



re-sourcing

Electronics Sector

Policy Makers

**Roadmap for Responsible Sourcing of
Raw Materials until 2050**

**Irene Schipper, Alejandro González, Miles Litvinoff,
Centre for Research on Multinational Corporations
(SOMO)**

August 2023



Disclaimer

This publication is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869276.

This publication reflects only the authors' view. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the information contained in this publication. The content of this report is pending approval by the European Commission.

Reproduction and translation for non-commercial purposes are authorized, provided the source is acknowledged and the publisher is given prior notice and sent a copy.

Imprint

Date: August 2023 | Alejandro González, Irene Schipper, Miles Litvinoff, Centre for Research on Multinational Corporations (SOMO)

Work package: WP4 | D4.6 Electronic Equipment Sector Roadmap for Responsible Sourcing of Raw Materials | Status/version (Final DRAFT) | Dissemination level (external)

<http://re-sourcing.eu>

Acknowledgements

The authors would like to express their gratitude to the members of the project consortium, the project's Platform Steering Committee and Advisory Board for their support in developing this report. We also want to thank the participants of the consultation processes for their continuous feedback that provided the foundation for the roadmap.

Special thanks for their valuable input and support go to:

Johannes Betz, Öko-Institut e.V.

Rebecca Burton, Initiative for Responsible Mining Assurance (IRMA)

Masuma Farooki, MineHutte

Gudrun Franken, Federal Institute for Geosciences and Natural Resources

Cristina Ganapini, Right to Repair

Audrey Gaughran, SOMO

Alexander Graf, Vienna University of Economics and Business

Deepak Gulliya, WWF India

Tobias Kind-Rieper, WWF Deutschland

Diego Francesco Marin, European Environmental Bureau

Jakob Neumaier, Öko-Institut e.V.

Michael Reckordt, PowerShift

Michael Tost, Montanuniversität Leoben

Any errors in this roadmap remain those of the authors.

Contents

List of Figures	2
List of Abbreviations and Acronyms	2
Executive Summary	3
1 Introduction	5
1.1 The Electronics Sector	5
1.2 Vision	7
2 Pathway	9
2.1 Target 1: Respect for Human Rights	12
2.2 Target 2: Circular Economy and Decreased Resource Consumption	20
2.3 Target 3: Responsible Production	28
3 Conclusion	36
4 Publication Bibliography	37

Figures

Figure 1: Depictions of the three sustainability pillars: social, environmental and economic (Purvis et al. 2019)	10
Figure 2: Milestones towards respect for human rights in the electronics sector by 2050	12
Figure 3: Milestones towards a circular economy and decreased resource consumption in the electronics sector by 2050	21
Figure 4: Milestones towards responsible production in the electronics sector by 2050	29
Figure 5: Roadmap for the electronics sector until 2050	36

Abbreviations and Acronyms

3TG	Tin, tungsten, tantalum and gold
ASM	Artisanal and small-scale mining
CRMA	Critical Raw Materials Act
CSOs	Civil society organisations
EC	European Commission
ETOs	Extraterritorial obligations
EU	European Union
FPIC	Free, prior and informed consent
ICMM	International Council on Mining and Metals
ICT	Information and communications technology
IFC	International Finance Corporation
ILO	International Labour Organization
IRMA	Initiative for Responsible Mining Assurance
MIPS	Material input per service
OECD	Organisation for Economic Co-operation and Development
OHCHR	Office of the UN High Commissioner for Human Right
OEF	Organisation environmental footprint
PEF	Product environmental footprint
RS	Responsible sourcing
SDGs	Sustainable Development Goals
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNGPs	UN Guiding Principles on Business and Human Rights

Executive Summary

This publication is an excerpt from the Electronic Equipment Sector Roadmap for Responsible Sourcing of Raw Materials with a focus on recommendations for policy makers. The full publication, with recommendations for policy makers, for industry, and for civil society, academia and research institutions, can be found [here](#).

Transformation of the electrical and electronic equipment sector is essential to meet the Paris Agreement's goals, to ensure a just energy transition and to meet the Sustainable Development Goals (SDGs), including fulfilment of their critical human rights dimension.¹ Electronics is one of the world's largest and fastest growing industries, employing millions of workers. The sector is defined by innovation and evolution of components and end-use products, and largely a business model that consequently relies heavily on obsolescence and consumers purchasing new versions of products and technologies every few years.

While some efforts have been made to recycle or reuse some raw materials that go into electronics production, the growth of the sector means that it is currently evolving away from sustainability goals as its demand for virgin materials continues to increase, accompanied by many negative impacts. The global consumer electronics market is forecast to grow at a compound annual rate of 5.1% to 2030 (Precedence Research 2022).

To ensure a just transition and to achieve the SDGs, the implementation of high social and environmental standards in production and sourcing along the entire supply chain is crucial.

Following the [State of Play and Roadmap Concepts for the Electronics Sector](#) – a stock-taking report of the current sustainability challenges in the electronics sector – this report by the RE-SOURCING project focuses on the road towards achieving a sustainable electronics transition by 2050. The RE-SOURCING project's Vision 2050 for the electronics sector describes the ultimate goal to be achieved with the roadmap.

This roadmap addresses 3TG minerals (tin, tungsten, tantalum and gold) and mica, and three supply chain stages: mining, manufacturing, and end of life/recycling. It provides milestones and recommendations for EU policy makers, international industry and civil society organisations (together with academia and research institutions), which have been developed to achieve the identified three main targets needed for a sustainable electronics sector:

- Respect for Human Rights
- Circular Economy and Decreased Resource Consumption
- Responsible Production

For the development of the sectoral roadmaps, the RE-SOURCING project relies primarily on bringing together existing knowledge from key stakeholder groups and regions. A series of three webinars between September 2022 and March 2023, supplemented by additional expert consultations, were used to elaborate the recommendations presented in this report.

Each target has milestones for short- (2025), medium- (2030) and long-term (2050) timeframes, as well as recommendations for the three stakeholder groups addressed. It is clear that we need to act without further delay to bring about the changes needed in mining, production, repair/reuse and end-

¹ "Human rights are essential to achieving sustainable development that leaves no one behind and are central to all its three dimensions – social, environmental, and economic" – OHCHR, no date.

of-life recycling/disposal. Therefore, there are a large number of milestones and recommendations for 2025 and 2030 as the basis for achieving the milestones for 2050.

The numbering of the three targets does not imply any priority. All are interlinked and should be pursued simultaneously to achieve the vision for the electronic equipment sector. Key issues for all three targets are transparency and good communication between stakeholder groups along the entire value chain. In addition, the rethinking of electronics in general and the end of materials and production from the very start (e.g. design for repair, reuse and recycling) is essential for a sustainable electronics sector.

Target 1 Respect for Human Rights focuses on filling major identified gaps in human rights protection in relation to current EU legislation and voluntary industry initiatives for the electronics sector. These gaps involve inadequate due diligence, limitations of scope including which raw materials are currently covered by existing standards, non-coverage of imported goods, loopholes and low thresholds, insufficient sanctions, a lack of consistent implementation, inadequate rights holders' avenues for protection and remedy, and poor-quality and non-transparent implementation of due diligence processes.

Target 2 Circular Economy and Decreased Resource Consumption is concerned with the need for changes in production, product design and efficiency, public expectations and consumer behaviour, the business model and incentives, and the economic system to achieve universal wellbeing and stay within planetary boundaries. A transition to an electronics sector without direct CO₂ emissions will be impossible without major improvements in energy efficiency, comprehensive use of renewable energy and substantially decreased demand; other environmental impacts such as on biodiversity will also need to be addressed. Additionally, an accessible, affordable and effective right to repair is crucial, and end-of-life electronic equipment and materials need to be seen as a source of raw materials, with improved collection and recycling. Current social and environmental standards in mining and electronics manufacturing do not sufficiently address increasing demand for raw materials or focus on reducing overall demand. Policy makers need to ensure the economic viability of repair and recycling and support the creation of a market for secondary raw materials.

Target 3 Responsible Production focuses on a significant reduction of inequality and a fair share of costs and benefits among value chain actors. The protection of workers is central here, as is the improvement of working conditions. Considerations include securing enabling rights, such as freedom of association and the right to know. Supply chain transparency, unitary taxation, and responsible public and private procurement are crucial elements in this pillar.

Keywords

electronics sector, 3TG minerals, mica, human rights, due diligence, labour rights, circular economy, responsible sourcing, transparency.

1 Introduction

1.1 The Electronics Sector

Work on the electronics sector started with the [State of Play and Roadmap Concepts for the Electronics Sector](#), published in December 2021. The aim of this report was to investigate the current state of the electronics sector with attention to three segments of the supply chain – mining, manufacturing (both contract and component manufacturing and production of branded electronics goods) and end of life/recycling – with a material focus on 3TG minerals (tin, tungsten, tantalum and gold) and mica.

The following provides a brief overview of the main findings of the [State of Play](#) report.

The electronics sector, which covers consumer electronics and electronic components such as semiconductors and circuit boards, is one of the world's largest and fastest growing industries, employing millions of workers. Consumer electronics are part of our daily life and have spurred economic growth across the globe. Electronics are increasingly intertwined with many technologies and economic sectors such as automotive, health, internet of things, defence and security, and are key for ambitious global goals such as digitalisation and the energy transition.

The global electronics industry is, however, associated with serious social, human rights and environmental harms, risks and challenges for responsible sourcing along its supply chain.² From mining to recycling, workers in the electronics supply chain may face poor working conditions including excessive working hours, health and safety hazards such as exposure to chemicals, low wages, violation of freedom of association and collective rights, flexibilisation of labour and in some cases gross rights violations such as child labour and forced labour. Civil society, trade unions and academics have documented many such abuses in electronics manufacturing.

Mining for key minerals to produce electronics can also affect the livelihoods and health of nearby communities, and erode and damage ecosystems, while mining and processing of minerals and electronics recycling potentially result in pollution of water, soil and air.³

Artisanal and small-scale mining (ASM) plays a significant role in global production and supports the livelihoods of millions of people in Africa, Asia and Latin America. It is often undertaken by impoverished and indebted miners who accept extremely low wages and poor working conditions in order to survive. ASM is deemed informal or even illegal in some jurisdictions. Artisanal and small-scale gold mining (ASGM) is the leading global cause of anthropogenic mercury emissions.

Gold mining is linked to organised crime and deforestation.⁴

The [EU Conflict Minerals Regulation](#) aims to regulate the import of 3TG minerals into the EU and to prevent global and EU smelters and refiners from using 3TG minerals produced by armed groups, often using forced labour and sold to finance weapons purchases or otherwise fund their activities. The regulation also aims to support the development of local communities. In force since 1 January 2021, the regulation requires EU companies to import 3TG minerals from responsible sources only. Gap analysis (see section 2 below) has found the regulation has shortcomings including limited material

² See [State of Play report](#), endnote 2.

³ See [State of Play report](#), endnote 4.

⁴ See [State of Play report](#), endnote 23.

scope (limitation to specific minerals and geographical regions), exclusion of manufactured goods, a threshold that allows loopholes, insufficient sanctions, different implementation per Member State and lack of transparency.

Contract manufacturers are large multinationals employing millions of workers to make components and products that they sell to their brand clients. Operating on low margins and extremely dependent on their clients, contract manufacturers are forced by this power imbalance to accept terms imposed by buyers, often detrimentally to their employees' working conditions. Civil society, trade unions and academics have documented serious human rights violations in electronics contract manufacturing.⁵ These include manufacturing hotspots such as China, India, Indonesia, Mexico, Vietnam, Malaysia and the Philippines (where basic labour rights are often not respected): forced labour; excessive working hours; breaches of social security obligations; health and safety hazards; unlawful termination of employment contracts; violation of freedom of association and collective bargaining rights; child labour; payment below living wage; union busting; harassment and gender discrimination; exposure to chemicals and noise; and multiple health issues.⁶ Public information and analysis are scarce about the practices of contract manufacturers.

Environmentally, semiconductor manufacture uses vast amounts of energy and water and generates hazardous waste and carbon emissions.

Most publicly known electronics brands, which are among the largest companies in the world in terms of sales and market value, outsource manufacturing to contract manufacturers. For many years, CSOs, trade unions and academics have documented cases and allegations of electronics brands causing, contributing to or being directly linked to serious social and environmental impacts along the supply chain, such as those mentioned above. At the root of many such abuses are lack of transparency, brands' purchasing practices and the use of toxic substances throughout the electronics lifecycle. Brands' buying practices such as pricing, lead times and technical specifications directly impact working conditions and sourcing practices along the supply chain. Brands have enormous leverage over the chain due to their purchasing and economic power.

End-of-life e-waste has become "the world's fastest-growing domestic waste stream, fueled mainly by higher consumption rates of electric and electronic equipment, short life cycles, and few options for repair".⁷

Voluntary due diligence schemes have gaps with regard to their ability to provide rights holders with effective opportunities for protection, such as lack of transparency on implementation, limited scope and limited credibility of, and overreliance on, audits.⁸ Although the growth of voluntary due diligence schemes has played an important part in raising awareness, creating leverage and setting new and higher standards in the electronics sector, they do not ensure implementation of human rights due diligence. Nor can authorities transfer their responsibility to regulate companies to voluntary schemes. Therefore, to protect human rights, international mandatory due diligence regulation with individual corporate accountability is crucial.

This is already the case with in the Conflict Minerals Regulation, which states that "Union importers

⁵ See [State of Play report](#), endnote 83.

⁶ Ibid.

⁷ See [State of Play report](#), endnote 5.

⁸ Rights holders are "individuals or social groups that have particular entitlements in relation to duty-bearers. Duty-bearers are state or non-state actors that have the obligation to respect, protect, promote, and fulfil human rights of rights-holders" – European Network of National Human Rights Institutions (no date).

retain individual responsibility to comply with the due diligence obligations set out in this Regulation.” At the same time, the regulation suggests that due diligence schemes can contribute to achieving its aims. A complicating fact is that electronics companies may have thousands of suppliers, and for each company to fully assess its supply chain may be impossible. Therefore, the Organisation for Economic Co-operation and Development’s Guidelines for Multinational Enterprises (OECD 2011) and the UN Guiding Principles on Business and Human Rights (UNGPs; UN 2011) embrace a risk-based approach. This enables flexibility by requiring companies to focus their attention where it is most needed (OECD Watch et al. 2022).

As to protecting the environment, fundamental systemic change is required, including revising the business model based on the externalisation of costs and maximisation of shareholder value and profit. An overall reduction of resource consumption is key, which will require profound changes in consumption and production patterns. Regulation is needed that requires electronics products to be designed for longer use, reuse, reparability and recyclability.

