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Children's Rights in the Just Green Transition

Research Report

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(*Please see Appendix A for the full list of interview participants.*)

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The statements in this document should not be taken as representing the official position and policies of UNICEF.

This report is dedicated to all the children around the world, whose futures are intrinsically linked to outcomes of the green transition. The objective is to contribute to the realization of children's rights, which will pave the way for a sustainable, inclusive and just future.

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Executive summary

The Convention on the Rights of the Child (CRC), adopted in 1989, is the most widely ratified human rights treaty in history, establishing that the child's best interests must be a primary consideration in all actions concerning them.[1] The CRC emphasizes the obligation of States to ensure the rights of all children without discrimination. The United Nations Guiding Principles on Business and Human Rights,[2] and the Children's Rights and Business Principles[3] outline the respective roles of governments and business in protecting and respecting human rights, including children's rights.

Today, as the impacts of climate change continue to escalate, children's rights are at substantial risk, especially in vulnerable regions around the world. Nearly every child worldwide is exposed to climate and environmental hazards, with one billion children living in countries identified as extremely high-risk by UNICEF's Children's Climate Risk Index.[4] These children face a cycle of increasing exposure and vulnerability that threatens their ability to survive, grow and thrive.[5]

The global green transition – aiming to move from fossil fuels to more sustainable energy systems – presents both opportunities and challenges. It is essential for achieving the 1.5°C target set by the Paris Agreement and ensuring a sustainable future. But if poorly managed, the transition will risk worsening social inequalities, particularly among children.

The international community has called for a just and equitable transition that protects all people, including the most vulnerable, as acknowledged in the UAE Consensus of COP28. However, children are frequently overlooked in this discourse, leaving their rights inadequately safeguarded amid the green transition. This lack of focus on children's unique vulnerabilities limits their involvement in planning and reduces the chances that their needs are addressed in climate action strategies.[6]

This report presents the findings from research on the implications of the green transition for children's rights and offers evidence that businesses, governments and other stakeholders can use to ensure children are not left behind. It focuses on two main areas:

1 Systemic business changes to achieve the 1.5°C target

The report identifies systemic changes that businesses need to adopt to meet the Paris Agreement goals. These changes require a significant shift across various industries – away from fossil fuels and linear production models, towards more sustainable practices such as renewable energy, circular supply chains, and ethical business models.

The six major shifts are:

- Moving from a fossil-fuel-based economy to low-carbon solutions.
- Transitioning to circular supply chains from traditional, wasteful production.
- Prioritizing ethical and traceable supply chains over cost efficiency.
- Adopting smart technologies to replace outdated, resource-intensive methods.
- Embracing inclusive development models that engage marginalized communities.
- Moving towards transparent and accountable governance.

Each of these shifts requires strategic action by businesses, including integrating environmental, social and governance (ESG) metrics, adopting responsible sourcing practices, and actively engaging local communities and vulnerable groups in decision-making.

1 United Nations, Convention on the Rights of the Child, General Assembly resolution 44/25 of 20 November 1989, article 3; full text (English PDF).
2 Office of the United Nations High Commissioner for Human Rights, 'Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework', OHCHR, New York and Geneva, 2011.
3 The Children's Rights and Business Principles are available in Arabic, Chinese, English, French, Japanese, Portuguese, Russian and Spanish at <https://resourcecentre.savethechildren.net/document/childrens-rights-and-business-principles-crbp>.
4 UNICEF Data, Children's Climate Risk Index (interactive website), 19 August 2021.
5 United Nations Children's Fund, The UNICEF Sustainability and Climate Change Action Plan (2023-2030), Executive Summary, New York, November 2023, p. 3.
6 United Nations Children's Fund, Children face unique vulnerabilities to environmental hazards at every stage of life: Fragile Beginnings, New York, February 2025


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2 Assessing impacts on children and their rights

The report analyses the green transition's direct and indirect impacts on children, focusing on how economic activities, business models, and policy changes might affect their rights. **The findings indicate that children are highly vulnerable to disruptions caused by the green transition:**

- Shifts in employment from carbon-intensive to green industries can lead to economic insecurity for families, particularly in fossil-fuel-dependent regions. This insecurity may push children into hazardous labour and reduce access to education.
- Financial pressures from rising costs of energy and green products can lead to economic hardship for low-income families, forcing children to leave school or work to help support their families
- Changes in land use for renewable energy installations and reforestation may lead to the displacement of families, loss of educational opportunities, and weakened cultural ties for children.

In addition, major evidence gaps in understanding how the green transition affects children, especially in underserved and vulnerable regions, were identified. Available studies have largely focused on broader environmental and economic outcomes, often overlooking how these changes specifically affect children. Further, they are frequently concentrated in regions where data collection is more feasible, with much of the input coming from adults. This means that children's unique experiences and needs have frequently been overlooked.

Conclusion:

The transition to a greener, more sustainable future is necessary to combat climate change and ensure long-term global well-being. However, this transition must be inclusive and consider the most vulnerable populations – particularly children – who are disproportionately affected by climate and socio-economic changes. A truly just transition calls for applying a child rights lens to promote focused attention on children throughout this process.[7]

By describing the systemic changes required, impacts on children, and evidence gaps, the report aims to provide a foundation for action by policymakers, businesses, communities and other stakeholders. By prioritizing children's rights in policies, community engagement and business strategies, a just green transition can pave the way for an equitable future where every child can thrive.

7 Li, Lulu, Discussion Brief: A child rights lens to just transitions, United Nations Children's Fund on behalf of the Nordic Business Rountable, October 2022.

01

INTRODUCTION: TOWARDS A JUST GREEN TRANSITION THAT RECOGNIZES CHILDREN'S RIGHTS

As the transition to low-carbon sustainable energy moves forward, countries and companies around the world are committing to climate goals, from COP pledges to net-zero road maps.

Within these commitments, attention to the human rights impacts is increasingly becoming a more common feature. However, although children are among those most affected by climate change, they are frequently side-lined in the global conversation on the transition to sustainable energy.

***Section 1** begins by outlining a basic definition of the transition, and proceeds to focus on the Convention on the Rights of the Child, the specific vulnerabilities of children, and the need to make children's rights and well-being a priority in global policies and action. It concludes by describing the framework, methodology and scope of this research.*

1.1 Defining 'green' and 'just'

The green transition

refers to the comprehensive transformation of economic, social and industrial systems to reduce greenhouse gas emissions, limit environmental degradation, and foster a low-carbon, climate-resilient future.[8]

While the transition out of fossil-fuel based economies and into cleaner, more sustainable energy systems is creating jobs and economic opportunities, it can also lead to economic disparities and social challenges – particularly for workers and communities that rely on high-carbon industries.[9] For the transition to be effective, it must also be 'just', ensuring that the fundamental rights of the most vulnerable are respected.[10]

A just transition

refers to the process of shifting to a low-carbon economy in a way that guarantees fairness, social equity and inclusivity, especially for marginalized communities and workers.[11] A consensus on the necessity of the just transition gained international traction in 2015, when the Paris Agreement was adopted and the 2030 Agenda for Sustainable development contained a pledge to "leave no one behind."[12]

Given the reliance on energy systems for all levels of society, it is crucial to adopt this broader perspective that encompasses societal impacts. In sum, **a just green transition is essential for societies** to build a sustainable future that not only addresses environmental concerns but also advances social justice, economic security and inclusivity.

8 *For a detailed discussion of the green transition's scope, see:* European Training Foundation, Skilling for the Green Transition, ETF Policy Briefing, European Union, 2023, p. 02.
9 *See, for example:* United Nations Department of Economic and Social Affairs, A Just Green Transition: Concepts and practice so far, UN DESA, November 2022.
10 Institute for Human Rights and Business, Just Transitions for All: Business, human rights and climate action, IHRB, November 2020, p. 5.
11 *See:* Just Transition Research Collaborative, Mapping Just Transition(s) to a Low-Carbon World, United Nations Research Institute for Social Development, December 2018.
12 United Nations Department of Economic and Social Affairs, A Just Green Transition: Concepts and practice so far, UN DESA, November 2022, p. 1.

1.2 Bringing children to the forefront

The Convention on the Rights of the Child (CRC), adopted by the United Nations General Assembly in 1989, is the most widely ratified human rights treaty in history. It sets forth the specific rights of children in 54 articles, and emphasizes that the child's best interests must be a primary consideration in all actions concerning them (article 3).

States Parties to the Convention are legally obligated to protect, respect and fulfil the rights of every child within their jurisdiction without discrimination of any kind (article 2). This applies regardless of the child's or their parent's or legal guardian's race, colour, sex, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth, or other status.

Momentum in achieving a just green transition benefits children in multiple ways – from supporting their right to health by reducing air pollution to preserving a liveable planet for future generations. The escalating impacts of environmental degradation and climate change, on the other hand, remain a fundamental threat to the fulfilment of children's human rights.

Nearly every child worldwide is exposed to climate and environmental hazards. As of 2021, one billion children lived in countries identified as extremely high risk by the UNICEF Children's Climate Risk Index.[13] These children face a cycle of increasing exposure and vulnerability, threatening their ability to survive, grow and thrive.[14]

Global declarations, publications and international forums consistently accentuate that the transition out of the fossil fuel-based economy and into a sustainable energy systems must be conducted in a "just, orderly and equitable" manner. This principle is formally acknowledged in the UAE Consensus of COP28, and further reinforced in the Mutirão Decision of COP 30 – which marks the first time a COP decision text included an explicit reference to children, alongside youth and intergenerational equity, signalling a more intentional focus on child rights in the climate negotiations.[15]

BOX 1

Children have the right to be heard in matters that affect them

The Committee on the Rights of the Child includes 18 independent, international experts who review progress and problems in implementing the CRC. It's their job to monitor whether governments fulfil their obligations, and to make recommendations for improvements.

In General comment No. 26, the Committee emphasizes that children must have access to meaningful participation in environmental and climate-related decisions. This right is not only about participation; it is also about justice and well-being.

However, even as governments and businesses increase their efforts towards a just green transition, children's rights are often overlooked in public discourse. This oversight limits the ability to safeguard children, who are especially vulnerable to the impacts of climate change, and reduces their involvement in just transition strategies and actions.

The triple planetary crisis of climate emergency, biodiversity collapse and pervasive pollution threatens to undo decades of development and humanitarian

13 UNICEF Data, Children's Climate Risk Index (interactive website), 19 August 2021.
14 United Nations Children's Fund, The UNICEF Sustainability and Climate Change Action Plan (2023-2030), Executive Summary, New York, November 2023, p. 3.
15 Child Rights International Network, COP30 Picks Up the Pace on Inclusion of Children, Yet Should Have Gone Further, CRIN, London, 24 November 2025.

progress.[16] The challenges caused by this crisis are intensified by economic crises, armed conflicts, and the lingering effects of the COVID-19 pandemic, including more severe economic inequalities and rising multidimensional poverty.[17]

Children in low-income countries face some of the greatest risks from climate change, as they are often exposed to multiple, overlapping climate and environmental hazards. Climate-related emergencies are increasing sharply: by 2021, more than 75 per cent of United Nations humanitarian appeals were in response to extreme weather events, up from 36 per cent in 2000.[18] Their vulnerability is further compounded by the fact that children experience higher health risks than adults; they breathe more air, and consume more food and water per unit of body weight, making them more susceptible to threats such as cholera, malaria, respiratory infections, and other climate-sensitive diseases. Exposure to environmental degradation and climate hazards during pregnancy, infancy, and childhood can disrupt healthy development and cause lasting physical, cognitive, and psychological harm, shaping children's health and well-being throughout their lives.[19]

FIGURE 1

Children face severe impacts from climate change but are under-represented in climate financing

2 billion children, ***83% per cent of children globally, are exposed to high levels of air pollution*** – around **600,000 children under age 5** die every year from respiratory infections caused by air pollution.[20]

1 billion children are exposed to high or extremely high ***water stress***, ***scarcity***, ***vulnerability*** or ***drought***.[21]

90% of diseases **linked to climate crises** are likely to affect children under age 5.[22]

During 2006–2023, *only* **2.4% of climate finance** serving the United Nations Framework Convention on Climate Change and the Paris Agreement could be classified as supporting projects with child-responsive activities.

Of all the project proposals approved, *only*

- **0.8%** incorporated ***social protection interventions***,
- **0.7%** aimed to address ***child-responsive health***.
- **1.0%** of projects included children's involvement as part of the ***design or monitoring***.[23]

16 Committee on the Rights of the Child, General comment No. 26 (2023) on children's rights and the environment, with a special focus on climate change, CRC/C/GC/26, United Nations, 22 August 2023, para. 1.
17 UNICEF Data, Impact of COVID-19 on Multidimensional Child Poverty, United Nations Children's Fund, 16 September 2020.
18 UNICEF Division of Global Communication and Advocacy, The Climate-Changed Child: A Children's Climate Risk Index supplement, New York, November 2023, p. 2.
19 United Nations Children's Fund, Children face unique vulnerabilities to environmental hazards at every stage of life: Fragile Beginnings, New York, February 2025
20 United Nations Children's Fund, The UNICEF Sustainability and Climate Change Action Plan (2023-2030), Executive Summary, New York, November 2023, p. 3; UNICEF Climate, Environment, Energy and Disaster Risk Reduction, A Brighter Life for Every Child with Sustainable Energy, New York, September 2022, p. 4.
21 UNICEF Division of Global Communication and Advocacy, The Climate-Changed Child: A Children's Climate Risk Index supplement, New York, November 2023, p. 2. See, also: UNICEF Data, Children's Climate Risk Index (interactive website), 19 August 2021.
22 Save the Children, 'Statistics About Climate Change and Children', The Climate Crisis, 2025.
23 Children's Environmental Rights Initiative Coalition, Falling Short: Addressing the climate finance gap for children, CERI, June 2023, pp. 5–6.

The most vulnerable children – those living in poverty, the youngest, the displaced, and those with disabilities – face even greater risks. These groups often lack access to essential services such as health care, clean water and education, placing them at greater harm from the impacts of climate change and environmental hazards.

The stress from climate-related challenges can cause households to use harmful coping mechanisms, including child marriage, child labour and family separation, and can deepen existing gender inequalities, particularly for young women and girls.[24]

Despite the impacts of climate change on children, they remain largely invisible in policy discussions and global climate commitments.[25] Only a small fraction of climate funding is dedicated to child-focused programmes. This creates a critical gap in efforts to ensure that children have equal access to the benefits of the green transition, are protected from adverse impacts, and have access to remedy when their rights are violated. [26]

1.3 Research framework, methodology and scope

In the context of responsible conduct, the child rights implications linked to alleviating climate change and implementing transition strategies should be a priority focus of the global discourse, as noted during a Nordic Business Roundtable organized by UNICEF Sweden and IKEA in October 2022. The perspectives and rights of children, both in vulnerable situations and as vital agents of change, need to be more fully explored and identified as a core element of the just green transition.[26]

Reflecting this premise, an overall objective of this research was to provide a resource for regulators, businesses, investors and other stakeholders.

Two key areas are explored:

1 **Identifying the systemic changes businesses must implement to achieve the 1.5°C target set by the Paris Agreement**

These changes have already resulted in economic and systemic shifts that affect diverse population groups, countries and stakeholders, and this trend is expected to accelerate.

2 **Assessing the direct and indirect impacts on children and their rights from economic activities and business models linked to the transition to a green economy**

This includes identifying risks that may arise from a lack of consideration for children's rights and specific needs.

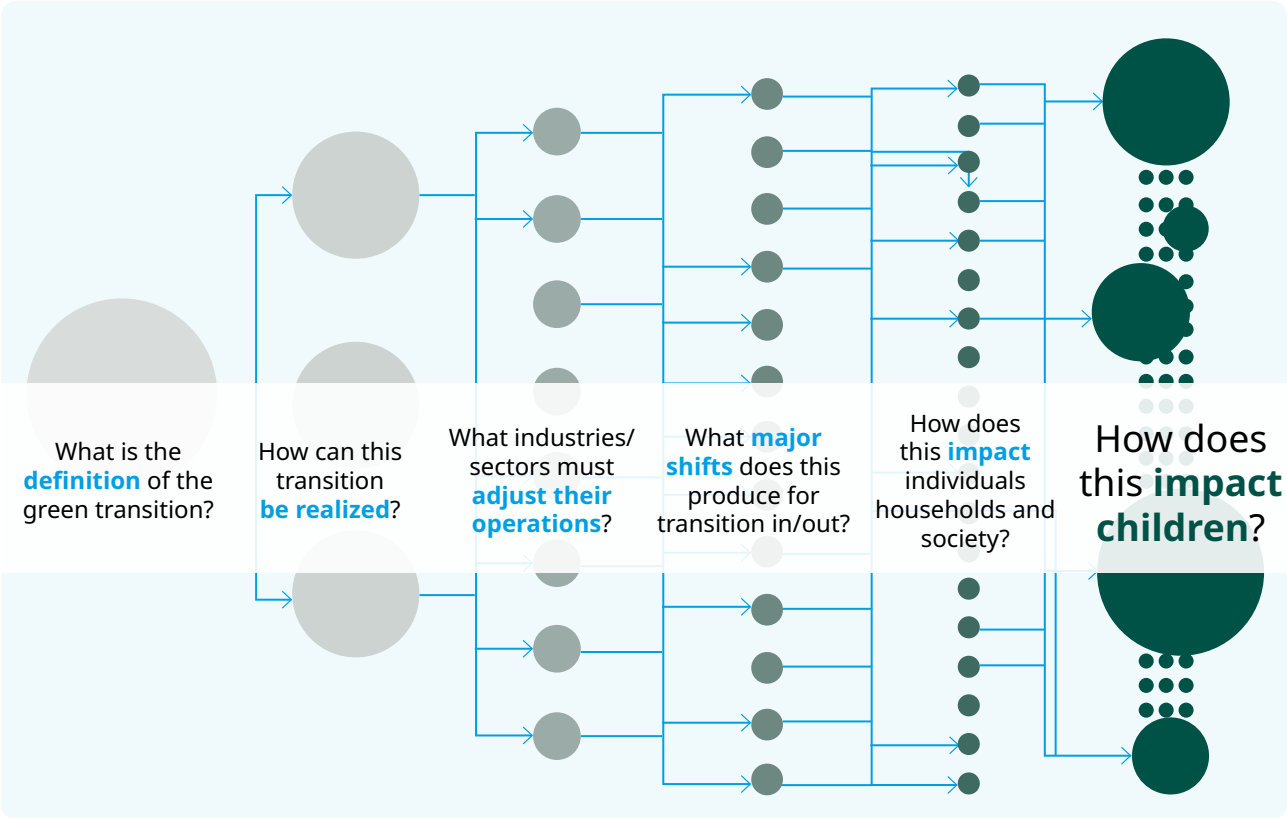
24 *See, for example:* United Nations Children's Fund, Child Marriage on the rise in the Horn of Africa as drought crisis intensifies, June 2022
25 *See, for example:* United Nations Children's Fund, The UNICEF Sustainability and Climate Change Action Plan (2023-2030), Executive Summary, New York, November 2023, p. 4
26 Li, Lulu, Discussion Brief: A child rights lens to just transitions, United Nations Children's Fund (on behalf of the Nordic Business Rountable, October 2022), 2022.

The research framework, methodology and scope are outlined below.

> ***The research framework***
> *was designed to provide a robust evidence base on the impacts of the green transition on children's rights, with a focus on the corporate responsibility to uphold human rights. Key sources of guidance included the Convention on the Rights of the Child,[27] the United Nations Guiding Principles on Business and Human Rights (UNGPs),[28] and the Children's Rights and Business Principles.[29]*

The framework followed a sequential approach to identify the green transition's impacts on children, considering both direct and indirect effects on their rights. Figure 2 illustrates how each stage was mapped to produce a comprehensive analysis of the research findings.

FIGURE 2
Schematic representation of the framework for this research



27 United Nations, Convention on the Rights of the Child, General Assembly resolution 44/25 of 20 November 1989; full text (English PDF).
28 Office of the United Nations High Commissioner for Human Rights, 'Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework', OHCHR, New York and Geneva, 2011.
29 The Children's Rights and Business Principles are available in Arabic, Chinese, English, French, Japanese, Portuguese, Russian and Spanish at <https://resourcecentre.savethechildren.net/document/childrens-rights-and-business-principles-crbp>.

The methodology

employed a mixed-method approach that combined a literature review of secondary sources and interviews with key informants.

The first phase was a review of relevant literature, encompassing both qualitative and quantitative information related to the research questions. Sources included academic journals and articles, institutional reports and briefs, news articles, NGO publications, industry reports and policy papers to provide a multifaceted perspective.

The literature review findings were analysed to identify key themes, patterns and gaps in the evidence. Compilation of the research database followed data management practices to ensure ethical collection, storage and analysis of data. The research adhered to principles that protect children's rights throughout the data life cycle, applying a participatory, accountable and culturally sensitive approach.

In the second phase, questionnaires for stakeholder engagement were drafted to address the evidence gaps. Semi-structured interviews were conducted with stakeholders identified as knowledge holders or contributors to the discourse on the main research questions, including four stakeholder groups: 1) child rights' experts, 2) climate policy experts, 3) private sector participants and 4) public sector participants, including regulators. Interviewees were also given the option to provide written responses to select questions via email. (*For the list of participants, see Appendix A.*)

Scope and limitations

The research was conducted from August–October 2024. The primary objective was to contribute to the growing body of evidence on the impacts of child rights within the context of the green transition and associated economic changes. It was also designed to support future research on knowledge or evidence gaps in relevant countries and regions.

Because the green transition is a relatively recent agenda, the availability of longitudinal data was limited. Therefore, the study primarily focused on analysing short-term impacts and emerging trends. Other imitations include:

Global coverage

The study focused on examples from the Global South due to the limited capacity for extensive global analysis.

Lack of on-the-ground interviews

Direct engagement with affected children was limited. To address this, anecdotal evidence and quantitative data were used to provide concrete examples where possible.

