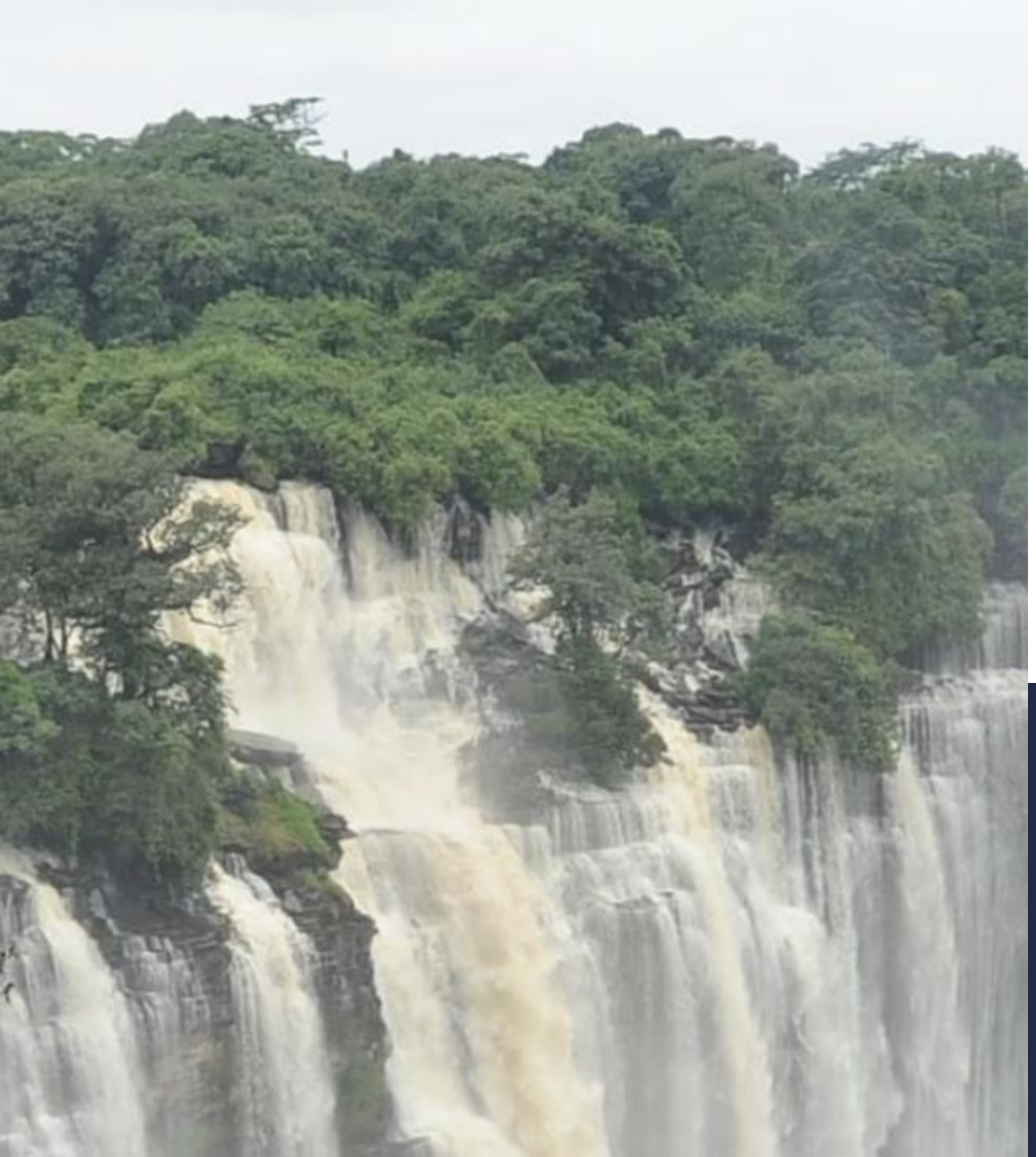


INSTITUTO NACIONAL
DE QUALIFICAÇÕES

Tema 3
Competências e empregos verdes

Transformação verde

07/fev/2025

Eduarda Castel-Branco

01

Transformação verde

Future of Jobs

Reskilling needs

WORLD ECONOMIC FORUM

44%

of workers' core skills are expected to change in the next five years

Source: World Economic Forum, *Future of Jobs Report 2023.*

Almost half of core skills are expected to change. Image: World Economic Forum

https://www.weforum.org/agenda/2023/05/future-of-jobs-2023-skills

A caminho de um Planeta mais Verde?

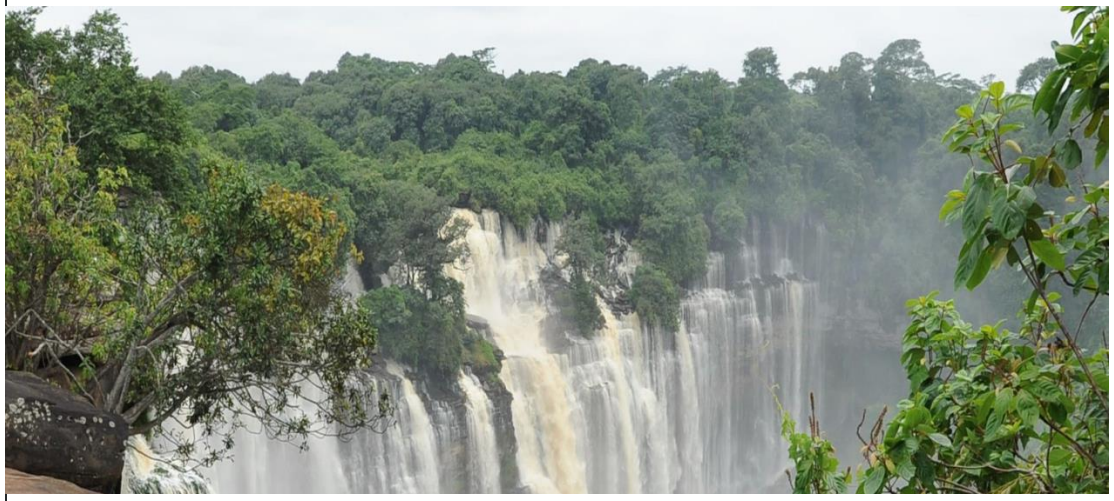
- Vários estudos indicam o ano de 2050 como o limite para neutralidade em termos climáticos.
- Investimentos em energias renováveis: Acelerar os investimentos em energias renováveis, como eólica, solar e hidrogénio, para reduzir a dependência dos combustíveis fósseis e melhorar a segurança energética.
- Melhoria da infraestrutura energética: Modernizar as redes de transmissão e distribuição de energia para acomodar as energias renováveis e garantir um aprovisionamento fiável.
- Promoção da eficiência energética: Incentivar as indústrias a adotarem tecnologias mais eficientes do ponto de vista energético, reduzindo os custos operacionais e as emissões.
- Desenvolvimento de uma estratégia integrada para a descarbonização: Coordenar as políticas energéticas para garantir que todas as indústrias possam beneficiar das oportunidades oferecidas pela transição energética.

Recuperação e crescimento com base na ecologização

- **Verde com um toque de castanho** é a cor da recuperação
- Ecologização da economia e da sociedade – no centro das estratégias de recuperação pós-Covid19 e do crescimento em muitos países
- As oportunidades de crescimento verde abundam em setores massivos como a energia, a mobilidade e a agricultura.
- Assim como as empresas da economia digital impulsionaram os retornos do mercado de ações nas últimas duas décadas, também as empresas de tecnologia verde podem desempenhar esse papel nas próximas décadas.
- UE, EUA, China, Japão, New Deal Verde da Coreia do Sul, Canadá, África – pacotes de estímulo ecológicos

Empregos mais verdes no futuro

- Para compensar as perdas de empregos esperadas, os esforços globais para descarbonizar em resposta à crise climática estão dando origem a uma grande diversidade de **riqueza de empregos verdes em todos os setores e indústrias**.
- Um cenário de recuperação **verde poderia gerar cerca de 3,5% do crescimento adicional do PIB mundial e um ganho líquido de emprego de 9 milhões de novos postos de trabalho por ano**, de acordo com dados da Agência Internacional de Energia.
- A transição verde poderá criar **30 milhões de postos de trabalho** a nível mundial nos domínios das **energias limpas, da eficiência e das tecnologias hipocarbónicas até 2030**.
- **No entanto, embora se tenha registado um crescimento contínuo dos empregos verdes nos últimos quatro anos, a requalificação e a melhoria das competências no sentido das competências verdes não estão a acompanhar o ritmo**.



https://www.weforum.org/agenda/2023/04/future-jobs-2023-fastest-growing-decline

Competências verdes

Competências verdes

Competências verdes – uma importante área de debate e ação política e que se tornou uma prioridade na investigação (quantitativa e qualitativa) e na comunicação social. Várias organizações internacionais estão a trabalhar na análise e taxonomia relacionadas com competências verdes.