In addition, a fair distribution of costs and benefits along the supply chain is important to address current levels of global and in-country economic inequality and poverty. Miners and workers deserve fair wages that capture a significant share of the value created. Initiatives that improve conditions on the ground, including human-rights-respecting formalisation of the ASM sector and ensuring improvements in the livelihoods of workers and their communities, require further development and scaling up, in cooperation with local actors such as artisanal miners, worker-led cooperatives and local businesses.

For further details of the project findings, see the [State of Play](#) report.

1.2 Vision

The horizon considered for the roadmap of the RE-SOURCING project is 2050. The vision for the electronics sector was developed based on the underlying concepts of the Paris Agreement,⁹ planetary boundaries,¹⁰ strong sustainability¹¹ and effective human rights due diligence¹² and will be incorporated in the definition of responsible sourcing that is developed towards the end of the project. Further information on the RE-SOURCING project’s vision for the electronics sector can be found in the [State of Play report for the electronics sector](#).

The remainder of this report outlines three key target areas for achieving the RE-SOURCING Vision 2050 (Electronics Sector):

- Respect for Human Rights
- Circular Economy and Decreased Resource Consumption
- Responsible Production

The discussion of each target area considers key milestones for 2025, 2030 and 2050, followed (in the full report) by specific recommendations for three key stakeholder groups: policy makers, industry

⁹ For further information on the Paris Agreement, see the [UNFCCC](#) and the [legislation](#).

¹⁰ On planetary boundaries, see Rockström et al. 2009, Steffen et al. 2015 and Raworth 2017.

¹¹ An explanation of the strong sustainability concept is provided by Ekins et al. 2003 and Dedeurwaerdere 2014.

¹² On human rights due diligence standards, see [UNGPs](#), [ILO Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy](#) and [OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas](#).

and civil society. This shorter document includes only recommendations for policy makers (for recommendations for industry, see [here](#), and for the full roadmap document, [here](#)).¹³

¹³ The authors consider the recommendations for civil society, academia and research institutions to be too general to merit a separate document.

2 Pathway

The three overarching targets of respect for human rights, circular economy and decreased resource consumption, and responsible production are, as stated above, based on the concepts of the Paris Agreement, planetary boundaries, strong sustainability and effective human rights due diligence. Several approaches to reach these targets overlap each other, and there are therefore cross-references between the three target sections below.

The following paragraphs explain the roadmap's scope, assumptions and limitations, and structure. To have a uniform project structure, these explanations are similar in the three sectors of the RE-SOURCING project. Before detailed presentation of Targets 1, 2 and 3 begins, we include discussion of the gap analysis undertaken in the State of Play report.

Scope

The RE-SOURCING project provides a roadmap encompassing recommendations for action for policy makers, industry and civil society. It does not propose new standards or guidelines, nor does it attempt to "reinvent the wheel". For many areas, appropriate standards have already been developed and the first and most important step is to successfully implement these.¹⁴

The State of Play report serves as a basis and baseline for the development of concrete recommendations for policy makers, industry and civil society for moving ahead to the RE-SOURCING project's vision for 2050. The recommended actions for policy makers focus mainly on the EU, whereas recommendations for industry and civil society can be considered at a broader international level. The RE-SOURCING project recognises the important role of investors, insurance, logistics providers and other business service providers. However, they are out of scope for this roadmap, although they are relevant for all three sectors (renewable energy, mobility and electric and electronic equipment) included in the RE-SOURCING project. Recommendations for these businesses will therefore be provided in a separate briefing document at a later stage in the project.

As with the State of Play report, this electronics sector roadmap focuses on the raw materials 3TG (tin, tungsten, tantalum and gold) and mica, and on the supply chain stages of mining, manufacturing (both contract and component manufacturing and production of branded goods) and end of life/recycling. This scope was defined as part of the consultation process for the State of Play report. There are, of course, other minerals and metals that are essential for the electronics sector, and many of the recommendations included here can also be applied to other raw materials.

Assumptions and limitations

The RE-SOURCING project roadmap for the electronics sector assumes technological advances but does not specifically address this issue, apart from the continuation of these advances and the necessary support from the public and private sectors. The conclusions from the consultation process indicate the difficulty in setting specific targets for the use of secondary raw materials, the circular economy, etc., as the necessary research has not yet been fully carried out. Nevertheless, this report attempts ambitious but realistic assumptions indicating the pathway to achieve the targets.

¹⁴ For further information on existing standards and initiatives, refer to the [State of Play report for the electronics sector](#).

Structure

The roadmap differentiates between targets and milestones. **Targets** define the desired end points and are kept at a high and aggregated level. They can be short term (2025), medium term (2030) or long term (2050). Targets were developed during a consultation process with the project's consortium partners, the Platform Steering Committee and Advisory Board, as well as the Roadmap Workshop with participants from various stakeholder groups of the electronics supply chain. The targets consider all three pillars of sustainability: social, economic and environmental (Figure 1).

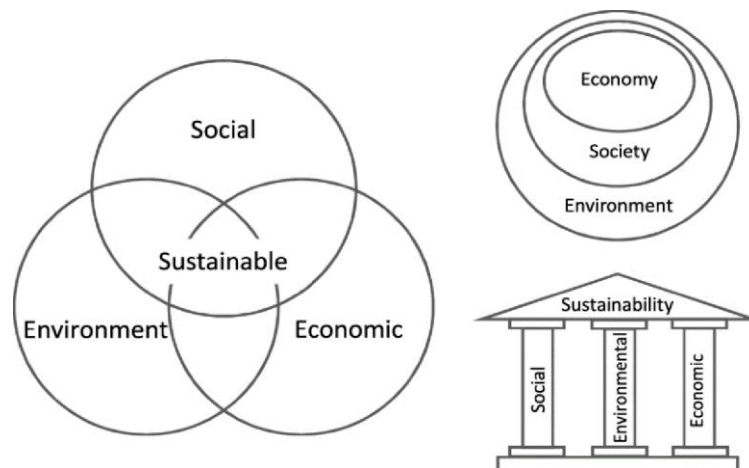


Figure 1: Depictions of the three sustainability pillars: social, environmental and economic (Purvis et al. 2019)¹⁵

Milestones are points along the desired trajectory from baseline to target and intended to help track progress. They can be short (2025), medium (2030) or long term (2050). While 2025 milestones may appear as short-term considerations, they refer to the achievement of commitments already made or set the direction for future goals. Wherever possible, milestones are specified according to desired quantity, quality and/or time (Capacity4dev 2016). Milestones also include existing and agreed goals, such as the UN Sustainable Development Goals (SDGs) and the Paris Agreement.

However, this roadmap focuses only on targets and milestones that are most relevant for the electronics sector. Targets and milestones not mentioned here are not considered irrelevant but are beyond the scope of this roadmap. Nevertheless, there are milestones that can be transferred to other sectors.

The classification of milestones and recommendations into categories is based on the authors' deliberations and should not be regarded as absolute. The time frame for the achievement of milestones and targets shows the latest deadline. However, earlier completion is strongly encouraged.

The term **responsible sourcing** is not considered as a simple supplier-manufacturer business transaction in the RE-SOURCING roadmap for the electronics sector. In this project, the term represents the idea that responsible sourcing engages all stages of the supply chain and should be understood as a joint effort to make each stage sustainable. The milestones and recommendations therefore focus not only on procurement but on all stages of the supply chain and touch upon sector-specific issues.

¹⁵ For more information on sustainability and responsible sourcing approaches, see the [State-of-Play Report on the International Responsible Sourcing Agenda](#) (Farooki et al. 2020)

Recommendations were developed by the report team and discussed and further revised during the consultation process. The authors' aim is to set recommendations for policy makers, industry and civil society that are ambitious but also realistic, in order to achieve the milestones and targets. Recommendations for policy makers and industry are provided under milestones for 2025, 2030 and 2050. Recommendations for civil society (together with academia and research institutions) are provided under milestones for 2025 and apply equally to the 2030 and 2050 milestones. As noted above, this shorter document includes only recommendations for policy makers (for recommendations for industry, see [here](#), and for the full roadmap document, [here](#)).

Gap analysis

The State of Play report included a gap analysis comparing current standards and initiatives for responsible sourcing with the Vision, and we have drawn on this gap analysis in our work towards this roadmap for responsible sourcing of minerals in the electronics sector. Main gaps identified in the State of Play report incorporated and built on gaps identified in the State of Play reports on the [renewable energy](#) and [mobility](#) sectors.¹⁶ These included that:

- Many current standards on mineral supply chains to a large part overlap; many cover only certain stages of the minerals supply chain; and none cover all issues.
- An overarching international framework is missing, and harmonisation and/or mutual recognition of standards is needed.

However, for the electronics sector, the State of Play analysis paid particular attention to gaps related to the [EU Conflict Minerals Regulation](#) and to voluntary due diligence schemes. The following main gaps were identified in relation to the regulation:

- The focus on 3TG minerals is too limited.
- The regulation does not apply to the import of manufactured goods.
- The set threshold allows loopholes.
- There are insufficient sanctions.
- There is different implementation per Member State.
- Lack of transparency.¹⁷

As to voluntary due diligence schemes, the following gaps were noted:

- The schemes do not provide rights holders with effective opportunities for protection and access to remedy.
- Lack of transparency regarding implementation.
- Lack of credibility of audits.
- Scope of due diligence too limited.
- Implementation shows the biggest gap according to studies.

Much of the roadmap that follows seeks to address these gaps.

¹⁶ See Kügerl and Tost 2021a and Betz et al. 2021 respectively.

¹⁷ See European NGO Coalition on Conflict Minerals et al. 2021.

2.1 Target 1: Respect for Human Rights

The Vision for the electronics sector towards 2050, developed with work on the [State of Play report for the electronics sector](#), incorporates the three pillars of social, environmental and economic sustainability. The sector roadmap now presents one overall target for each of these three pillars, starting with human rights and access to remedy, broadly corresponding to the social sustainability pillar.

The State of Play report defines Respect for Human Rights as “full respect for and protection of human rights across all entire value chain operations including effective mechanisms for accountability and access to remedy for affected rights holders”.

Under the human rights pillar we acknowledge the need for a level playing field has also been identified as a gap in the State of Play reports on the renewable energy (Kügerl and Tost 2021a) and mobility (Betz et al. 2021) sectors. For the successful implementation and enforcement of human rights, we consider due diligence laws as a way to achieve a level playing field and have built the milestones on this. The human rights milestones also focus on filling the identified gaps in human rights protection in relation to current EU legislation and voluntary industry initiatives for the electronics sector.

The following milestones and recommendations will form the basis for reaching the target of Respect for Human Rights in the electronics sector (Figure 2).

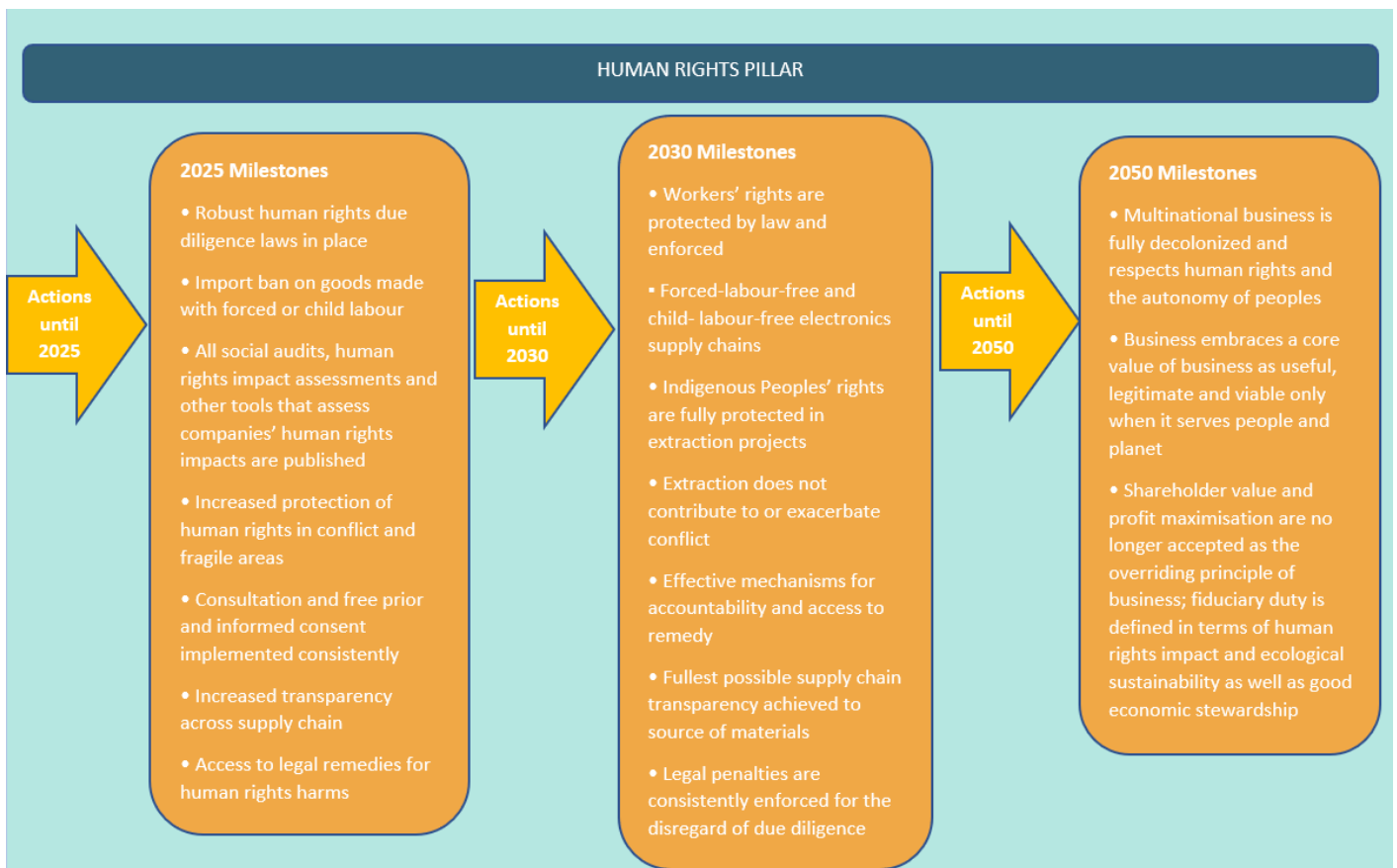


Figure 2: Milestones towards respect for human rights in the electronics sector by 2050

2.1.1 Milestones 2025

- Robust human rights due diligence laws in place.
- Import ban on goods made using forced or child labour.
- All social audits, human rights impact assessments and other tools that assess companies' human rights impacts are published.
- Increased protection of human rights in conflict and fragile areas.
- Consultation and free, prior and informed consent implemented consistently.
- Increased transparency across the supply chain.
- Access to legal remedies for human rights harms supported in home states.