Private sector perspectives

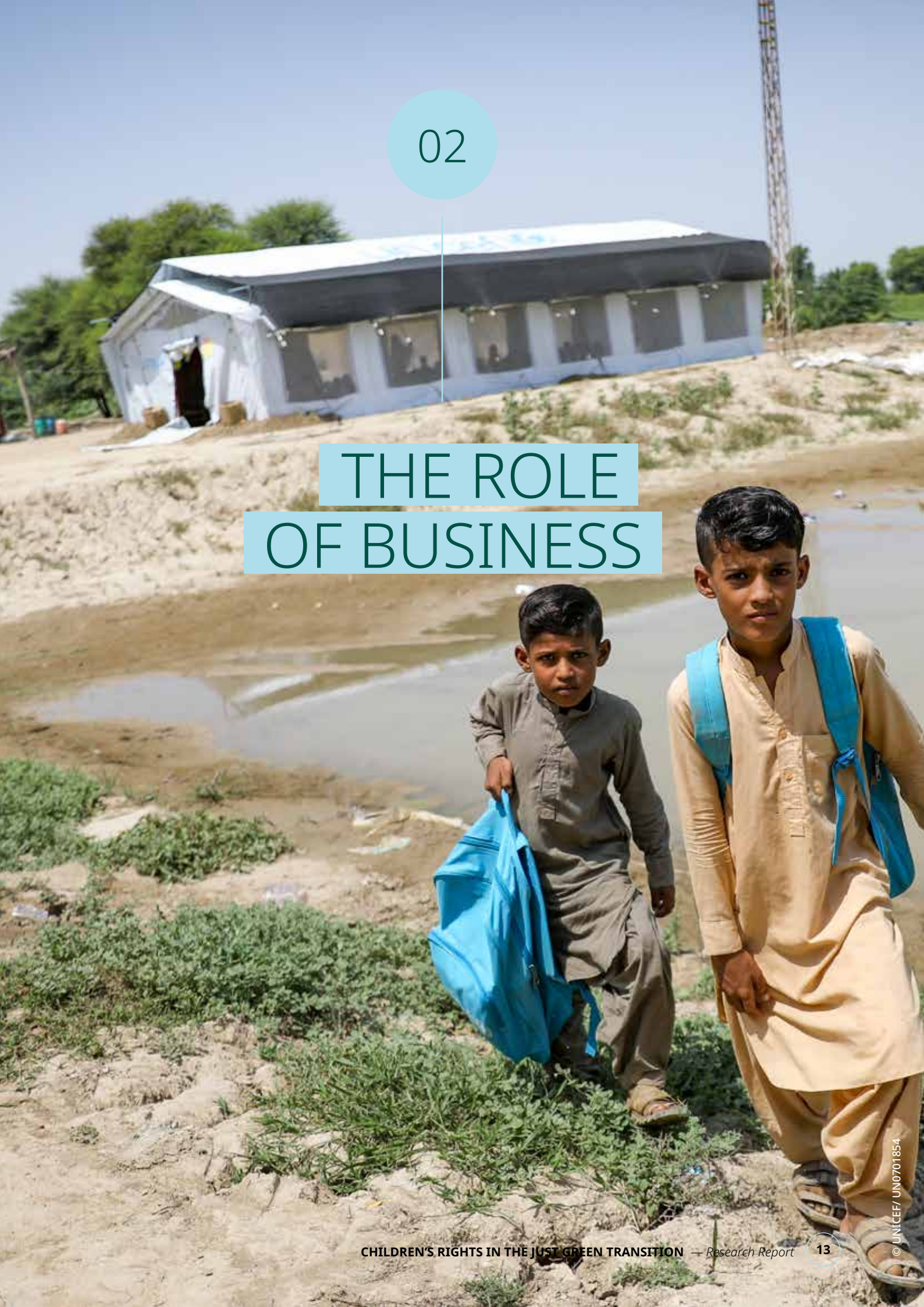
A small sample size resulted in the omission of some perspectives from the private sector. This deficit was compensated for by incorporating available secondary data and expert opinions.

Cultural specificity

Potential gaps in cultural context were mitigated by consulting local experts and reviewing relevant literature.

02

THE ROLE OF BUSINESS



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Achieving the 1.5°C target set by the Paris Agreement requires reducing greenhouse gas emissions by 45 per cent below 2010 levels by 2030 and reaching net-zero emissions by 2050. This means there is a short window of opportunity to meet the goals for transitioning from carbon-intensive production and consumption to sustainable and green economies.

Responsible business conduct during the green transition includes actively safeguarding children's best interests through the framework established in the UNGPs, specifically:

> Governments

have a duty to regulate businesses to prevent violations of children's rights, such as child labour or environmental destruction, and to use strong monitoring mechanisms that hold businesses accountable for their activities.

> Businesses

have a responsibility to avoid infringing on children's rights and to address any adverse impacts, including those arising indirectly (e.g., wind farms and displacement). This includes policy commitments, conducting due diligence, and tracking accountability in all activities throughout their value chains.

In addition to mitigating harm, businesses have a key role in supporting children's rights by creating opportunities for children to benefit from positive developments – such as access to clean energy, safe water, digital inclusion, and climate-resilient infrastructure.

Children affected by harmful business practices must have access to judicial or non-judicial remedies. *Governments and companies share the responsibility to ensure that grievance mechanisms are accessible, child-friendly and effective.*

The just transition concept is increasingly being applied as a framework for public and private sector action on climate change. It encompasses public policies and business action to address the ways that industry's transition away from greenhouse gas emissions affects jobs and livelihoods (the transition 'out') and measures to generate the low- or zero-greenhouse-gas-emission jobs and livelihoods of a sustainable society (the transition 'in').[30]

***Section 2** outlines key changes in business models, products and services, and the broader impacts on communities, families and children's rights. It concludes by exploring how operating models are changing to adopt sustainable practices towards achieving an inclusive green transition.*

2.1 How business models are changing

The green transition is driving companies to rethink their business models to meet environmental goals, regulatory demands, and shifting consumer preferences. This transformation involves a shift towards low-carbon solutions, circular economy practices and eco-innovation.

Companies are introducing electric-powered equipment, renewable energy devices, and sustainable consumer goods while phasing out carbon-intensive offerings.

Services are also being converted, for example, into energy-as-a-service models, and green finance and mobility solutions, alongside new health, wellness and sustainable tourism offerings.

These changes reflect evolving efforts to align business operations with the principles of sustainability, resource efficiency, and climate responsibility. Table 1 summarizes the key changes to products and services.

30 Institute for Human Rights and Business, Just Transitions for All: Business, human rights and climate action, IHRB, November 2020, p. 6.

TABLE 1
Products and services

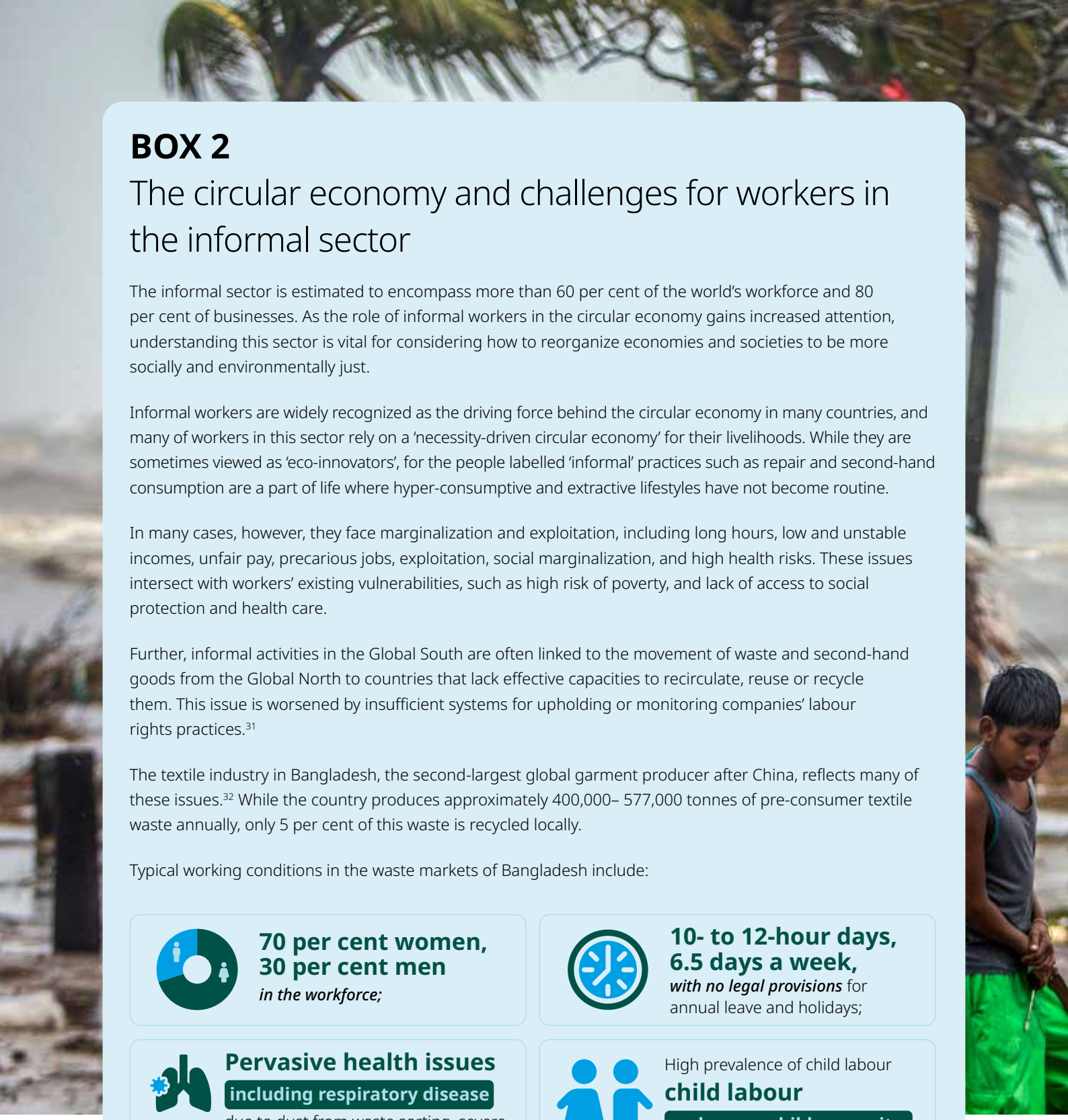
Type of products and services	Disappearing products and services	New products and services
Transportation and mobility	• Internal combustion engine vehicles (gasoline/diesel cars, buses, trucks) • Diesel-powered fleets (trucks, buses, ships) • Short-haul flights	• Electric, hydrogen and alternative fuel vehicles (cars, buses, trucks, e-bikes, e-rickshaws, scooters) • Electric-powered fleets (ships, trucks, ferries) • Electric aircraft, drones, and high-speed electric rail
Energy and utilities	• Coal-fired power plants, gas-based generators • Fossil-based energy utilities	• Solar panels, wind turbines, geothermal energy, microgrids • Energy-as-a-service (solar installations, battery storage)
Construction and industrial equipment	• Diesel-powered construction and agricultural machinery	• Electric-powered machinery (tractors, forklifts, cranes)
Consumer goods and appliances	• Gas-powered stoves and water heaters • High-energy-use appliances	• Energy-efficient heat pumps, induction cooktops, electric heaters • Smart, energy-efficient internet of things devices and wearables
Food and agriculture	• Animal-based meat and dairy products • Fossil-fuel fertilizers and chemical pesticides	• Plant-based food alternatives, lab-grown meat and dairy • Organic and bio-based fertilizers and pest control
Tourism and hospitality	• Carbon-intensive tourism (cruise lines, aviation-heavy travel)	• Eco-tourism, sustainable hospitality, low-impact travel services
Finance and carbon markets	• Traditional fossil fuel financing and investments	• Green bonds, ESG-linked loans, impact investing, carbon credit platforms
Packaging and materials	• Single-use plastics and non-recyclable packaging	• Biodegradable, compostable, reusable, or recyclable packaging
Waste management	• Landfilling-based waste management • Waste disposal without energy recovery	• Circular economy models: recycling, upcycling, repair services • Waste-to-energy technologies, composting
Ownership models	• Traditional ownership of appliances, batteries, and tools	• Subscription and leasing models: batteries-as-a-service, tool leasing
Maintenance and support services	• Internal combustion engine vehicle maintenance (e.g., oil changes)	• Electric vehicle maintenance, battery recycling, and energy management services
Carbon management	• High-carbon supply chains	• Carbon footprint assessments, offsets, emissions trading services

As the green transition reshapes companies' operating models, it influences the availability and affordability of products and services for consumers. These shifts can have far-reaching and complex impacts on children, families and the communities where they live, potentially resulting in both direct and indirect challenges to children's rights. Table 2 highlights some of the potential opportunities and challenges. (*For a discussion of the circular economy's impacts as they relate to conditions in the informal sector, see Box 2, below.*)

TABLE 2
Opportunities and challenges for people and communities

Type	Opportunities	Challenges
Employment and jobs	• New jobs in renewable energy sectors (solar, wind, hydropower). • Growth of electric vehicle manufacturing and charging infrastructure. • Expansion of circular economy jobs (repair, recycling, upcycling).	• Job losses in fossil fuel industries (coal, oil, gas) threatening livelihoods and community stability with SMEs in these sectors and their local supply chains particularly exposed. • Displacement of mechanics, drivers, and workers dependent on diesel-powered vehicles. • Skills gap: Workers in traditional sectors may lack training for green jobs.
Energy access and affordability	• Access to renewable energy solutions in off-grid areas (solar microgrids, small hydro). • Energy-as-a-service offerings reduce dependence on fossil fuels.	• High upfront costs of solar systems, electric vehicles, and energy-efficient appliances. • Low-income households may struggle with affordability without subsidies.
Food systems and agriculture	• Higher incomes for farmers through organic agriculture and eco-certifications. • Growth in plant-based food production and lab-grown alternatives.	• Transition from fossil-fuel fertilizers and pesticides may reduce yields initially. • Plant-based or organic food can be more expensive, limiting access for low-income groups.
Health and environment	• Cleaner air and water from reduced fossil fuel emissions. • Reduction in pollution-related diseases (asthma, respiratory illnesses). • Eco-friendly agriculture reduces water contamination from chemical runoff.	• Air pollution may persist in transition phases as fossil fuel industries decline slowly. • Resistance from some communities reliant on traditional products or practices (e.g., animal-based diets). • Without integrated detox strategies, decarbonization efforts risk increasing toxic exposures, disproportionately harming children and vulnerable communities.

Type	Opportunities	Challenges
Finance and economic inclusion	• Green finance instruments (ESG loans, green bonds) provide new funding opportunities. • Support for entrepreneurs to launch sustainable businesses and start-ups.	• Smallholder farmers and micro-businesses may struggle to access green finance, increasing inequality.
Mobility and transport	• Development of electric public transportation (e-buses, e-bikes). • Expansion of shared mobility platforms (car-sharing, bike rentals). • New jobs in electric vehicle maintenance and battery recycling.	• Drivers and mechanics working with diesel vehicles may lose their livelihoods. • Rural communities may struggle with access to electric vehicle infrastructure and affordable transport.
Tourism and hospitality	• Growth in eco-tourism promoting conservation and sustainable travel. • New business models in green hospitality (energy-efficient hotels, eco-resorts).	• Traditional tourism models (e.g., cruises, air travel) under pressure, leading to reduced employment and loss of income with particularly severe impacts on SMEs.
Social inclusion and governance	• Increased participation in community-led energy projects (cooperatives managing solar microgrids). • Opportunity for governments to design just transition frameworks that protect workers.	• Weak governance or lack of policy can lead to unequal access to green jobs and services. • Without proper planning, fossil-fuel-reliant communities are at risk of economic isolation.



BOX 2

The circular economy and challenges for workers in the informal sector

The informal sector is estimated to encompass more than 60 per cent of the world's workforce and 80 per cent of businesses. As the role of informal workers in the circular economy gains increased attention, understanding this sector is vital for considering how to reorganize economies and societies to be more socially and environmentally just.

Informal workers are widely recognized as the driving force behind the circular economy in many countries, and many of workers in this sector rely on a 'necessity-driven circular economy' for their livelihoods. While they are sometimes viewed as 'eco-innovators', for the people labelled 'informal' practices such as repair and second-hand consumption are a part of life where hyper-consumptive and extractive lifestyles have not become routine.

In many cases, however, they face marginalization and exploitation, including long hours, low and unstable incomes, unfair pay, precarious jobs, exploitation, social marginalization, and high health risks. These issues intersect with workers' existing vulnerabilities, such as high risk of poverty, and lack of access to social protection and health care.

Further, informal activities in the Global South are often linked to the movement of waste and second-hand goods from the Global North to countries that lack effective capacities to recirculate, reuse or recycle them. This issue is worsened by insufficient systems for upholding or monitoring companies' labour rights practices.[31]

The textile industry in Bangladesh, the second-largest global garment producer after China, reflects many of these issues.[32] While the country produces approximately 400,000– 577,000 tonnes of pre-consumer textile waste annually, only 5 per cent of this waste is recycled locally.

Typical working conditions in the waste markets of Bangladesh include:

70 per cent women, 30 per cent men
in the workforce;

10- to 12-hour days, 6.5 days a week,
with no legal provisions for annual leave and holidays;

Pervasive health issues
including respiratory disease
due to dust from waste sorting, severe back pain from working directly on the floor; and

High prevalence of child labour
child labour
and young children onsite
due to lack of childcare.

31 Circle Economy Foundation, Ashoka, IKEA Social Entrepreneurship and UNDP Accelerator Labs, Circularity & Informality: Redefining narratives, White Paper, October 2024, pp. 7, 18, 8.

32 *The example of Bangladesh is presented in two publications – the full research report, with recommendations for companies on how to address child rights risks and engage responsibly, and a supplemental summary that offers additional recommendations for governments, civil society organizations and consumers:* Centre for Child Rights and Business, Child Rights and Informal Textile Waste Recycling in Bangladesh and Supplementary Report, December 2024.

Child protection laws and regulations do not reach this segment of society, and enforcement is non-existent. Some of the factors pulling children into the workforce include the ease of entry, as no prior skills are required, and the acceptance of having children around the workplace as a substitute for childcare or school.

Textile waste workers typically start with their first job at age 13 and progress through unskilled jobs – sorters, shop assistants, cleaners, machine operators, porters – that provide neither security nor prospects. Workers in their forties and fifties often struggle to survive on a salary comparable to that of a child engaged in child labour.

This vulnerability can drive a cycle of poverty, as working mothers have no education or childcare support. Families struggle with little resources for their children, who, in turn, are at risk of being pulled into the poverty trap as they are forced to work in low-skilled jobs to provide for their families.

While the garment industry is credited with lifting people in Bangladesh out of poverty, large segments of the workforce remain mired in precarious conditions. Moreover, the goods produced from recycled materials often fall short of the goals of a circular economy – reducing waste, recycling and reusing materials – as the main emphasis remains on quick profits.

The challenges faced by workers in informal recycling are seldom acknowledged, despite their contribution to recycled products officially labelled as 'sustainable'. Therefore, textile waste recycling in Bangladesh remains an example of deficient accountability and progress on the core principles of the just transition.

In light of a growing emphasis on corporate due diligence, the current industry focus on reputation and risk management is likely to be insufficient for ensuring sustainable operations. However, a significant scope exists for constructive engagement and support of the people working in the informal recycling sector, particularly with the involvement of a full range of stakeholders, from workers to companies, and including government, civil society organizations and consumers.

2.2 Systemic economic shifts and the strategies adopted by businesses

As companies rethink their business models, they are also reshaping their operating models to adopt sustainable practices and low-carbon solutions. The journey towards an inclusive green transition is rarely linear. Instead, it involves a complex web of interconnected strategies for phasing out greenhouse-gas-emitting activities and facilitating the transition into a sustainable economy.

In this context, a company's *value chain* is typically part of a larger value stream – often called the 'supply chain' or 'value system' – which includes activities from initial raw material sourcing to end-user consumption. Suppliers have their own value chains (upstream value), responsible for producing and delivering necessary inputs, while products often move through distribution channels (channel value) before reaching the buyer.

Six economic shifts necessary to achieve a just green transition were identified through a value chain analysis, reflecting key strategies that are being implemented by businesses throughout their operations and value chains. The analysis examined 21 industries classified under the International Standard Industrial Classification of All Economic Activities (ISIC) developed by the United Nations Statistics Division (*see Appendix B for the list of industries*).

Table 3 outlines the six economic shifts and offers a summary of business strategies. Implementation of these strategies varies by sector, with some industries requiring more extensive adjustments due to their higher energy and carbon usage. Delivering these strategies has wide-ranging implications for economies and societies globally. Understanding these changes is essential to ensure that both the positive and adverse impacts on society, families and vulnerable communities, particularly children, are identified and addressed effectively.

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TABLE 3

Systemic economic shifts required to achieve a just green transition and current business strategies

Shifts	Strategies
1) Transition out of fossil fuel-based economy to low-carbon energy	• Transitioning to renewable energy sources (wind, solar, biofuels) in facilities and operations. • Utilizing carbon capture, storage and carbon credits to offset emissions. • Electrification of transport and machinery, along with low-carbon mobility solutions. • Adopting energy-efficient technologies and smart grids for enhanced operational efficiency.
2) Transition out of linear and wasteful production models to circular supply chains	• Adopting circular supply chains, product lifecycle extensions, and reverse logistics. • Use recycled materials in production and designing products for durability, repairability, and recycling. • Zero waste manufacturing and waste reduction through material recovery, reuse, and recycling initiatives.
3) Transition out of supply chains that prioritize short term cost-efficiency toward more ethical and traceable supply chains that integrate environmental and social standards, ensuring long-term economic value	• Shifting towards traceable, ethical and sustainable sourcing of raw materials. • Collaborating with suppliers to meet environmental and social standards. • Reducing scope 3 carbon emissions and water usage in the supply chain. • Localization of supply chain. • The use of biodegradable and natural products instead of synthetic or chemical-based materials
4) Transition out of outdated technologies and processes that contribute to environmental degradation to smart technologies	• Developing smart technologies, e.g., precision agriculture, energy management • Investing in research and development for sustainable product and solution development. • Leveraging AI and data analytics to monitor emissions, optimize resource use, and improve supply chain transparency.
5) Transition out of traditional business models that prioritize economic gains over social equity to inclusive development strategies	• Engaging local and Indigenous communities in decision-making and co-creating development plans. • Supporting social programmes related to education, health, and employment. • Developing fair and inclusive workplace policies that emphasize DEI.
6) Transition out of weak governance models that allow for corporate exploitation of resources to transparent and accountable governance system	• Integrating ESG metrics into business operations and reporting frameworks. • Engaging stakeholders in sustainability efforts. • Collaborating with governments and other organizations to shape policy and drive industry standards.