O Cedefop define competências verdes como «os conhecimentos, competências, valores e atitudes necessários para viver, trabalhar e agir em economias e sociedades que procuram reduzir o impacto da atividade humana no ambiente**".**

<u>As competências para a economia verde consistem em::</u>

- **competências transversais**, ligadas a pensar e agir sustentáveis, relevantes para todos os setores económicos e profissões;
- **competências específicas** necessárias para adaptar ou aplicar normas, processos e serviços para proteger os ecossistemas e a biodiversidade e reduzir o consumo de energia, materiais e água;
- **competências altamente especializadas** necessárias para desenvolver e aplicar tecnologias verdes, como as energias renováveis, o tratamento de águas residuais ou a reciclagem**;**

As competências para a economia verde são também referidas como competências para empregos verdes, competências para a transição verde ou competências verdes.

O que é preciso para a transição verde (empregos e competências)?

Analisar os empregos e as competências para um futuro verde

Criar programas e formação para disseminar competências verdes

Elaboração de planos de carreira e transição para novos e antigos empregos

Grupos (Clusters) de competências verdes

Ambiente e Turismo Sustentável	Este cluster engloba competências relacionadas com a gestão de ecossistemas naturais, como florestas e zonas marítimas, e inclui competências para a promoção do turismo sustentável.
Agricultura Sustentável	Estas competências centram-se na melhoria de práticas agrícolas que sejam ambientalmente sustentáveis e benéficas para os produtores, consumidores e ecossistemas.
Construção Sustentável	As competências no âmbito deste cluster envolvem a melhoria da eficiência energética nos edifícios e o alinhamento das práticas de construção com os princípios de uma economia circular.
Economia Sustentável	Este grupo refere-se a competências que apoiam o conceito mais amplo de economia circular, incluindo a eficiência na utilização dos recursos e a minimização dos resíduos.
Energia Sustentável	Competências relacionadas com a transformação da produção de energia através da integração de fontes renováveis, como a energia solar, eólica ou hídrica.
Produção Sustentável	Estas competências são relevantes para modificar os métodos de produção existentes a fim de reduzir o impacto ambiental e aumentar a sustentabilidade.
Transportes sustentáveis	Este cluster envolve competências que visam a redução das emissões dos transportes, a utilização de combustíveis alternativos e a promoção de sistemas de partilha de mobilidade.

Green Skills - 279 competências únicas

Rácio de competências verdes – países selecionados África / e toda a África (base de dados de ofertas de emprego)

Green Share	Kenya	Nigeria	South Africa	Angola	Cameroon	Ghana	Africa
2022	2,46%	1,75%	1,53%	4,72%	2,95%	2,62%	1,58%
2023	3,08%	1,90%	1,83%	5,28%	5,27%	2,40%	1,73%
2024	3,24%	2,22%	1,94%	6,59%	6,12%	6,32%	1,90%

ACQF

Green skills share (%)
Updated data: 31/08/2024

Country	2022	2023	2024
Gambia	13,48%	10,67%	18,03%
Madagascar	13,98%	9,18%	15,87%
Guinea	16,62%	23,94%	11,45%
Mauritania	3,41%	4,67%	10,40%
The Republic of Congo	6,51%	5,08%	10,00%
Chad	8,37%	6,89%	9,64%
Malawi	5,80%	5,80%	9,62%
Liberia	6,36%	8,28%	9,44%
Benin	6,32%	6,31%	9,14%
Mozambique	4,18%	5,12%	9,09%
Togo	2,32%	9,06%	8,83%
South Sudan	4,86%	5,67%	8,78%
Burundi	5,71%	6,85%	8,51%
Guinea - Bissau	5,71%	9,02%	8,33%
Somalia	3,00%	4,63%	7,68%
Mali	6,71%	7,17%	7,59%
Niger	2,63%	5,24%	7,13%
Angola	4,72%	5,28%	6,59%
Laos	2,36%	5,53%	6,58%
Tanzania	6,64%	7,10%	6,43%
Belize	2,59%	3,18%	6,42%
Ghana	2,62%	2,40%	6,32%
Gabon	1,82%	3,09%	6,28%
Cameroon	2,95%	5,27%	6,12%
Central African Republic	4,03%	2,76%	6,04%
Burkina Faso	6,36%	6,13%	5,99%
Côte di'Ivoire	5,61%	6,84%	5,91%
Zambia	3,68%	5,02%	5,91%
Zimbabwe	3,59%	2,73%	5,86%
Libya	2,42%	4,37%	5,73%
Rwanda	4,56%	6,60%	5,39%
Lesotho	2,23%	4,18%	5,32%
Uganda	3,75%	4,74%	5,22%
Ethiopia	4,81%	5,49%	5,17%
Senegal	5,05%	4,68%	4,70%
Eritrea	5,08%	3,57%	4,17%
Sudan	4,07%	5,63%	4,10%
Kenya	2,87%	3,13%	3,08%
Namibia	1,43%	1,90%	2,90%
Tunisia	2,51%	2,53%	2,85%
Nigeria	1,75%	1,90%	2,22%
South Africa	1,53%	1,83%	1,94%
Djibouti	3,35%	3,69%	1,79%
Egypt	1,29%	1,53%	1,67%
Mauritius	1,81%	1,81%	1,66%
Algeria	1,13%	1,22%	1,65%
Botswana	4,62%	3,71%	1,50%
Morocco	1,15%	0,98%	1,20%
Sierra Leone	4,81%	2,50%	0,61%

Os empregos verdes estão a aumentar, mas a magnitude é diferente nos diferentes países