Overall considerations to 2025

Protecting human rights across the electronics industry is an essential condition of responsible sourcing. Substantial efforts have been made in the realm of business and human rights to ensure that the rights of individuals and communities are respected, protected and fulfilled in the context of business operations in the sector. The [UNGPs](#) (UN 2011) and the [OECD Guidelines for Multinational Enterprises](#) (OECD 2011) have clarified the legal obligations of States¹⁸ and the responsibilities of businesses¹⁹ for human rights. Elements of these accepted international standards are now increasingly reflected in laws including the [EU Batteries Directive](#) and the upcoming EU [due diligence law](#) and [Critical Raw Materials Regulation](#).

However, despite this progress, human rights continue to be abused across the extractive sector and throughout the electronics supply chain. To achieve the responsible sourcing milestones on human rights, decisive action is needed, building on established standards as well as closing critical gaps in implementation and enforcement. Rights holders are central to the milestones on human rights, and consultation is therefore critical, as is the ability for people to achieve meaningful remedy. Supply chain transparency is crucial to enable implementation and monitoring of due diligence commitments.

RECOMMENDATIONS FOR POLICY MAKERS TO 2025

Policy makers have the opportunity to ensure that due diligence legislation in the EU is robust, comprehensive, world leading and effective. The authors believe that passing effective due diligence legislation is central to the wider goals of the RE-SOURCING project, and this is therefore both a 2025 milestone and a recommendation to policy makers.

Industry's implementation of due diligence is currently often limited to the first tier of suppliers; most electronics companies do not go further than the refiners. This is too limited. Supply chain due diligence must cover the full supply chain up to extraction and supply of raw materials.

¹⁸ "States' international human rights law obligations require that they respect, protect and fulfil the human rights of individuals within their territory and/or jurisdiction. This includes the duty to protect against human rights abuse by third parties, including business enterprises" – UNGPs.

¹⁹ Businesses are "required to comply with all applicable laws and to respect human rights" – UNGPs.

RECOMMENDATIONS

- Enact effective corporate human rights due diligence legislation.
- Require corporate human rights due diligence to extend downstream and upstream (to the mining of raw materials).
- Require human rights due diligence and transparency from mineral importers.
- Reform of EU Conflict Minerals Regulation to cover more minerals and close loopholes.
- Enact effective legislation to ban goods made using forced and child labour, including provisions for remediation and disclosure requirements on all levels of suppliers.
- Protect human rights defenders.
- Support CSOs in their human rights monitoring and reporting and involve them in development of policies and auditing.
- Include human rights supply chain due diligence requirements in all trade agreements.

Due diligence²⁰

Regarding human rights due diligence legislation, EU policy makers should, first, acknowledge that the decades-long approach of corporate self-regulation via industry schemes, multi-stakeholder initiatives and third-party auditing has proven insufficient in identifying risks and preventing and mitigating harm. EU policy makers have responded to the inherent limitations of self-regulation by recognising the need for effective human rights due diligence legislation. Such legislation should not rely on the same insufficient industry schemes and third-party auditing (Quijano and Wilde-Ramsing 2022).

EU corporate human rights due diligence legislation and its implementation should include, at a minimum:

- Making companies individually responsible for human rights due diligence across their supply chain, whether they are members of an industry scheme or other initiative or not.
- A stipulation that membership in industry schemes or other initiatives, including certification arrangements, or achievement of a positive audit result, will not be treated as substitutes for, equivalent to or indicators of human rights due diligence, and will not shield companies from liability, trigger a lighter monitoring or enforcement regime, or serve as a basis for establishing a presumption of compliance.
- Companies should not assume that business partners are in compliance with human rights due diligence requirements and expectations simply because they are members of an industry scheme or other initiative (even where judged to meet certain fitness criteria), hold certification from them or have achieved a positive audit result.
- Encouragement and expectation that companies will use the full range of available tools and mechanisms, and develop new ones where necessary, to better enable, assist, monitor and verify compliance with human rights due diligence requirements in their supply chain.
- Authorities responsible for monitoring and enforcing the EU's human rights due diligence regime should focus on all measures taken, whether within or outside the context of an industry scheme or other initiative, when considering if corporate human rights due diligence is adequate.
- In examination of specific complaints or claims, Member State regulators, enforcement

²⁰ While the focus under Target 1 of this roadmap is on human rights due diligence, many of the same standards and principles apply to environmental due diligence, discussed under Target 2.

authorities and courts should be required to focus on the company's actual and potential impacts on human rights, and the extent to which its human rights due diligence measures are effective and genuinely capable in practice of addressing the relevant risks and impacts.

- Regulators, enforcement authorities and courts should not rely on industry schemes or other initiatives (even where judged to meet certain fitness criteria), holding certification from them or achieving a positive audit result in assessing compliance and liability.²¹

Recent commentary from the [UN Special Rapporteur on Human Rights Defenders](#) has criticised current EU corporate sustainability due diligence proposals. Mary Lawlor, the UN Special Rapporteur, argues that the EU should oblige businesses to meaningfully consult affected and potentially affected communities and groups, including human rights defenders, throughout the process; address risks of retaliation against people who speak out against negative impacts of business activities; and empower affected people to seek remedy and accountability (UN Special Rapporteur 2023).

CSOs [Amnesty International](#) and [Shift](#) have also commented on the EU proposals. The former states that the proposals “fail to live up to international human rights standards”, leaving “gaps ... for the victims of corporate harm” (Amnesty International 2023); while the latter urges that the forthcoming directive must “incentivize the right kinds of approaches by companies that are more likely to deliver better outcomes in practice” (Shift 2023).

Human rights due diligence legislation should make clear that the risk-based approach to due diligence applies to the full value chain, including upstream and downstream business relationships. This is clearly indicated in the texts of the UNGPs, the OECD Guidelines and the [OECD Due Diligence Guidance for Responsible Business Conduct](#). It is equally clarified in authoritative commentary by the Office of the UN High Commissioner for Human Rights (OHCHR), International Labour Organization (ILO) and OECD, and in rulings by OECD National Contact Points (OECD Watch et al. 2022).²²

While due diligence legislation has broad application, it is widely recognised that enhanced due diligence and other measures are needed when mineral extraction takes place in conflict-affected areas (European Commission 2018; OECD 2016). As the State of Play report observes, the EU Conflict Minerals Regulation has significant gaps and limitations. In the context of electronics and in particular communications technology goods, new minerals beyond 3TG that are now the focus of global attention were not prominent when the regulation was developed. Critically too, the regulation does not apply to the import of manufactured goods. Additionally, there are insufficient sanctions, different implementation per Member State and a lack of transparency.

Labour rights, supply chain mapping, transparency

Due diligence legislation alone is not sufficient to tackle specific human rights problems in the electronics sector. In particular policy makers should do more to promote the rights of workers along the supply chain, from mining to processing, and from manufacture to recycling. Requiring companies to map their supply chain and workers' rights issues in the chain is critical. Where companies cannot provide this information, the information gap should be reported transparently. Without such public information it is impossible for trade unions, workers' advocates, CSOs and workers themselves to respond to risks and harms. Opacity in supply chains has long been at the core of the disempowerment of workers and is a major obstacle to achieving the protection of human rights and responsible sourcing.

²¹ See Quijano and Wilde-Ramsing 2022.

²² See also Clean Clothes Campaign et al. 2022a.

Supply chain transparency is possible. Civil society has demonstrated this, and some companies have gone far further than others. Policy makers should require full supply chain transparency and information on workers' rights in the chain. Policy makers should also make clear the expectation that companies act with due diligence to know about workers' rights and take remedial action where needed. Such action should not involve ending contractual relationships, unless this is required by law, but rather involve engaging to remedy the situation. While accepting that this is not straightforward and that leverage differs by context, significantly more can be done than at present, starting with transparency.

Transparency is also important in relation to the tools on which companies rely to assess their human rights impacts. In this regard social audits have long been an area of concern because their tools, underlying process and outcomes are often not disclosed. As these tools are currently a significant feature of the industry, policy makers should make clear requirements for transparency about tools, processes and outcomes.

Policy makers can also give support at the international level to help establish fair and living wages and protection of livelihoods in the electronics supply chain, and ensure this is done in ways that are beneficial to third countries.

The rights of workers in artisanal and small-scale mining (ASM) require special attention. Policy makers should ensure that prohibitions against forced and child labour in supply chains are enforced, and that they support remedy for those affected as far as possible. Action to address such serious labour rights issues should not lead to further abuse of rights, and companies involved should work collaboratively to remedy the situation and not simply to exit the problem context without remediation (Responsible Mica Initiative, no date; SOMO 2016).

See also under milestones for 2030.

Forced labour

In September 2022, the European Commission presented a proposal for a [Regulation on Prohibiting Products Made with Forced Labour](#), including child labour, on the internal market of the EU (European Commission 2022a; European Parliament 2023b). The proposal covers all products, made in the EU or imported, end products or components, regardless of the sector.

The ILO estimates the global number of people in a situation of forced labour at around 27.6 million, including 3.3 million children (ILO 2022). The European Parliament has played an important initiating role, as it has called for a ban on products made with forced labour in several resolutions. The Parliament has also adopted resolutions on specific issues related to forced labour, such as its 2020 resolution on child labour in mica mines in Madagascar (European Parliament 2020b).²³

While there is already ample EU legislation that prohibits forced labour, and human rights due diligence legislation in the making also addresses forced and child labour, no current or pending legislation includes an explicit prohibition on placing and selling products on the EU market made using forced labour. The proposal would therefore complement existing and upcoming legislation and contribute to the eradication of forced labour. It does not introduce extra due diligence requirements for companies.

CSOs in principle welcome the EU's 2022 forced labour proposal. However, improvements are needed.

²³ This followed media attention resulting from SOMO and Terre des Hommes's [research report](#) on child labour in Malagasy mica mining (SOMO and Terre des Hommes 2019).

Workers' rights should be taken more into account, and there should be provisions to ensure affected workers receive remediation. In addition, disclosure requirements are currently too weak: companies should be required to publicly disclose their suppliers, sub-suppliers and business partners throughout their value chain to enable effective implementation of the regulation (Clean Clothes Campaign 2022b).

2.1.2 Milestones 2030

- Workers' rights are protected by law and enforced.
- Forced-labour-free and child-labour-free electronics supply chains.
- Indigenous Peoples' rights are fully protected in mineral extraction projects.
- Extraction does not contribute to or exacerbate conflict.
- Effective mechanisms for accountability and access to remedy.
- Fullest possible supply chain transparency achieved.
- Legal penalties are consistently enforced in home states for the disregard of due diligence obligations.

Overall considerations to 2030

To fundamentally address the impact of multinational business operations on human rights, a paradigm shift is needed (Amnesty International 2014). Rights must be protected by law; and when multinational businesses operate across borders, the legal protection of human rights must do so also.

The [Maastricht Principles on Extraterritorial Obligations of States](#) (2011) note: "Despite the universality of human rights, many States still interpret their human rights obligations as being applicable only within their own borders. This attempt to limit accountability territorially has led to gaps in human rights protections, especially in human rights regulation and accountability of transnational corporations and international financial institutions. Extraterritorial obligations (ETOs) are a missing link in the universal human rights protection system. ETOs allow human rights to assume their proper role as the legal basis for regulating globalization and ensuring universal protection of all people and groups. ETOs are a tool needed to ultimately stop violations of human rights, destruction of ecosystems, and climate change."

Policy makers should take their lead from the broad group of human rights advocates and scholars who drafted the Maastricht Principles and seek reforms of the law that allow states to meet their human rights ETOs obligations fully. Much of the difficult legal thinking and problem solving has been done, and what remains is political willingness to act.

As we state under other targets in this roadmap, the changes needed to protect and respect human rights in the electronics sector require industry to change its business model. The current model is predicated on shareholder value, short-term profit maximisation and minimising direct costs to business (whatever the wider and often longer-term costs to society including to sustainable livelihoods, affected communities and the natural environment). Human rights, environmental degradation and climate change are, to a large extent, still seen as "externalities". This business model is the core of the challenge, and there is no route to genuinely responsible sourcing if the model remains unchanged. (For more discussion, see under recommendations for industry to 2050.)

RECOMMENDATIONS FOR POLICY MAKERS TO 2030

By 2030 policy makers should embrace and create significant legal protections for human rights in the context of multinational business operations. Building on the existing jurisprudence and on the conversion of corporate human rights due diligence into law in the EU, policy makers should place parent companies under an express legal duty of care towards individuals and communities whose human rights are or may be affected by their operations – and those of their subsidiaries, consortium partners and suppliers – in every country (Amnesty International 2014).

To ensure that rights are protected, EU policy makers should also use their leverage in international policy spaces to advance cooperation among States to protect rights globally in the context of multinational corporate operations.

Policy makers should also pay attention to reducing the undue influence of companies on policy making and make legitimate engagement transparent. It is challenging to make fundamental reforms when powerful and wealthy business actors have opaque influence on the policy-making process.

In the period to 2030, careful attention should be paid to the role of enforcement bodies, including regulators and courts, to ensure they are sufficiently resourced to carry out their functions in respect of protecting human rights.

RECOMMENDATIONS

- Make parent/controlling companies legally responsible for human rights abuses resulting from their global operations.
- Ensure regulatory enforcement of due diligence, transparency and other legislation is adequately resourced and protected from corporate influence.
- Develop guidance for judges and prosecutors, preferably in a multilateral forum, with respect to international cooperation and assistance to ensure effective remedy in cases concerning multinational companies' operational-related human rights abuses.
- Require companies to produce plans to significantly shift their business model to meet the requirements of sustainable, responsible, human-rights-respecting materials sourcing.
- Appoint a responsible government agency in each EU Member State for supply chain human rights due diligence.
- Impose penalties for the disregard of due diligence obligations and for non- or incomplete submission of due diligence plans.
- Make companies legally liable for human rights violations caused by failure to comply with due diligence obligations throughout the supply chain.