These six shifts and the strategies used by businesses to achieve them are summarized below (see Appendix C for a more detailed discussion).

1 Transition out of fossil-fuel-based economy to low-carbon solutions

The shift from a fossil-fuel-based economy to low-carbon solutions is critical for reducing greenhouse gas emissions. Industries are adopting cleaner energy sources, electrifying equipment, and modernizing infrastructure to decarbonize value chains. Sectors such as transportation, manufacturing and agriculture are increasingly using electric vehicles, renewable-powered machinery, and cleaner fuels such as hydrogen and biofuels. In industries such as steel and cement, carbon capture, utilization and storage is being implemented to mitigate emissions that are challenging to eliminate.

2 Transition out of linear and wasteful production models to circular supply chain

To promote sustainability, industries are moving away from linear 'take-make-waste' production models to circular supply chains that emphasize minimizing waste and maximizing resource reuse. This transition involves adopting recycling, remanufacturing and product life-cycle extensions across sectors such as agriculture, construction and manufacturing. Circular practices help industries reduce their reliance on raw materials, enhance resource efficiency, and minimize environmental impacts by reusing and repurposing products and materials whenever possible.

3 Transition out of supply chains prioritizing short term cost-efficiency toward more ethical and traceable supply chains that integrate environmental and social standards, ensuring long term economic value

Industries are increasingly recognizing the importance of sustainability and transitioning towards ethical and traceable supply chains. This shift involves adopting responsible sourcing, collaborating with suppliers to ensure adherence to environmental and social standards, reducing emissions, and ensuring ethical labour practices. Additionally, many sectors are integrating compostable and biodegradable materials in products to minimize environmental impact and promote circular economy practices. Technologies such as blockchain are being used to provide transparency throughout the supply chain. Industries such as agriculture, mining, manufacturing and retail are focused on measures to ensure that the sourcing of materials meets ethical standards to prevent human rights abuses and environmental harm.

4 Transition out of outdated technologies and processes to smart technologies

The move away from outdated, resource-intensive processes towards smart technologies can be an essential part of reducing environmental impacts and enhancing supply chain transparency. Innovations such as precision agriculture, smart grids and data analytics are being applied to optimize resource use, reduce emissions and increase efficiency. Smart technologies are being used in sectors such as construction, real estate and manufacturing to monitor environmental impacts and reduce resource consumption, while the information and communication technology sector supports efforts to enhance supply chain transparency and efficiency.

5 Transition out of traditional business models into inclusive development strategies

Industries are also transitioning away from traditional, profit-focused business models towards inclusive development strategies that prioritize social equity. This involves actively engaging local and Indigenous communities in decision-making processes, supporting social programmes related to education, health and employment, and promoting diversity, equity and inclusion (DEI) within the workplace. These strategies aim to ensure that industries address local needs, foster community relationships, and create inclusive environments that value diverse talents and perspectives.

6 Transition out of weak governance models to transparent and accountable governance systems

The final shift involves moving away from weak governance structures that allow corporate exploitation towards governance models that emphasize transparency and accountability. Integrating environmental, social and governance (ESG) metrics into business operations is key to achieving this transition. Businesses are also engaging stakeholders in their sustainability initiatives and collaborating with governments to shape policies that promote transparency and accountability. This approach is being adopted by industries such as agriculture, mining and financial services to ensure that long-term environmental and social responsibilities are prioritized.

03

CHILD RIGHTS AND THE TRANSITION'S ECONOMIC AND SOCIAL IMPACTS

The transformative strategies driving the global green transition go beyond environmental outcomes: They result in systemic economic shifts that affect livelihoods, resource access and social structures. While these changes are vital for sustainability, they have both positive and negative impacts on vulnerable populations, particularly children.

Resource reallocation, employment shifts and policy changes all shape the environment in which children grow, including the ability of parents and other caregivers to provide an adequate standard of living for their households.

Although businesses have begun transitioning to green economies, are phasing out greenhouse-gas-emitting activities – and, in some cases, refer to the 'just transition' in their plans – consideration of children's rights remains limited.

The Convention on the Rights of the Child (CRC) provides a lens for examining the benefits and potentially adverse impacts of corporate actions to operate in line with the green transition. Case studies bring to light the ways that businesses have acted to improve or worsen the conditions in which children live, play and study.

***Section 3** draws on the literature review, key informant interviews and secondary interviews to identify and analyse the positive and negative child rights impacts of the green transition. The subsections feature an analysis based on specifically relevant articles in the CRC, followed by additional discussion on the impacts.*

(For a concise view of the relevant rights, see Appendix D; for the sources used to identify potential adverse impacts on children and child rights, see Appendix E.)

3.1 Employment and workforce transformation

The transition to renewable energy and the circular economy presents opportunities and challenges for children's rights. Green job creation and reskilling initiatives contribute to economic stability for families, which in turn supports children's access to education, health care and an adequate standard of living.

Locally managed renewable energy projects, such as solar farms and wind installations, create community-level employment, enhance family incomes and provide children with a more secure and supportive environment. Furthermore, some resource extraction industries, particularly in renewable technologies, have invested in social infrastructure, resulting in improved health-care services for families, benefiting children's health and development.

However, the shift away from carbon-intensive industries has also resulted in job losses. Globally, approximately 13 million energy-related jobs are likely to be lost as a result of the phase-out of fossil fuels within the energy system. Further, the shift to 'green' jobs favours countries and locations that have a high concentration of skilled workers. Upskilling will be essential for the remaining workforce to manage new materials and processes, as the renewable energy sector faces a substantial skills gap, with 36 per cent of workers needing specialized expertise.[33]

These factors lead to economic instability, especially in low-income regions and those heavily reliant on fossil fuel extraction. Economic insecurity can push children into hazardous labour to support their family, undermining their right to education and health. Additionally, families displaced by renewable energy projects or mining for raw materials may face poor living conditions and lack access to essential services, leaving children vulnerable to malnutrition, disrupted education and long-term health issues.

Extractive industries further expose children to harmful substances, leading to respiratory disease and cognitive impairment. Vulnerable communities around these industries also face increased risks of child exploitation, including sexual abuse, exacerbating the emotional and physical toll on children.

33 World Economic Forum, Accelerating an Equitable Transition: A framework for economic equity, Insight Report, WEF, January 2024, pp. 15, 16.

TABLE 4

Employment and workforce transformation – Child rights impacts, by relevant article in the CRC

Positive impacts	Negative impacts
Health (article 24) • Green job creation and reskilling improve family incomes, supporting better access to health care and nutrition. **Education** (article 28) • Local energy projects reduce time children spend on chores, allowing more focus on education. **Adequate standard of living** (article 27) • Sustainable employment lifts families out of poverty, providing stable environments for children.	**Health** (article 24) • Hazardous waste from circular economy exposes children to harmful substances, causing health issues. **Adequate standard of living** (article 27) • Environmental degradation may disrupt sustainable livelihoods, which are critical for ensuring children's development. **Education** (article 28) • The loss of jobs in extractive industries force children into labour, limiting their access to education. **Protection from child labour** (article 32) • Demand for raw materials in renewable energy industries leads to child labour in unsafe mining. **Protection from drug abuse** (article 33) • High rate of drug and alcohol consumption of children in the extractive areas. **Protection from sexual exploitation** (article 34) & **trafficking** (article 35) • High rate of sexual abuse and trafficking due to child labour in the extractive industries.

Changes in skills and employment

Positive impacts on children's rights

Green job creation, driven by the transition to renewable energy and the circular economy, offers a chance to revitalize communities and spur economic growth. Locally managed renewable energy projects, such as solar farms and wind installations, generate community-level employment. For example, Shell has created more than 1,800 jobs as part of its energy transition strategy, focusing on reskilling workers in low-carbon technologies.[34]

The growing demand for digital skills in renewable energy systems such as wind, solar and biomass energy opens doors to specialized, higher-paying roles, improving household incomes and supporting families by enhancing access to health care, nutrition and education.

Similarly, the circular economy, particularly in waste management and recycling, creates numerous job opportunities while promoting environmental sustainability and healthier communities. For example, projects such as Scotland's Levenseat Recycling Facility divert waste from landfills and provide temporary and permanent jobs in waste sorting and energy recovery.[35]

Furthermore, sustainable practices such as localized renewable energy can empower women by creating

34 World Benchmarking Alliance, Just Transition Assessment 2021: Are high-emitting companies putting people at the heart of decarbonisation?, WBA, pp. 25–26.

35 Scottish Financial News, £1m Grant Fuels Waste Facility Upgrade and Job Creation in Polmont, 20 October 2023.

economic opportunities. This shift offers workers training and development, leading to higher-paying jobs, lifting families out of poverty, and creating a stable, supportive environment for children with improved access to health care, education and clean living conditions.

An interviewee shared an example from the Philippines where solar energy training programmes for disadvantaged youth in Taal Lake and Tawi-Tawi were established through collaborative efforts involving multiple organizations and government agencies. These programmes provided hands-on training and integrated marginalized communities into the emerging green economy. Approximately 90 youths participated in training, half of whom were female. These initiatives are particularly beneficial in contexts where young people often lack viable paths to employment or skills development.

Negative impacts on children's rights

As businesses transition out of carbon-intensive industries, many vulnerable families face job losses, leading to widespread economic insecurity. This is especially evident in regions where fossil fuel or resource extraction has been the primary source of employment for generations, for instance, in the coal-dependent region of Mpumalanga, South Africa.[36]

As high-carbon industries shrink, alternative job opportunities may become scarce, making it difficult for families to secure a stable source of income and worsening economic challenges. The shift to circular supply chains, while improving sustainability, can further disrupt traditional labour markets by reducing the demand for raw materials and manual labour.

Families relying on extraction industries face an uncertain future, pushing them closer to poverty. For children, this often means reduced access to education, health care and nutritious food, placing their overall development at risk.

Job loss among men in transitioning industries means that women often take on multiple roles, including informal labour in addition to unpaid caregiving. Overburdened mothers may struggle to provide quality care, affecting children's health, education and overall development.

Moreover, the decline of traditional industries may lead families to migrate from rural to urban areas in search of new opportunities. Carbon-intensive regions with out-migration face greater challenges in offering their residents equitable economic opportunities, access to social services, and comparable levels of well-being.[37] In these difficult conditions, children's education is frequently disrupted as they have limited access to essential services and social infrastructure.

In regard to recycling, an interview participant noted that labour-intensive processes are frequently shifted to low-income countries. More technical, safer recycling methods are concentrated in wealthier nations, leading to an unequal distribution of economic benefits from the green transition.

Improper handling of hazardous waste, particularly electronic waste (e-waste), can release dangerous substances, including mercury, cadmium and lead, into the environment. Children working in informal waste management or living near disposal sites often face direct exposure, leading to severe health consequences, including lung damage, skin diseases and increased risk of cancer.

Post-industrial recycling initiatives for garment waste in countries such as Bangladesh show that the benefits of green initiatives often do not reach the most vulnerable populations – and children are left with harmful tasks while profits and safer jobs are shifted elsewhere .[38] The interviews also highlighted the case of discarded cars being shipped to low-income countries in Africa, where children are involved in dismantling these vehicles. This practice leads to pollution and perpetuates harmful labour practices among vulnerable populations.

Due to the impact of the factors described above, the transition to green energy sources, while vital for environmental sustainability, can create cycles of poverty that are difficult to escape without targeted support and intervention.

36 Mohlakoana, Nthabiseng, South Africa's Coal Workers Face an Uncertain Future: Mpumalanga study flags they're being left out of the green transition, The Conversation, 28 August 2024.

37 Coal Transitions, Downscaling or Upskilling in Carbon-intensive Regions?: Socio-economic challenges in the transition to climate-neutrality, 2023.

38 *See, for example:* Centre for Child Rights and Business, Child Rights and Informal Textile Waste Recycling in Bangladesh, Research Report, December 2024.

Employment in resource extraction industries

Positive impacts on children's rights:

Employment opportunities in renewable-energy-related resource extraction industries can have positive impacts, particularly in regions where these industries serve as a primary economic engine.

One benefit is the creation of jobs that provide stable incomes for workers and support local economies. Additionally, large-scale mining companies often invest in social infrastructure, leading to improved water, sanitation and hygiene services for entire communities. Some mining companies in Bolivia, for instance, create jobs, provide private health insurance for workers, and extend health-care services to surrounding communities.[39] These services include services such as neonatal and maternal health, psychology, ambulance access, and early vaccination. As a result, children in these areas benefit from enhanced social security and improved health outcomes, which supports their overall development and well-being.

Negative impacts on children's rights

The growing demand for raw materials and minerals used in renewable energy technologies, such as silicon for solar photovoltaics and cobalt for electric vehicles, has increased scrutiny to labour practices across global supply chains.

For example, in the Democratic Republic of Congo, cobalt mining is associated with child labour while in Xinjiang, polysilicon production relies on forced labour.[40] The lack of transparency and oversight can exacerbate risks of exploitative practices, including child labour. (*See Table 5, below, on the relative importance of various materials for technologies involved in the energy transition.*)

The ILO estimates 40–50 per cent of all forced labour victims are children.[41] In impoverished regions, families often rely on hazardous, low-wage work, sending children into labour to support household needs. This risk is particularly prevalent in informal supply chains such as artisanal and small-scale mining, where weak regulations and minimal oversight prevail.[42] In contrast, larger industrialized supply chains with stricter regulations pose a lower risk, such as in Bolivia, where two-thirds of industrial mining sites held triple-standard certifications and no child labour was reported.[43]

Children in these sectors are often involved in dangerous tasks such as mining, sorting, reprocessing waste, packaging and transporting minerals, violating their right to be protected from hazardous work. They may also work in surrounding activities such as selling food at mines and junkyards.

Beyond mining, children in the informal e-waste processing sector face similarly unsafe environments without regulatory protections, exposing them to hazardous substances, leading to chronic health issues and impaired development.[44] Without proper safety protocols, children also experience exploitation, malnutrition and a lack of educational opportunities, further threatening their health and development.

Reports from ombudspersons for children and adolescents in Bolivia indicate that many cases of sexual exploitation occur in mining and extractive areas, where a lack of governance allows criminal activities

39 Pérez, Sebastián, et al., 'Minería Privada y Derechos de la Niñez en Bolivia: Una mirada desde la corresponsabilidad' (Private Mining and Children's Rights in Bolivia: A co-responsibility perspective), UNICEF and The Dragonfly Initiative, August 2018, Internal final draft (in Spanish).

40 Office to Monitor and Combat Trafficking in Persons, Forced Labor and the Clean Energy Transition: Finding a responsible way forward, United States Department of State, Washington, D.C., July 2022. *On the broader impacts of mining on communities, see:* Amnesty International, Powering Change or Business as Usual? Forced evictions at industrial cobalt and copper mines in the Democratic Republic of the Congo, Index no: AFR 62/7009/2023, London, 11 September 2023.

41 Sislin, John, Appendix E: Definitions of child and forced labor, Approaches to Reducing the Use of Forced or Child Labor: Summary of a workshop on assessing practice, National Academies Press, Washington, D.C., 2009.

42 International Labour Organization, Child Labour in Mining and Global Supply Chains, ILO, 23 September 2019; Sovacool, Benjamin K., When Subterranean Slavery Supports Sustainability Transitions? Power, patriarchy, and child labor in artisanal Congolese cobalt mining, *The Extractive Industries and Society,* vol. 8, no. 1, March 2021, pp. 271–293.

43 Pérez, Sebastián, et al., 'Minería Privada y Derechos de la Niñez en Bolivia: Una mirada desde la corresponsabilidad' (Private Mining and Children's Rights in Bolivia: A co-responsibility perspective), UNICEF and The Dragonfly Initiative, August 2018, Internal final draft (in Spanish).

44 World Health Organization, Electronic Waste: Digital dumpsites and children's health, WHO, 2 October 2024.

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such as child trafficking to thrive.[45] Exploitation often goes unreported, as perpetrators are frequently family members or legal guardians, making intervention difficult. In remote areas, isolation from protective services can lead to increased sexual aggression.[46]

The demand for resources worsens these abuses, with poverty pushing families to engage their children in hazardous labour, leaving them vulnerable to exploitation and emotional trauma. Additionally, drug abuse among child labourers in resource extraction industries is on the rise, further compounding the issues of sexual and psychological violence, trapping children in cycles of exploitation.

Industries such as mining, oil drilling and fracking often expose workers and nearby residents to harmful substances, including heavy metals, toxic chemicals and particulate matter. Children living in these areas may suffer from respiratory issues, neurological damage and developmental delays due to prolonged exposure to air and water pollution. For example, lead exposure from mining activities has been linked to cognitive impairment and reduced IQ in children, impacting their right to health and proper development.

45 Office of the Ombudsman, Las Niñas y las Adolescentes: Derechos invisibilizados y vulnerados – Diagnóstico base (Girls and Adolescent Girls: Invisible and violated rights – Baseline assessment), La Paz, Plurinational State of Bolivia, October 2015 (in Spanish).

46 Pérez, Sebastián, et al., 'Minería Privada y Derechos de la Niñez en Bolivia: Una mirada desde la corresponsabilidad' (Private Mining and Children's Rights in Bolivia: A co-responsibility perspective), UNICEF and The Dragonfly Initiative, August 2018, Internal final draft (in Spanish).

TABLE 5

Clean energy technologies require a wide range of minerals and metals

Technology	Copper	Cobalt	Nickel	Lithium	Rare earth elements	Chromium	Zinc	Platinum group metals*	Aluminium
Solar PV	●	●	●	●	●	●	●	●	●
Wind	●	●	●	●	●	●	●	●	●
Hydro	●	●	●	●	●	●	●	●	●
Concentrated solar power	●	●	●	●	●	●	●	●	●
Bioenergy	●	●	●	●	●	●	●	●	●
Geothermal		●		●	●	●	●	●	●
Nuclear	●	●	●	●	●	●	●	●	●
Electricity networks	●	●	●	●	●	●	●	●	●
EVs and battery storage	●	●	●	●	●	●	●	●	●
Hydrogen	●	●	●	●	●	●	●	●	●

Legend: Importance
● High
● Moderate
● Low

* Platinum group metals consist of six metallic elements – platinum, palladium, rhodium, ruthenium, osmium, iridium – which include key materials in autocatalysts, reducing harmful tailpipe emissions from cars, buses and trucks, thereby contributing to cleaner air and in the development of clean hydrogen technologies. These technologies, increasingly important in both transportation and power generation, support the global shift towards a net-zero economy. (Source: Natural Resources Canada, Platinum Facts, Government of Canada, 13 March 2025)

Source: International Energy Agency, Mineral Requirements for Clean Energy Transitions, IEA, n.d.

3.2 Availability and cost of goods and services

Greener agriculture and electrified transport reduce pollution and improve environmental health. Greener products and services offer healthier options for consumers. This directly benefits children's well-being.

However, as businesses shift towards sustainable production and renewable energy sources, the cost of raw materials (e.g., metals, lithium, cobalt and rare earth elements) increases due to high demand and limited supply. Higher costs for electric vehicles, energy-efficient appliances and other eco-friendly technologies, along with the premium prices often charged for organic foods and plant-based alternatives, may place these products out of reach for lower-income households.

In regions where fossil fuels have been the primary energy source, transitioning to renewables incurs high upfront costs for infrastructure, which are often passed on to consumers in the cost of utilities. Supply chain disruptions during this transition can also reduce the availability of key goods and services, further straining vulnerable economies and widening inequality.

Among the most vulnerable families, increased expenses for basic goods and services, coupled with loss of income from shifting employment opportunities, may place children at higher risk of engaging in labour, including hazardous work. Without adequate policies and subsidies to cushion these impacts, the green transition risks exacerbating energy poverty, increasing living costs, and reducing access to essential goods for the most deprived communities.

As society shifts towards valuing green products, lower-income families may struggle to afford more expensive sustainable goods.[47] This inequality can exacerbate existing social divisions and deepen financial challenges for vulnerable families.

Without affordable alternatives, they may experience reduced income or higher costs, directly impacting children's standard of living and increasing the risk of child labour as children may need to contribute to household work or income.

TABLE 6

Availability and cost of goods and services – Child rights impacts, by relevant article in the CRC

Positive impacts	Negative impacts
Health (article 24) • Greener practices in agriculture lead to healthier food production and cleaner environment benefiting children's physical health. **Adequate standard of living** (article 27) • Availability of organic and sustainably produced goods provides children with healthier food options, enhancing their overall well-being. **Education** (article 28) • Electrified transport in rural areas improves school attendance and learning environments.	**Health** (article 24) • Higher food prices and production costs resulting from sustainable practices can limit access to nutritious food for children in low-income families. **Adequate standard of living** (article 27) & Protection from child labour (article 32) • Increased costs for green services and goods burden low-income families, leading to reduced access to essentials. Economic pressures on vulnerable families may increase the risk of child labour. **Education** (article 28) • Higher costs for transportation impact school attendance and other educational opportunities.

47 Pankratz, Derek, David R. Novak and Stephen Rogers, The Cost of Buying Green, Deloitte Insights, 17 June 2022.

Positive impacts on children's rights

Greener agricultural practices, such as reducing the use of synthetic fertilizers, contribute to long-term environmental sustainability by improving soil quality and reducing harmful runoff.[48] These changes promote healthier ecosystems, creating safer environments that benefit children.