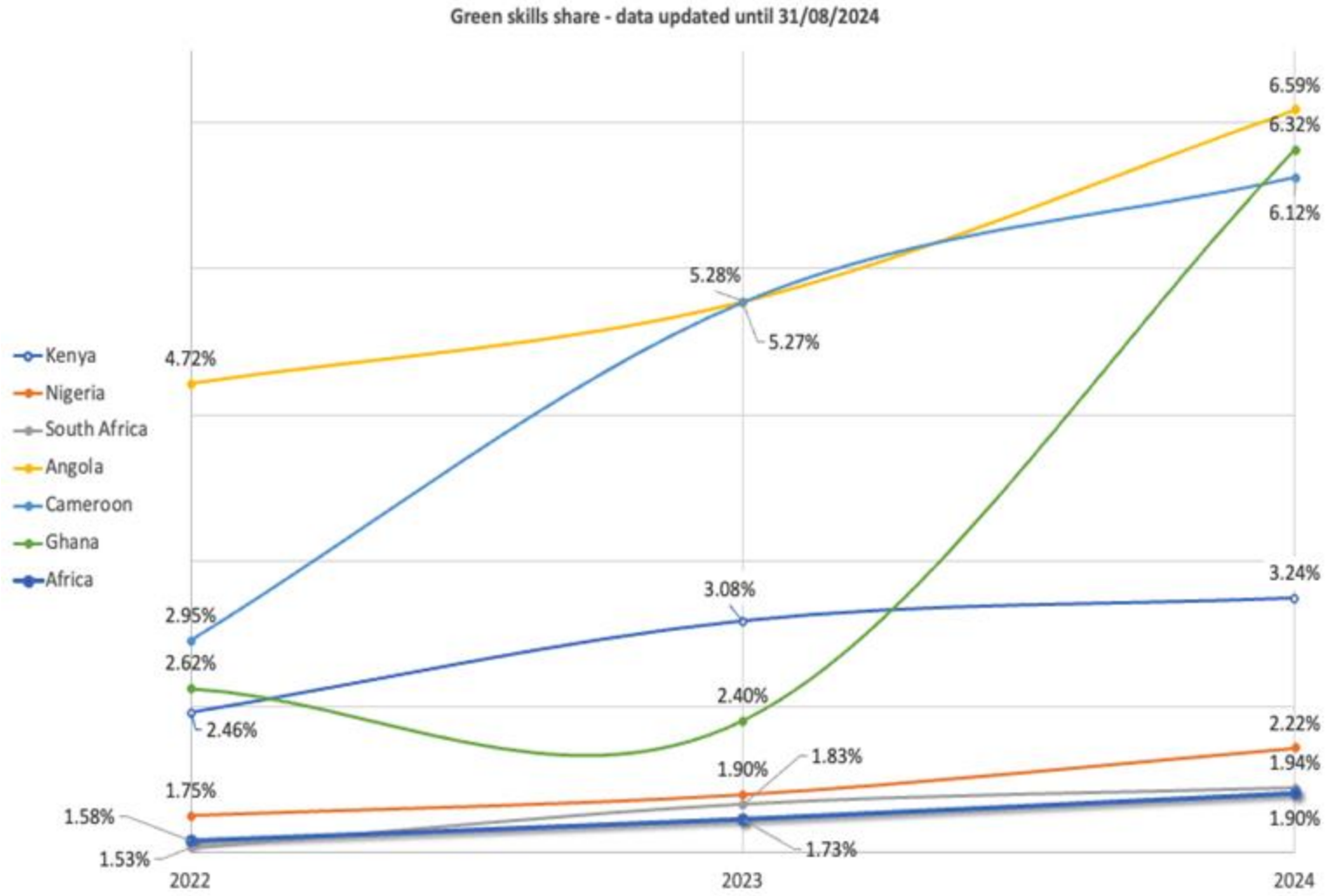
O rácio (%) verde é a percentagem de OJAs que contêm pelo menos uma competência verde no número total de OJAs para uma determinada ocupação.

A quota verde nos países africanos apresenta um ritmo de crescimento variado. Angola, Camarões e Gana lideraram a trajetória de crescimento, com aumentos notáveis até 2024, refletindo um foco significativo em iniciativas verdes.

Angola, por exemplo, passou de uma quota de nível médio em 2022 para se tornar líder em 2024.

Países como o Quénia, a Nigéria e a África do Sul apresentaram um crescimento mais lento, sugerindo a necessidade de intensificar os esforços de política verde para acelerar o progresso.

A quota verde global para África aumentou pouco indicando que ainda são necessárias estratégias mais amplas em todo o continente para apoiar transições verdes em escala.



Source: ETF & Lightcast Global Job Postings

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Top 20 Competências verdes África

Skills / skill set	% (from 20)	Nº unique job postings
Waste Management	10,34%	20.494
ISO 14000 Series	8,90%	17.637
Renewable Energy	5,92%	11.743
Environmental Laws	5,30%	10.504
Environmental Protocols	5,08%	10.078
Climate Variability And Change	3,43%	6.807
Photovoltaics	2,40%	4.757
Energy Management	2,37%	4.696
Environmental Compliance	2,13%	4.220
Concentrix Solar	2,11%	4.189
Climate Change Adaptation	1,87%	3.716
Recycling	1,87%	3.704
Solar Systems	1,83%	3.623
Environmental Protection	1,78%	3.524
Energy Conservation	1,77%	3.514
Energy Consumption	1,48%	2.938
Environmentalism	1,30%	2.582
One-Line Diagram	1,27%	2.509
PVsyst	1,21%	2.397
Climate Resilience	1,15%	2.285

Procura de competências «verdes» em África:
O aumento da procura de competências verdes reflete uma mudança para a sustentabilidade

- Os dados indicam uma ênfase crescente nas competências verdes, com a **Gestão de Resíduos a liderar com mais de 10%.**
- As **normas ISO 14000 e as competências em Energia Renovável** também mostram uma forte demanda, enfatizando o movimento da indústria em direção à padronização e adoção de energia limpa.
- As competências **relacionadas com o clima, como a variabilidade climática, a adaptação e a energia fotovoltaica**, estão a ganhar destaque, evidenciando a necessidade de resiliência face às alterações climáticas.
- Essas tendências sugerem que os empregos em todos os setores estão incorporando cada vez mais competências verdes, refletindo uma consciência ambiental mais ampla e um impulso para a sustentabilidade em todo o mercado de trabalho.

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Source: ETF & Lightcast Global Job Postings

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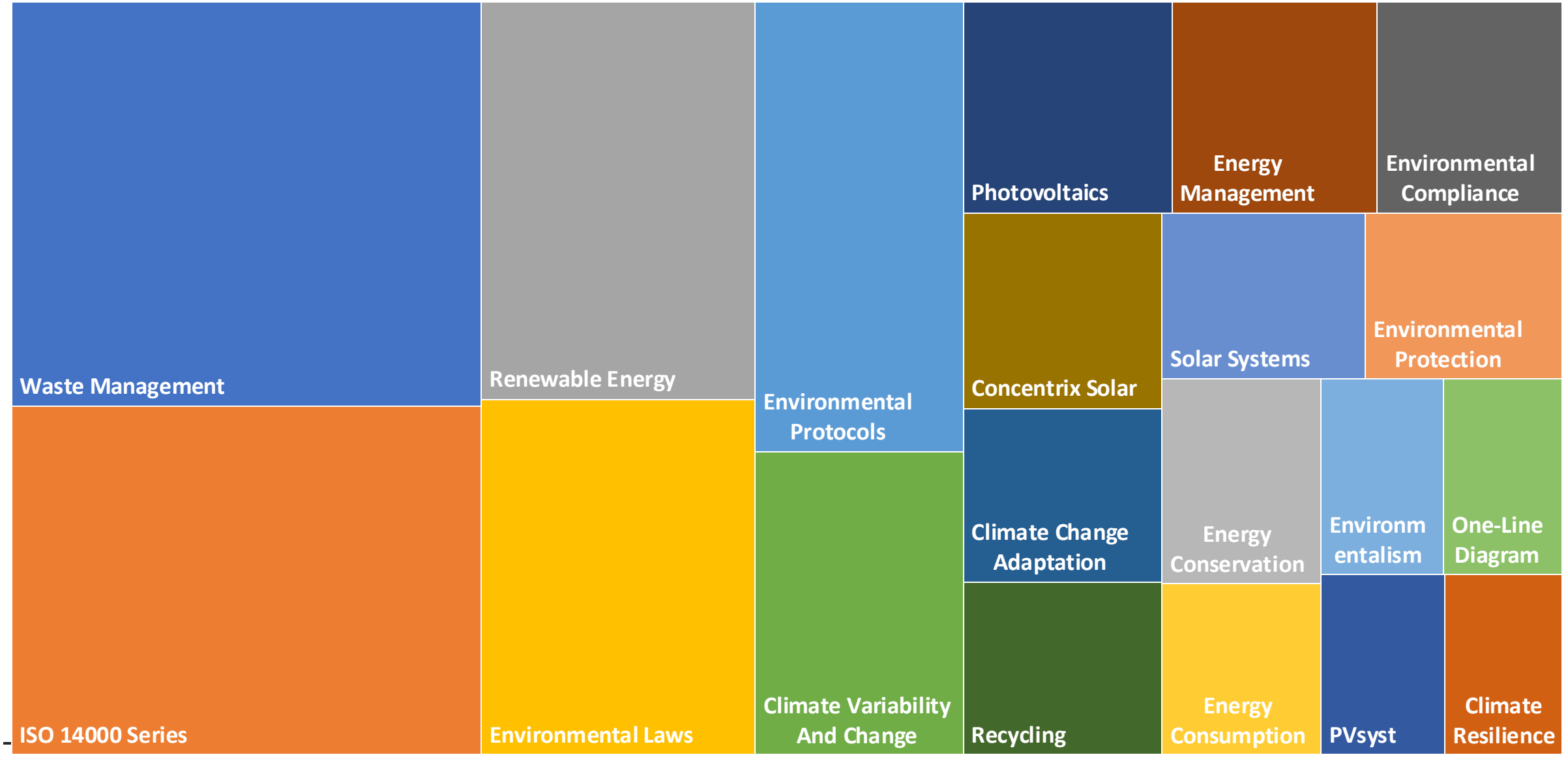
TOP 20 COMPETÊNCIAS VERDES AFRICA