2.1.3 Milestones 2050

- Multinational business is fully decolonised and respects human rights and the autonomy of peoples.
- Business embraces a core value of business as useful, legitimate and viable only when it serves people and planet.
- Shareholder value and profit maximisation are no longer accepted as the overriding principles of business; fiduciary duty is defined in terms of human rights impact and ecological

sustainability as well as good economic stewardship.

Overall considerations to 2050

Responsible production, including in the electronics sector and particularly in the extractive sector that feeds electronics, is undermined by the dominant economic and business model, reform of which is critical to sustainability. For more than 50 years, a specific and narrow view of the purpose and role of the business company has prevailed. Commonly associated with the work of the US economist Milton Friedman, it holds that the main purpose of a corporation is to maximise value – make money – for its shareholders and that it is the fiduciary duty of the directors to make sure this happens. Institutional shareholders such as hedge funds and asset managers have strongly promoted this view (HEC Paris 2021). This growth-at-all-costs ideology drives both the behaviour of multinational companies and government policy globally. Yet it is antithetical to sustainability and leads inexorably towards deeper inequality within and between countries.

The single-minded pursuit of short-term shareholder value and profit has prompted questionable strategies on the part of companies aimed at attracting investors, from share buybacks and excessive dividend payments, often funded by debt, to aggressive tax planning (Barton et al. 2016; Clarke 2022). In parallel, government prioritisation of economic growth above all else, encouraged by corporate lobbying, has led to self-interested trade policies and highly unequal international tax and investment agreements that harm the economies of less powerful countries and have enforcement mechanisms that are almost completely absent in international agreements on human rights, the environment and climate change (Oxfam 2002; Korten 2015). Today, more enlightened company managements increasingly pursue a wider set of more responsible goals (Fitzgerald 2019; [B Team](#), no date).

In pursuit of economic growth, governments promote rapid extraction of resources and high levels of consumerism. Because this growth model is fundamentally competitive, and leverages the power of some countries over others, it has exploited pre-existing inequalities and reinforced economic advantages gained by colonialism. Hence we use the term “decolonised” in the 2050 milestones. Decolonisation refers to efforts “to reverse the legacy of inequality and racism left by colonialism and [to] redress the unequal power relations it produced and perpetuated” (Rodríguez 2020). Because European colonialism created today’s world using “economic violence” that “materially enrich[ed] some people at the expense of others” (Koram 2021, pp. 230, 233), power holders in government and industry should recognise and work to remove the structural legacy whereby large-scale businesses unjustly and excessively extract wealth from the societies in which they operate.

RECOMMENDATIONS FOR POLICY MAKERS TO 2050

Achieving the 2050 milestones requires sustained action, building on the recommendations and milestones for 2030. After 2030, action should merge towards a wholly sustainable model.

RECOMMENDATIONS

Policy makers should continue to:

- Adapt the legal and policy framework to support a different kind of business model.
- Encourage third countries’ actions to ensure multinational business is held accountable.
- Expand legal and effective non-legal options to challenge corporate behaviour.
- Set human rights, climate mitigation and biodiversity safeguarding requirements for all business

actors.

- Develop and implement robust pension reforms to decouple pension provision from short-term shareholder-dominated and profit-maximising corporate behaviour.²⁴

2.2 Target 2: Circular Economy and Decreased Resource Consumption

The [State of Play report for the electronics sector](#) defines the Circular Economy and Decreased Resource Consumption as “the imperative of protecting the environment, including remaining within planetary boundaries, preventing global warming of more than 1.5°C above preindustrial levels, and preventing further biodiversity loss”. This target broadly corresponds to the environmental sustainability pillar.

Key principles required for a Circular Economy and Decreased Resource Consumption include:

- Elimination of waste and pollution and keeping products and materials longer in use.
- Remaining within planetary boundaries.
- Preventing global warming of more than 1.5°C above preindustrial levels.
- Preventing further biodiversity loss, restoring biodiversity and regenerating natural systems.

For further discussion of contextual issues surrounding, and requirements for meeting the environmental sustainability target, see the [Renewable Energy Sector Roadmap](#) (Kügerl and Tost 2021, sections 2.1 and 2.2) and the [Mobility Sector Roadmap](#) (Degreif and Betz 2022, section 2.1).

The electronics sector is defined by innovation and evolution of components and end-use products, and its business model relies heavily on obsolescence and consumers recurrently purchasing new versions of products and technologies. While some efforts have been made to recycle or reuse some raw materials that go into electronics production, the sector as a whole is not moving decisively towards circular economy and decreased consumption targets.

For the sector to make a meaningful contribution to this target, it will require major changes to the business model and incentives, as well as substantial efforts at education of consumers.

The key points on the supply chain are:

- Extraction of raw materials, in particular key minerals, which drives a range of social and environmental damage and geopolitical competition for access to limited resources.
- Processing and refining of minerals, with impacts on water and generating harmful waste.
- Manufacturing of components and/or finished goods.
- End-user companies’ sales to, and interface with, consumers.

Several stages of production are energy intensive, while extraction and processing generate considerable waste material, including hazardous waste in some contexts. Manufacturing also generates waste material that can be harmful to health and the environment. The marketing and sale of many electronics promote a culture of intense consumer demand for new and innovative goods, leading to major increases in use of raw materials and generation of electronics waste.

²⁴ For proposals to decouple personal pensions from dependency on stock markets and link pensions to investment in essential public services and local priorities, see Simpson et al. 2003.

As noted in the State of Play report, there are gaps in current social and environmental standards for mining and electronics manufacturing. Current standards insufficiently address the increasing demand for raw materials, and more attention is needed for environmental sustainability and resource efficiency. Most current standards focus on reducing negative externalities but not on reducing demand for and extraction of raw materials. Indeed, some current standards based on reducing externalities assume and implicitly support increased demand for raw materials and end products.

Core issues to ensure that the manufacture of electronic goods takes place in consistency with a circular economy and decreased consumption are:

- Reduced need for minerals through repair, reuse and recycling: this concerns EU policy and innovation by industry.
- Reduced overall demand for new goods, which requires reducing consumer demand through education to support a fundamental shift in the public consciousness.
- Technological innovation directed to extend product lifetimes and reduce the need to change hardware regularly.
- Ending aggressive marketing based on novelty value.
- An EU requirement to include warning labels with the sale of all short-lifespan goods.
- Dramatically reduced waste generation in the sector, from mining to end of life.

Within the electronics sector, the technology revolution is driving innovation and increased consumer demand for new and “up-to-date” goods. It is now commonplace in the developed North to consider personal computers, mobile phones and household goods such as televisions as requiring replacement within three to five years. This must change.

The following milestones and recommendations will form the basis for reaching the target of Circular Economy and Decreased Resource Consumption in the electronics sector (Figure 3).

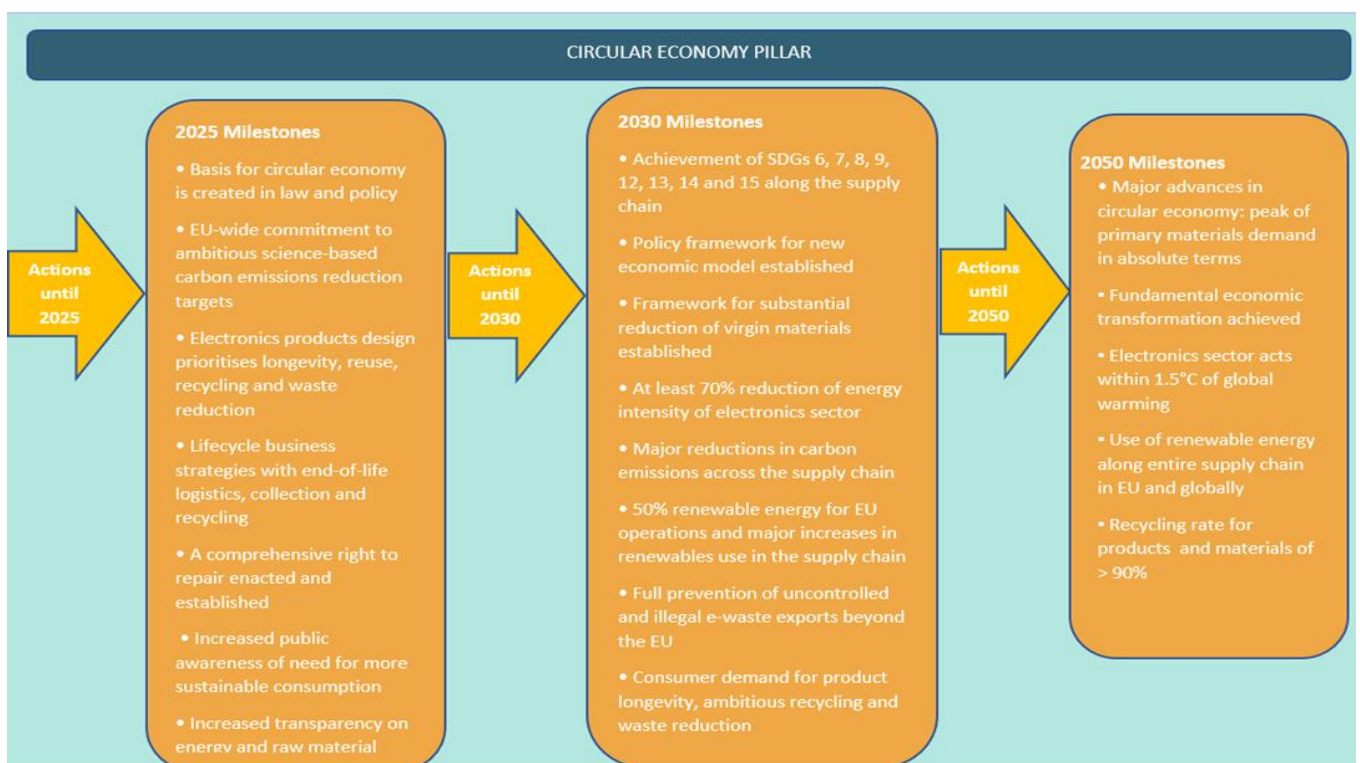


Figure 3: Milestones towards a circular economy and decreased resource consumption in the electronics sector by 2050

2.2.1 Milestones 2025

- Basis for circular economy is created in law and policy.
- EU-wide commitment to science-based carbon emissions reduction targets.
- Electronics products design prioritises longevity, reuse, recycling and waste reduction.
- Lifecycle business strategies with end-of-life logistics, collection and recycling.
- A comprehensive right to repair enacted and established.
- Increased public awareness of need for more sustainable consumption.
- Increased transparency on energy and raw material consumption in electronic goods.

Overall considerations to 2025

The 2025 milestones lock in a strong foundation to achieve the Circular Economy and Decreased Resource Consumption target. Building on the existing legal basis within the EU – and looking at incremental but ambitious increases in targets around energy consumption, waste and recycling – all players in the electronics industry should be clear on the parameters and direction of travel.

The EU has a policy and legislative framework relevant to the Circular Economy and Reduced Resource Consumption, including as part of the EU's Green Deal (European Commission 2019a). However, greater policy coherence is needed, including industrial, environmental, trade and development policies.

The EU's Green Deal is still fundamentally based on growth and consumption. Statements about decoupling growth from resource consumption are not yet underpinned by realistic proposals. Much growth, including in the electronics sector, relies on the EU consuming significant amounts of metals and minerals, only a portion of which are currently collected, recovered and recycled. Current efforts to rebalance economic growth with sustainable consumption messages are important but insufficient. More must be done to confront the limits of long-established economic prescriptions about growth and to chart a new course. This includes an open debate and attempting new approaches.

A genuinely circular economy cannot be based on increasing consumption and the primacy of short-term shareholder value and profit. Circularity challenges the basis on which many industry leaders have built businesses. Meaningful embracing of circular economy goals will significantly disrupt the electronics sector and in particular manufacturers of personal technology goods. Efforts that follow rather than lead the market will be insufficient. And business leaders will not be able to convince shareholders of the need to change without a strong legislative framework that offers a level playing field so that no competing company is disadvantaged by taking positive action. That said, some actors in the electronics industry are showing leadership and should do more to push laggards and to identify and name the challenges along the supply chain.

RECOMMENDATIONS FOR POLICY MAKERS TO 2025

To set clear legal foundations for a circular economy, it is imperative that the EU passes all planned relevant legislation with robust measures and with a focus on coherence with circular economy goals. Several key instruments will be debated and shaped in 2023-2024 that are directly relevant, including the [Critical Raw Materials Act](#) (CRMA), the [Right to repair](#) proposal and the plans for a [Circular electronics initiative](#) (European Parliament 2023a).

Energy efficiency

In 2021 the European Commission put forward a [proposal for a recast directive on energy efficiency](#) as part of the [European Green Deal](#). Setting “energy efficiency first” as an overall principle of energy policy, the recast proposal would “raise[s] the level of ambition of the [EU energy efficiency target](#)” and require “EU countries to collectively ensure an additional reduction of energy consumption of 9% by 2030 compared to 2020” (European Commission, no date).

In 2023 the EU Council presidency and European Parliament negotiators [announced](#) a provisional new agreement with a target of reducing the EU’s final energy consumption from 2020 levels by 11.7% by 2030 (Council of the European Union 2023).²⁵ Member States would be required to contribute to meeting the overall target through “indicative national contributions and trajectories” in their integrated national energy and climate plans. However, the agreement fell short of the 14% reduction target that the Parliament had sought and the 13% target the Commission had argued for in 2022 to help end EU countries’ dependency on Russian fossil fuels after Russia invaded Ukraine (Reuters 2023).

An independent study published in late 2022 had recommended a 14.5% EU reduction target by 2030 that would have “environmental, economic and social benefits” including major energy and transportation costs savings, with reduced energy bills benefitting the poorest households; reduced costs of fossil fuel imports and thus greater energy security; an estimated 752,000 jobs created, particularly in energy efficiency sectors; and an increase in the EU’s GDP and wealth (FEDARENE (European Federation of Agencies and Regions for Energy and the Environment 2022)).

A limitation is that the scope of the regulation is within the EU. It does not apply to energy use by EU entities in their supply chain operations in countries outside the EU. This means that, at present, energy efficiency in the supply chain (mining sites, smelting, and so on) depends on the actions of companies and third governments. We discuss this further below.

E-waste, longevity, repair and recycling

In the EU, it is estimated that less than 40% of e-waste is recycled. A public opinion survey conducted in the EU shows that almost 80% of respondents “believe that manufacturers should be required to make it easier to repair digital devices or replace their parts individually” (PubAffairs Bruxelles 2022).