Similarly, electrifying public busses and other transport systems reduces pollution, directly improving air quality and reducing respiratory issues among children.[49] The broader shift to electric vehicles also lowers greenhouse gas emissions, contributing to a healthier environment. Sustainable practices, such as sourcing organic raw materials or using renewable energy in production, reduce the environmental footprint of goods and offer healthier alternatives.

Phasing out high-emission products, such as gasoline-powered small machinery, further reduces carbon footprints and pollution, directly enhancing children's health. The increased availability of greener products, such as organic food or sustainably produced goods, supports a healthier lifestyle, though affordability remains a challenge for lower-income families. Ultimately, environmentally friendly products and practices will help protect children's health and well-being by reducing exposure to harmful substances and fostering a more sustainable future.

Negative impacts on children's rights

Implementing sustainable practices in industries such as manufacturing and agriculture often increases production costs, resulting in higher prices for goods and services, as shown in Figure 3.

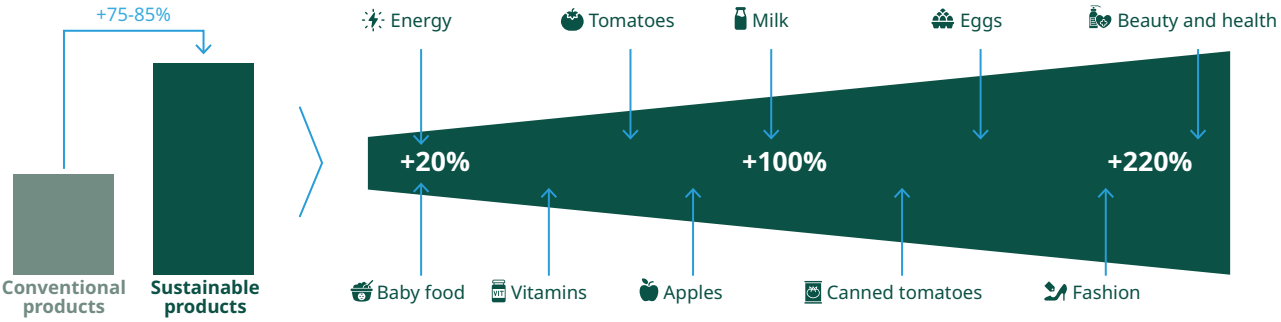
Electric vehicles, for example, are much more expensive compared to traditional internal combustion engine vehicles. Sustainable farming methods can initially lead to increased food prices due to lower yields and higher production costs. Moreover, as shown in Figure 3, the 'green premiums' associated with the cost of healthier or environmentally friendly products can make them unaffordable for low-income families,[50] potentially widening economic disparities and reducing access to options for children.

Low-income families in developing countries often face challenges when transitioning away from high-emission technologies due to high upfront costs of cleaner alternatives and credit constraints.

Research demonstrates that when households are required to pay for energy-efficient technologies such as cook stoves entirely upfront, their willingness to pay is substantially lower compared to those offered instalment plans.[51] For instance, access to a 12-week instalment plan more than doubled the willingness to pay for a stove, from US$12 to US$25.

The lack of affordable alternatives may force families to continue using high-emission technologies, exposing children to indoor air pollution, which has been linked to severe respiratory issues and developmental challenges.

FIGURE 3
Price markups for green and sustainable products



Source: Gusta, Antony, Are Sustainable Products More Expensive?, Ecoswap, 18 February 2023.

48 United States Environmental Protection Agency, Sources and Solutions: Agriculture, 20 March 2025.
49 *See, for example:* American Lung Association, The Road to Clean Air: Benefits of a nationwide transition to electric vehicles, n.d.
50 World Economic Forum, Accelerating an Equitable Transition: A framework for economic equity, Insight Report, WEF, January 2024, pp. 17, 21.
51 Berkouwer, Sussana, and Joshua Dean, Barriers to Energy Efficiency Adoption in Low-Income Communities, Kleinman Center for Energy Policy, 9 December 2021.

BOX 3
Impacts of access to financial services

Banking services designed according to just transition principles could help protect children's rights by promoting families' economic stability and ensuring access to basic needs such as food, education and health care. However, as financial institutions prioritize green finance products – such as ESG-linked loans, green bonds, and carbon credit platforms – traditional investments in carbon-intensive industries are declining, leaving many businesses and workers in fossil-fuel sectors without access to needed funding.

Additionally, smallholder farmers and micro-businesses often struggle to meet the stricter criteria for green financing or to access the expertise required to secure sustainable funding. This shift risks concentrating financial benefits among larger corporations and wealthier regions, deepening economic inequality.

Some green financial policies aimed to promote the transition to a low-carbon economy further jeopardize the viability of micro-, small- and medium-sized enterprises, which frequently cannot afford credentials such as third-party sustainability assessments, excluding them from green financing channels despite environmentally sound practices.[52]

In regions with limited banking infrastructure or digital access, marginalized groups face further exclusion from financial services such as credit, insurance and investment opportunities. Access to financial services can empower individuals economically and socially, enabling them to better integrate into economic activity and actively contribute to economic growth. But the financial sector is reaching only a small fraction of the population due to constraints that limit or block the inclusion of certain population groups, particularly women.[53]

More than 80 per cent of the world's 1.4 billion adults without financial accounts live in places at risk from climate crisis, intensifying the impact of economic and environmental shocks. Financial services contribute to climate mitigation by enabling individuals and businesses to invest in climate-resilient infrastructure, adopt sustainable agricultural practices, and apply energy-efficient technologies. In addition, the availability of insurance and savings products speed recovery from environmental shocks.[54]

In the face of climate crisis and environmental degradation, low-income households and micro-, small- and medium-sized enterprises (MSMEs) are disproportionately exposed to the physical risks and impacts – including floods, wildfires and crop failures. Because this undermines productivity and collateral reliability, smaller businesses are often classified as higher-risk customers, prompting financial institutions to charge higher rates or deny services altogether.[55]

Also, many financial products and services are designed to attract urban or affluent customers, leaving low-income families underserved. The lack of access to affordable credit, insurance, and other essential financial tools constrains economic opportunities for parents and other caregivers, limiting their ability to invest in education and health care for children.

Without targeted efforts to bridge these gaps, including subsidies, microfinance options, and community-based lending models, financial exclusion caused by the green transition could widen income inequality and limit opportunities for vulnerable populations to participate in the evolving green economy.

52 Imboden, Kathryn, Barry Herman and Djordjija Petkoski, eds., Widening Access, Enhancing Growth, Alleviating Poverty, Summary Report on the Building Inclusive Financial Sectors for Development E-conference, 28 March–13 April 2005, World Bank Institute, Financing for Development and the United Nations Capital Development Fund, 2005, p. 2.

53 United Nations Capital Development Fund and Financing for Development, Blue Book on Building Inclusive Financial Sectors for Development: A multi-stakeholder consultative process – Overview, November 2005, p. 1. *See, also:* United Nations, *Building Inclusive Financial Sectors for Development,* New York, May 2006, available at: <www.uncdf.org/article/597/building-inclusive-financial-sectors-for-development-migration>.

54 World Bank Group, Financial Inclusion: Overview, 27 January 2025.

55 Volz, Ulrich, and Peter Knaack, Inclusive Green Finance: A new agenda for central banks and financial supervisors, INSPIRE, June 2023, p. 2.

3.3 Energy source, access and cost

The transition to renewable energy benefits children's health by reducing pollution and improving access to energy in underserved areas, for example, through solar-powered systems in schools and health-care facilities.

As technological advancements drive down costs and economies of scale take effect, renewable energy becomes more cost-effective over time. As a result, communities and even individual households may develop their own independent grids, reducing reliance on a centralized power grid.

Decentralized and localized energy distribution supports a more resilient energy system, where power generation is distributed across multiple small sources rather than a few central hubs.[56] This enables communities to tailor energy production to their specific needs, leveraging local renewable resources and enhancing energy security. In some cases, these off-grid solutions come in the form of renewable-equipped products or equipment, which is particularly helpful as a supplement to low-load communities.

Historically, businesses have relied on low-cost fossil fuels with predictable expenses, but at the expense of environmental sustainability. Transitioning from fossil fuels to renewable energy often involves substantial upfront investments in new infrastructure, such as solar panels, wind turbines, grid modernization, and energy storage systems. These costs can lead to increased energy prices in the short term, which are likely to be passed on to consumers and disproportionately affect low-income families.

Improved energy systems offer long-term benefits, but the short-term impacts risk worsening energy poverty for vulnerable households. This financial strain may lead families to cut spending on essentials such as food, health care and education, and, in some cases, increase child labour as children contribute to household income. In regions with underdeveloped infrastructure, and limited concessional finance, this shift can strain household resources and exacerbate the energy poverty trap.[57]

TABLE 7

Energy source, access and cost – Child rights impacts, by relevant article in the CRC

Positive impacts	Negative impacts
Health (article 24) • Improved air quality and reduced pollution from renewable energy and electric transport benefit children's health. **Adequate standard of living** (article 27) • Renewable microgrids enhance energy reliability for essential services, supporting children's well-being. **Education** (article 28) • Energy access in rural areas improve school attendance and learning environments.	**Health** (article 24) • In energy-poor regions, reliance on harmful energy sources can lead to serious health problems for children. **Social security** (article 26) • Limited access to basic necessities undermines children's well-being. **Adequate standard of living** (article 27) • Rising energy costs and unreliable energy sources burden low-income families, limiting access to essentials. **Education** (article 28) • Unreliable energy sources put children out of school **Protection from child labour** (article 32) • Families facing economic pressure may resort to child labour.

56 Nadeem, Talha Bin, Distributed Energy Systems: A review of classification, technologies, applications, and policies, Energy Strategy Reviews, vol. 48, July 2023, article101096.

57 World Bank Group, Breaking Down Barriers to Clean Energy Transition, Feature Story, 16 May 2023.

Positive impacts on children's rights

The transition from fossil fuels to renewable energy is essential for combating climate change, leading to long-term environmental benefits that contribute to healthier communities and reduced pollution-related health issues.

Phasing out high-emission goods, such as gasoline-powered small machinery, helps reduce carbon footprints and environmental pollution. This will directly improve children's health outcomes and support the right to a healthy environment. The increased availability of greener products, such as organic food or sustainably produced goods, contributes to a healthier lifestyle for those who can afford it. Environmentally friendly products support children's health and overall well-being by reducing exposure to harmful substances.

In the long-term, renewable energy technologies can lower costs and enhance energy security. Improved energy systems – particularly through decentralized and renewable-powered microgrids – ensure reliable power for essential infrastructure, including health care facilities, schools and water systems. This is vital for improving children's health and education outcomes.

For instance, in Malawi, solar-powered water systems dispatched in schools, health-care facilities and in nearby communities helped reduced absenteeism by addressing illness and menstrual hygiene needs, and minimized time spent by children gathering water.[58] These systems have improved home hygiene, lowered disease rates, and enhanced the quality of health-care services for children.

Through a variety of benefit-sharing and ownership models, microgrids are providing Indigenous communities with reduced costs for reliable energy, while also strengthening social cohesion and resilience. These community-driven microgrids function as 'behind the meter' systems that allow users to both consume and produce energy, creating shared advantages, and fostering a sense of ownership by enabling participants to control their energy resources and manage their supply.[59]

Depending on the business model, such as the 'pay as you go' system used in East Africa, households can save on utility costs by making small, incremental payments via mobile phones, with companies covering the initial installation costs.[60] This approach improves financial stability, strengthens livelihoods, and ultimately benefits children by providing better living conditions, reliable energy for education, and healthier environments in which to grow.

Negative impacts on children's rights

The transition to green energy is crucial for climate change adaptation and mitigation. However, this shift risks exacerbating energy poverty, which affects every aspect of people's lives by limiting access to modern, reliable and affordable energy services.[61]

Investments in renewable infrastructure, such as solar panels, wind farms and smart grids, often lead to higher energy prices in the short term. For example, while solar power is showing great potential in India, rooftop installations for households are complicated and require high upfront costs with long payback periods.[62] Higher electricity prices disproportionately impact low-income households, potentially forcing families to cut spending on essentials such as food, health care, and education.

Moreover, inadequate infrastructure for renewable energy, including backup systems, can lead to energy reliability issues. In areas with a high risk of energy poverty, low-income families may turn to polluting and harmful energy sources (e.g., wood, charcoal) to meet their energy needs.[63] This financial strain can result in malnutrition, disrupted education, and increased child labour to contribute to household income.

58 *See:* United Nations Children's Fund, Scaling-Up Climate Resilient Sustainable Solar-Powered Systems for Institutions and Communities in Rural Malawi, WASH Field Note, UNICEF, New York, 2020

59 Cuzner, Robert, Community Microgrids to the Rescue: Local energy production builds sustainable neighborhoods, The Earth & I, Washington, D.C., n.d.

60 Factor This, M-KOPA: Bringing solar to millions via pay-as-you-go mobile payments, 16 November 2014.

61 Bazilian, Morgan, and Kandeh Yumkella, Why Energy Poverty Is the Real Energy Crisis, World Economic Forum, 18 March 2015.

62 Sinha, Manoj, Decentralized Renewable Energy Can Accelerate India's Path to Net Zero by 2050, ETEnergyWorld, *Economic Times,* 22 March 2024.

63 Danish Institute for Human Rights, Scoping Paper: Human rights and the energy transition in Tanzania, DIHR, Copenhagen, December 2022, p. 16.

3.4 Location of operations and land use changes

As businesses transition towards sustainability, they are moving away from traditional land uses such as landfills and coal mining and increasingly acquiring land for renewable energy infrastructure. This includes wind farms, solar arrays and energy storage facilities, all of which require large investments in land.

Simultaneously, the demand for nature-based solutions, including reforestation, wetland restoration and sustainable agriculture, is rising as companies strive to mitigate climate change, enhance biodiversity, and generate high-quality carbon credits. While carbon credits from nature-based solutions are not generally considered to be suitable for 'net zero' purposes – due to concerns about the permanence of carbon removal – they are still used to reduce emissions or remove greenhouse gasses over the short or medium time frames.[64]

This dual focus on renewable energy and nature-based projects is driving companies to reassess their land-use strategies, often resulting in relocation or expansion into regions with optimal environmental conditions for sustainable initiatives.

The development of green infrastructure and carbon offset projects can promote environmental sustainability and economic stability, creating job opportunities that can improve family incomes and children's access to health care, education and a better standard of living. Moreover, responsible decommissioning helps preserve cultural heritage and restore healthy environments.

However, displacement from green projects can lead to poverty, loss of education, and weakened cultural ties for children. Offshoring and relocation may further impact children by increasing poverty and limiting access to resources. Poorly managed decommissioning can expose children to environmental toxins, harming their health.

Economic pressures from land loss and job displacement may push children into labour, affecting their well-being. While some impacts on children can be inferred, the specific risks from changes in land usage remain unclear due to limited data, making it difficult to fully assess the severity of these challenges and indicating a need for further research on this issue in the just green transition context.

64 Global Business Initiative on Human Rights, Integrating Human Rights into Company Climate Action: Insights from business practitioners, GBI Climate and Human Rights Resource, East Sussex, United Kingdom, January 2024, p. 18.

TABLE 8

Location of operations and land use changes – Child rights impacts, by relevant article in the CRC

Positive impacts	Negative impacts
Health (article 24) • Reduced pollution from green projects and responsible decommissioning support healthier environments. **Adequate standard of living** (article 27) • Job opportunities from renewable projects enhance family income, supporting children's access to essential needs. **Education** (article 28) • Economic stability from green projects improves children's access to education. **Cultural identity** (article 30) • Restoring Indigenous lands during decommissioning helps preserve children's cultural heritage.	**Life, survival and development** (article 6) • In some cases, children are physically harmed or killed from conflict and violence surrounding land change. **Violence and reintegration** (articles 19 & 39) • Violence or conflicts affecting children. Displacement and family separation harm children's emotional well-being. **Health** (article 24) • Inadequate impact assessments at project sites can lead to environmental hazards that adversely affect children's health. **Adequate standard of living** (article 27) • Job offshoring leads to increased poverty and a decline in children's living standards. **Education** (article 28) & Rest, play, and participate freely in cultural life (article 31) • Displacement disrupts education, and economic instability may reduce children free time. **Cultural identity** (article 30) • Displacement from traditional lands disconnects children from cultural practices. **Protection from child labour** (article 32) • With limited access to resources, families facing economic pressure may resort to child labour

Development of green infrastructure and carbon offset projects

Positive impacts on children's rights

Reforestation, afforestation,[65] renewable energy initiatives, and other carbon offset projects can help mitigate climate change, which contributes to ensuring a healthy environment for future generations. They can also promote economic sustainability. In Denmark, for example, the construction of large-scale offshore wind farms in Port of Esbjerg has generated job opportunities in local communities.[66] This economic boost helps families achieve financial security, supporting children's right to an adequate standard of living.

Furthermore, carbon offset projects contribute to reducing greenhouse gas emissions and preserving ecosystems through carbon credits generation. By combining green infrastructure development with carbon offset efforts, these initiatives can address children's rights as well as contribute to reducing environmental degradation.

Negative impacts on children's rights

As companies develop green infrastructure and pursue carbon offset projects and nature-based solutions, such as reforestation, afforestation and biodiversity conservation, large tracts of land are often repurposed, leading to the displacement of families and disruption of local communities. These projects frequently encounter challenges, including land grabs and the acquisition of Indigenous lands without free, prior and informed consent.[67]

Furthermore, when land rights are poorly defined and informal, governments often grant large tracts of lands to developers at very low rental rates without consent from local communities.[68] Such interference with sacred and traditional sites undermines the right to cultural identity, leaving children without support structures that foster a sense of belonging and stability.

For example, in Cambodia, the Think Biotech reforestation project – intended for carbon sequestration and sustainable forestry – led to deforestation, monoculture planting, and violations of Indigenous and community land rights.[69] The project, near Southeast Asia's rare lowland forests, lacked adequate consultation, and threatened local livelihoods and food cultivation.

The displacement from traditional lands further deprives children of their homes, access to education, and stable sources of food and water, threatening both their physical and emotional well-being. Forced resettlement may also disrupt children's attendance and access to education, affecting not only academic pursuits but also their ability to integrate into new school communities, which is crucial for their development, rest and play.

Children who are displaced due to conflict and lack proper guardianship are especially vulnerable to child labour, hazardous work and other forms of exploitation. This risk is heightened when communities lose their rights to land and livelihoods, which may force families to send their children to work for basic survival.

In addition, during times of socio-economic instability, societies may experience increased antisocial and immoral behaviours. This may lead to an increase in adolescent prostitution, as foreign workers brought in for these projects often pay higher prices for such services.

Children who most move from places with ethnic, cultural or religious significance are deprived of vital customary experiences, with potentially long-term effects on their cultural identity and overall development.

65 *On the environmental benefits, see, for example:* Climate Impact Partners, Afforestation, 2025.
66 State of Green, Port of Esbjerg: World's largest base port for offshore wind activities, 29 July 2022.
67 Timperley, Jocelyn, Why Wind and Solar Companies Need to Address Human Rights, Energy Monitor, 9 February 2022.
68 Barajas, Jorge A. Rincón, Christoph Kubitza and Jann Lay, Large-scale Acquisitions of Communal Land in the Global South: Assessing the risks and formulating policy recommendations, *Land Use Policy,* vol. 139, April 2024, article 107054.
69 Ibid.

Infrastructure decommissioning

Positive impacts on children's rights

Responsible project decommissioning can benefit local communities, including children, by promoting sustainable development and enhancing well-being. Mitigating the impact of decommissioning on Indigenous people and local communities helps preserve cultural heritage and social structures, and opens up opportunities for sustainable development, and can boost local economies to improve living standards.

The Futuro Ativo Sines initiative, launched by EDP to address the impact of decommissioning Sines, Portugal's largest coal power plant, on workers and local communities.[70] In collaboration with local authorities, EDP provides social investment programmes, strengthens local NGOs, and offers reskilling and upskilling training, etc.[71] This comprehensive approach helps minimize the effects of the plant's closure on workers, suppliers, and communities while fostering new opportunities for sustainable development.

Negative impacts on children's rights

When renewable project sites are decommissioned without proper restoration of land rights or responsible waste management, Indigenous or local communities may lose access to their land and experience environmental harm.[72] Potential impacts on children include environmental hazards, cultural disintegration and the loss of family livelihoods, which can deeply affect their development and future.

Environmental contamination poses health risks to children, who are especially vulnerable due to their developing bodies and weaker immune systems. Exposure to harmful substances such as heavy metals or industrial waste chemicals can result in health issues, including respiratory problems, developmental disorders, and weakened immune systems.

Relocation to improve value chain and efficiency

Positive impacts on children's rights

Relocating operations to improve the value chain efficiency can have positive impacts on children, particularly through the economic and environmental benefits it generates. By optimizing the supply chain and relocating operations closer to key markets, businesses not only increase efficiency but also create a more sustainable and supportive environment for children and families.

By reducing the need for extensive travel and transportation, businesses can lower their operational costs, which may result in increased job opportunities for local communities. This can enhance family income, directly supporting children's access to better living conditions, health care and education.

Additionally, with less travel and transportation, there is a reduction in carbon emissions, contributing to cleaner air and healthier environments for children. Cleaner air quality reduces the risk of respiratory illnesses, supporting children's overall health and development.

Negative impact on children's rights

Offshoring production to countries with access to lower cost renewable energy or sustainable raw materials can have impact children's rights in the communities left behind. The loss of employment for parents and other guardians leads to higher poverty rates and financial instability, compromising the right to an adequate standard of living as families struggle to afford basic needs.

This instability also hinders access to education, as children may be forced to leave school to support their families. Additionally, the stress and instability caused by job loss impacts children's emotional well-being.