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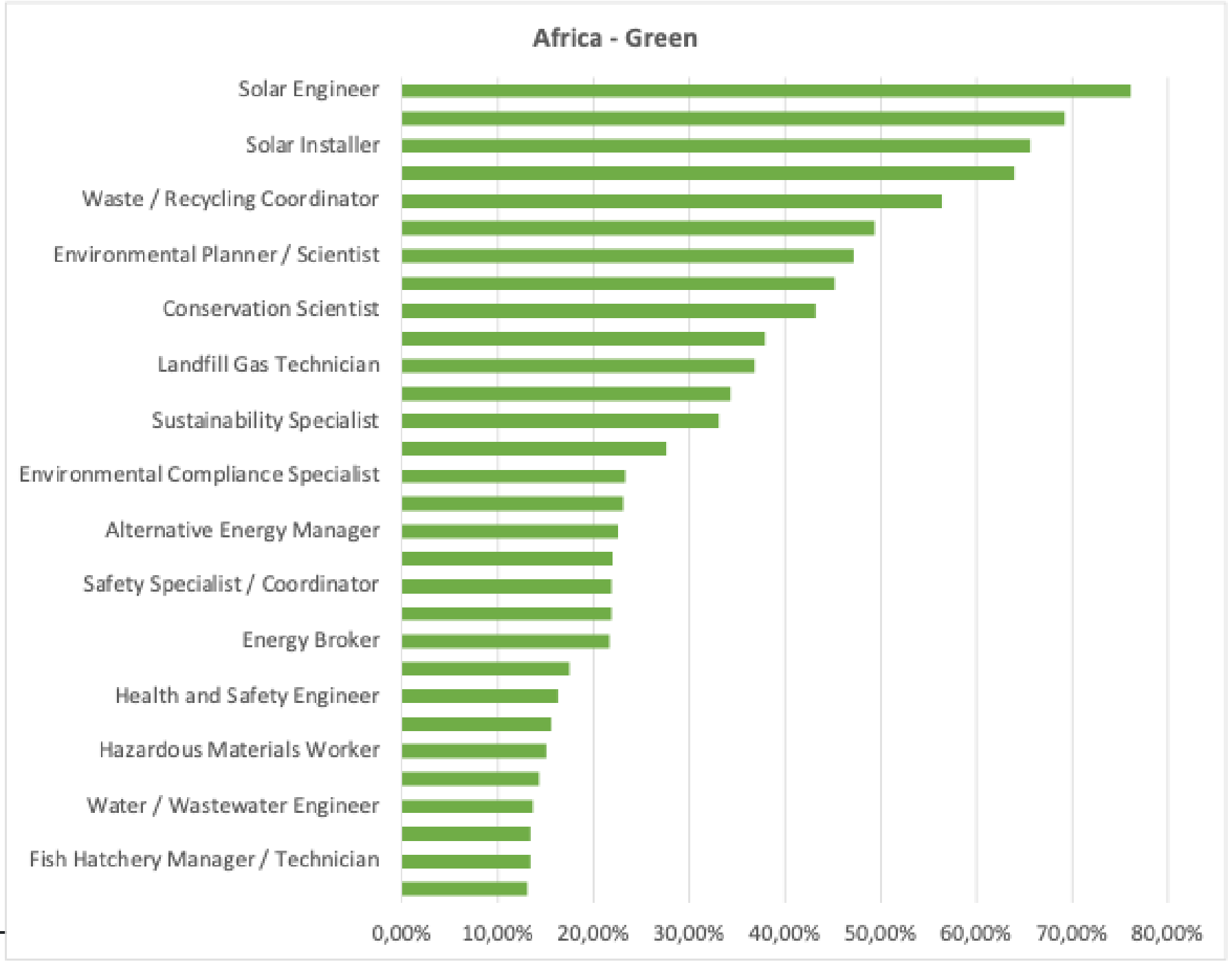
Profissões mais verdes – Toda a África

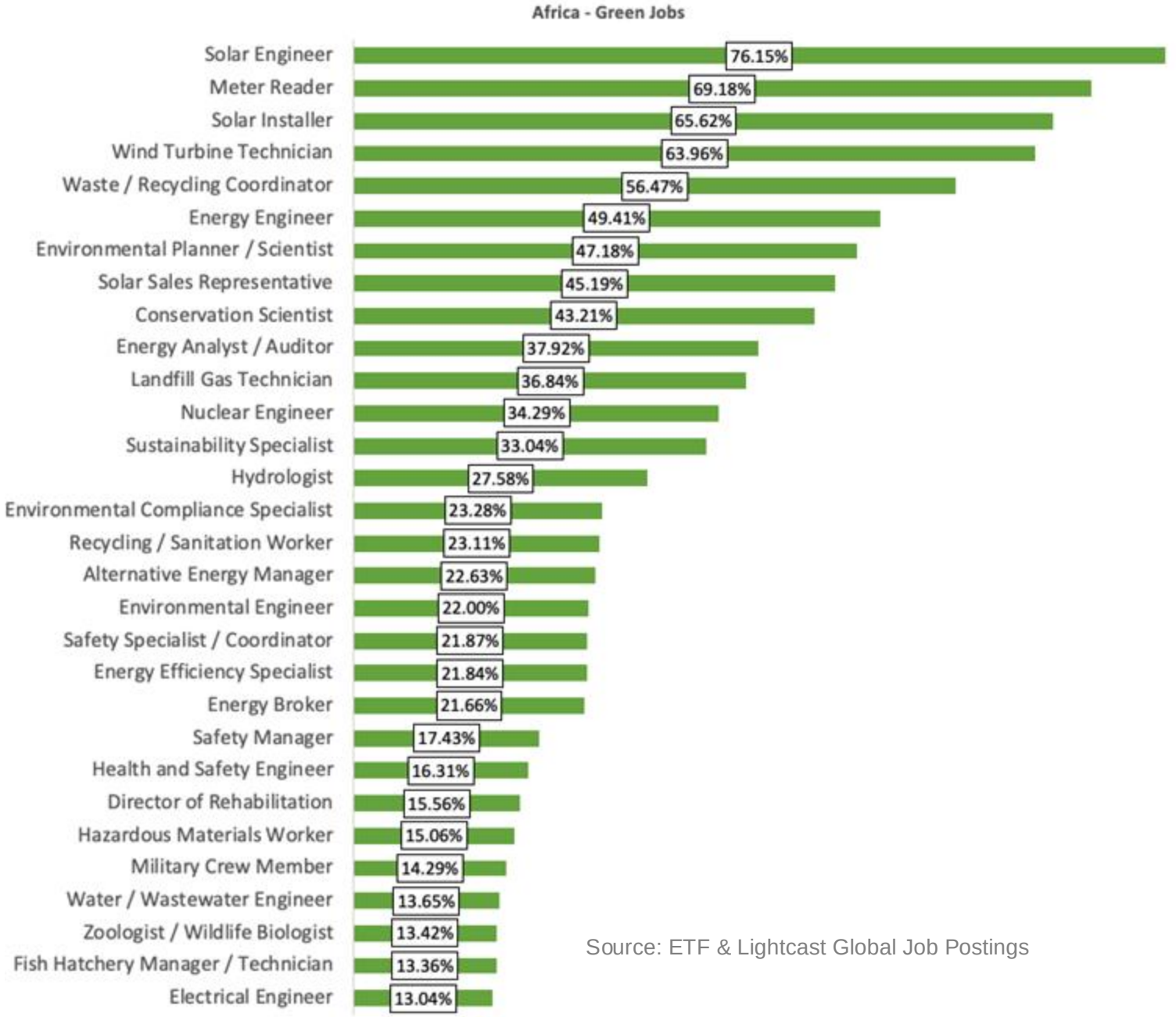
Com base em ofertas de emprego online (Análise de Big Data)



Os principais empregos verdes em África refletem a mudança do continente para as energias renováveis e práticas de sustentabilidade.

