change and disaster displacement. <https://www.unhcr.org/news/latest/2016/11/581f52dc4/frequently-asked-questions-climate-change-disaster-displacement.html> (accessed 4 November 2017).
- United Nations. 2015. *Transforming our World: The 2030 Agenda for Sustainable Development*. <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf> (accessed 11 November 2017).
- UN-OHRLLS (Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States). 2011. *Small Island Developing States: Small Islands, Big(Ger) Stakes*. <http://unohrlls.org/custom-content/uploads/2013/08/SIDS-Small-Islands-Bigger-Stakes.pdf> (accessed 7 November 2017).
- USAID. 2012. Climate change adaptation in Senegal. https://www.climatelinks.org/sites/default/files/asset/document/senegal_adaptation_fact_sheet_jan2012.pdf (accessed 6 November 2017).
- . 2014. *Climate-Resilient Development: A Framework for Understanding and Addressing Climate Change*. http://pdf.usaid.gov/pdf_docs/pbaaa245.pdf (accessed 4 November 2017).
- Vanuatu. 2006. *Vanuatu Education Sector Strategy 2007–2016, Incorporating the Ministry of Education Corporate Plan and Medium-Term Expenditure Framework for 2007–2009*. www.paddle.usp.ac.fj/collect/paddle/index/assoc/van019.dir/doc.pdf (accessed 7 November 2017).



United Nations
Educational, Scientific and
Cultural Organization



International Centre
for Technical and Vocational
Education and Training

Climate change is an ongoing process that, at the current pace of such activities, cannot be avoided. Tools have been proposed to deal with climate change focus on adaptation and mitigation. Strengthening national and international awareness of and commitment to reducing the impact of climate change has become the only viable option to ensure the sustainability of life on Earth.

The Paris Agreement entered into force in 2016 with the aim of bringing all nations together in a common goal of combating climate change and adapting to its impacts. According to the Agreement, every party should submit a climate plan laying out its adaptation and mitigation targets. Technical and vocational education and training (TVET) has the potential to play significant roles in these plans. The smooth transition to green societies and economies relies on amongst others the knowledge, skills and competencies to promote sustainable development. Effective education and training for sustainable development pivots on

governance and vision, and the ability to empower people in an inclusive manner to act in favour of sustainable development. It also relies on the ability to train, upskill, reskill and empower those that can take advantage of the job growth and job creation potential in a changing economy.

This discussion paper compiles and reviews relevant information regarding the country submissions (Nationally Determined Contributions and National Communications) which lay out adaptation plans and the policies created in fifty-seven selected countries. The aim is to summarize key information that can help assess the ongoing and potential contribution of TVET to the realization of these plans. The analysis made through this discussion paper has helped to generate a set of approaches for climate change adaption, through the education and training lens. These approaches can be used to advance the discussion in strengthening the technical and vocational skills development component in country climate adaptation plans.