70 EDP S.A., EDP Launches 'Futuro Ativo Sines' Project to Promote Initiatives to Support the Region, 13 January 2021.
71 World Economic Forum, Mobilizing Investment for Clean Energy in Emerging Economies: Futuro Ativo Sines Programme, Portugal, WEF, 12 August 2021.
72 Global Business Initiative on Human Rights, Integrating Human rights into Company Climate Action: Insights from business practitioners, GBI Climate and Human Rights Resource, East Sussex, United Kingdom, January 2024, p. 12.

3.5 Business processes and governance

The adoption of circular economy principles is transforming business operations by prioritizing resource efficiency, waste reduction and material reuse. Unlike traditional linear models, the circular economy focuses on efficient resource use and minimizing the impact of environment, public health and economy throughout the value chain.

Supply chain transparency, ethical sourcing and adherence to ESG criteria are now essential to ensuring that operations meet environmental and social standards. This transformation promotes responsible corporate behaviour and redefines value chains, while it also addresses long-term risks for companies.

A transition out of weak governance models that allow for corporate exploitation of resources – and into transparent and accountable governance systems – encompasses at least three elements:

- **integrating ESG metrics** into business operations and reporting frameworks;
- **engaging stakeholders** in sustainability efforts; and
- **collaborating with governments and organizations** to shape policy and drive industry standards.

However, without strong governance and policy, ethical sourcing, supply chain localization, zero-waste practices and other sustainable business activities may unintentionally result in unequal access to green services and employment in local communities. This includes integrating detoxification into corporate governance – through mandatory HRDD, life-cycle assessment and safe chemicals/waste capacity – so that emissions reductions do not come at the cost of rising toxic exposures for children

Participants in the research interviews noted that many companies still struggle to understand the specific impacts of the green transition on children. They often focus on broader corporate social responsibility initiatives such as health and education, rather than addressing child labour, harmful sourcing conditions and other supply chain risks. While green products (e.g., electric vehicles, solar panels) offer environmental benefits, companies may overlook the hidden harms tied to raw material sourcing.

Emerging low-carbon technologies (e.g., battery production, mineral extraction and end-of-life handling of batteries, solar panels and electronics) can introduce significant toxic risks unless companies embed detoxification measures into their business processes. The UN Special Rapporteur underscores that several decarbonization technologies can aggravate existing pollution burdens without robust life-cycle management, hazardous-substance controls and child-sensitive human rights due diligence – gaps that disproportionately affect children.[73]

One interviewee pointed out that companies tend to overlap child rights with human rights, which can hinder efforts to engage children in the development of just transition strategies and to address the negative impacts specific to children.

Ethical sourcing and supply chain localization can improve children's health, education and rights protection, while zero-waste initiatives reduce pollution. However, shifts to local suppliers and zero-waste practices may also disrupt income for global families, pushing children into labour and limiting access to essentials, ultimately straining children's development and family stability.

In other contradictions, many companies promote products such as electric vehicles for their lower emissions, but they often fail to address the sourcing of raw materials. The green reputation of these products stands in stark contrast to the often opaque and harmful conditions associated with sourcing the materials necessary for their production. Solar panels, with approximately 95 per cent of their production concentrated in China, face similar issues: Companies have limited visibility and control over the conditions within these supply chains.

73 UN Human Rights Council, The toxic impacts of some proposed climate change solutions (Report of the Special Rapporteur on hazardous substances and wastes, A/HRC/54/25, 13 July 2023

In addition, there is a broader tension in the green transition: Although shifting towards greener business practices provides opportunities for environmental and social progress, it also introduces challenges that can adversely impact children's rights.

Ethical sourcing, social investments and waste reduction initiatives can improve health, education and environmental sustainability, but disruptions in traditional supply chains and localization practices can have unintended negative effects on children's health, educational access and cultural stability.

TABLE 9

Business processes and governance – Child rights impacts, by relevant article in the CRC

Positive impacts	Negative Impacts
Life, survival and development (article 6) • Sustainable practices create a safer environment, supporting children's development. **Health** (article 24) • Ethical sourcing and zero waste manufacturing improve environmental quality, benefiting children's health. Also, supply chain localization reduces emissions, leading to better health outcomes for children. **Protection from child labour** (article 32) & sexual exploitation (article 34) • Ethical sourcing reduces child labour, protecting children from hazardous work.	**Life, survival and development** (article 6) & Health (article 24) • Poor worker welfare increased caregiving burdens reduce proper care, negatively affecting children's health and development. • Hazardous substances and waste from low-carbon technologies (e.g., batteries, mineral extraction, solar panel components) can introduce toxic exposures when not managed with strong life-cycle and detoxification controls, disproportionately harming children's health. **Consideration of the child's best interests** (article 3) & Right to be heard (article 12) • While many governments and businesses are investing in green initiatives, few policies specifically consider children's views or their unique vulnerabilities during the transition. **Adequate standard of living** (article 27) • Supply chain localization and zero waste practices disrupt incomes, leading to financial instability for families. **Education** (article 28) • Economic hardship may force children into work, reducing their educational opportunities. **Protection from child labour** (article 32) • Financial pressures push children into hazardous work environments.

Positive impacts on children's rights

Ethical sourcing practices adopted by companies can reduce child labour in supply chains.[74] By avoiding partnerships with suppliers that use exploitative practices, businesses support children's protection from hazardous work environments, and contribute to their health and well-being by reducing exposure to harmful substances. Ethical sourcing encourages more sustainable production, which fosters a safer and more stable environment, indirectly promoting children's development.

Supply chain localization presents an opportunity to reduce greenhouse gas emissions by minimizing the distance goods are transported. Research indicates that nearly one-fifth of these emissions from the food

74 Chartered Institute of Procurement & Supply, Ethical Sourcing, CIPS, 2025.

sector stem from transportation, with rich countries disproportionately contributing to the problem.[75] Localizing supply chains allows companies to lower emissions, resulting in cleaner air and notable health benefits for children. Furthermore, adopting zero-waste practices enhances environmental sustainability by cutting pollution and waste.[76] Through waste-free production processes, companies foster a cleaner environment, positively influencing children's health and overall development.

Moreover, when businesses contribute to sustainable development when they collaborate with other stakeholders to invest in social initiatives and develop corporate due diligence procedures that incorporate child rights impact assessments.

Private voluntary social investments have focused on enhancing the infrastructure and resources of institutions that provide essential health, education and water services to communities within their sphere of influence. For instance, BNP Paribas Cardiff partnered with UNICEF to combat childhood obesity in five countries in Latin America, promoting healthy eating and physical activity through school-based initiatives and campaigns, reaching more thaw 20 million people.[77]

By involving local and Indigenous communities in decision-making, businesses uphold children's right to participate in matters that affect them. Empowering communities allows children and their families to shape local development plans, ensuring their voices are considered in projects that directly impact their lives.

Negative impacts on children's rights

While beneficial for reducing emissions, localization of supply chains can negatively impact global communities that previously relied on these partnerships. When businesses shift from global suppliers to local ones, the resulting loss of income can cause financial instability for families. This economic hardship can limit children's access to food, housing and health care, affecting their right to an adequate standard of living. In some cases, it may also force children into labour to help support their families, thus compromising their right to education and protection from economic exploitation.

Zero-waste manufacturing, while environmentally beneficial, can have unintended economic impacts. Small-scale waste recycling businesses, often constrained by limited resources and traditional supply practices,[78] may lose contracts, jeopardizing the livelihoods of many families.

This economic disruption can harm children's living standards, as families struggle to meet basic needs, potentially pushing children out of school and into unsafe work environments to help support the household. Furthermore, the financial stress can disrupt children's education, as children may be compelled to leave school to contribute financially.

These changes can also lead to broader social disruptions. Communities that depend on international supply partnerships may experience fragmentation, affecting children's sense of belonging and stability.

Additionally, the loss of contracts by small suppliers can place greater caregiving burdens on families, disproportionately affecting women. Women, particularly those with limited education or low-income employment, often take on additional responsibilities to support family income. This increased workload can reduce the time available for caring for their children, potentially leading to poorer developmental outcomes.[79]

75 The Conversation, The World's Affluent Must Start Eating Local Food to Tackle the Climate Crisis, New Research Shows, 20 June 2022.
76 UN Environment Programme, Towards Zero Waste: A catalyst for delivering the Sustainable Development Goals, UNEP, 23 November 2023.
77 Business Engagement and Partnerships for Child Rights Team, Engaging Business for Children's Rights: Latin America and the Caribbean 2023, UNICEF Regional Office for Latin America and the Caribbean, June 2024, p. 14.
78 Derhab, Neama, and Zakaria Elkhwesky, A Systematic and Critical Review of Waste Management in Micro, Small and Medium-sized Enterprises: Future directions for theory and practice, *Environmental Science and Pollution Research*, vol. 30, 22 December 2022, pp. 13920–13944.
79 Hsin, Amy, and Christina Felfe, When Does Time Matter? Maternal employment, children's time with parents, and child development, *Demography*, vol. 51, no. 5, October 2014, pp. 1867–1894.

3.6 Technology and digitalization

The integration of technologies such as artificial intelligence (AI), smart grids and online platforms has transformed business operations, shifting from labour-intensive processes to automated, data-driven systems. Traditional methods, often marked by inefficiencies, higher resource consumption and slower decision-making, are being replaced by digital technologies that can improve supply chain performance by enhancing efficiency, resilience and robustness.[80]

Knowledge and technology can be key enablers in scaling up low-carbon energy sources and energy-efficient solutions. Countries with advanced knowledge and information infrastructures, particularly high-income countries, have capitalized on global trade in clean energy technologies.

Digitally enabled smart energy systems are a central component of the net-zero transformation, allowing consumers to optimize their energy demand and providing an intermediary function between consumers and operators.[81]

For society, families and children, advanced technologies integrated as part of the just green transition have both positive and negative impacts. On the positive side, these technologies can enhance energy reliability, create new jobs, and provide educational opportunities.

However, they also risk displacing workers, increasing living costs, and creating disparities in access, which can disproportionately affect vulnerable communities and ultimately impact children's rights. In addition, the environmental impacts of the vast data centres required for AI, especially regarding land use and the rapidly increasing consumption of water and electricity, have significant impacts on local communities.[82]

TABLE 10

Technology and digitalization – Child rights impacts, by relevant article in the CRC

Positive impacts	Negative impacts
Right to be heard (article 12) & **Seek, receive and share information** (article 13) • Digital platforms allow children to engage in climate advocacy. **Access to information** (article 17) • Digital platforms give children access to information. **Health** (article 24) • AI and smart grids reduce emissions and improve energy reliability, contributing to a healthier environment. **Adequate standard of living** (article 27) • AI can reduce energy costs, and digital initiatives may empower families, improving children's living conditions. **Education** (article 28) • Smart grids ensure stable electricity for studying, and digitalization enhances access to education.	**Privacy** (article 16) • Increased data collection poses risks to children's privacy. **Access to information** (article 17) • Some families may face digital divide and unequal access to information. **Health** (article 24) • Land use combined with high water and electricity consumption required for large-scale data centres can harm local environments and communites, with negative impacts on children's health and wellbeing **Adequate standard of living** (article 27) • Job losses and increased costs from technology upgrades can create financial instability for families. **Education** (article 28) • Displacement of workers and the digital divide limit educational opportunities, especially for girls.

80 Yang, Miying, Mingtao Fu and Zihan Zhang, The Adoption of Digital Technologies in Supply Chains: Drivers, process and impact, *Technological Forecasting and Social Change*, vol. 169, August 2021, article no. 120795.

81 *See, for example:* Department for Business, Energy & Industrial Strategy, Transitioning to a Net Zero Energy System: Smart Systems and Flexibility Plan 2021, Office of Gas and Electricity Markets, United Kingdom, July 2021.

82 Taft, Molly, AI Is Eating Data Center Power Demand – and It's Only Getting Worse, *Wired Science*, 22 May 2025; Crawford, Kate, Generative AI is Guzzling Water and Energy, *Nature*, vol. 626, 22 February 2024, p. 693.

Positive impacts on children's rights

One interview participant noted that the adoption of green technologies has been prominent among major industries, including information and communication technology, consumer goods, and renewable fuel providers. For example, Neste, a Finnish energy company, has been actively engaged in positioning itself as a leader in sustainability, incorporating child rights considerations.[83]

The Child Atlas developed by Save the Children offers a data platform that visualizes and analyses children's outcomes globally. By providing accessible, high-quality information on key child development indicators, this platform can facilitate children's participation in global discussions, advocacy, and decision-making on climate and environmental issues.[84]

Digitalization also plays a positive role in the green transition by empowering women economically and socially through improved access to markets, education and opportunities. For example, the Green & Digital initiative in Iran, a collaboration between UNDP Iran and Digikala, supports women and vulnerable communities around the Lake Urmia Basin.[85]

By equipping participants with digital skills and connecting them to online markets, the initiative enables local producers, particularly women, to sell sustainable products and reach wider consumer bases.[86] This approach fosters greener business practices, while it also strengthens livelihoods, enhances family support systems, and builds economic resilience against environmental challenges.

Negative impacts on children's rights

Despite these benefits, challenges persist, including risks associated with the digital divide and gender disparities in digital access and skills. Adolescent girls in South Asia, for example, are 35 per cent less likely than boys to have basic digital skills, such as sending emails. Additionally, cultural norms and perceptions in the region's middle- to low-income countries view technology-related careers as more suitable for boys, delaying girls' access to technology and limiting their opportunities in the digital economy.[87]

This gap means that the positive impacts of digitalization do not reach all members of the community equally, perpetuating inequalities and hindering access to educational and economic opportunities.

Furthermore, in the global discourse on AI, there has been negligible attention paid to children and their human rights, including the right to be heard. Young people, up to age 18, represent more than a quarter of the world's population and are the largest cohort of online users, which means they will experience the greatest impacts of AI over their life course. But they have primarily been denied a 'seat at the table'. As artificial intelligence becomes increasingly embedded in sustainable energy systems, it is essential to remedy the current failure to engage children in the design, implementation and regulation of this technology.[88]

83 Norjama, Nina, Taking Action on Children's Rights, Neste, 2 January 2025. https://www.neste.com/news-and-insights/sustainability/taking-action-childrens-rights

84 Child Rights Resource Centre, Understanding Children's Lives Through the Power of Data, Save the Children, Last updated: 7 October 2024.

85 United Nations Development Programme, UNDP Iran and Digikala Join Forces to Boost Livelihoods of Lake Urmia Basin Inhabitants, 16 February 2022.

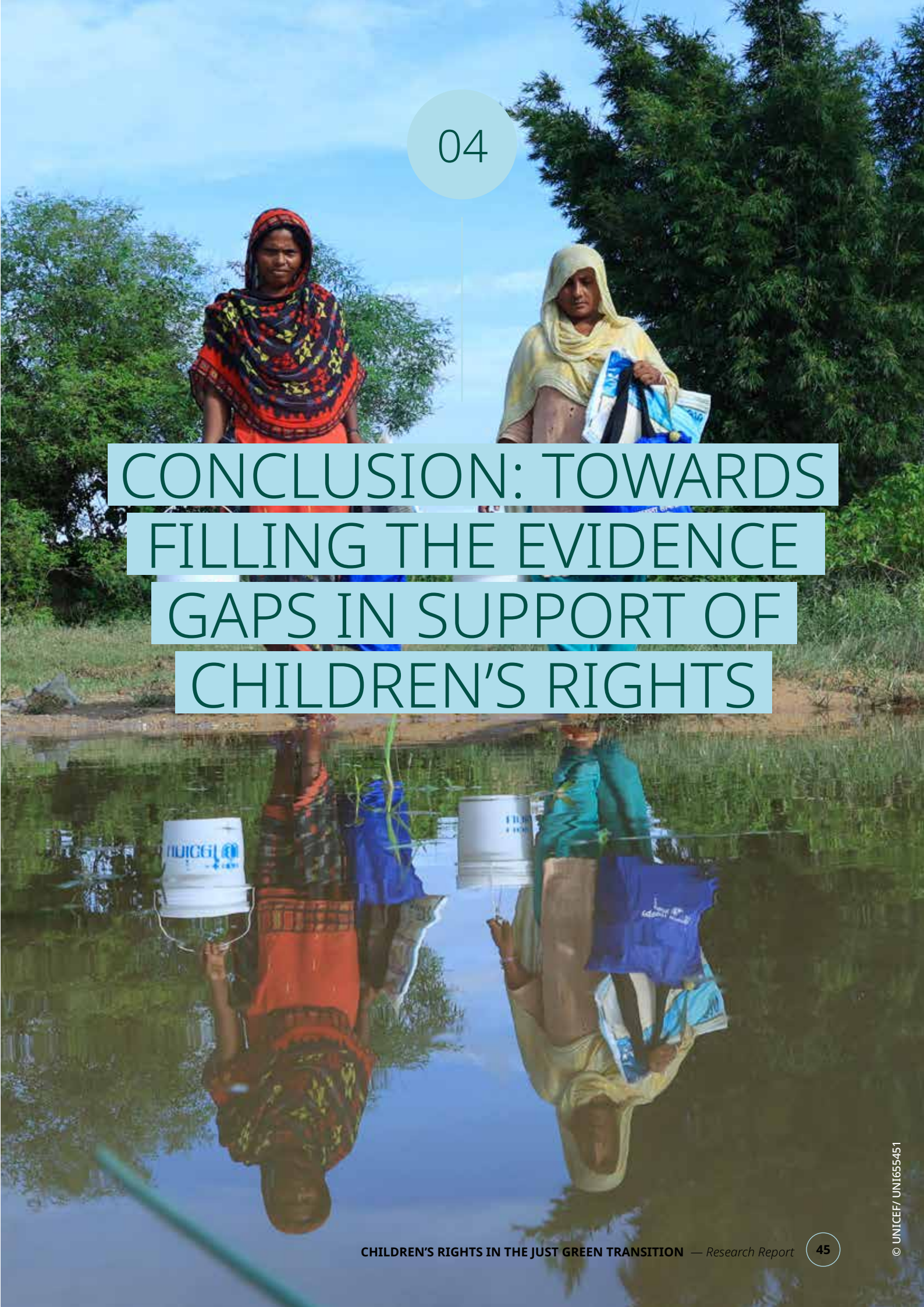
86 Providas, Claudia, Greening Livelihoods, Bridging the Digital Divide, United Nations Development Programme, 20 June 2022.

87 Njikho, Veronica Kamanga, Bridging the Digital Divide in South Asia, UNICEF South Asia, 29 May 2024.

88 Nylund, Bo Viktor, How Can Generative AI Better Serve Children's Rights? Looking to the Convention on the Rights of the Child, UNICEF Innocenti – Global Office of Research and Foresight, n.d.; Özkul, Didem, and Steven Vosloo, Children's Perspectives on Their Best Interests and AI: How do young people feel about the AI revolution? They told us, UNICEF Innocenti – Global Office of Research and Foresight, 14 October 2025, United Nations Children's Fund, Artificial Intelligence Governance in Motion: A rapid global review of AI regulation and its implications for children's rights, UNICEF, New York, October 2025

04

CONCLUSION: TOWARDS FILLING THE EVIDENCE GAPS IN SUPPORT OF CHILDREN'S RIGHTS



The green transition holds great potential for positive impact, from healthier environments through reduced air pollution, to preserving a liveable planet for future generations. But it also brings challenges that can adversely affect children and other vulnerable populations.

Children are disproportionately impacted by the systemic economic shifts accompanying this transition, and their rights must be safeguarded throughout the process.

Figure 4 illustrates a conceptual framework of the links between economic shifts related to the green transition and the negative impacts on children, in a complex web of actions, impacts and human rights.

A just green transition will respect and support children's rights, as outlined in the Convention on the Rights of the Child, complemented by the Children's Rights and Business Principles. To achieve this, it is essential for stakeholders to integrate child-focused considerations into all aspects of planning, decision-making and implementation – ensuring that economic, environmental and social benefits reach children and their communities, while mitigating any potential negative impacts.

This research report aims to be a starting point in reaching this goal, while recognizing that additional studies will be a key to more fully understanding the scope of impacts – both beneficial and adverse – on children and child rights.

Most of the available research and evidence focuses on the broader environmental and economic outcomes, often overlooking the specific ways in which the green transition affects children. Additionally, the available studies are concentrated in regions where data collection is more feasible, typically gathering input from adults.

This leaves a gap in understanding the areas where children are disproportionately impacted by climate change or related activities, especially in low-income countries or rural areas. Children who experience these impacts often lack a platform to voice their experiences, making it difficult to fully grasp the unique challenges they face.

One system that could be used to support future study is described in Box 4. **Ultimately, such research will bring the rights and needs of children to the forefront – and make a vital contribution to reaching the global goals of inclusive, sustainable growth that prioritizes universal well-being for the youngest and most vulnerable members of society.**

BOX 4

Determining the significance of evidence gaps related to child rights in a just green transition

To assess the importance of current evidence gaps, the research team developed a scoring system based on the six criteria listed in Table 11. In this system, a higher score for criteria 1–4 indicates greater urgency for additional research, and a lower score for criterion 5 indicates a lack of data.

TABLE 11

Criteria and scoring system for prioritizing potential research locations

Criteria	Scoring mechanism
1) Impact on children's rights (evidence gap perspective)	Evaluates the extent to which the available evidence comprehensively addresses child rights issues. Higher scores indicate more significant gaps that could lead to unmet needs in child protection, health, education or well-being.
2) Number of children affected (evidence gap perspective)	Measures the lack of data concerning children in specific populations. A higher score reflects a gap in data impacting a larger number of children.
3) Severity of adverse outcomes (evidence gap perspective)	Assesses gaps in understanding the severity of adverse outcomes, such as health risks, educational disruptions, or lack of protection from exploitation. Higher scores indicate that critical outcomes are not well-documented.
4) Urgency for Intervention (evidence gap perspective)	Determines how critical it is to collect evidence to address potential adverse effects on children. Higher scores denote an urgent need for intervention to prevent or mitigate harm.
5) Availability of current data	Evaluates how much data is already available regarding the green transition's impact on child rights in the country. A lower score indicates a lack of sufficient data, thereby prioritizing that region for further research.