- Os engenheiros solares têm o maior rácio verde, com 76%, indicando uma demanda significativa por soluções de energia solar.
- Leitores de Medidores, Instaladores Solares e Técnicos de Turbinas Eólicas também apresentam altas participações verdes, variando de 63% a 69%, enfatizando o foco na transição energética.
- Os Coordenadores de Resíduos/Reciclagem e os Engenheiros de Energia apresentam mais de 45% de quotas verdes, sugerindo uma necessidade crescente de gestão de resíduos e eficiência energética.
- Planeadores Ambientais e Cientistas da Conservação completam os principais papéis, indicando esforços para promover práticas sustentáveis e proteção ambiental.

Principais empregos verdes em África – Rácio verde



Source: ETF & Lightcast Global Job Postings

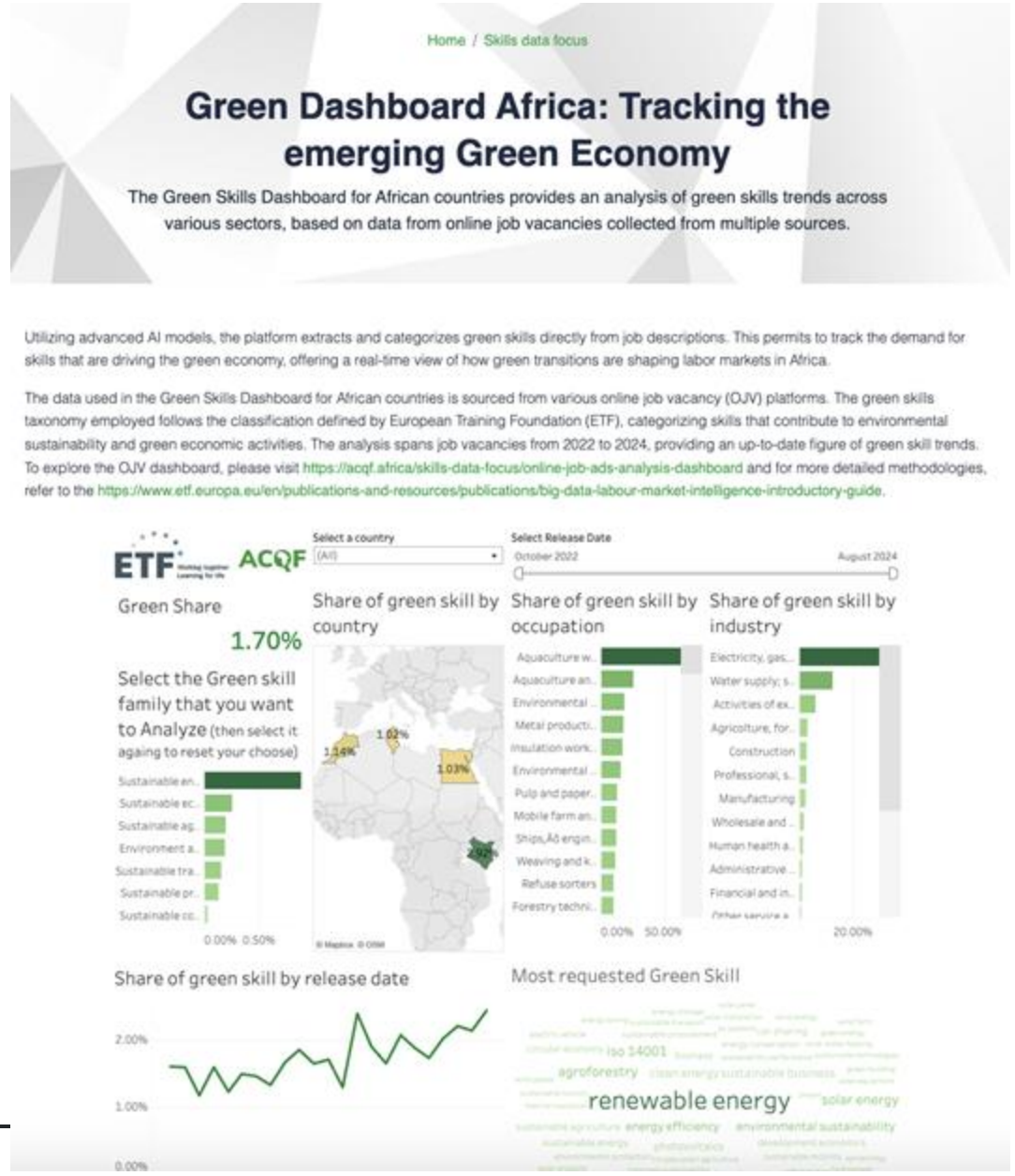
Kenya: Green skills needed for selected occupations

Occupation	Green skill	Unique Job postings (Oct 22- Jul 23)
Electronics mechanics and servicers	solar panels	7
	solar energy	2
	environmental protection	2
Environmental engineers	environmental sustainability	32
	environmental protection	19
	sustainable procurement	9
	renewable energy	9
	sustainable business	7
	energy efficiency	7
	sustainable energy	5
	circular economy	4
	development economics	3
	climate smart agriculture	3
	green energy	2
	ecotourism	2
	clean energy	2
	carbon footprint reduction	2
	sustainable agriculture	1
	sustainability performance	1
	iso 14001	1
	hydroponics	1
	clean technology	1
	agroforestry	1
Metal production process controllers	iso 14001	2
Statistical, mathematical and related associate professionals	environmental protection	18
	clean energy	18
	energy efficiency	11
	green building	9
	sustainable materials	6
	sustainable building	6
	sustainable agriculture	6
	renewable energy	5
	circular economy	5
	biomass	4
	agroforestry	4
	sustainable energy	3
	hydropower	1
	biofuels	1

Top 20 Green Skills Kenya

Skills / skill set	% (from 20)	Nº unique job postings
renewable energy	22,95%	2.598
agroforestry	9,08%	1.028
clean energy	6,54%	740
sustainable business	6,47%	732
solar energy	6,27%	710
circular economy	5,64%	638
environmental sustainability	5,48%	620
development economics	5,05%	572
biomass	4,22%	478
solar systems	3,45%	390
environmental protection	3,41%	386
energy efficiency	3,41%	386
sustainable energy	3,38%	382
sustainable agriculture	2,99%	338
climate smart agriculture	2,54%	288
green energy	2,31%	262
iso 14001	2,19%	248
agroecology	1,80%	204
solar products	1,63%	184
electric vehicle	1,18%	134

Dados sobre a transformação das competências



03

Implicações para educação e formação

Implicações para a educação-formação

- Necessidade de desenvolver tecnologias, processos de produção, produtos, serviços e modelos empresariais respeitadores do ambiente em todos os setores da economia;
- Muda a forma como as profissões tradicionais são realizadas (e ensinadas) e cria novas profissões;
- Cria uma procura de novas competências e conhecimentos e a necessidade de melhorar e requalificar um grande número de pessoas;
- Necessidade de aumentar a sensibilização ambiental nos programas de ensino e formação;
- Exige uma estreita interação entre os sistemas de educação e formação e os respetivos contextos e comunidades, a fim de criar ecossistemas de competências em que o desenvolvimento de competências acompanhe as mudanças económicas, tecnológicas e sociais

UNESCO: nova orientação

SHORT SUMMARY

Greening curriculum to get all learners climate-ready

Education is a powerful tool to transform the world and drive long-long-term climate change action.

This Guidance responds to the calls from young people for a holistic approach to climate change and sustainability in the curriculum. It outlines a common language on how quality climate change and sustainability can be reflected in the curriculum by setting expected learning outcomes per age group (from 5-year-olds and up to 18+ age group, including a lifelong learning approach).