The EU has made some progress on e-waste. The European Commission’s 2020 Circular Economy Action Plan included plans to promote longer product lifetimes, improve the collection and treatment of waste electrical and electronic equipment, and explore options for an EU-wide take-back scheme for older mobile phones, tablets and chargers (European Commission 2020a). This was positive, but faster progress is needed.

The Commission’s 2022 proposal of a new framework for eco-design requirements for sustainable products (European Commission 2022b) seeks to build on “the sustainability and circularity aspects listed in the Circular Economy Action Plan”. By making “materials last for longer, ensuring their value is retained for as long as possible and boosting the use of recycled content in products”, the proposal will “promote the decoupling of economic development from natural resource use and reduction of material dependencies”. It will include regulatory measures for electronics and ICT including mobile phones, tablets and laptops, such as design for energy efficiency and durability, reparability, upgradability, maintenance, reuse and recycling (European Parliament 2022).

²⁵ “Final” energy consumption represents energy consumed by end-users such as businesses and households, whereas “primary” energy consumption includes energy used to produce and supply energy.

Well-targeted and well-judged government incentives can play a role in achieving circular economy goals in the electronics industry. As noted by [PACE](#) (Platform for Accelerating the Circular Economy): “About 80% of the total environmental impact of a product is determined in the design phase. Providing incentives and technical support to designing electronics for longevity (making them durable, easy-to-upgrade, or easy-to-repair), recyclability (easy-to-disassemble, with safe inputs), and with recycled content is key to achieving a circular economy” (PACE, no date).

Incentives to industry should come with clear commitments and goals. Enabling infrastructure such as more recycling options and waste collection, with effective monitoring, can advance circularity across the economy. Making take-back schemes mandatory can also push the sector forward in terms of recycling.

The Circular Economy initiative commits the EU to implement the right to repair, including a right to update obsolete software (European Commission 2020a). The EU will also “consider new horizontal material rights for consumers for instance as regards availability of spare parts or access to repair and, in the case of ICT and electronics, to upgrading services” (European Parliament 2020a). More recently, in March 2023 the Commission adopted a “[proposal on common rules promoting the repair of goods](#)”.

The Right to Repair civil society campaign has identified essential elements needed in any EU legislation on right to repair, including design requirements to ensure easy disassembly and replacement of key components, starting with mobile phones, laptops and other IT products, and the importance of consumers being well informed about repairability of the electronic goods they purchase. The campaign considers the Commission’s 2023 [right to repair proposal](#) insufficient to make repair accessible and affordable. It calls for provision for independent providers, universal access to affordable spare parts, repair manuals and diagnostic tools, meaningful financial incentives for repair, and bans on anti-repair practices such as software serialisation of parts. Right to Repair argues that promoting repair will lead to major environmental gains, reduced dependency on raw material and component imports, and creation of local green jobs ([Right to Repair 2023](#))²⁶ (see also Good practice box below).

Good practice recommendations for the right to repair²⁷

- From the design stage, ensure that devices are resilient and lend themselves to repair and upgrades and not to disposal.
- Ensure the ecosystem supports repair and upgrade choices and is not cost prohibitive relative to replacing the device.
- Provide for end-of-life support services to ensure recycling and/or reuse of device.
- Provide software support such that devices continue to be compatible with software updates.

The Critical Raw Materials Act (CRMA) is also relevant to a circular economy. This legislation includes provisions for recycling and EU self-sufficiency, but a core premise is that the EU wants to seek access to critical minerals. This is linked to industrial needs in technology and electric vehicles. The legislation should ensure consistency with circular economy provisions. In particular, waste generated by mining for critical minerals is an issue. Reducing the demand for products that consume resources must form a stronger part of EU policy, alongside repair, reuse and recycling. Several provisions in the CRMA are of concern, including proposals to fast-track mining permits in the EU, a move that can undermine environmental protection. Elements of the CRMA also echo policies that view resource-rich third

²⁶ See also Right to Repair 2021 and European Environmental Bureau 2019.

²⁷ See Farooki et al. 2023, section 4.

countries primarily as mere suppliers of raw materials for EU consumption.

Recycling must advance significantly in relation to the electronics sector, and here both policy makers and industry have a role to play. Investment in research is required for the EU to become a global leader and innovator in recycling. This should be accompanied by more effective prevention of uncontrolled and illegal e-waste exports beyond the EU to third countries where informal urban e-waste mining results in toxins harming the health of informal workers – often including children and migrants – on dump sites, their communities and the wider environment (IPIS 2022).

Current Basel Convention restrictions on transboundary movements of hazardous e-waste outside the EU and OECD contain loopholes. One proposal is to extend electronic equipment producers' responsibility to the transboundary movement of e-waste, with financial responsibility to the end of a product's life, including recycling or landfilling (IPIS 2022). This would be consistent with the EU Commission's [corporate sustainability due diligence](#) proposals (European Commission no date).

Since recycling alone cannot provide sufficient amounts of raw materials for the electronics sector, it is important to avoid and reduce resource consumption wherever possible, as well as to address the high levels of currently uncollected waste.

RECOMMENDATIONS

Policy makers should ensure all forthcoming directives and revisions on raw materials, e-waste, batteries, and so on, promote lifecycle business strategies in the electronics sector.

- Adopt a revised Energy Efficiency Directive with ambitious targets (at least 14% from 2020 levels by 2030) for lowering energy consumption.
- Enact a Critical Raw Materials Act that reflects robust circular economy measures to reduce mineral consumption.
- Set strong reuse, recovery and recycling targets.
- Enact the right to repair with meaningful standards of accessibility and affordability.
- Set up mandatory take-back schemes allowing customers to return electronic goods at end of life.
- Improve and expand e-waste collection and require more action by industry.
- Strengthen the prevention of uncontrolled and illegal e-waste exports to third countries.

Public education and transparency

The achievement of a circular economy requires a significant shift in public awareness and perception. As noted in the Renewable Energy Sector Roadmap, policy makers should recognise that industry will struggle to achieve resource efficiency and energy reduction targets in the absence of significant changes in consumption. This will require public education as well as the use of technology that reduces the need for raw materials.

A public education drive should ensure that the full lifecycle of electronic equipment is made clear, and also the imperative of the EU not consuming disproportionately from other regions to satisfy demand. Efforts to decouple growth from environmental impact and the potential of technology to enable the manufacture of electronic goods with decreasing need for new raw materials should not lead to complacency about the more challenging issue of decreased overall electronics consumption.

Education efforts should include a focus on the right to repair and effective schemes to enable people

to share, recycle and reuse electronics goods. Overall, for the achievement of a circular economy and decreased consumption, the EU should, as the Renewable Energy Sector Roadmap states, implement the 10-year framework of programmes on sustainable consumption and production (SDG 12): “Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature (SDG 12).”

Transparency is fundamental if stakeholders are to know if policy, legislative acts and educational measures are working. Requiring companies to report on key circular economy parameters across the supply chain should be aligned with current reporting requirements for companies in electronics.

RECOMMENDATIONS

- An EU-wide public awareness campaign set up and running to 2030.
- Public education campaigns on repair, take-back and recycling options.
- Require reporting from industry on lifecycle business strategies, either as a new requirement or built into sustainability reporting.
- Initiate labelling of products to clearly show recycled content and durability.
- Require companies to substantiate their environmental claims using product environmental footprint (PEF) and organisation environmental footprint (OEF) methods.

2.2.2 Milestones 2030

- Achievement of SDGs 6, 7, 8, 9, 12, 13, 14 and 15 along the supply chain.
- Policy framework for new economic model established.
- Framework for substantial reduction of virgin materials established.
- At least 70% reduction of energy intensity of electronics sector.
- Major reduction in carbon emissions across the supply chain.
- 50% renewable energy for operations in the EU and major advancements elsewhere in the supply chain.
- Full prevention of uncontrolled and illegal e-waste exports beyond the EU.
- Consumer demand for product longevity, ambitious recycling and waste reduction.

Overall considerations to 2030

To reach the milestones for 2030, policy makers and industry need to embrace a significant shift in the economy. Industry should plan and expect significant disruption and see itself as the catalyst for change. Policy makers should ensure the clarity and decisiveness necessary for all industry players to move with the required speed and commitment. As the changes needed to achieve the 2030 milestones require action outside as well as within the EU, policy should be informed by dialogue with stakeholders in third countries.

RECOMMENDATIONS FOR POLICY MAKERS TO 2030

The milestones for 2030 and achieving the SDGs require that the EU amends and advances the legal

framework, building on the circular economy and European Green Deal measures in place in 2025. A clear message that targets and levels of ambition will increase over time is important to ensure that 2050 milestones are achievable. By 2030 the EU should also make decisive changes in relation to electronic waste exports and public procurement of electronic goods. Signalling these ambitions from 2025 will allow industry to make the necessary changes.

RECOMMENDATIONS

- Revised EU circular economy targets to reflect substantially increased ambition.
- Revised Critical Raw Materials Act to include new and more ambitious targets.
- Increase EU waste collection, recycling and reuse targets through revision of relevant directives.
- Introduce legislation for mandatory design-for-repair and design-for-recycling, and on reuse and repurposing.
- EU public procurement rules amended to disallow purchase of electronic equipment that does not meet minimum standards for virgin materials use reduction, repair and recycling.
- Substantially increase EU energy efficiency targets.
- Notify mining companies in EU supply chains that after 2035 no extraction using fossil fuel energy will be accepted.
- Effectively enforce the EU ban on export of e-waste.
- Legislate a fiduciary duty to act with due diligence in relation to environmental impacts.

The enabling environment requires policy makers to combine revision of laws and targets with further efforts to move the narrative from one of economic growth and consumption to a focus on satisfying human needs, universal wellbeing, equality and staying within planetary boundaries (Raworth 2017; DEAL 2021). Relevant wellbeing tools and indicators include the [Human Development Index](#), the [Multidimensional Poverty Index](#) and Bhutan's [National Happiness Index](#). Achievement of the SDGs, including those related to energy (SDG 7), responsible consumption and production (SDG 12), climate action (SDG 13) and safeguarding and restoring biodiversity (SDG 15), requires this decisive shift.

Sustaining public awareness, support and momentum within the EU should be coupled with taking a leadership role internationally, including on shifting narratives in high-consumption countries and social strata away from economic growth to human wellbeing. This message should be part of core foreign policy and international trade messaging. Moves to replace the language and framing that have dominated global economic discourse are crucial to embed a different relationship between human society and planetary boundaries, moving away from seeing people as consumers and nature as a resource to be consumed.

Additionally, measures in the EU in relation to industry standards along supply chains should be robustly assessed in terms of potential negative impacts on low-income countries in the chain. Negative impacts should be mitigated so that progress is swift but fair.

RECOMMENDATIONS

- Support countries outside the EU in creating a circular economy.
- Focus more on wellbeing than on economic growth.

2.2.3 Milestones 2050

- Major advances in circular economy: peak of primary materials demand in absolute terms.
- Fundamental economic transformation achieved.
- Electronics sector acts within 1.5°C of global warming.
- Use of renewable energy along entire supply chain in EU and globally.
- Recycling rate for products and materials of > 90%.

RECOMMENDATIONS FOR POLICY MAKERS TO 2050

Achieving the 2050 milestones requires sustained action, building on the recommendations and milestones for 2030. From 2030, action should merge towards a wholly sustainable model.

RECOMMENDATIONS

Policy makers should continue to:

- Adapt the legal and policy framework to support a business model that fully respects planetary boundaries.
- Encourage third countries' actions to ensure multinational business is accountable.
- Expand legal and effective non-legal options to challenge corporate behaviour.
- Set human rights, climate change mitigation, and biodiversity safeguarding/restoring requirements for all business actors.
- Develop and implement robust pension reforms to decouple pension provision from short-term shareholder-dominated and profit-maximising corporate behaviour.²⁸

2.3 Target 3: Responsible Production

The [State of Play report for the electronics sector](#) defines Responsible Production as “global eradication of poverty and a significant reduction of inequality that includes a minimum social foundation and a fair share of costs and benefits among the value chain actors”. This target broadly corresponds to the economic sustainability pillar.

Responsible production in the electronics sector encompasses responsibility in relation to the impact of production on the environment, climate and the rights of workers, affected people and communities, and on the economies and wellbeing of host countries. As stated in the [State of Play report](#), due diligence is often perceived as risk to the company and not to the affected people. For this target, the milestones need to bridge the gap between the current due diligence efforts and legislation, on the one hand, and the rights holders who are still insufficiently protected, on the other.

Responsible production requires transparency about impacts and about the value chain. As major elements of human rights and environmental impacts are covered in some detail under Targets 1 and 22 in this roadmap, these issues will be addressed more briefly here.

²⁸ For proposals to decouple personal pensions from dependency on stock markets and instead link pensions to investment in essential public services and local priorities, see Simpson et al. 2003.

The core factors that ensure that the manufacture of electronic goods takes place responsibly are:

- Ensuring that all stages of production, from mining to marketing, minimise and mitigate any negative impacts on human rights and the environment, including the climate.
- Following circular economy principles to minimise waste and the need for virgin raw materials.
- Ensuring the extraction of minerals does not cause, exacerbate or benefit from conflict or abuse.
- Ensuring the protection of workers’ rights along the supply chain including fair pay for workers.
- Respecting and promoting the rights of affected people and communities.
- Significantly reducing inequalities in income and wealth across the value chain.

Within the electronics sector, the extraction of minerals has received most attention when it comes to responsible production. Extraction of minerals like cobalt has been linked to child labour, conflict and corruption. A spotlight on this supply chain phase has led to some improvements (Mancini et al. 2021). Minerals refining and processing have received less attention from policy makers, industry, CSOs and researchers. Yet this production phase frequently sees workers exposed to health risks and labour rights abuses, discriminated against and receiving low pay for hazardous work.

The actions of major companies and brands have also received limited attention. However, pressure from large companies and brands on component producers and contract manufacturers in terms of costs, delivery and speed can drive labour rights violations. Failures of responsible production along the supply chain are frequently not isolated but respond to market pressures from elsewhere in the chain. A lack of transparency about the supply chain exacerbates failures of responsible production.

The following milestones and recommendations will form the basis for reaching the target of Responsible Production in the electronics sector (Figure 4).