Given the widespread evidence gaps and the extensive number of countries where the green transition could severely impact child rights, it will be important to prioritize certain countries or regions for further research. Examining the likelihood of adverse child rights impacts resulting from transition activities can facilitate effective exploration through an analysis based on five additional criteria:

1 **Population under age 18**
Percentage of children

2 **Risks of child labour**
Child Labour, UNICEF Data, Last update: June 2025. Next update: June 2026

3 **Strength of human rights laws**
Human Freedom Index, Cato Institute, 2024

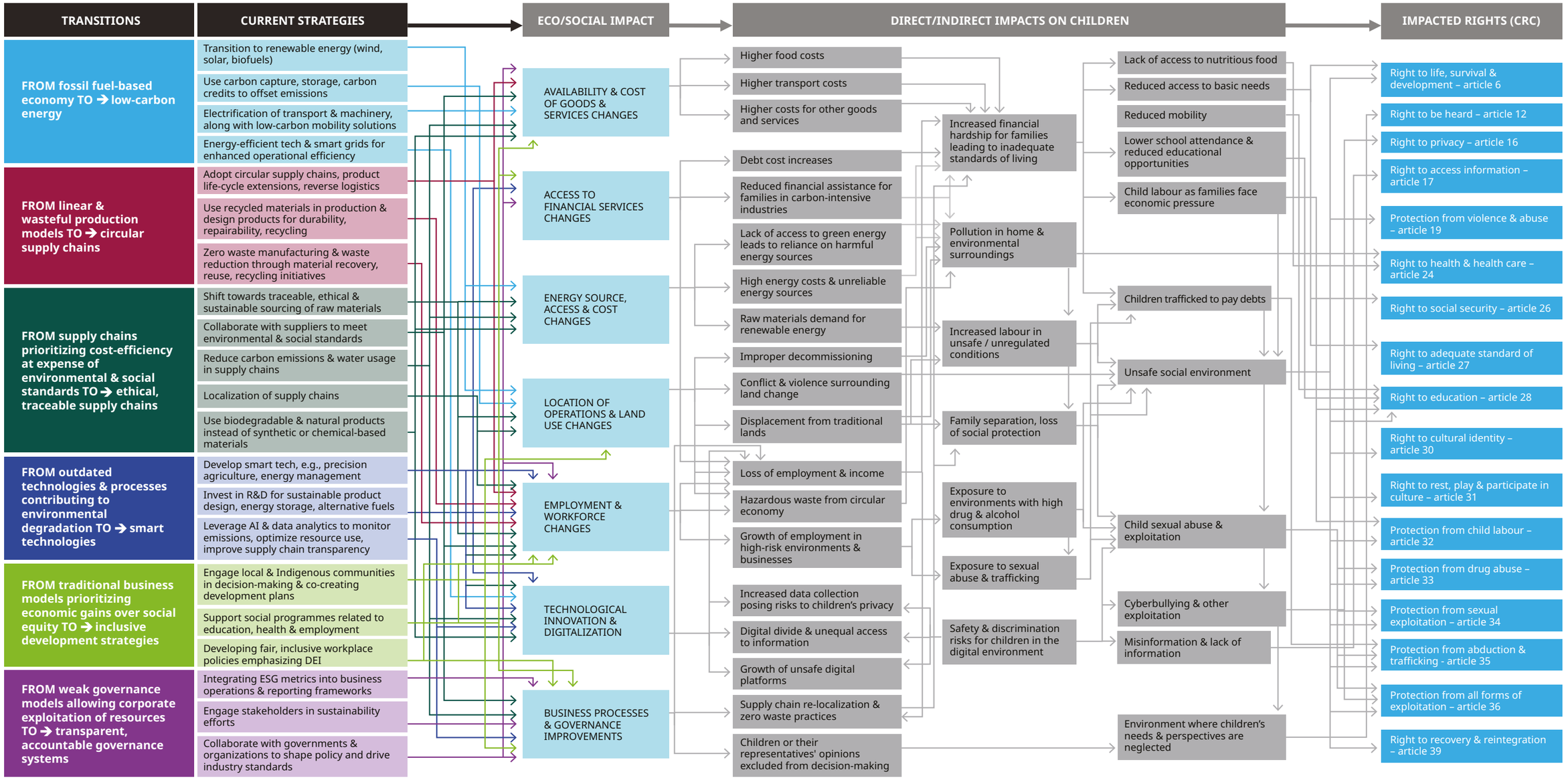
4 **Strength of social services**
Literacy rate as proxy

5 **Speed of transition**
Energy Transition Index, World Economic Forum, 2025

Applying this type of system to select a range of countries, varying in geographical location, economic status and size of the child population, will help ensure a broad spectrum of learning.

FIGURE 4

Conceptual framework outlining the links between economic shifts and adverse impacts on child rights



A

APPENDIX A: LIST OF INTERVIEW PARTICIPANTS

Children's rights experts

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Tashmeem Muntazir Chowdhury, Head of Sustainable Finance, BRAC Bank (on behalf of Sabbir Hossain, Deputy Managing Director and Chief Operating Officer)

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B

APPENDIX B: INDUSTRIES INCLUDED IN THE ANALYSIS

AWR Lloyd's research (August–October 2024)

examined how business strategies are being implemented across 21 industries, classified according to the International Standard Industrial Classification of All Economic Activities (ISIC), United Nations Statistics Division. The industries are:

- Agriculture, forestry and fishing
- Mining and quarrying
- Manufacturing
- Electricity, gas, steam and air conditioning supply
- Water supply; sewerage, waste management and remediation activities
- Construction
- Wholesale and retail trade; repair and selling of motor vehicles and motorcycles
- Transportation and storage
- Accommodation and food service activities
- Information and communication
- Financial and insurance activities
- Real estate activities
- Professional, scientific and technical activities
- Administrative and support service activities
- Public administration and defence; compulsory social security
- Education
- Human health and social work activities
- Arts, entertainment and recreation
- Other service activities
- Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
- Activities of extraterritorial organizations and bodies

C

APPENDIX C: BUSINESS STRATEGIES IN RESPONSE TO SYSTEMIC ECONOMIC SHIFTS

1

Transition out of fossil-fuel based economy to low-carbon solutions:

To transition from a fossil-fuel-based economy, industries must eliminate high-emission energy sources by reducing emissions and electrifying value chains with cleaner energy. This shift is essential to protect both society and the environment. The move to a low-carbon economy requires cleaner energy, improved efficiency, and modernized infrastructure, with non-RE producers and various industries playing key roles in driving this change.[89] Across different sectors, some common strategies emerge. A summary of the key activities that span various industries, contributing to the broader green transition, is offered below.

Electrification of equipment and operations

Electrification is a key decarbonization strategy across industries. For example, heavy machinery in mining, manufacturing, construction, and electricity, gas, steam and air conditioning supply are being electrified. Electric vehicles are replacing traditional combustion-engine cars in transportation, and electric heating, cooling and cooking systems are becoming common in the construction, real estate and accommodation sectors. In agriculture, tractors, equipment and irrigation systems are increasingly powered by renewable electricity, further reducing emissions.

Adoption of renewable energy sources

The adoption of renewable energy sources (e.g., wind, solar, hydropower) is essential to reducing reliance on fossil fuels. Industries such as electricity and gas supply, manufacturing, water supply, waste management, education, transportation, and information and communication are rapidly integrating renewable energy into their operations. For example, renewable energy is replacing coal-fired power plants in electricity generation, while manufacturing plants are installing solar panels on-site. In the accommodation and food service sector, hotels and restaurants are incorporating renewable energy for heating and electricity. Water supply and agriculture industries are utilizing solar and hydropower to reduce operational emissions.

Energy efficiency improvements

Industries are adopting advanced technologies and practices to improve energy efficiency and reduce overall energy consumption. For instance, manufacturing facilities are upgrading machinery and optimizing production processes to cut energy use. In the construction sector, green building certifications like LEED and BREEAM encourage the development of energy-efficient buildings. Accommodation and food service businesses are improving energy efficiency through better insulation, energy-efficient appliances, and smart energy management systems. Similarly, wholesale and retail trade, repair of motor vehicle and motorcycles, and information and communication industries are incorporating energy-efficient lighting and HVAC systems, while electricity, gas, steam and air conditioning supply sector is enhancing grid efficiency to minimize energy waste.

Transition to cleaner fuels

Cleaner fuels (e.g., biofuels, hydrogen, synthetic) are being adopted across many sectors. Transportation is a key area where this shift is occurring, with aviation turning to sustainable fuels, and shipping transitioning to biofuels and renewable e-ammonia. In mining and quarrying, biofuels and synfuels are used to power heavy machinery. The wholesale and retail trade sector is increasingly utilizing electric and hybrid delivery vehicles to reduce emissions from logistics and last-mile delivery. Accommodation and food service is transitioning to cleaner energy by incorporating bioenergy systems for heating and cooking. The electricity, gas, steam and air conditioning supply industry is also incorporating hydrogen and bioenergy as cleaner alternatives to traditional fuels.

Carbon capture, utilization and storage (CCUS) and carbon offset projects

CCUS captures CO_2 emissions for storage or repurposing (e.g., using it to reinforce concrete). This is an option for industries that are difficult to decarbonize, including steel, cement, chemicals manufacturing, and electricity, gas, steam and air conditioning supply. Water supply and waste management sectors are exploring CCUS to capture methane and other emissions. Many industries are purchasing carbon credits from reforestation and restoration projects to offset emissions, promoting transparency and supporting environmental restoration. These initiatives can help industries transition to low-carbon operations while complying with global sustainability goals.

89 International Energy Agency, Net Zero by 2050: A roadmap for the global energy sector, IEA, 2025.

2

Transition out of linear and wasteful production models to circular supply chains:

The shift from a linear and wasteful production model to circular supply chains is a crucial part of creating a more sustainable and resource-efficient economy. Industries are increasingly adopting practices that extend product life cycles, minimize waste, and recover materials for reuse.90 These changes help reduce environmental impact, increase resource efficiency, and drive innovation. Across various sectors, several common strategies are being implemented to facilitate this transition.

Adopting circular supply chains

The transition to circular supply chains aims to minimize waste and reuse materials at every stage of production. Industries manufacturing, agriculture, construction, mining, information and communication, and electricity, gas, steam and air conditioning supply are leading this shift. In these sectors, recycled materials and remanufacturing processes reduce the reliance on raw resources. For instance, in electricity generation, components from decommissioned systems can be reused in new installations, while excess heat from steam generation can be repurposed, lowering the demand for virgin materials.

Product life-cycle extensions

Extending the life cycle of products is a key pillar of circular economy practices. By designing products for durability and repairability, industries can ensure that goods remain in use for as long as possible. Wholesale and retail trade, transportation, and real estate sectors are increasingly promoting repair services, product refurbishment, and resale. In the manufacturing industry, machinery and equipment are designed with modular components that can be easily replaced or upgraded, preventing the need for complete product replacement. Additionally, reverse logistics – where products are returned, repaired or refurbished for resale – are gaining traction in industries such as wholesale and retail trade, transportation, electricity supply, and accommodation and food service. Retailers, for example, are implementing take-back schemes for electronics and other consumer goods, enabling materials to be recycled or reused rather than discarded.

Waste reduction through material recovery, reuse and recycling

Waste reduction and recovering materials is now central to industries such as mining, agriculture, water supply, electricity supply, information and communication and construction. Manufacturing captures valuable by-products, while construction reuses materials and mining reprocesses tailings. Industries are recycling waste back into production, with water supply and waste management treating wastewater and recycling materials. Construction recycles steel and concrete, while accommodation and food services compost organic waste. In the information and communication sector, e-waste management is becoming increasingly important as companies focus on recovering valuable metals (e.g., gold, copper, rare earth elements) from discarded electronics, while safely disposing of toxic materials.[91]

Sustainable material sourcing and eco-design

Many industries, including manufacturing, real estate, wholesale and retail trade, and electricity and gas supply, are shifting to sustainable, recyclable materials with lower environmental impacts. This transition emphasizes eco-design, making products easier to recycle or repurpose and focusing on long-term sustainability over short-term convenience. Construction and real estate increasingly use deconstructable, recyclable materials, while accommodation and food services adopt sustainable packaging to reduce waste and dependence on non-renewable resources. The electricity and gas supply sector is also incorporating recyclable components into power plants and renewable energy systems.

90 BHP, Sustainability, 2025.
91 AT&T, The Value of Connection, Sustainability Summary, 2023.

3

Transition out of supply chains that prioritize short term cost-efficiency toward more ethical and traceable supply chains that integrate environmental and social standards, ensuring long term economic value

As industries across the globe increasingly recognize the importance of sustainability, there is a growing shift from supply chains that prioritize cost-efficiency at the expense of environmental and social standards to ethical and traceable supply chains. This transition requires industries to adopt practices that prioritize environmental stewardship, ethical labour practices, and transparency. The following are common strategies and actions industries are taking to make their supply chains more ethical, traceable and sustainable.

Shifting towards traceable, ethical and sustainable sourcing of raw materials

Across various industries, there is a strong movement towards ensuring that raw materials are ethically and sustainably sourced. This shift is particularly relevant for industries such as mining, agriculture, manufacturing, electricity and gas supply, and wholesale and retail trade. For example, companies in the mining sector are increasingly requiring their suppliers to meet ethical mining standards to prevent human rights abuses and environmental degradation. Similarly, in agriculture, businesses are focusing on sourcing from farms that adhere to sustainable farming practices, including organic and regenerative agriculture, ensuring that the supply of raw materials such as cotton, coffee and palm oil meets ethical standards. Digital technologies (e.g., blockchain, data management systems) ensure traceability throughout supply chains, helping industries such as wholesale and food services meet consumer demands for transparency and maintain sustainable practices.

Collaborating with suppliers to meet environmental and social standards

Collaboration with suppliers is essential for ensuring environmental and social standards in supply chains. Industries such as manufacturing, construction, energy, and gas supply and water supply are working closely with suppliers to reduce carbon footprints and promote ethical labour practices. For example, in real estate and construction, contractors, suppliers and architects source sustainable materials (e.g., responsibly managed timber, low-carbon cement). This collaboration also involves educating suppliers on sustainable practices. Industries such as agriculture and forestry train farmers and suppliers in sustainable land management, water conservation and pesticide reduction, ensuring that materials meet environmental standards while supporting local livelihoods.

Reducing carbon emissions and water usage

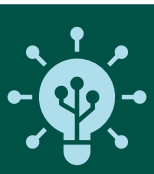
Reducing carbon emissions and water usage is vital for building sustainable supply chains. Industries such as transportation, mining, manufacturing, electricity and gas supply, accommodation, and the information and communication sector are adopting measures to lower emissions and conserve water. For example, the transportation industries optimize routes, adopt electric vehicles, and invest in energy-efficient technologies. Water-intensive sectors such as agriculture and mining are implementing drip irrigation and wastewater recycling, while hotels utilize water-efficient systems and recycle greywater. In the information and communication sector, data centres are cutting energy use with advanced cooling systems, while companies minimize e-waste through recycling and reuse programmes.[92]

Promoting social responsibility and ethical labour practices

Ensuring ethical labour practices is increasingly important in industries such as mining, agriculture, retail, manufacturing, and electricity and gas supply, where risks of poor working conditions and exploitation are higher. In response, companies are implementing fair wages, safe working conditions and equal opportunities throughout their supply chains. In electricity and gas, efforts to uphold labour standards extend to contractors and suppliers involved in renewable energy projects. Certifications such as Fair Trade and Rainforest Alliance help industries meet social and environmental standards, building consumer trust and ensuring commitment to ethical supply chains.

92 Vodafone Group, ESG Reports, 2025.

4 *Transition out of outdated technologies and processes that contribute to environmental degradation to smart technologies:*



Industries are increasingly moving away from supply chains that prioritize cost-efficiency at the expense of environmental and social standards. The focus is shifting towards ethical, sustainable and traceable supply chains, ensuring that companies align with global sustainability and social responsibility goals. Below are the common strategies industries are adopting to achieve this transition.

Developing smart technologies

Adopting smart technologies is vital for ethical and traceable supply chains. Innovations such as precision agriculture, energy management, and data analytics optimize resource use and reduce environmental impacts. Precision agriculture minimizes water and fertilizer use, while energy management systems in sectors such as manufacturing, construction, real estate, and electricity and gas supply reduce energy consumption and emissions. Electricity and gas companies use smart grid technologies to enhance efficiency, while transportation companies optimize routes to cut fuel consumption. Water supply sectors employ smart systems to monitor water use, and the information and communication industry supports these technologies to improve transparency and efficiency in supply chains.

Investing in R&D

R&D in sustainable product design, energy storage and alternative fuels is a necessity in ethical supply chains. Manufacturing, mining, transportation, and electricity and gas supply sectors are developing eco-friendly products to reduce environmental impacts. R&D promotes recyclable materials in manufacturing, advanced batteries, and hydrogen fuel cells to support renewable energy integration and alternative fuels in transportation and electricity generation. Mining, and electricity and gas supply companies are exploring sustainable technologies for mineral extraction and energy generation, reducing land disruption and water usage. The information and communication sector advances data management and process optimization technologies, aligning industries with sustainability goals.

Leveraging AI and data analytics for emissions, resource optimization and transparency

AI and data analytics are revolutionizing supply chains by reducing emissions, optimizing resources, and improving transparency. Electricity and gas supply companies use AI to monitor grid efficiency and emissions, while sectors such as agriculture, manufacturing and transportation use AI to track resource use, identify inefficiencies and reduce waste. The information and communication industry plays a key role in developing AI and data solutions for real-time supply chain monitoring. Construction employs AI to assess the environmental impact of building materials, while retail and food services use AI to track product origins and ensure ethical sourcing. Blockchain and digital platforms enhance transparency and traceability across industries.

5

Transition out of traditional business models that prioritize economic gains over social equity to inclusive development strategies

Industries across various sectors are transitioning from traditional business models that prioritize economic gains to more inclusive development strategies that emphasize social equity. This shift involves engaging local communities, supporting social programmes, and promoting diversity, equity and inclusion (DEI) in the workplace. Below are common strategies adopted across industries to foster inclusive development.

Engaging local and Indigenous communities in decision-making

Industries such as agriculture, forestry, fishing, mining and quarrying, manufacturing, construction, and electricity and gas supply are involving local and Indigenous communities in decision-making processes. By co-creating development plans with these communities, businesses can better ensure that local needs and cultural sensitivities are respected. This collaborative approach is also seen in water supply, waste management, real estate and other sectors, where community engagement leads to more sustainable resource management and stronger local relationships.

Supporting social programmes related to education, health and employment

Many industries – including transportation, storage, finance and insurance, wholesale and retail trade, education, and accommodation and food service – are investing in social programmes aimed to improve education, health and employment. These sectors support initiatives that provide educational opportunities, health-care access and job creation for underserved communities. By doing so, industries such as information and communication, water supply and waste management contribute to community development, while fostering long-term economic and social partnerships.

Developing fair and inclusive workplace policies

Inclusive workplace policies emphasizing DEI are becoming standard across industries such as manufacturing, electricity and gas supply, construction, real estate, wholesale and retail trade, and financial and insurance activities. These policies promote gender equality, fair wages and safe working conditions, ensuring that diverse talent is welcomed and supported. Industries such as information and communication, and transportation are focusing on DEI to cultivate innovation and a culture of inclusion, which benefits both the workforce and the broader community.

6 *Transition out of weak governance models that allow for corporate exploitation of resources to transparent and accountable governance systems:*

Industries are moving away from weak governance models that enable corporate exploitation towards transparent and accountable governance systems. This shift focuses on integrating environmental, social, and governance (ESG) metrics, engaging stakeholders, and collaborating with governments to shape policies.[93] Below are common strategies being adopted across relevant industries for improving governance.

Integrating ESG metrics into business operations and reporting frameworks

Industries such as agriculture, mining, manufacturing, electricity and gas supply, water supply, financial services and education are incorporating ESG metrics into their operations and reporting frameworks. This integration ensures responsible resource management, transparency in operations, and mitigation of social and environmental risks. Sectors such as transportation, real estate, information and communication, and accommodation and food services are using these metrics to monitor and report on their environmental impact, labour practices and governance structures, promoting accountability.