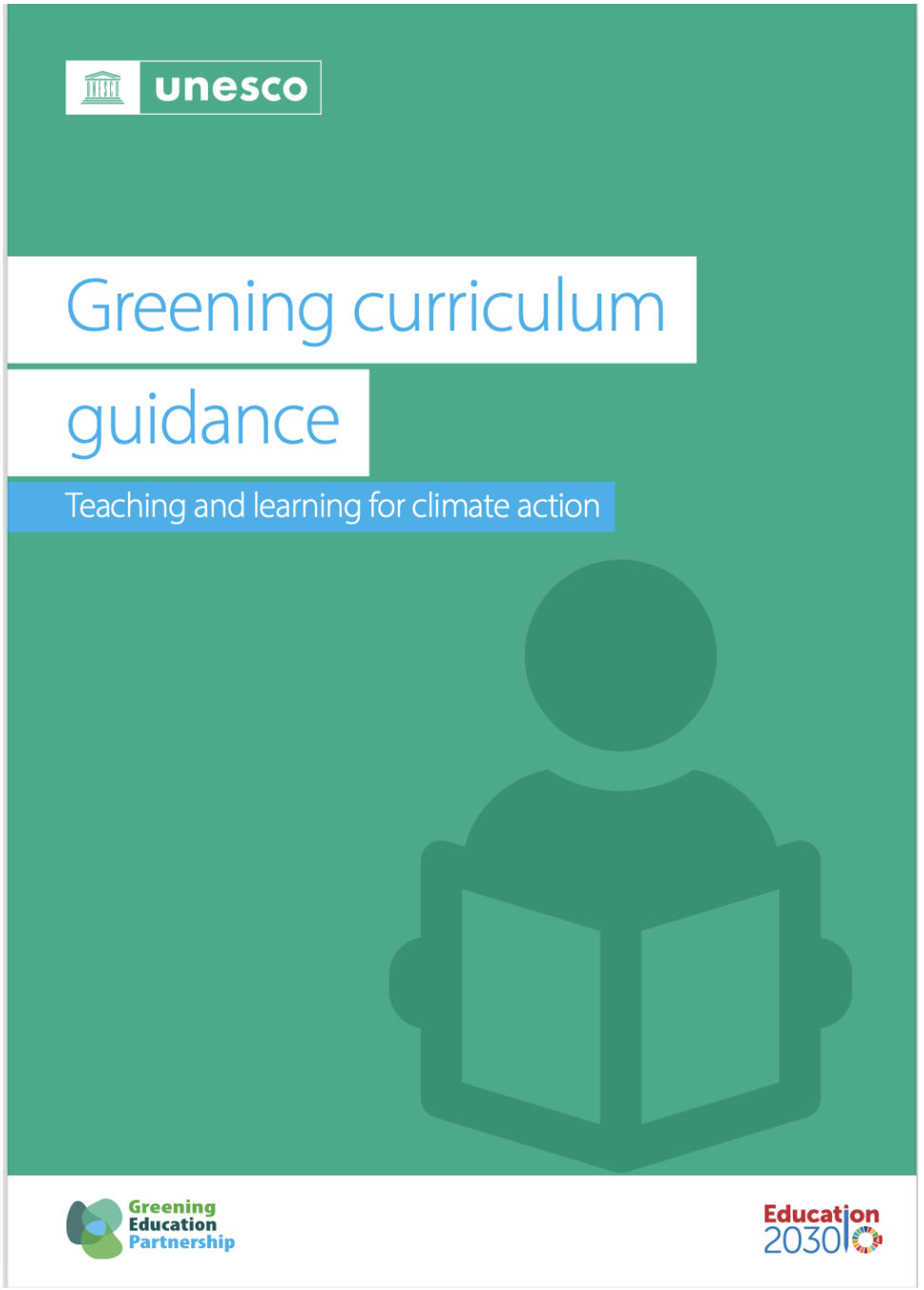
Target: **90%** countries green national curriculum **by 2030**

This is crucial for accelerating country-level action and ensuring joint monitoring of progress. The objective is to have 90 per cent of all countries include climate change in their curricula by 2030, as established by the Greening Education Partnership.

This Guidance aims to support countries, schools or individual practitioners in reassessing their ongoing practices to adopt a more action-oriented, holistic, scientifically accurate, justice-driven and lifelong learning approach to climate change.

unesco

"Since wars begin in the minds of men and women it is in the minds of men and women that the defences of peace must be constructed"



UNESCO: Nova Orientação Educação Verde

- General strategies for greening education (Section 2)
- Key concepts, topics, and learning outcomes (Section 3)
- Implementation of the Greening Curriculum Guidance (Section 4).

1. Estratégias gerais para a transformação verde da educação
2. Conceitos chabe, tópicos e resultados de aprendizagem
3. Implementacão da Orientação para a transformação verde da educação

Implementação das Orientações: Esta secção 3 recomenda como conceber e implementar um currículo ecológico relevante para contextos locais com base nas presentes orientações. Os tópicos abordados incluem o planeamento do setor da educação, a conceção do currículo e a conceção de abordagens a nível da instituição. Esta secção também explora a forma como as sinergias internacionais podem ser aproveitadas e destaca os papéis importantes dos jovens, dos decisores políticos, das comunidades e de outras partes interessadas.

Princípios da transformação verde da educação (1)

Action-oriented

- **Empowering:** It supports learners' empowerment, self-efficacy and agency by improving their analytical, communication, and other skills, and by supporting the acquisition of relevant knowledge and values for sustainable development and addressing climate change.
- **Learner-centred:** The pedagogy (e.g. critical, participatory, problem-oriented, learner-centred and experiential approaches) allows students to actively participate in learning processes, critically engage with personal experiences and their natural environment, and construct their own understanding.
- **Career-related:** It incorporates practices or ideas that can be applied to career choices and workplace practices.
- **Transformative:** It contributes to collective society-wide, local and global efforts to change human behaviour, systems and underlying causes and root drivers of climate change.

Princípios da transformação verde da educação (2)

Justice-promoting

- **Based on a human rights approach:** It builds on and promotes an understanding of universal human rights – including the rights of children and young people – and the rights of all persons to health, education, information equality and non-discrimination. Using a human rights-based approach, within education addressing climate change, also involves raising awareness among young people, encouraging them to recognize their own rights, acknowledge and respect the rights of others, and advocate for those whose rights are violated.
- **Based on gender equality:** It addresses the different ways that gender norms can influence inequality, and how these inequalities can affect vulnerabilities to climate change.
- **Based on inter-generational equity:** It develops a notion that ensures the rights and obligations of future generations while maintaining those of the present generation.
- **Based on intra-cultural equity:** It develops a vision of environmental, economic, and social justice and fairness across communities and cultures within the current generation.

Princípios da transformação verde da educação (3)