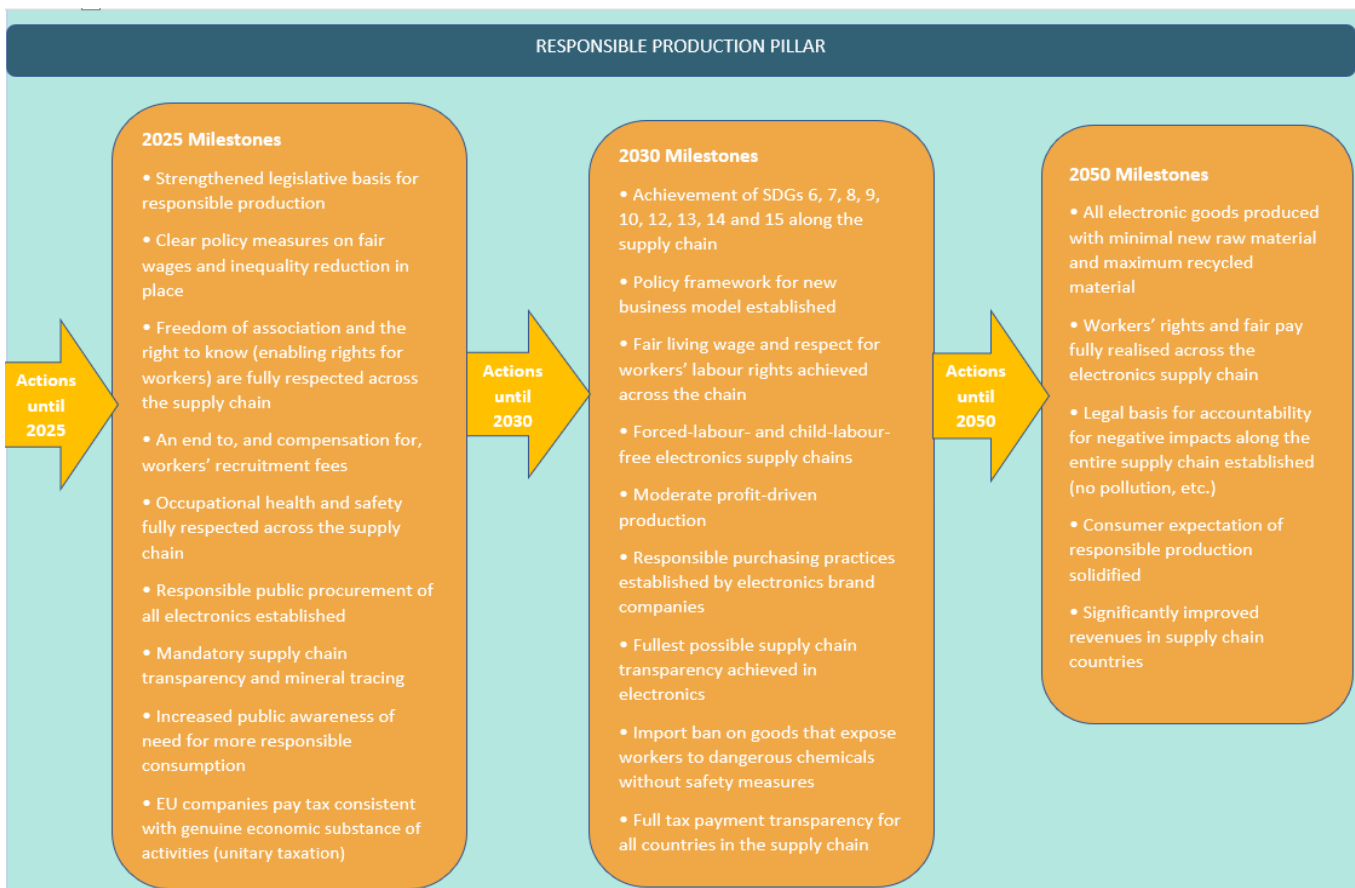


Figure 4: Milestones towards responsible production in the electronics sector by 2050

2.3.1 Milestones 2025

- Strengthened legislative basis for responsible production.
- Clear policy measures on fair wages and inequality reduction in place.
- Freedom of association and the right to know (enabling rights for workers) are fully respected across the supply chain.
- An end to, and compensation for, workers' recruitment fees.
- Occupational health and safety fully respected across supply chain.
- Responsible public procurement of all electronics established.
- Mandatory supply chain transparency and mineral tracing.
- Increased public awareness of need for more responsible consumption.
- EU companies pay right tax in right place at right time consistent with genuine economic substance of activities (unitary taxation).²⁹

Overall considerations to 2025

Achieving the 2025 milestones for responsible production requires substantial action by industry based in, or selling into, the EU in relation to its supply chains through third countries where the majority of raw material extraction and processing takes place. EU regulations, such as the Conflict Minerals Regulation and the Batteries Regulation, provide the basis for action by industry actors. This can and should be augmented by ambitious responsible business practices. But, as we emphasise under Target 1, a legal framework is the only way to ensure a level playing field within the EU and to foster EU leadership on responsible sourcing.

Legal and policy provisions needed for the realisation of human rights (Target 1) and a circular economy (Target 2) are relevant to responsible production. The rights of workers, fair pay and efforts to combat inequality are also critical. Production is only responsible if the workers who produce goods are not exploited within a system where others capture an excessive and unjust proportion of the wealth created. As understanding of the widespread negative consequences of severe economic inequality and efforts to combat this gain prominence internationally, the inequality that characterises the global electronics supply chain requires action. Across the value chain, substantial wealth is extracted while the imposition of "externality" costs and poor pay and labour conditions characterise the chain itself.

Enabling rights: freedom of association and the right to know

For workers in the electronics supply chain, freedom of association and the right to know are key enabling rights to realise decent working conditions. The right to know embraces the right to access all information that may impact or is necessary to realise workers' rights, including all information that affects their lives and livelihoods. The right to information is indivisible from the core labour rights to participation and association. The [UN Special Rapporteur on toxics and human rights](#) argues that the right to information, for instance in relation to toxic substances, is the foundation for the realisation

²⁹ See Tax Justice Network, [Unitary tax explained](#) (2019) and Fair Tax Mark, [Standards and Guidance Notes](#) (no date).

of many other rights such as to health, to life, to refuse unsafe work and to a safe and healthy work environment (GoodElectronics Network et al. 2020).

Workers' right to information encompasses corporate information; business practices between buyers and suppliers; position of the company in the value chain; details of facilities and the workforce; due diligence policies and practices, including risks, findings and outcomes, and specifics of materials, components, processes and products.

Freedom of association is "a fundamental human right proclaimed in the Universal Declaration of Human Rights" (ILO 2016). Freedom of association and the right to collective bargaining are of fundamental importance. When workers are free to organise, join a trade union and negotiate working conditions, they have the ability to secure decent conditions in general. In practice, electronics workers are often denied these rights. Companies often undermine union organising and collective bargaining by hiring workers with temporary contracts whose position is already weak; and regular workers can face reprisals if they organise or join a union (GoodElectronics, no date).

Recruitment fees

The practice of making workers pay recruitment fees is a major issue in the manufacturing sector in Asia, including in electronics. Workers pay the equivalent of three to four years' wages in their home country (e.g. Indonesia, Vietnam) to access jobs abroad at suppliers of major international brands. While paying off huge debts to their recruiters, they experience what can be called "debt bondage". They cannot afford to lose their job at the foreign employer for which they (or their family) paid so much. They are in a very precarious situation and vulnerable to exploitation.

Some company codes of conduct recognise this issue. The [Apple code](#) says: "Workers shall not be required to pay employers' or their agents' recruitment fees or other similar fees to obtain their employment. If such fees are found to have been paid by Workers, such fees shall be repaid to the worker" (Apple 2022). However, [known cases](#) of workers being compensated are very rare (Tagesschau 2023).

RECOMMENDATIONS FOR POLICY MAKERS TO 2025

EU policy makers should enact a suite of regulations and directives relevant to responsible production by 2025, including a ban on products made with [forced labour and child labour](#) (European Commission 2022a), the [Due Diligence Directive](#), the [Batteries Regulation](#) and the [Critical Raw Materials Act](#) (CRMA). These legal and policy instruments can provide a solid foundation for responsible production, but they must be coherent with responsible sourcing goals. This is not always the case.

For example, the CRMA, while making statements that appear in line with responsible production and sourcing, is underpinned by an economic and foreign policy logic that appears to run counter to these goals. Strategic raw materials projects are being developed in both the EU and third countries where a sense of urgency for access to raw materials for technology and the low-energy transition risks overriding responsible extraction (Business & Human Rights Resource Centre 2021; Chatham House 2023; SOMO 2023). Within the EU the CRMA establishes a maximum duration for permitting processes for projects involving extraction, processing and recycling. This is a concern because faster permitting can equal less time for environmental checks and consultations.

Current EU policy in relation to critical minerals needed for technology and electronics forms part of a geopolitical scramble for access to resources. This policy, involving competition with the US and China as other key actors, and leveraging diplomatic, trade and aid instruments, is not consistent with

promotion of responsible sourcing or responsible production. At minimum, responsible sourcing and responsible production should combine with efforts to reduce mineral sourcing and reduce production (see also Target 2).

As noted in the [State of Play](#) report, the electronics industry is a major consumer of tin, tantalum, tungsten and gold. Enforcement of the EU [Conflict Minerals Regulation](#), which covers these minerals, is critical for responsible production in the electronics sector. The regulation aims to ensure that EU importers of 3TG meet international responsible sourcing standards, set by the OECD, and has the potential to make a major impact on smelters and refiners of 3TG, as it requires that they can show that the four minerals are responsibly sourced.

EU legal frameworks should also bring greater clarity to expectations that workers will be paid a fair wage – at minimum, a living wage. While this can be legislated for within the EU, measures are needed to ensure companies act to align supply chains with living wage goals, including requirements for full supply chain transparency; require companies to identify contexts where a living wage is not paid; and oblige them to work collaboratively to remedy the situation (and not simply to exit a problem context without remediation). These measures are in line with the requirements of due diligence and will bear fruit more quickly if robust guidance is provided.

The efforts of the EU, US and China to secure access to critical minerals for electronics and technology include the provision of incentives and subsidies to industry actors. In view of lessons from the Covid-19 pandemic, responsible production should ensure that any public money used to enable industry actors to gain access to minerals should come with clear and robust safeguards and be fully transparent and accountable. Responsible production is not consistent with the conversion of public money into unjustified private profit.

Overall, policy makers should consider not only the enabling framework they can provide for responsible production, but also the risks of providing a contrary enabling framework, one that allows, or even encourages, poor practice. Policy coherence is essential.

RECOMMENDATIONS

- Pass coherent, robust and mutually reinforcing directives on Li-ion batteries, due diligence and critical raw materials, forced labour, fair wages, and conflict minerals.
- Make transparency of supply chains mandatory in the EU.
- Put in place strong EU standards for tracing raw materials.
- Engage with third countries on workers' rights in the electronics supply chain.
- Put in place public procurement guidance on electronics that reflects responsible sourcing.
- Support public education on responsible production and reduced consumption to create demand for responsible production of electronics.
- Require companies to disclose their supply chains, including gaps in their knowledge.
- Develop plans to introduce a system of unitary taxation for multinational businesses.

With regard to focusing more on wellbeing than on GDP, as the [Mobility Sector Roadmap](#) puts it: “Our economic system is based on growth. Many people have to work more than 40 hours a week to be able to keep up with the ever-rising prices ... [T]he state’s debts and budget rely on the growth of the economy ... [T]he decoupling of economic growth and resource consumption is strongly debated. Instead of economic growth, policies should focus on wellbeing as an important indicator. As a result,

decreasing resource consumption requires a change in the economic system itself. Examples could be a tax on resources ... or a focus on lowering the working hours per week ... It is important that a future economy ensures higher wellbeing, while curbing the system of unlimited consumption.”³⁰

In this context, as mentioned under Target 2, wellbeing tools and indicators such as the [Human Development Index](#), the [Multidimensional Poverty Index](#) and Bhutan’s [National Happiness Index](#) merit greater attention.

In addition to law and policy, the EU can use its procurement leverage and its agenda-setting role to support responsible production. As the EU notes in relation to [Green Public Procurement](#): “Europe’s public authorities are major consumers. By using their purchasing power to choose environmentally friendly goods, services and works, they can make an important contribution to sustainable consumption and production.”

Green public procurement guidance is, however, a voluntary instrument. Responsible production in electronics will be substantially aided by producing technical specifications for public procurement with the aim to make responsible sourcing requirements mandatory.

Policy makers can also do more to raise public awareness and demonstrate to citizens that procurement is consistent with responsible production. Such action combines rewarding industry actors that show leadership and public education on the issues.

2.3.2 Milestones 2030

- Achievement of SDGs 6, 7, 8, 9, 10, 12, 13, 14 and 15 along the supply chain.
- Policy framework for new business model established.
- Fair living wage and respect for workers’ labour rights achieved across the chain.
- Forced-labour-free and child-labour-free electronics supply chains.
- Moderate profit-driven production.
- Responsible purchasing practices established by electronics brand companies.
- Fullest possible supply chain transparency achieved in electronics.
- Import ban on goods that expose workers to dangerous chemicals without safety measures.
- Full tax payment transparency for all countries in supply chain.

Overall considerations to 2030

Achieving the 2030 milestones on responsible production requires deeper economic shifts. The 2025 milestones set the trajectory for deeper change, and provide industry with sufficiently clear signals to ensure relevant transitions in the business model can be accomplished. By 2030, several core areas of responsible production should be achieved.

As 2030 is the deadline for achieving the SDGs, it is important to look at the intersection of SDGs and the electronics sector. Responsible production and achievement of several SDGs are interlinked.

³⁰ As the mobility sector roadmap also notes, we recognise the need for developing countries to continue their growth to bring people out of poverty and increase wellbeing in line with SDG 8. In countries with low GDP, happiness or subjective wellbeing still increases significantly with only small increases in GDP (Jackson 2017).

Policy makers and industry should aim for continuous improvement through a combination of raising targets in all key areas (energy use, waste, recycling, transparency) and public education to reshape demand for electronics.

RECOMMENDATIONS FOR POLICY MAKERS TO 2030

Revision of the obligations of company directors is a cornerstone of enabling responsible production across supply chains. In the EU context, building on the provisions in due diligence law is important. This must go beyond the recommendations of the EU [Study on directors' duties and sustainable corporate governance](#) (European Commission 2020b), which focused on long-term sustainability of business, to encompass the impact of business on the sustainability of ecosystems, climate and biodiversity. A renewed effort is needed to clarify the language of sustainability and to avoid environmental sustainability being seen as synonymous with the sustainability of business operations. Directors' duties should include obligations to act to protect the environment and human rights across value chains. Reliance on social audits and voluntary schemes is demonstrably insufficient.