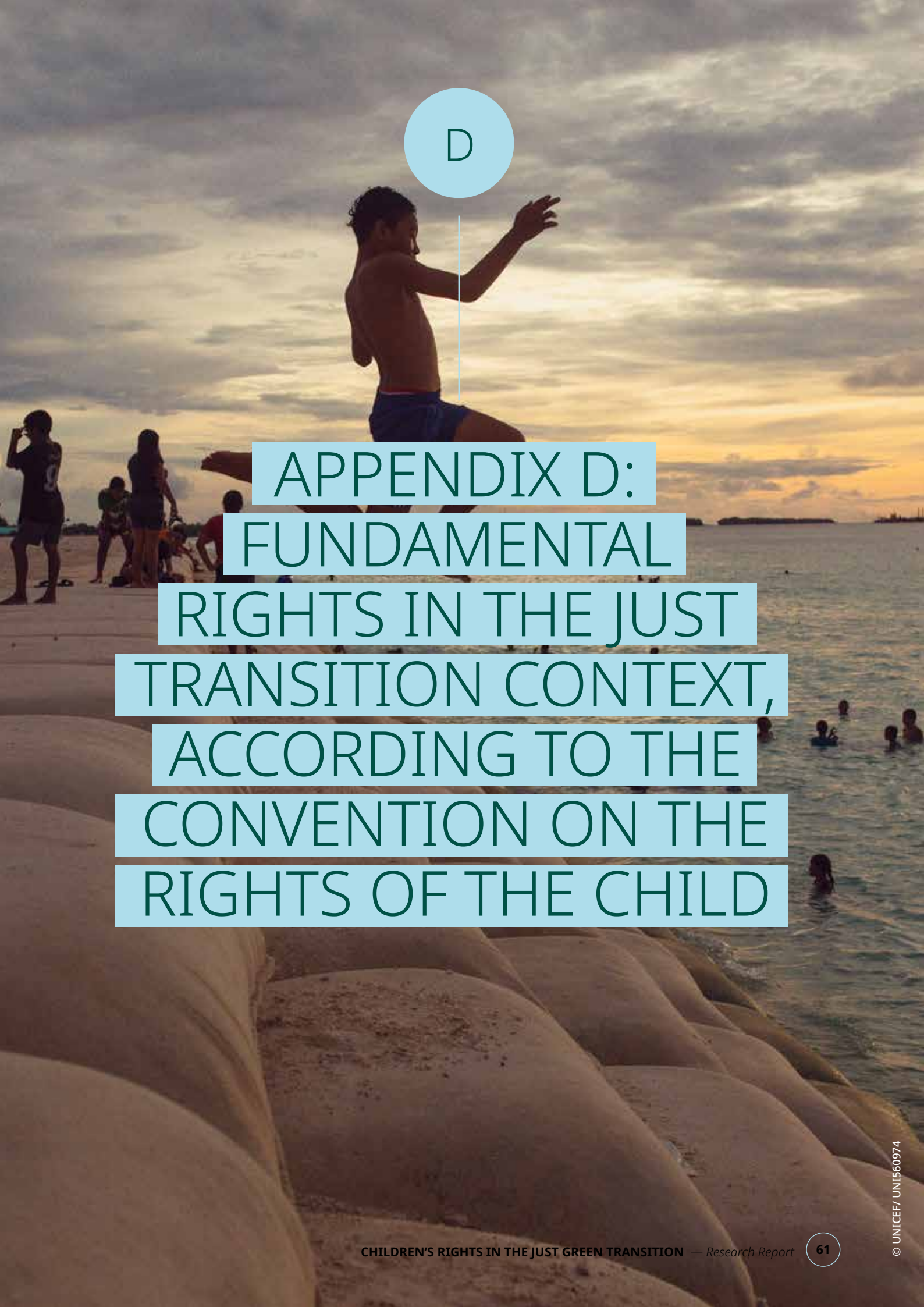
Engaging stakeholders in sustainability efforts

Industries are recognizing the importance of involving stakeholders in their sustainability efforts. Across sectors, including construction, wholesale and retail trade, real estate, manufacturing, financial services and mining, businesses are engaging local communities, investors and employees in governance decisions to promote accountability. Stakeholder engagement ensures that companies address social and environmental concerns while aligning business practices with broader sustainability goals.

Collaborating with governments and organizations to shape policy and drive industry standards

Collaboration with governments and other organizations is vital for industries aiming to implement transparent governance systems. Mining, water supply, energy and financial services are working closely with regulatory bodies to shape policies that promote sustainability and prevent resource exploitation. Industries such as manufacturing, transportation, and information and communication are collaborating with international organizations and NGOs to develop industry-wide standards and improve corporate accountability. By working together, industries are driving regulatory changes that ensure long-term environmental and social responsibility.

93 de Souza Barbosa, Anrafel, et al., Integration of Environmental, Social, and Governance (ESG) Criteria: Their impacts on corporate sustainability performance, *Humanities and Social Sciences Communications*, vol. 10, 13 July 2023, article 410 (2023).



D

APPENDIX D: FUNDAMENTAL RIGHTS IN THE JUST TRANSITION CONTEXT, ACCORDING TO THE CONVENTION ON THE RIGHTS OF THE CHILD

If children's rights are not explicitly safeguarded, 'green' measures have the potential to worsen inequality instead of reducing it, undermining the principles of a just transition.

The table below underscores the right of all children, everywhere, to a clean, healthy and sustainable environment. It lists the relevant rights defined in specific articles of the Convention on the Rights of the Child[94] and highlighted in General comment No. 26. The second column offers a discussion of how these rights can be affected, for better or worse, along with key government or business responses that can support and protect children.

While the CRC articles in this table are grouped by topics, it is important to remember that all human rights are "indivisible, interdependent and interrelated." They do not apply in a hierarchy of importance. Also, while some rights are threatened by environmental degradation, others play a role in safeguarding children's rights in relation to the environment. The right to education, for example, has both dimensions.[95]

Everything flows from articles 1, 2 & 3 ...	
• **A child is every human being under age 18 (article 1)** • **All rights apply to all children without discrimination of any kind (article 2)** • **In all actions concerning children, the best interests of the child should be a primary consideration (article 3)**	*Every child has equal and universal rights* – regardless of their parents' or guardians' status, including race, colour, sex, language, religion, political or other opinion, disability, property, or national, ethnic, social or birth origins. Environmental harm can be a bigger threat to children in Indigenous communities, minority groups, children with disabilities, and those living in places most affected by disasters and climate change. Achieving the green transition must not disproportionately affect children and youth from low-income, marginalized or vulnerable communities. When making decisions about the environment and climate change, governments must consider the effects on children growing up today, and in the future. Business decisions should ensure that short-term economic gains do not override children's long-term well-being.
Every child has the right to ...	
• **Life, survival and development** (article 6) • **The highest attainable standard of health**, and to facilities for treatment and rehabilitation (article 24) • **An adequate standard of living** that supports their physical, mental, spiritual, moral and social development (article 27)	*Cleaner water, fresher air, healthier environments, more sustainable agriculture.* These are just some of the benefits for children that are emerging from the green transition. The CRC explicitly mentions the dangers of environmental pollution in article 24, which requires governments to combat disease and malnutrition, and reduce infant and child mortality. Governments must also ensure that children are not living in poverty – but instead have access the safe food, clean water and decent housing they need to live, grow and develop to their full potential. These rights are at risk when the shift from carbon-intensive to green industries leads to economic insecurity for families, particularly in locations that exclusively depend on fossil fuels. Sustainable energy projects may also lead to such issues as: increased heat from solar panel installations; disrupted ecosystems during infrastructure construction; or challenges to pastoralist ways of life that support food security.

94 For the Convention on the Rights of the Child full text, open <www.unicef.org/media/52626/file> (English, PDF).

95 Committee on the Rights of the Child, General comment No. 26 (2023) on children's rights and the environment, with a special focus on climate change, CRC/C/GC/26, United Nations, 22 August 2023, para. 13.

• **Express their views freely** in all matters affecting them and the opportunity **to be heard** in judicial or administrative proceedings (article 12) • **Seek, receive and share information** and ideas of all kinds (article 13) and **access to information** from diverse national and international sources (article 17) • **Freedom of association and peaceful assembly** 15)	*As rights holders, children are entitled to be recognized and fully respected as environmental actors* – as well as to be protected from infringements of their rights as a result of environmental harm. Children often stand up for their environmental rights as human rights defenders. Many children also spend time with friends and groups where they exchange information and ideas. They have the knowledge and ability to flag negative impacts and to propose solutions. They should be taken seriously by adults. Governments and businesses should promote children's access to clear, accurate environmental and climate-related information – including information about plans and decisions being made, and about actions that children can take themselves. The exclusion of children and youth from green transition planning and monitoring limits intergenerational justice.
• **Education** that encourages the development of respect for the natural environment (article 29) • **Rest, play, and participate freely in cultural life and the arts** (article 31) • **Children of Indigenous origin or who belong to an ethnic, religious or linguistic minority** have the right to enjoy their own culture, practise their religion, and use their own language (article 30)	*Education can support the green and just transition through climate literacy,* green jobs training, and overall empowerment of children and youth. *Children should be supported with environmental education* that is accurate, appropriate for diverse ages, and available in local languages. The places where children learn should be safe from environmental harm. Children should be able to play and be active in clean, safe places and connect with our natural world. Green and just transition projects create healthier environments with greater access to greener spaces. When governments or businesses make plans for new wind farms and solar parks, roads, buildings, and even entire neighbourhoods, they need to consider where and how children will have places for recreation and play, and space to participate in cultural activities. Changes in land use for renewable energy installations and reforestation may lead to the displacement of families and weakened cultural ties for children. Indigenous children and children of minority groups' survival, ways of life, and cultural practices are often very connected to their natural environment. This should be accounted for in the development of sustainable energy.

Every child must be free from …	
• **Economic exploitation and child labour** (article 32) • **All forms of physical or mental violence, injury, abuse or maltreatment** (article 19), including sexual exploitation and abuse (article 34); abduction, sale and trafficking (article 35) • **Arbitrary or unlawful interference with his or her privacy**, family, home or correspondence (article 16)	*Environmental harm and climate change can lead to unstable situations, conflicts and inequalities*, leaving children at greater risk of physical and psychological violence. Stronger efforts are needed to protect children by investing in essential social services and by working to solve the root causes of violence and abuse. Ethical sourcing and supply chain localization can improve children's health, education and rights protection, while zero-waste initiatives reduce pollution. But shifts to local suppliers and zero-waste practices – as well as loss of household income due to changing needs for green vs. fossil fuel workers – may limit access to essentials and push children into hazardous labour. While green products, such as electric vehicles and solar panels, offer environmental benefits, the hidden harms tied to raw material sourcing are often overlooked. The high demand for cobalt and lithium for batteries, for example, may create risks of exploitative child labour. Both governments and business entities need to strengthen the safeguards that ensure children are not exposed to hazardous work in green transition supply chains. Digitalization and use of AI-driven technologies are a central feature of increasing the efficiency of sustainable products and energy systems. However, the collection, analysis and profiling of children's data can undermine their right to privacy and the protection of their personal information. Additionally, their right to be free from exploitation and abuse can be undermined by technologies that track, monitor and broadcast their internet use.

E

APPENDIX E: EVIDENCE OF POTENTIAL ADVERSE IMPACTS ON CHILD RIGHTS

This appendix complements Section 3 on child rights and the transition's economic and social impacts. This list of evidence highlighting potential adverse impacts of the green transition on children's rights is not exhaustive. It reflects both the literature review and interviews conducted during the research, and contains two types of examples: 1) Those related to issues resulting from implementing the transition or failure to address the impacts of climate change; and 2) Those that provided context by illustrating adverse impacts of child rights violations in general but are not specific to the green transition.

The content is organized by the six economic shifts outlined in Table 2: Systemic economic shifts and the strategies adopted by businesses, then by the relevant rights according to specific articles of the Convention on the Rights of the Child (CRC).

1

Employment and workforce transformation

Life, survival and development, article 6; Adequate standard of living, article 27; Education, article 28; Protection from child labour, article 32 – In Colombia, the decline of the coal industry, particularly in regions such as La Guajira and Cesar, has left many families reliant on coal-intensive sectors economically vulnerable.[96] Without access to alternative employment opportunities, children in some families may be withdrawn from school or pushed into informal mining or agricultural work.

In the Appalachian region of the United States, coal mines have closed due to the shift towards cleaner energy. And many families relying on coal for income are facing economic hardship.[97] This vulnerability can lead to reduced access to health care, education and nutritious food for children in these communities, hindering their overall development and well-being.

In Zambia's Copperbelt Province, job losses from mine closures, like Mopani Copper Mines, have left families in poverty.[98] This directly affecting children as many may force to leave school to work to meet household needs, jeopardizing their education and future opportunities.

Adequate standard of living, article 27

In Germany, regions such as Lusatia Mining District have faced significant job losses due to the coal phase-out in favour of renewable energy.[99] This transition has brought financial instability to many families and increased costs associated with upgrading to energy-efficient technologies, ultimately impacting children's standard of living and overall well-being.

Protection from child labour, article 32

As noted by an interview participant, mining for resources like cobalt and lithium, particularly in countries such as the Democratic Republic of the Congo, often involves child labour. Children are put at significant risk, being involved in hazardous work environments with little to no protective measures. The industry itself, while touted as green, has substantial social and environmental issues tied to it, including exposure to toxic elements and dangerous work practices.

Another example cited by an interviewee relate to the situation in Southern Madagascar, where children are employed in mica mining. Mica is used for insulating batteries in electric vehicles, yet the practices surrounding its extraction are far from ethical or sustainable.

96 Rodríguez, Rodrigo, Jobs and Justice in Focus as Colombia Looks to the End of Coal, Dialogue Earth, 14 October 2024.
97 West Virginia Public Broadcasting, Amid Coal's Decline, What Comes Next for Appalachia, 7 January 2022.
98 Cotterill, Joseph, Zambia's Plan to Dig Its Way Out of Debt with a Copper Revival, *Financial Times*, 13 August 2023.
99 Radtke, Jörg, and Martin David, How Germany Is Phasing Out Lignite: Insights from the Coal Commission and local communities, *Energy, Sustainability and Society,* vol. 14, no. 7, 2024.

In Sandawana, Zimbabwe, the lithium rush has led to the exploitation of children, who are subjected to hazardous child labour in artisanal and small-scale mining. These young workers endure dangerous conditions, including exposure to collapsing mine shafts and the absence of basic sanitation facilities. [100]

Protection from child labour, article 32

Case studies of children engaged in informal textile waste recycling in Bangladesh illustrate how families working in precarious conditions with barely enough income to afford food and rent are often compelled to take children out of school to work as additional breadwinners.[101]

Protection from drug abuse, article 33 and from sexual exploitation, article 34

In Bolivia, where mining supports the energy transition, local communities have faced rising drug and alcohol abuse among children, driven by disrupted lifestyles and a lack of social infrastructure. In addition, foreign nationals who have immigrated to work in mining companies have been implicated for the growth of the adolescent prostitution due to their willingness to pay higher prices.[102]

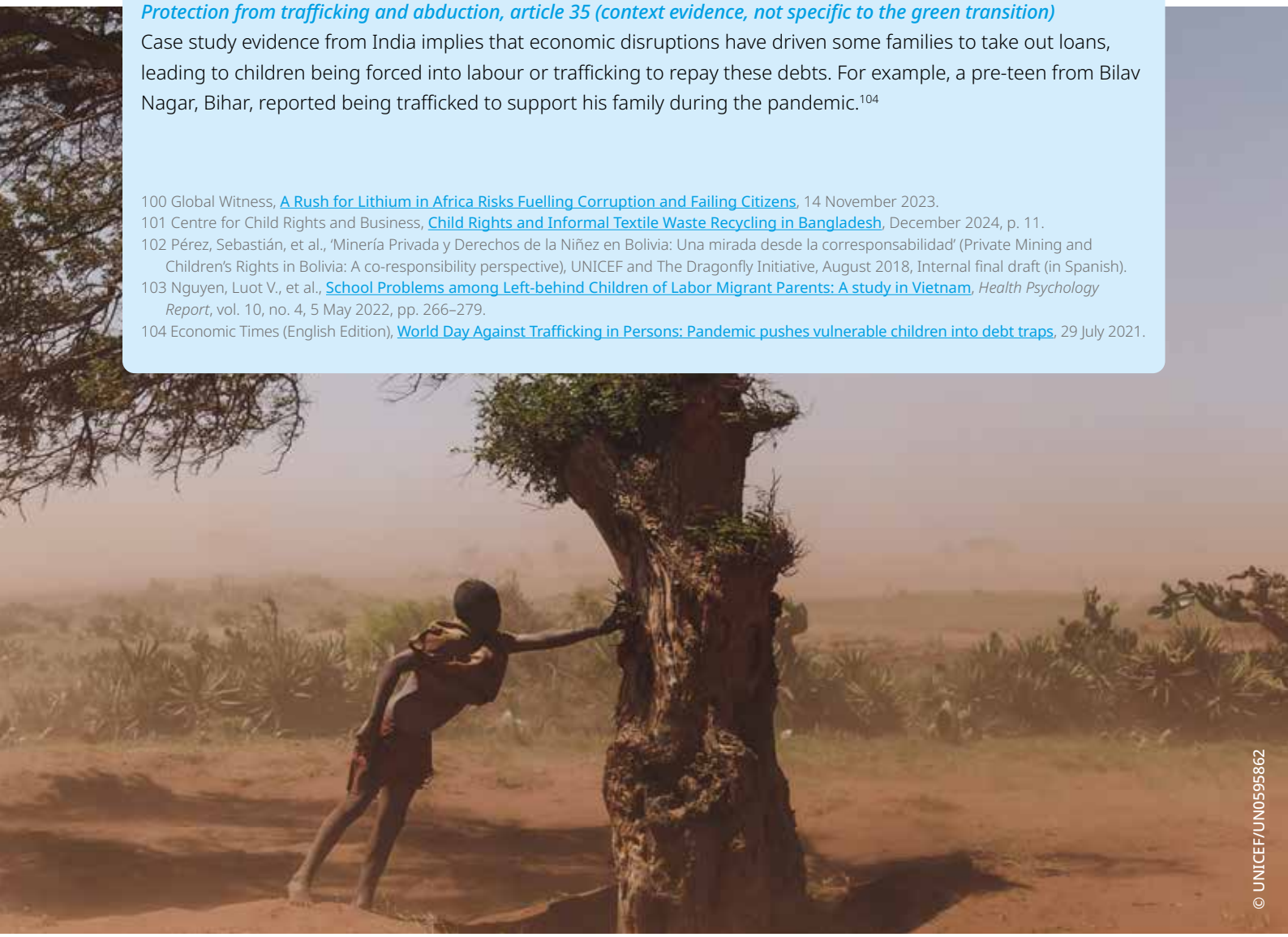
Health, article 24; Adequate standard of living, article 27 (context evidence, not specific to the green transition)

A case study from Viet Nam has shown that parental migration for work can lead to psychological risks in children, including depression, anxiety and behavioural problems. These issues are often compounded by children's greater household responsibilities and a lack of adequate educational support, such as tutoring and daily supervision, which can hinder their academic progress.[103]

Protection from trafficking and abduction, article 35 (context evidence, not specific to the green transition)

Case study evidence from India implies that economic disruptions have driven some families to take out loans, leading to children being forced into labour or trafficking to repay these debts. For example, a pre-teen from Bilav Nagar, Bihar, reported being trafficked to support his family during the pandemic.[104]

100 Global Witness, A Rush for Lithium in Africa Risks Fuelling Corruption and Failing Citizens, 14 November 2023.
101 Centre for Child Rights and Business, Child Rights and Informal Textile Waste Recycling in Bangladesh, December 2024, p. 11.
102 Pérez, Sebastián, et al., 'Minería Privada y Derechos de la Niñez en Bolivia: Una mirada desde la corresponsabilidad' (Private Mining and Children's Rights in Bolivia: A co-responsibility perspective), UNICEF and The Dragonfly Initiative, August 2018, Internal final draft (in Spanish).
103 Nguyen, Luot V., et al., School Problems among Left-behind Children of Labor Migrant Parents: A study in Vietnam, *Health Psychology Report*, vol. 10, no. 4, 5 May 2022, pp. 266–279.
104 Economic Times (English Edition), World Day Against Trafficking in Persons: Pandemic pushes vulnerable children into debt traps, 29 July 2021.



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2 *Availability and cost of goods and services*

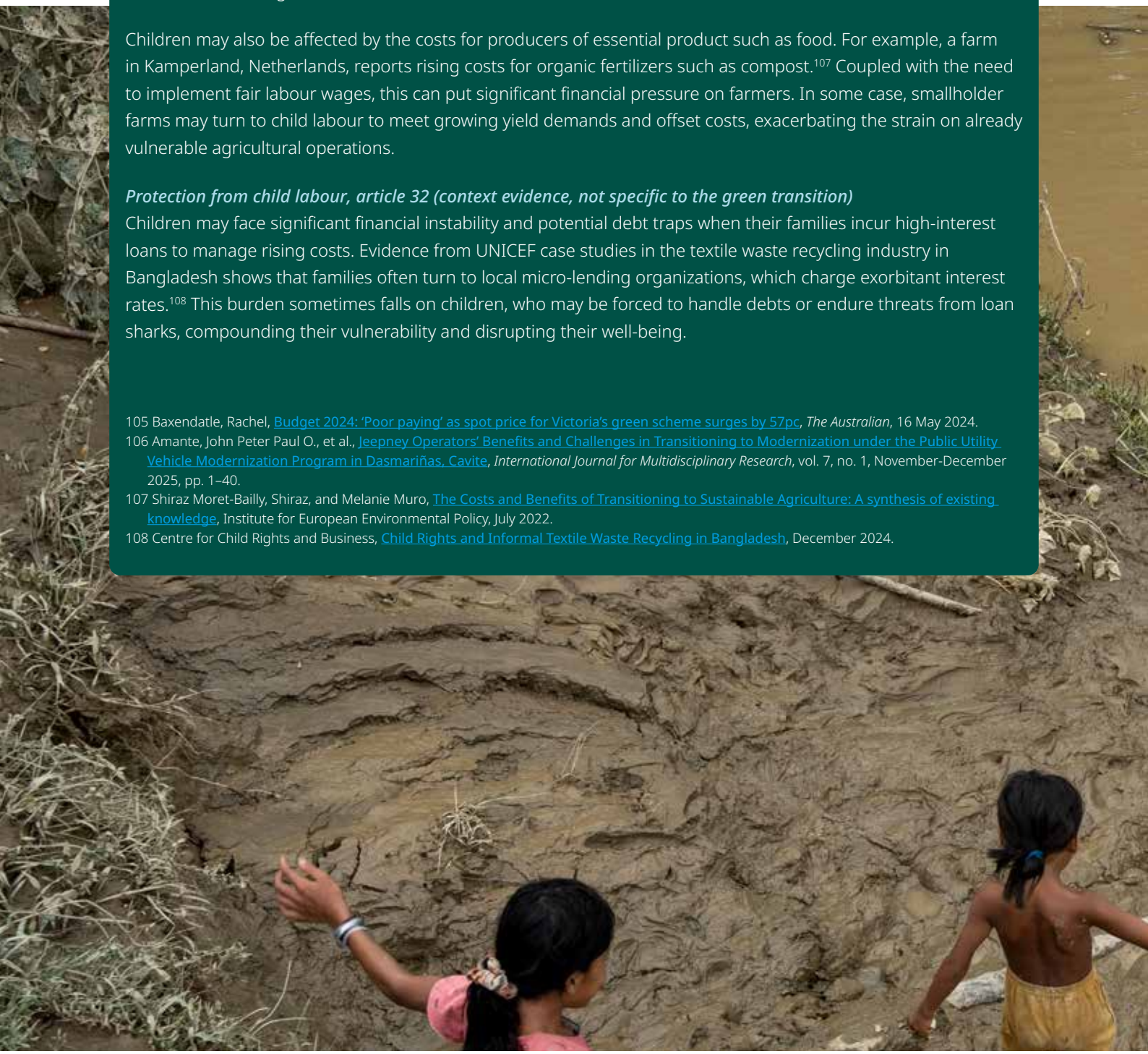
Adequate standard of living, article 27; Education, article 28; Protection from child labour, article 32 – The Victorian Energy Upgrades scheme in Australia, intended to subsidize the transition from gas to electricity, has disproportionately burdened low-income families with higher power bills, as they cannot afford the upgrades benefiting wealthier households.[105] This financial strain often affects children, as it reduces resources for essentials such as health care and a stable home environment.