Quality content

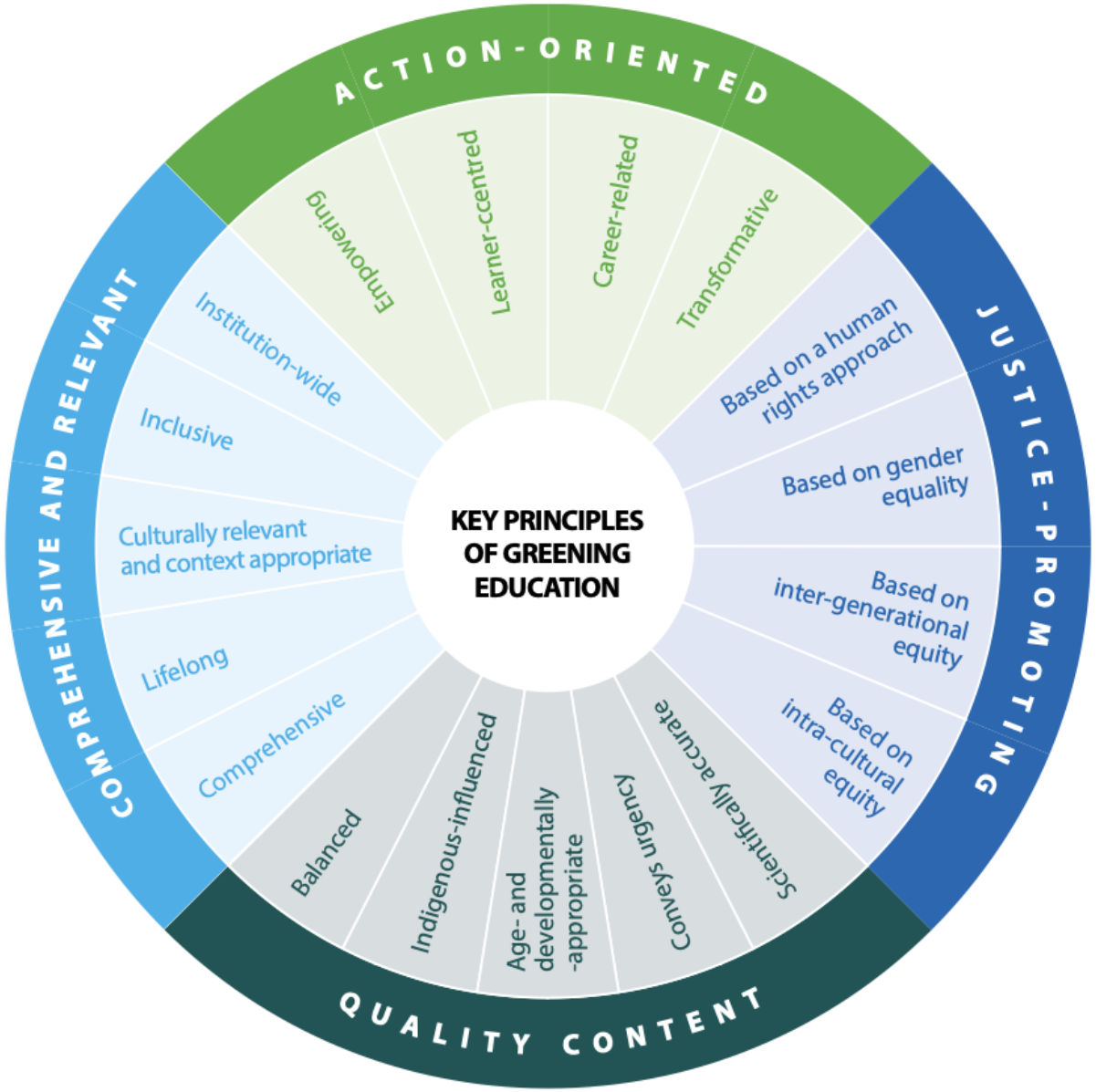
- **Scientifically accurate:** The content is based on evidence related to climate change and sustainable development.
- **Conveys urgency:** Greening education stresses the urgency of adequately addressing the growing climate emergency.
- **Age- and developmentally-appropriate:** The content is responsive to the evolving capabilities of the child and young person as they grow.
- **Indigenous-influenced:** Indigenous knowledge and perspectives are incorporated within education, especially from indigenous groups who are locally based.
- **Balanced:** Cognitive, social and emotional, and behavioural learning dimensions are addressed in a balanced manner to ensure a holistic approach to greening education.

Princípios da transformação verde da educação (4)

Comprehensive and relevant

- **Comprehensive:** It provides opportunities to acquire comprehensive, accurate, evidence-informed and age-appropriate information on sustainable development and climate change over time and throughout a learner's formal, non-formal and informal (e.g. museums and libraries) education, and including TVET.
- **Lifelong:** This is a continuing educational process that starts at an early age, and where new information builds upon previous learning, using a spiral-curriculum approach.
- **Culturally relevant and context appropriate:** It fosters learning outcomes that are relevant to local climate change challenges and solutions, and cultural structures and norms that affect people's choices in addressing sustainable development and climate change.
- **Inclusive:** Greening education involves a range of actors from inside and outside education, including experts, parents, community members and local leaders who bring alternative perspectives, new skills, intergenerational and indigenous knowledge to understand climate challenges and solutions.
- **Institution-wide:** Greening education principles are integrated throughout the learning environment, affecting the organization-wide culture and practices.

Princípios da transformação verde da educação (5)



Abordagem holística para a transformação verde da educação

Resultados de aprendizagem por tópico e grupo etário - exemplo (1)

Key ideas and learning outcomes per topic per age group

Topic 1.1. Weather, climate and climate change

'Weather' describes our daily experience of precipitation, wind, atmospheric temperature, etc. while 'climate' describes patterns over longer periods of time, such as average seasonal profiles and exceptional events. Average temperatures of the lower atmosphere are rising, and this phenomenon is called global warming or global heating. Future temperatures can be predicted using complex models that integrate natural and manmade climate factors and potential feedback effects. International agreements and institutional arrangements enable governments to consult on targets for climate change mitigation, e.g. the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement, the work of the Intergovernmental Panel on Climate Change (IPCC) and the annual Conference of the Parties (COP) to the UNFCCC.

	Cognitive	Social and emotional	Behavioural
5-8 years	**KEY IDEA: 'Weather' describes daily experience, while 'climate' describes weather patterns over many years.**		
	Learners should be able to: ▶ describe some features of the weather in their country or community. ▶ generalize regular weather patterns as seasons and 'climates.'	Learners should be able to: ▶ participate in group discussions about seasonal preferences, actively listening to their classmates' perspectives on different seasons. ▶ explain their own preferences in a way that is respectful of others' viewpoints, fostering understanding and building positive relationships. ▶ demonstrate curiosity about the world around them, asking questions about plants, animals, and weather. ▶ connect their emotional responses to the seasons by asking questions that reveal their wonder, excitement, or even anxieties about different weather patterns or changes in nature.	Learners should be able to: ▶ demonstrate the ability to assess weather risks, select appropriate clothing and gear, identify safe locations (like shelter), and implement preventative measures (e.g. avoiding flood zones, securing outdoor furniture) to navigate various challenging weather conditions.
9-12 years	**KEY IDEA: Average global temperatures are increasing and extreme weather events more frequent.**		
	Learners should be able to: ▶ demonstrate an understanding that temperature has changed in the past over long periods of time, and that changes have become more rapid since industrialization. ▶ investigate the range of temperatures in their country. ▶ explain the term 'global warming' (used interchangeably with the term 'global heating'). ▶ describe how seasonal temperatures may vary from year to year, but that the trend is upwards. ▶ describe some of the effects of global warming, globally and in their region, such as heatwaves, drought, wildfires, melting glaciers and ice caps, sea level rise, increased ocean temperature and acidity, death of coral reefs, and increased severity and frequency of storms, hurricanes and monsoons and flooding.	Learners should be able to: ▶ express their own feelings about taking action, like feeling hopeful, empowered, or motivated to make a difference. ▶ participate in activities that connect positive emotions with taking action on climate change.	Learners should be able to: ▶ collaborate in family/local actions to prevent/mitigate/adapt to the enhanced risk of events such as flooding, heatwaves, wildfires, drought such as planting drought-resistant trees.

Resultados de aprendizagem por tópico e grupo etário – exemplo (2)