Policy makers should also establish incentives that discourage the payment of excessive dividends to shareholders, share buybacks and other measures that financialise the electronics and technology sectors. Such measures drive short-termism and deepen wealth inequalities. The abandonment, since the 1980s, of policies that curbed the excesses of short-term, shareholder-dominated and profit-maximising corporate operations should be reinstated, with necessary updates in the current context.

RECOMMENDATIONS

- Overhaul directors' duties and reporting responsibilities in the EU.
- Implement control mechanism for supply chain due diligence.

As noted under the 2025 milestones, transparency is essential for responsible production. EU policy makers should make corporate and supply chain transparency a greater international priority. This goes beyond, but can build on, initiatives like the [Extractive Industries Transparency Initiative](#). Transparency on financial aspects of extraction does not cover processing or manufacturing, and issues such as fair payment of workers do not receive attention. The EU can work with third country partners to establish a presumption of transparency across supply chains (including but not limited to electronics), which can have multiple benefits for addressing global inequalities and the SDGs.

As with transparency, efforts greatly increase the use of renewable energy along the entire supply chain require action outside the EU. Industry has a key role to play, as discussed below. However, policy makers should engage internationally on how to ensure that all countries can achieve renewable energy. This is essential for the wider goals of a just energy transition, as well as to ensure that electronic goods produced and/or sold in the EU are responsibly produced.

RECOMMENDATIONS

- Make supply chain transparency as a tool for responsible production of electronics an agenda item in international policy spaces.
- Address use of renewable energy in electronics production supply chains with other international policy makers.
- Align EU trade policy with responsible sourcing and human rights, and incorporate supply chain due diligence in all EU trade agreements.

The achievement of all milestones also requires more informed demand from citizens. Policy makers should see public engagement, persuasion and education on responsible production as a continuous process.

2.3.3 Milestones 2050

- All electronic goods produced with minimal new raw material and maximum recycled material.
- Workers' rights and fair pay fully realised across the electronics supply chain.
- Legal basis for accountability for negative impacts along the entire supply chain established (no pollution, etc.).
- Consumer expectation of responsible production solidified.
- Significantly improved revenues in supply chain countries.

RECOMMENDATIONS FOR POLICY MAKERS TO 2050

Achieving the 2050 milestones requires sustained action building on the recommendations and milestones for 2030. After 2030, action should merge towards a wholly sustainable and equitable model.

The changes needed cannot be limited to the electronics sector but require a shift in the economic paradigm. Between 2030 and 2050, policy makers should progressively amend the legal and policy frameworks that support the current economic model and predominant business model. Given the extent to which society has become reliant on this model, despite its harmful consequences, policy makers should put in place safety measures to enable the transition needed to a social-purpose-led economic and business model that prioritises ecological sustainability and social equity.

Policy makers should also look at the global context. Current trade and investment policy approaches, including those relevant to the electronics sector, treat third countries mainly as sources of raw materials. Moving towards 2050, it is imperative that the EU reviews and carries out a wholesale revision of its foreign economic policy with an express intention to decolonise its foreign policy, including trade and investment policy.

RECOMMENDATIONS

Policy makers should continue to:

- Adapt the legal and policy framework to support a social-purpose-led business model.
- Encourage third countries' actions to ensure multinational business is accountable.
- Expand legal and effective non-legal options to challenge corporate behaviour.
- Set human rights, climate change mitigation, and biodiversity safeguarding/restoration requirements for all business actors.

3 Conclusion

This roadmap for responsible sourcing for the electronic equipment sector presents major and urgent challenges for all three stakeholder groups addressed – policy makers, industry and civil society – and for the general public. In this respect it is no different from the other two roadmaps in the RE-SOURCING project, on renewable energy and mobility. There is huge urgency in addressing these challenges with minimum delay to avert climate disaster and further destruction of biodiversity, human life chances and wellbeing. There can be no environmental responsibility without corresponding responsibility towards universal human rights, or vice versa. And human rights in this context very much include economic, social and cultural as well as civil and political rights.

Only fully transformative change, achieved strategically across all sectors of the economy and society will be enough. The prevailing linear, short-term, shareholder-dominated and profit-maximising business model must give way, as must the fixation on GDP and economic growth, in favour of the goal of achieving wellbeing within planetary boundaries for all people and communities, leaving no one behind – in the words of the central promise of the Sustainable Development Goals – wherever in the world people may happen to live.

The EU, its policy makers, industries, civil society and citizens can be standard bearers and trailblazers for the changes needed, but only by truly “walking the talk” of social, environmental and economic sustainability. All actors should work together to play their part. There is no time to waste.



Figure 5: Roadmap for the electronics sector until 2050

4 Publication Bibliography

Note: This shorter document for policy makers contains, unedited, the same bibliography as the full Electronic Equipment Sector Roadmap for Responsible Sourcing of Raw Materials, published [here](#).

Amnesty International (2014) Injustice incorporated: Corporate abuses and the human right to remedy. Amnesty Index Number: POL 30/001/2014, <https://www.amnesty.org/en/documents/pol30/001/2014/en/>, last accessed 24/04/2023.

Amnesty International (2023) EU: New business sustainability law must be strengthened to protect human rights, May 2023, <https://www.amnesty.org/en/latest/news/2023/05/eu-new-business-sustainability-law-must-be-strengthened-to-protect-human-rights/>, last accessed 17/05/2023.

Apple (2022) Apple Supplier Code of Conduct, <https://www.apple.com/supplier-responsibility/pdf/FY23-Supplier-Code-of-Conduct-and-Supplier-Responsibility-Standards.pdf>, last accessed 21/04/2023.

Barton, Dominic; Horváth, Dezső; Kipping, Matthias (eds) (2016) Re-Imagining Capitalism. Oxford University Press.

Betz, Johannes; Degreif, Stefanie; Dolega, Peter (2021) State of Play and Roadmap Concept for the Mobility Sector. RE-SOURCING, April 2021, <https://re-sourcing.eu/reports/sop-mobility-sector/>, last accessed 10/05/2023.

B Team (no date) We advocate for economic systems change and new corporate norms — to protect our natural environment and secure a safe, sustainable and equitable future for all, <https://bteam.org/>.

Business & Human Rights Resource Centre (2021) Transition Minerals Tracker: Regional analysis of human rights policies and practices, <https://tinyurl.com/4pnazzd8>.

Capacity4dev (2016) Logical Framework Approach for Project and Programme Cycle Management. Session 10: Indicators (I) – Indicators, baselines, targets and milestones. Methodological Knowledge Sharing programme, August 2016, <https://europa.eu/capacity4dev/rom/documents/session-10-indicators-i-indicators-baselines-targets-and-milestones-0>, last accessed 09/03/2023.

Chatham House (2023) Europe's pursuit of securing critical raw materials for the green transition, <https://www.chathamhouse.org/2023/04/europes-pursuit-securing-critical-raw-materials-green-transition-0>.

Clarke, Clifton (2022) Protecting Shareholder Value: Unethical Corporate Leadership Threatens the American Dream. Journal of Intercultural Management and Ethics 5 (2), [DOI:10.35478/jime.2022.2.02](https://doi.org/10.35478/jime.2022.2.02).

Clean Clothes Campaign; European Center for Constitutional and Human Rights; Public Eye; SOMO (2022a) Respecting Rights or Ticking Boxes? Legislating Human Rights Due Diligence, <https://www.somo.nl/respecting-rights-or-ticking-boxes/?noredirect=en-GB>, last accessed 30/03/2023.

Clean Clothes Campaign et al. (2020b) Civil Society Statement on the Proposed Regulation on Prohibiting Products Made with Forced Labour on the European Union Market, <https://cleanclothes.org/news/2022/statement-on-proposed-eu-regulation-prohibiting-products-made-with-forced-labour>, last accessed 30/03/2023.

Council of the European Union (2023) Council and Parliament strike deal on energy efficiency directive, press release, March 2023, <https://www.consilium.europa.eu/en/press/press-releases/2023/03/10/council-and-parliament-strike-deal-on-energy-efficiency-directive/>, last accessed 22/05/2023.

DEAL (Doughnut Economics Action Lab) (2021) About Doughnut Economics, <https://doughnuteconomics.org/about-doughnut-economics>, last accessed 15/03/2023.

Dedeurwaerdere, Tom (2014) Sustainability Science for Strong Sustainability. Edward Elgar Publishing, <https://www.elgaronline.com/view/9781783474554.xml>, last accessed 09/03/2023.

Degreif, Stefanie; Farooki, Masuma; Endl, Andreas; Barriere, Noé; Berger, Gerald; Schlupe, Mathias; et al. (2020) The RE-SOURCING Common Approach. RE-SOURCING, March 2020, <http://re-sourcing.eu/reports/d12->

[in-rs-template-final/](#), last accessed 09/03/2023.

Degreif, Stefanie; Betz, Johannes (2022) Mobility Sector: Roadmap for Responsible Sourcing of Raw Materials until 2050. RE-SOURCING, July 2022, <https://re-sourcing.eu/reports/re-sourcing-mobility-sector-roadmap/>, last accessed 09/03/2023.

Earthworks et al. (2019) NGO letter to the World Bank re Mining & Renewables, <https://earthworks.org/resources/ngo-letter-to-the-world-bank-re-mining-renewables>, last accessed 09/05/2023.

Ekins, Paul; Simon, Sandrine; Deutsch, Lisa; Folke, Carl; Groot, Rudolf De (2003) A framework for the practical application of the concepts of critical natural capital and strong sustainability. *Ecological Economics* 44 (2–3), 165–185, [DOI:10.1016/S0921-8009\(02\)00272-0](https://doi.org/10.1016/S0921-8009(02)00272-0).

European Commission (2018) Commission Recommendation (EU) 2018/1149 on non-binding guidelines for the identification of conflict-affected and high-risk areas and other supply chain risks under Regulation (EU) 2017/821 of the European Parliament and of the Council, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H1149&rid=1>.

European Commission (2019a) The European Green Deal. Communication from the Commission, COM/2019/640 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX%3A52019DC0640>, last accessed 09/03/2023.

European Commission (2019b) Clean energy for all Europeans, <https://data.europa.eu/doi/10.2833/9937>, last accessed 09/03/2023.

European Commission (2019c) Sustainable industry, European Green Deal, https://ec.europa.eu/commission/presscorner/api/files/attachment/859442/Sustainable_industry_en.pdf, last accessed 09/03/2023.

European Commission (2020a) Circular Economy Action Plan, European Green Deal, https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en#:~:text=The%20EU's%20new%20circular%20action,new%20agenda%20for%20sustainable%20growth, last accessed 09/03/2023.

European Commission (2020b) Study on directors' duties and sustainable corporate governance: Final report, <https://op.europa.eu/en/publication-detail/-/publication/e47928a2-d20b-11ea-adf7-01aa75ed71a1/language-en>, last accessed 29/03/2023.

European Commission (2021a) Commission Staff Working Document Impact Assessment Report accompanying the document Proposal for a Directive of the European Parliament and of the Council amending Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment, <https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX:52021SC0245>, last accessed 14/03/2023.

European Commission (2021b) Proposal for a Directive of the European Parliament and of the Council on energy efficiency (recast), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0558>, last accessed 14/03/2023.

European Commission (2022a) Proposal for a regulation on prohibiting products made with forced labour on the Union market, COM(2022) 453, https://single-market-economy.ec.europa.eu/document/785da6ff-abe3-43f7-a693-1185c96e930e_en, last accessed 30/03/2023.

European Commission (2022b) Proposal for a Regulation of the European Parliament and of the Council establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC, COM(2022) 142, <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022PC0142>, last accessed 10/05/2023.

European Commission (2023a) Proposal for a Directive of the European Parliament and of the Council on common rules promoting the repair of goods and amending Regulation (EU) 2017/2394, Directives (EU)

2019/771 and (EU) 2020/1828, COM(2023) 155 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0155>, last accessed 10/05/2023.

European Commission (2023b) Proposal for a regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/102, https://single-market-economy.ec.europa.eu/publications/european-critical-raw-materials-act_en, last accessed 20/03/2023.

European Commission (no date) Batteries, https://environment.ec.europa.eu/topics/waste-and-recycling/batteries_en#law, last accessed 20/03/2023.

European Commission (no date) Corporate sustainability due diligence, https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en, last accessed 20/03/2023.

European Commission (no date) Energy efficiency directive, https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en#:~:text=The%20recast%20proposal%20raises%20the,the%202020%20reference%20scenario%20projections, last accessed 14/03/2023.

European Commission (no date) Green Public Procurement, https://ec.europa.eu/environment/gpp/index_en.htm, last accessed 21/03/2023.

European Environmental Bureau (2019) Revealed: The climate cost of “disposable smartphones”, <https://eeb.org/revealed-the-climate-cost-of-disposable-smartphones/>, last accessed 30/03/2023.

European Environmental Bureau (no date) 100% renewables future, <https://eeb.org/work-areas/climate-change/renewable-energy/>, last accessed 23/05/2023.

European Network of National Human Rights Institutions (no date) Human Rights-Based Approach, <https://ennhri.org/about-nhris/human-rights-based-approach/>.

European NGO Coalition on Conflict Minerals; European Network for Central Africa; International Peace Information Service (IPIS); PAX; et al. (2021) The EU Conflict Minerals Regulation: Implementation at the EU Member State level, <https://ipisresearch.be/wp-content/uploads/2021/06/Review-paper-on-EU-Conflict-Minerals-Regulation-1-1.pdf>.

European Parliament (2020a) Answer given by Mr Reynders on behalf of the European Commission, 13 May 2020, https://www.europarl.europa.eu/doceo/document/E-9-2019-004171-ASW_EN.html,m last accessed 17/05/2023.

European Parliament (2020b) Resolution of 13 February 2020 on child labour in mines in Madagascar, https://www.europarl.europa.eu/doceo/document/TA-9-2020-0037_EN.html, last accessed 30/03/2023.

European Parliament (2022) Revision of the Ecodesign Directive, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/699502/EPRS_BRI\(2022\)699502_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/699502/EPRS_BRI(2022)699502_EN.pdf), last accessed 31/03/2023.

European Parliament (2023a) Legislative Train Schedule: Circular electronics initiative, <https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-circular-electronics>, last accessed 24/04/2023.

European Parliament (2023b) Proposal for a ban on goods made using forced labour, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/739356/EPRS_BRI\(2023\)739356_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/739356/EPRS_BRI(2023)739356_EN.pdf), last accessed 30/03/2023.