In urban areas such as Manila, the Public Utility Vehicle Modernization Program, aimed at overhauling the public transport system by replacing older jeepneys with environmentally friendly models, has resulted in higher public transit fares.[106] Increased transportation costs make it difficult for low-income families to afford daily school commutes, resulting in reduced school attendance.

Children may also be affected by the costs for producers of essential product such as food. For example, a farm in Kamperland, Netherlands, reports rising costs for organic fertilizers such as compost.[107] Coupled with the need to implement fair labour wages, this can put significant financial pressure on farmers. In some case, smallholder farms may turn to child labour to meet growing yield demands and offset costs, exacerbating the strain on already vulnerable agricultural operations.

Protection from child labour, article 32 (context evidence, not specific to the green transition)
Children may face significant financial instability and potential debt traps when their families incur high-interest loans to manage rising costs. Evidence from UNICEF case studies in the textile waste recycling industry in Bangladesh shows that families often turn to local micro-lending organizations, which charge exorbitant interest rates.[108] This burden sometimes falls on children, who may be forced to handle debts or endure threats from loan sharks, compounding their vulnerability and disrupting their well-being.

105 Baxendatle, Rachel, Budget 2024: 'Poor paying' as spot price for Victoria's green scheme surges by 57pc, *The Australian*, 16 May 2024.
106 Amante, John Peter Paul O., et al., Jeepney Operators' Benefits and Challenges in Transitioning to Modernization under the Public Utility Vehicle Modernization Program in Dasmariñas, Cavite, *International Journal for Multidisciplinary Research*, vol. 7, no. 1, November-December 2025, pp. 1–40.
107 Shiraz Moret-Bailly, Shiraz, and Melanie Muro, The Costs and Benefits of Transitioning to Sustainable Agriculture: A synthesis of existing knowledge, Institute for European Environmental Policy, July 2022.
108 Centre for Child Rights and Business, Child Rights and Informal Textile Waste Recycling in Bangladesh, December 2024.



3

Energy source, access and cost

Health, article 24 – In Kenya, particularly in rural areas, many households rely on biomass fuels such as wood and charcoal for cooking due to limited access to modern energy sources including access to clean fuels and technologies and inadequate infrastructure. This practice exposes children to indoor air pollution, leading to serious health issues like respiratory and cardiovascular disease.[109]

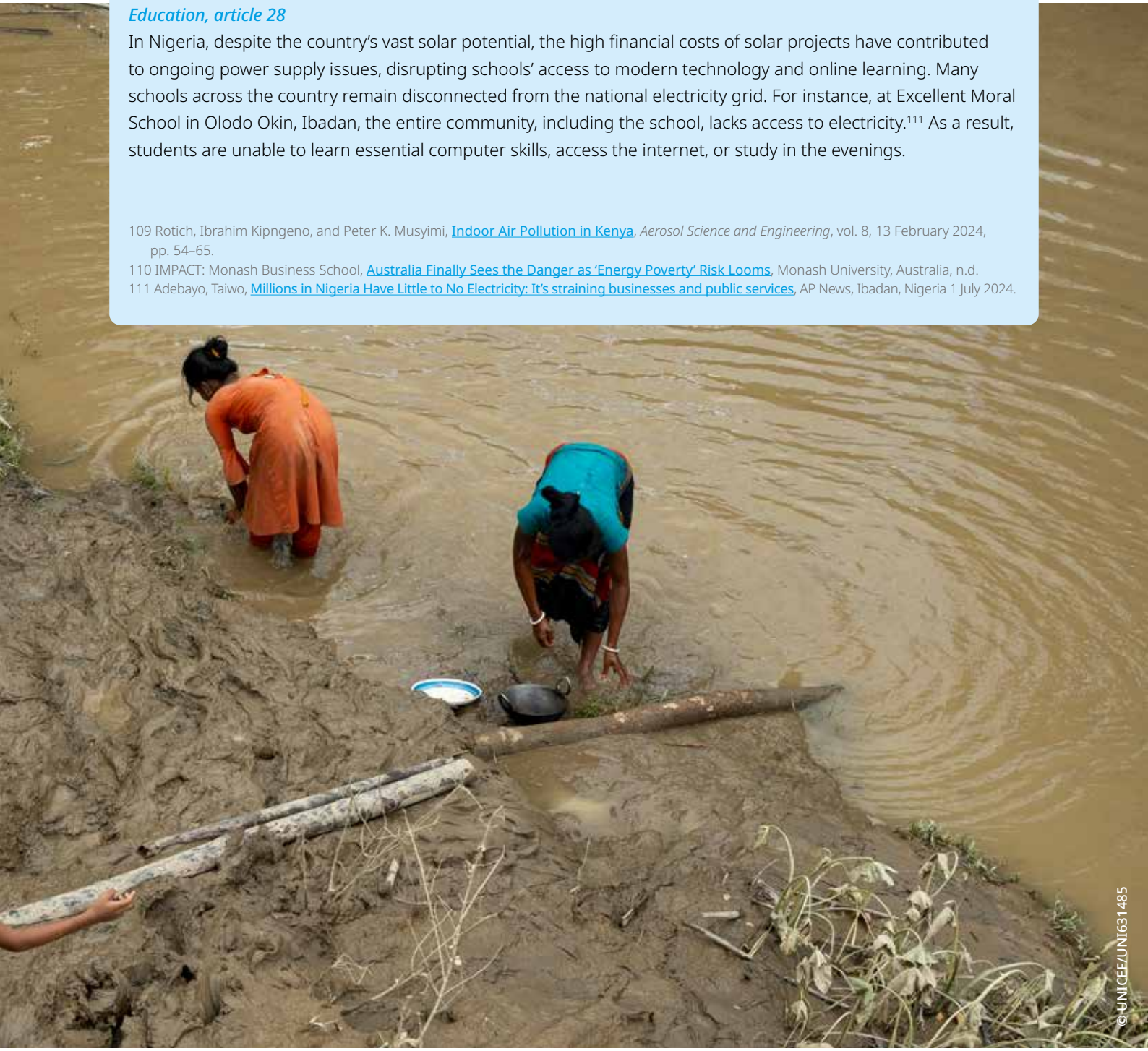
Social security, article 26; Adequate standard of living, article 27

In Australia, energy poverty limits access to adequate energy services, disproportionately affecting low-income households.[110] Rising energy costs exacerbate financial pressures, forcing families to make difficult choices between essential needs. This strain not only affects household stability but also indirectly impacts children's emotional well-being and development by creating stressful home environments.

Education, article 28

In Nigeria, despite the country's vast solar potential, the high financial costs of solar projects have contributed to ongoing power supply issues, disrupting schools' access to modern technology and online learning. Many schools across the country remain disconnected from the national electricity grid. For instance, at Excellent Moral School in Olodo Okin, Ibadan, the entire community, including the school, lacks access to electricity.[111] As a result, students are unable to learn essential computer skills, access the internet, or study in the evenings.

109 Rotich, Ibrahim Kipngeno, and Peter K. Musyimi, Indoor Air Pollution in Kenya, *Aerosol Science and Engineering*, vol. 8, 13 February 2024, pp. 54–65.
110 IMPACT: Monash Business School, Australia Finally Sees the Danger as 'Energy Poverty' Risk Looms, Monash University, Australia, n.d.
111 Adebayo, Taiwo, Millions in Nigeria Have Little to No Electricity: It's straining businesses and public services, AP News, Ibadan, Nigeria 1 July 2024.



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4

Location of operations and land use

Health, article 24

The construction and development of the Xayaburi Dam and other hydropower projects along the Mekong River, affecting populations in Myanmar, Thailand, Laos, Cambodia and Viet Nam have been criticized for inadequate management, lacking impact assessments that address human rights and gender concerns,[112] Along with plastic pollution, Dams and other infrastructure developments, as well as plastic pollution, threaten to disrupt the wilderness central to the Mekong's health.[113] These practices can harm children's health by releasing toxins into the environment and contaminating soil and groundwater.[114]

Health, article 24

Children living near e-waste sites such as Agbogbloshie in Ghana are exposed to elevated blood lead levels due to the informal recycling of toxic e-waste components. Burning e-waste releases harmful substances, including lead, mercury and cadmium, leading to air and soil pollution.[115]

In Guiyu, Guangdong, one of the largest e-waste recycling sites, where informal methods expose children to hazardous materials like lead, causing severe health issues such as lung damage and developmental problems.[116]

As highlighted by an interview participant, the process of extracting minerals for green technologies often leads to significant environmental damage. In the Democratic Republic of the Congo, the extraction of cobalt and other minerals has contaminated water sources, directly affecting children's health. The toxins used in mining operations, including those that filter into the water table, pose severe risks to local communities, particularly children, who are more vulnerable to the health impacts of pollution.

Adequate standard of living, article 27

The rapid expansion of Indonesia Weda Bay Industrial Park and nickel mining, particularly in Sulawesi and the Maluku Islands, has been driven by the growing demand for electric vehicle batteries.[117] However, this development has led to significant environmental degradation, including deforestation and water pollution, which have disrupted local livelihoods and may negatively impact children's living standards.

112 Deetes, Pai, Phairin Sohsai and Tanya L. Roberts Davis, Sites of Struggle and Sacrifice: Mapping Destructive Dam Projects along the Mekong River, International Rivers, 25 June 2024.
113 UN Environment Programme, Plastic Pollution Threatens the Mekong, a Wildlife Wonderland, 25 March 2021.
114 Evans, J. E., Contaminated Sediment and Dam Removals: Problem or opportunity?, Eos, 8 October 2015.
115 Amankwaa, Ebenezer Forkuo, Kwame A. Adovor Tsikudo and Jay A. Bowman, 'Away' Is a Place: The impact of electronic waste recycling on blood lead levels in Ghana, *Science of The Total Environment,* vols. 601–602, 1 December 2017, pp. 1566-1574,
116 Guo, Pi, et al., Blood Lead Levels and Associated Factors among Children in Guiyu of China: A population-based study, PLOS One, 19 August 2014.
117 Climate Rights International, Nickel Unearthed: The human and climate costs of Indonesia's nickel industry, CRI Indonesia Report, January 2024.

4

Life, survival and development, article 6; Protection from all forms of violence, abuse and neglect, article 19; Cultural identity, article 30; Recovery and integration, article 39

In Kenya, the clearance of land for the Lake Turkana wind power project exacerbated existing ethnic conflicts, leading to violence among Indigenous groups, which injured and killed children.[118] The displacement can also affect a child's psychological well-being and cultural identity.

An interviewee shared example from the Philippines. In Mindanao, renewable energy projects led to disputes over land rights, exacerbating existing cultural tensions. Although these projects have the potential to bring positive change, such as in water access or skills training, without addressing community-level issues, they may lead to new forms of inequality and cultural conflicts that disproportionately affect children.

Adequate standard of living, article 27

In the United States, the offshoring of manufacturing jobs to countries like Viet Nam and China, where companies seek cheaper renewable energy or raw materials, has led to the loss of numerous local jobs, particularly in manufacturing-dependent regions such as the Rust Belt.[119] These shifts can directly impact the standard of living for children in these communities, affecting their access to resources and opportunities.

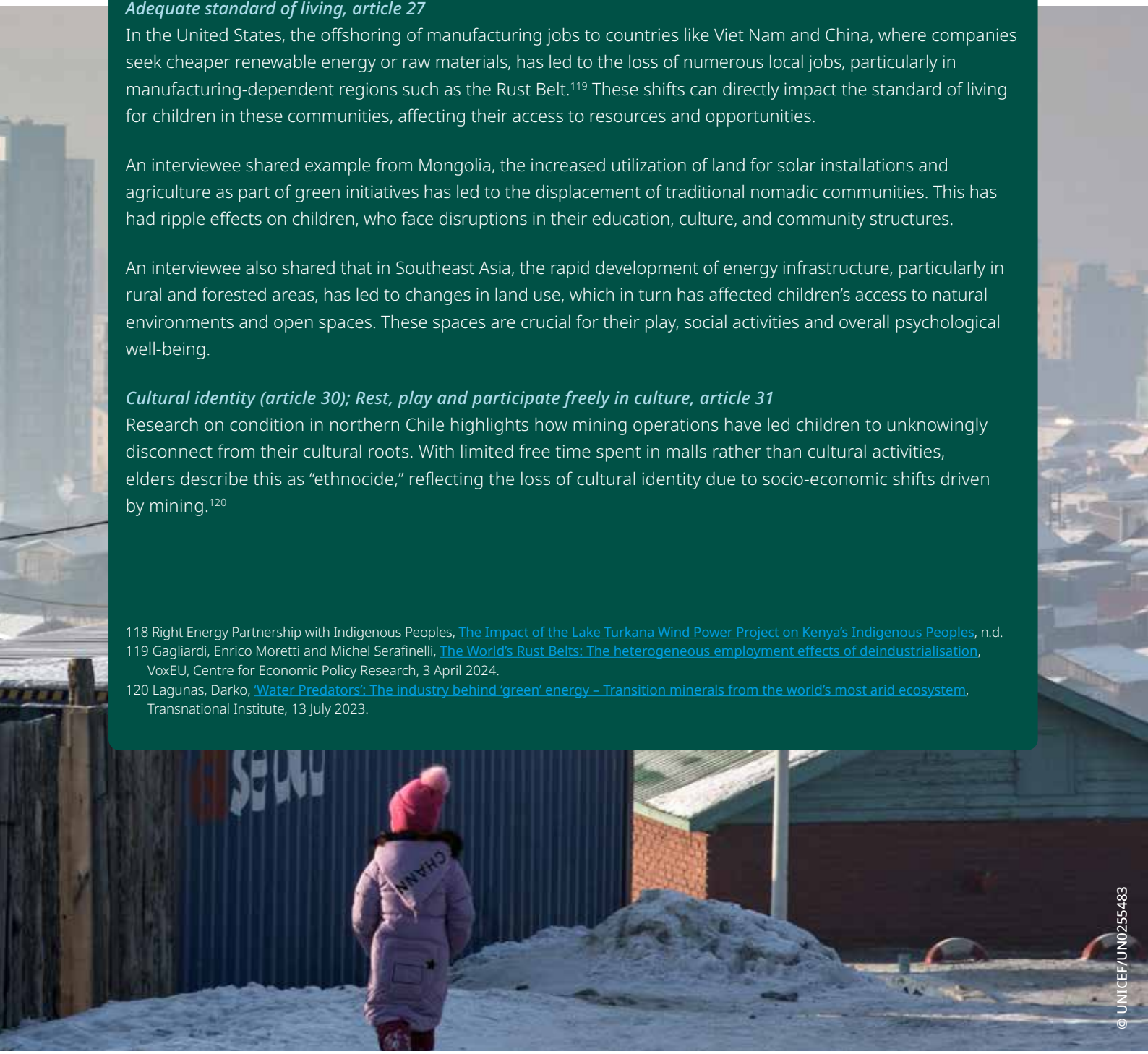
An interviewee shared example from Mongolia, the increased utilization of land for solar installations and agriculture as part of green initiatives has led to the displacement of traditional nomadic communities. This has had ripple effects on children, who face disruptions in their education, culture, and community structures.

An interviewee also shared that in Southeast Asia, the rapid development of energy infrastructure, particularly in rural and forested areas, has led to changes in land use, which in turn has affected children's access to natural environments and open spaces. These spaces are crucial for their play, social activities and overall psychological well-being.

Cultural identity (article 30); Rest, play and participate freely in culture, article 31

Research on condition in northern Chile highlights how mining operations have led children to unknowingly disconnect from their cultural roots. With limited free time spent in malls rather than cultural activities, elders describe this as "ethnocide," reflecting the loss of cultural identity due to socio-economic shifts driven by mining.[120]

118 Right Energy Partnership with Indigenous Peoples, The Impact of the Lake Turkana Wind Power Project on Kenya's Indigenous Peoples, n.d.
119 Gagliardi, Enrico Moretti and Michel Serafinelli, The World's Rust Belts: The heterogeneous employment effects of deindustrialisation, VoxEU, Centre for Economic Policy Research, 3 April 2024.
120 Lagunas, Darko, 'Water Predators': The industry behind 'green' energy – Transition minerals from the world's most arid ecosystem, Transnational Institute, 13 July 2023.



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5

Business processes and governance

Life, survival and development, article 6; Health, article 24 (context evidence (not specific to the green transition)

Significant adverse impacts can occur when companies neglect to mitigate the social and environmental consequences of their operations. For example, in Indonesia's palm oil industry, weak corporate governance prioritizes profits over worker welfare, leading to long working hours and insufficient family support for employees.[121] The palm oil industry has been associated with multiple adverse environmental impacts on children, including air pollution from severe toxic smoke caused by burning forests to clear land. This contributes to respiratory diseases, young child mortality, asthma, lung damage, low birthweight and impaired cognitive development.[122]

The UN Special Rapporteur on hazardous substances and human rights warns that several decarbonization technologies, including mineral extraction, battery production, and the end-of-life handling of solar panels and electronics, can aggravate toxic pollution without robust life-cycle management and hazardous-substance controls. These governance gaps pose disproportionate health risks to children, who are more vulnerable to toxic exposures throughout their development.[123]

Right to be heard, article 12

Interviewees mentioned that even well-intended projects (e.g., renewable energy installations) do not often involve children or their representatives in decision-making. This lack of inclusion can lead to negative outcomes, such as exposure to environmental hazards or the loss of community infrastructure that is vital for child development.

Adequate standard of living, article 27

Grupo Bimbo, the Mexican multinational food company, implemented responsible waste management practices and circular economy models to align with global sustainability standards. However, as part of these efforts, the company streamlined its operations, leading to the closure of some factories.[124] This transition resulted in job losses and financial instability for families, making it increasingly challenging for them to meet basic needs, particularly for their children.

Protection from child labour, article 32

In the broader context of corporate social responsibility, interview participants noted that businesses have sometimes been more proactive than governments in taking on green initiatives. However, these initiatives may prioritize environmental over social metrics, and there is little evidence of meaningful consideration of children's rights. Interviewees expressed the opinion that companies are generally more inclined to focus on positive public-facing initiatives, such as school support, rather than addressing complex social issues such as child labour in supply chains.

121 Roundtable on Sustainable Palm Oil, Protecting Local Labour Rights in the Palm Oil Sector, RSPO, 4 October 2020.
122 UNICEF, Palm Oil and Children in Indonesia: Exploring the sector's impacts on children's rights, Jakarta, Indonesia, October 2016, p. 7.
123 UN Human Rights Council, The toxic impacts of some proposed climate change solutions (Report of the Special Rapporteur on hazardous substances and wastes, A/HRC/54/25, 13 July 2023
124 Milling Middle East & Africa, Grupo Bimbo to Close Albuquerque Bakery, Impacting 149 Employees, 22 January 2024.

6 *Technology innovation and digitalization*

Right to privacy, article 16 (context evidence, not specific to the green transition)
Data collection can cause children harm, particularly when school databases are breached.

In the United States, for example, the Government Accountability Office found 99 student data breaches that affected hundreds of school districts between 2016 and 2020. A data breach at the Illuminate Education educational technology company, in 2022, compromised sensitive information such as the free-lunch and special education status of 820,000 public school students. For a minor, this type of security risk could have long-lasting, negative effects that aren't easy to identify (e.g., if hackers used a student's social security number to take out a line of credit it could go undetected for years, or this information could cause hiring bias when seeking employment as an adult).[125]

Access to information, article 17; Education, article 28 (context evidence, not specific to the green transition)
Many children in lower-income or rural areas and developing regions experienced a digital divide during the COVID-19 pandemic. For example, even when tablets were available, a lack of internet connectivity prevented many children from participating effectively in online classes.[126] This highlights that while digital tools are an essential part of remote education, they remain ineffective without adequate internet infrastructure to support their use.

Protection from all forms of violence, abuse, neglect and exploitation, article 19; Prevention of abduction, sale or trafficking of children, article 35 (context evidence, not specific to the green transition)
Evidence indicates that there is a risk of online exploitation when a child engages in digital platforms, particularly when communicating with unknown adults without supervision. While information and communication technologies make it easier for children to share knowledge and collaborate, they also make it easier to produce, distribute and share sexually explicit material and other illegal content.[127] Evidence shows that girls experience more pressure to share sexually explicit images and face harsher judgement when those images are distributed beyond their intended recipient.[128]

125 UChicago News, UCUChicago, NYU Team Find Online Education Tools Pose Privacy Risks, University of Chicago, 10 March 2023. For the full report, see: Chaneson, Jake, et al., Uncovering Privacy and Security Challenges In K-12 Schools, *Conference on Human Factors in Computing Systems*, 23–28 April 2023, Hamburg, Germany.
126 Lai-Chong Law, Effie, Panos Vostanis and Michelle J. O'Reilly, Insights from Impacts of the Digital Divide on Children In Five Majority World Countries During the COVID-19 Pandemic, *Behaviour & Information Technology*, vol. 42, no. 15, 2023, pp. 2696–2715.
127 UNICEF Division of Communication, State of the World's Children 2017: Children in a digital world, United Nations Children's Fund, New York, December 2017, p. 8
128 Livingstone, Sonia, and Jessica Mason, Sexual Rights and Sexual Risks among Youth Online: A review of existing knowledge regarding children and young people's developing sexuality in relation to new media environments, European NGO Alliance for Child Safety Online, September 2015, p. 5.

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