13-15 years	**KEY IDEA: Temperatures of the lower atmosphere have risen faster since industrialization and especially in this century. Many countries are seeking to limit this increase to 1.5C (or under 2C). International agreements and institutions promote this goal, and many scientists are researching new technologies that can reduce global warming.**		
	Learners should be able to: ▶ give some examples of how scientists collect weather data, including the temperature of the lower atmosphere. ▶ demonstrate an understanding of the role of international action to address global warming. ▶ describe recent IPCC temperature projections and assess the targets for limiting average global temperature rise to 1.5C (or less than 2C).	Learners should be able to: ▶ appreciate the importance of monitoring weather patterns and climate trends through engaging in debates, discussions, and collaborative activities.	Learners should be able to: ▶ adopt more sustainable lifestyle choices such as including energy-saving practices in schools (e.g. turning off lights, using natural light)
16-18 years	**KEY IDEA: Climate projections show that global warming in this century may exceed 1.5C or 2C, depending on human actions and available technologies. Increases in the frequency and strength of extreme weather events are predicted, together with sea level rise and impacts on ecosystems and biodiversity.**		
	Learners should be able to: ▶ identify key findings of the most recent IPCC reports of greatest relevance to their own region/country. ▶ assess the likelihood of high, low or central temperature predictions. ▶ analyse types of extreme events that occur globally, regionally and in their locality, and assess how they might be affected by global warming. ▶ evaluate the potential of innovative technologies and of societal and economic practices that may lessen the pace of global warming, such as transitioning to a circular economy and addressing lifestyle choices. (See Key Concepts 5 Post-Carbon Economies and 6 Sustainable Lifestyles.)	Learners should be able to: ▶ show empathy with those at risk of internal displacement by climate change (e.g. drought, desertification, sea level rise) through creative works such as artwork, poems, or stories that capture the experiences of those facing displacement.	Learners should be able to: ▶ work with fellow students and youth groups, to counter misinformation on climate change in online spaces, and advocate for preventive measures. (See Topic 4.6 Tackling Climate Mis/Disinformation.) ▶ initiate or support efforts to mitigate/adapt to the effects of global warming, in their school and community. (See Key Concept 4 Resilience-Building).
18+	**KEY IDEA: Scientific knowledge on climate change is increasing. New data may affect models and projections and perhaps suggest even greater urgency of action to mitigate planetary warming and its impact on learners' own and other communities and on the natural world, with especial attention to climate justice (see Key Concept 4 Climate Justice).**		
	Learners should be able to: ▶ evaluate the role of the IPCC, assessing the significance of its current reports and predictions and consider their uncertainties, including possible feedback effects. ▶ select one or more key findings of the IPCC reports and consider some creative ways to address them through technological change, green manufacturing and transport, sustainable agriculture and transitioning to a circular economy. ▶ analyse international agreements and national policies for carbon reduction, in view of the need to sequester carbon, adopt regenerative practices, and go beyond net zero to post-carbon practices and lifestyles (see Key Concept 5 Post-Carbon Economies).	Learners should be able to: ▶ feel concern over the impact of projected climate change on their own and future generations in different regions and for different social groups, especially those who are socially/economically marginalized and in vulnerable locations. ▶ empathize with nature and place value on the need to take care of the natural environment at local and global scale, including through the adoption of green practices and the use of green skills through activities such as virtual exchanges with students from other schools, regions or countries facing different environmental challenges.	Learners should be able to: ▶ engage in advocacy, debate, and negotiations locally, nationally and globally for climate change mitigation and adaptation measures. ▶ develop video clips, podcasts, vlogs, etc. and share via social media and other channels, as appropriate. ▶ adopt (and with youth peers, family, educational institutions, and employers) promote best practices such as energy efficiency and conservation, sustainable agriculture, forests and fisheries. ▶ choose green products, travel, construction, etc. (See Key Concept 6 Sustainable Lifestyles.) ▶ conduct action research with local communities, municipalities and businesses on the impact of climate change and on prevention/adaptation measures.

Resultados de aprendizagem por tópico e grupo etário - exemplo (3)

Topic 1.2. Greenhouse gases

The Earth's temperature is affected by naturally occurring GHGs which serve as a blanket, lessening the loss of heat from the Earth's surface. Loss of heat (as infra-red radiation) from the Earth's surface is restricted by small amounts of GHGs such as CO_2 in the lower atmosphere. Without this 'greenhouse effect', the Earth's average air temperature would be -18C instead of about 15C. The rise in the levels of CO_2 and of other GHGs (computed as CO_2 equivalents), since industrialization, corresponds to the rise in overall global temperature. CO_2 stays in the atmosphere for thousands of years. Water vapour (H2O) is also a GHG but forms clouds and falls as rain. Methane (CH4) from natural sources and from cattle farming, waste dumps, leakage from oil wells, etc. is a stronger GHG than CO_2 but stays in the atmosphere for a shorter time. GHGs also include nitrous oxides (N2O), ozone and other chemicals. Chemicals such as fluorocarbons used in refrigerators are GHGs but are better known for damaging the ozone layer in the stratosphere. The stratospheric ozone layer is a friend of life on Earth, absorbing much of the ultraviolet radiation from the sun which would otherwise be harmful. Destruction of the ozone layer at the Earth's poles (creating a seasonal 'ozone hole') is discussed in Topic 1.6 Renewable Energy below.

	Cognitive	Social and emotional	Behavioural
5-8 years	**KEY IDEA: Sunshine heats the Earth's surface. GHGs such as CO_2 in the air help to stop this heat being radiated into space.**		
	Learners should be able to: ▶ give evidence of the heat from solar radiation (e.g. effect on hands, stones). ▶ explain that some gases in the air (e.g. CO_2 that we breathe out) act like a greenhouse or blanket and keep the air warm. ▶ describe air temperatures during different seasons and times of day, and those that they like/find uncomfortable. ▶ suggest the effects of too much warming if human activities increase the amount of GHGs like CO_2.	Learners should be able to: ▶ participate in activities that spark wonder about the sun's warmth. ▶ show concern that global warming due to people's greenhouse gas emissions may cause problems to people and animals, e.g. heatwaves, melting of ice where polar bears live.	Learners should be able to: ▶ raise the awareness of family members regarding greenhouse gas emissions due to people's activities, which are causing global warming and associated problems. ▶ tell stories about the sun and its warmth. ▶ play outdoor games like 'Follow the Sun', where children follow the direction of the sun's rays.
9-12 years	**KEY IDEA: GHGs from natural sources keep the Earth warm enough for life. However, extra CO_2 from use of fossil fuels and other sources has an unwanted global warming effect.**		
	Learners should be able to: ▶ describe the main gases in the air we breathe and explain that CO_2 (e.g. from exhalation), and some other gases in the atmosphere, keep the air warm (at about 15C instead of -18C) by stopping heat loss into space. ▶ design simple demonstrations of the greenhouse effect. ▶ explain the concept of fossil fuels (formed underground over millions of years) and that burning them in cars and other vehicles, for heating, etc. generates extra CO_2, increasing the 'greenhouse effect.' ▶ explain that CO_2 is created by burning wood and that forest conservation and expansion is needed to help re-absorb this as well as CO_2 from other human activities.	Learners should be able to: ▶ show concern over the potential harm to people and animals from human-induced greenhouse gas emissions, including feeling empathy with those affected by increased flooding, sea level rise, drought, etc. ▶ appreciate the value of forests by empathizing with the motivation of indigenous people or young forest wardens to protect forests in their region/country.	Learners should be able to: ▶ raise family, school and community awareness about GHGs and the ways in which locally used fuels, etc. create CO_2, adding to global warming. ▶ take actions to reduce use of fossil fuels (e.g. by walking instead of using motorized transport). ▶ participate in community gardening or tree planting projects to learn about the relationship between sunlight, plants, and GHGs.

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QNQ Verde: principais vectores

Nos descritores de nível

Competências verdes:

- Tranversais: conteúdo obrigatório desde ensino primário (ou pré-escolar...)
- Específicas: microcredenciais; módulos; novos programas e qualificações;
- Altamente especializadas: novos programas e qualificações:

Alianças e parcerias

- **Estado e sociedade**
  - ❖ Estratégia, programa nacional de desenvolvimento sustentável, investimento verde.
  - ❖ Energias renováveis
  - ❖ Gestão urbana
  - ❖ Biodiversidade e áreas de conservação
  - ❖ Boas práticas – comunidades, associações, entidades educação-formação todos os níveis
  - ❖ Sinergias: nacional-regional-continental-global
    - ❖ECCAS: desenvolvimento sustentável da Bacia do Congo – economia florestal, energias renováveis, biodiversidade
- **Empresas (PME, Grandes, Internacionais)**
  - ❖ Responsabilidade social; pesquisa aplicada e inovação; novas tecnologias; novas normas facilitadoras de eficiência energética, de materiais e tratamento de resíduos; apoio a projectos piloto
  - ❖ Banca verde

A vossa inteligência colectiva - Roteiro para o QNQ-SNQ verde

1. Competências Verdes: objectivos, benefícios; porquê e para quem

2. Situação actual das Comp. Verdes – todos os níveis de Ensino e formação. Inquérito

3. O QNQ e as Comp Verdes – quais as possibilidades?

4. Dados e análises: situação actual

5. Futuramente: Comp. Verdes Transversais

6. Futuramente: Comp Verdes Específicas

7. Futuro: Comp. Verdes altamente especializadas

8. Plano de Acção e cronograma para Educação e QNQ - Angola Verde. Grupo de Trabalho

9. Divulgar, aprender, agir conjuntamente entre países: SADC, ECCAS, União Africana, PALOP

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Obrigada