European Union (2006) Consolidated text: Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC [Batteries Regulation], <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006L0066-20180704>, last accessed 20/03/2023.

European Union (2017) Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas [Conflict Minerals Regulation], <http://data.europa.eu/eli/reg/2017/821/oj/eng>, last accessed 20/03/2023.

Fair Tax Mark (no date) Standards and Guidance Notes, <https://fairtaxmark.net/why-get-the-mark/criteria-and-standards/>, last accessed 11/05/2023.

Farooki, Masuma; et al. (2020) The International Responsible Sourcing Agenda: State-of-Play. RE-SOURCING, April 2020, <https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5e060a5ca&ppId=PPGMS>, last accessed 09/03/2023.

Farooki, Masuma; González, Alejandro; Schipper, Irene (2023) Meeting the Milestones in the Responsible Sourcing Roadmap: Good Practice Guidelines for the Electronics Sector. RE-SOURCING, April 2023, <https://re-sourcing.eu/reports/good-practice-guidelines-electronics-sector/>.

FEDARENE (European Federation of Agencies and Regions for Energy and the Environment) (2022) New study on the benefits of a higher EU Energy Efficiency target, December 2022, <https://fedarene.org/new-study-on-the-benefits-of-a-higher-eu-energy-efficiency-target/>, last accessed 22/05/2023.

Fitzgerald, Maggie (2019) The CEOs of nearly 200 companies just said shareholder value is no longer their main objective. CNBC, August 2019, <https://www.cnbc.com/2019/08/19/the-ceos-of-nearly-two-hundred-companies-say-shareholder-value-is-no-longer-their-main-objective.html>.

González, Alejandro; Schipper, Irene (2021) State of Play and Roadmap Concepts for the Electronics Sector. RE-SOURCING, December 2021, <http://re-sourcing.eu/reports/final-sop-eees/>, last accessed 17/05/2023.

GoodElectronics Network (no date) Freedom of association, <https://goodelectronics.org/topic/freedom-association/>, last accessed 24/04/2023.

GoodElectronics Network; SOMO; Business, Human Rights and the Environment Research Group (2020) Beyond corporate transparency: The right to know in the electronics industry, <https://goodelectronics.org/beyond-corporate-transparency/>, last accessed 30/03/2023.

HEC Paris (2021) Activist Hedge Funds: Good for Some, Bad for Others? <https://www.hec.edu/en/knowledge/articles/activist-hedge-funds-good-some-bad-others>.

ICMM (International Council on Mining and Metals) (no date (a)) Responsible Production, <https://www.icmm.com/en-gb/our-principles/mining-principles/principle-8>, last accessed 15/03/2023.

ICMM (no date (b)) SDG 12: Responsible Consumption and Production, <https://www.icmm.com/en-gb/our-work/supporting-the-sustainable-development-goals/responsible-consumption-and-production>, last accessed 15/03/2023.

IFC (International Finance Corporation) (2012) Performance Standard 3: Resource Efficiency and Pollution Prevention, https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/performance-standards/ps3, last accessed 15/03/2023.

ILO (2016) Freedom of Association and Collective Bargaining, <https://www.ilo.org/global/topics/dw4sd/themes/freedom-of-association/lang--en/index.htm>, last accessed 31/03/2023.

ILO (2022) Global Estimates of Modern Slavery: Forced Labour and Forced Marriage, https://www.ilo.org/global/topics/forced-labour/publications/WCMS_854733/lang--en/index.htm, last accessed 30/03/2023.

ILO (2023) Tripartite declaration of principles concerning multinational enterprises and social policy (MNE Declaration), https://www.ilo.org/empent/Publications/WCMS_094386/lang--en/index.htm, last accessed 30/03/2023.

- IPIS (2022) Urban mining and e-waste exports: overview and recent initiatives, <https://ipisresearch.be/weekly-briefing/urban-mining-and-e-waste-exports-overview-and-recent-initiatives/>, last accessed 15/05/2023.
- IRMA (no date) What we do, <https://responsiblemining.net/what-we-do/>, last accessed 15.05.2023.
- Jackson, Tim (2017) Prosperity without Growth: Foundations for the Economy of Tomorrow. Routledge (Taylor & Francis Group).
- Koram Kojo (2022) Uncommon wealth: Britain and the aftermath of empire. John Murray.
- Korten, David (2015) When Corporations Rule the World. Berrett-Koehler Publishers.
- Kügerl, Marie-Theres; Tost, Michael (2021a) State of Play and Roadmap Concepts for the Renewable Energy sector. RE-SOURCING, February 2021, <https://re-sourcing.eu/reports/08022021-re-sourcing-wp4-d41-v2-res/>, last accessed 10/05/2023.
- Kügerl, Marie-Theres; Tost, Michael (2021b) Renewable Energy Sector: Roadmap for Responsible Sourcing of Raw Materials until 2050. RE-SOURCING, August 2021, https://re-sourcing.eu/static/7d58b046a89ea05c923f24fa3bbb0bf/final_res_roadmap_2021.pdf, last accessed 28/07/2022.
- Maastricht Principles on Extraterritorial Obligations of States in the area of Economic, Social and Cultural Rights (2011) <https://www.ciel.org/project-update/extra-territorial-obligations-etos/>, last accessed 20/03/2023.
- Mancini, Lucia; Eslava, Nicolas A.; Traverso, Marzia; Mathieux, Fabrice (2021) Assessing impacts of responsible sourcing initiatives for cobalt: Insights from a case study, Resources Policy 71, 102015, [DOI:10.1016/j.resourpol.2021.102015](https://doi.org/10.1016/j.resourpol.2021.102015).
- OECD (2011) Guidelines for Multinational Enterprises, <http://mneguidelines.oecd.org/guidelines/>, last accessed 20/03/2023.
- OECD (2016) Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, <https://www.oecd.org/daf/inv/mne/OECD-Due-Diligence-Guidance-Minerals-Edition3.pdf>, last accessed 09/03/2023.
- OECD (2018) Due Diligence Guidance for Responsible Business Conduct, <https://www.oecd.org/investment/due-diligence-guidance-for-responsible-business-conduct.htm>, last accessed 30/03/2023.
- OECD (2021) Frequently Asked Questions: How to address bribery and corruption risks in mineral supply chains, <https://mneguidelines.oecd.org/faq-how-to-address-bribery-and-corruption-risks-in-mineral-supply-chains.pdf>, last accessed 30/03/2023.
- OECD Watch; Swedwatch; European Coalition for Corporate Justice; European Center for Constitutional and Human Rights; SOMO (2022) Downstream due diligence: Setting the record straight, <https://www.somo.nl/wp-content/uploads/2022/12/Downstream-due-diligence.pdf>, last accessed 30/03/2023.
- OHCHR (no date) About the 2030 Agenda for Sustainable Development and human rights, <https://www.ohchr.org/en/sdgs>, last accessed 30/03/2023.
- Oxfam (2002) Rigged Rules and Double Standards: Trade, globalisation, and the fight against poverty, <https://tinyurl.com/5n99dutw>.
- Oxford Brookes University (2022) Researchers agree: The world can reach a 100% renewable energy system by or before 2050, August 2022, <https://www.brookes.ac.uk/About-Brookes/News/2022/08/Researchers-agree-The-world-can-reach-a-100-renewable>, last accessed 23/05/2023,
- PACE (Platform for Accelerating the Circular Economy) (no date) The Electronics Program, <https://pacecircular.org/action-agenda/electronics>, last accessed 15/03/2023.
- PubAffairs Bruxelles (2022) Right to repair: MEPs want more durable and more easily repairable products, <https://www.pubaffairsbruxelles.eu/eu-institution-news/right-to-repair-meps-want-more-durable-and-more-easily-repairable-products>

[easily-repairable-products/](#), last accessed 09/05/2023.

Purvis, Ben; Mao, Yong; Robinson, Darren (2019) Three pillars of sustainability: in search of conceptual origins. *Sustainability Science* 14 (3), 681–695, [DOI:10.1007/s11625-018-0627-5](https://doi.org/10.1007/s11625-018-0627-5).

Quijano, Gabriela; Wilde-Ramsing, Joseph (2022) A piece, not a proxy: The European Commission’s dangerous overreliance on industry schemes, multi-stakeholder initiatives, and third-party auditing in the Corporate Sustainability Due Diligence Directive. SOMO, <https://www.somo.nl/wp-content/uploads/2022/11/A-piece-not-a-proxy.pdf>, last accessed 30/03/2023.

Raworth, Kate (2017) *Doughnut economics: Seven ways to think like a 21st-century economist*. Random House.

RE100 (no date) We are accelerating change towards zero carbon grids at scale, <https://www.there100.org/>, last accessed 12/05/2023.

Responsible Mica Initiative (no date) <https://responsible-mica-initiative.com/>.

Reuters (2023) EU strikes deal to curb energy use by 2030, March 2023, <https://www.reuters.com/business/energy/eu-reaches-agreement-to-reduce-energy-consumption-eu-level-by-117-2030-2023-03-10/>, last accessed 22/05/2023.

Right to Repair (2021) Part pairing: a major threat to independent repair, <https://repair.eu/news/part-pairing-a-major-threat-to-independent-repair/>, last accessed 30/03/2023.

Right to Repair (2023) Not yet accessible, affordable nor mainstream: campaigners tighten the screw on new EU Right to Repair proposal, <https://repair.eu/news/not-yet-accessible-affordable-nor-mainstream-campaigners-tighten-the-screw-on-new-eu-right-to-repair-proposal/>, last accessed 30/03/2023.

Ritthof, Michael; Rohn, Holger; Liedtke, Christa; Merten, Thomas (2002) Calculating MIPS: Resource productivity of products and services. Wuppertal Institut for Climate, Environment and Energy at the Science Centre North Rhine-Westphalia, <https://epub.wupperinst.org/frontdoor/deliver/index/docId/1577/file/WS27e.pdf>, last accessed 12/05/2023.

Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, F. S., III; Lambin, E.; et al. (2009) Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society* 14(2), 32, <http://www.ecologyandsociety.org/vol14/iss2/art32/>, last accessed 09/03/2023.

Rodriguez, Jenny (2020) How to start decolonising your business. University of Manchester Alliance Manchester Business School, <https://www.alliancembs.manchester.ac.uk/original-thinking-applied/original-thinkers/how-to-start-decolonising-your-business/#:~:text=Decolonising%20is%20an%20attempt%20to,that%20consider%20many%20diverse%20voices>, last accessed 10/05/2023.

Rohn, Holger; Pastewski, Nico; Lettenmeier, Michael; Wiesen, Klaus; Bienge, Katrin (2014) Resource efficiency potential of selected technologies, products and strategies. *Science of the Total Environment* 473-474, 32–35, [DOI: 10.1016/j.scitotenv.2013.11.024](https://doi.org/10.1016/j.scitotenv.2013.11.024).

Sarker, Shuronjit Kumar; Haque, Nawshad; Bhuiyan, Muhammed; Bruckard, Warren; Pramanik, Biplob Kumar (2022) Recovery of strategically important critical minerals from mine tailings. *Journal of Environmental Chemical Engineering* 10(3), <https://www.sciencedirect.com/science/article/abs/pii/S221334372200495X>, last accessed 11/05/2023.

Shift (2023) From Policing to Partnership: Designing an EU Due Diligence Duty that Delivers Better Outcomes, May 2023, <https://www.amnesty.org/en/latest/news/2023/05/eu-new-business-sustainability-law-must-be-strengthened-to-protect-human-rights/>, last accessed 17/05/2023.

Shift and Mazars (no date) The UN Guiding Principles Reporting Framework, <https://www.ungpreporting.org/>, last accessed 31/03/2023.

Simpson, Alan; Hines, Colin; Murphy, Richard (2003) People's pensions: New thinking for the twenty-first century. New Economics Foundation, https://neweconomics.org/uploads/files/5dde38e3ffca8bef3_com6y1pby.pdf, last accessed 17/05/2023.

SOMO (2016) Should I stay or should I go? Exploring the role of disengagement in human rights due diligence, <https://www.somo.nl/should-i-stay-or-should-i-go/>.

SOMO (2023) Ten reasons why the European Commission's proposed Critical Raw Materials Regulation is not sustainable – and how to fix it, <https://www.somo.nl/somo-position-paper-on-critical-raw-materials-regulation/>.

SOMO; Terre des Hommes (2019) Child Labour in Madagascar's Mica Sector, <https://www.somo.nl/child-labour-in-madagascars-mica-sector/>, last accessed 30/03/2023.

Steffen, Will; Richardson, Katherine; Rockström, Johan; Cornell, Sarah E.; Fetzer, Ingo; Bennett, Elena M.; et al. (2015) Planetary boundaries: guiding human development on a changing planet. Science 347 (6223), DOI:10.1126/science.1259855.

Tagesschau (2023) First compensations for migrant workers [trans.], https://www.tagesschau.de.translate.google.com/investigativ/lieferkettengesetz-entschaedigungen-wanderarbeiter-101.html?x_tr_sl=de&x_tr_tl=en&x_tr_hl=en-US&x_tr_pto=wapp, last accessed 21/04/2023.

Tax Justice Network (2019) Unitary tax explained: infographic, <https://taxjustice.net/2019/11/21/unitary-tax-explained-infographic/>, last accessed 21/03/2023.

UNFCCC (2015) The Paris Agreement, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>, last accessed 09/03/2023.

United Nations (2011) Guiding Principles on Business and Human Rights, https://www.ohchr.org/sites/default/files/documents/publications/guidingprinciplesbusinesshr_en.pdf, last accessed 20/03/2023.

United Nations (2015) Paris Agreement, https://unfccc.int/sites/default/files/english_paris_agreement.pdf, last accessed 09/03/2023.

United Nations Special Rapporteur on Human Rights Defenders (2023) HRDs and the progress of the EU's Corporate Sustainability Due Diligence Directive, <https://srdefenders.org/resource/hrds-and-the-progress-of-the-eu-corporate-sustainability-due-diligence-directive/>, last accessed 17/05/2023.

United Nations Sustainable Development Group (no date) Universal Values Principle Two: Leave No One Behind, <https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind>, last accessed 10/05/2023.

World Bank (no date) Climate-Smart Mining: Minerals for Climate Action, <https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action>, last accessed 15/03/2023.



re-sourcing

Coordinated by:

Vienna University of Economics and
Business, Institute for Managing
Sustainability Welthandelsplatz 1A
1020 Vienna

phone: +43-1-31336-5452

email: info@re-sourcing.eu

