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Respecting Rights in Renewable Energy: Supporting Investment in Sustainable and Ethical Green Technologies.

A policy brief to the UK Government



Rare earth mine in the Uyghur Region. (Peter Chou Kee Liu / Flickr)



The world must rapidly transition away from fossil fuels to limit the global temperature rise to 1.5°C. The solar and electric vehicle sectors are critical to this transition. However, both industries source many of their critical inputs from the Uyghur Region, a Region where the Chinese Government is systematically persecuting the native Uyghur and Turkic and Muslim-majority peoples, including through state-imposed forced labour. In addition to widespread human rights abuses, the dominance of the Uyghur Region in green technology supply chains also poses critical risks for global energy security.

Coordinated global action is needed to shift solar supply chains away from the Uyghur Region and prevent the electric vehicle industry from becoming any more reliant on the Region than it already is. Decisive action is needed to make the world's transition to clean energy just, fair and equitable. This is not possible as long as the current transition relies on green technologies made with systemic government-sponsored Uyghur forced labour.

As a key source of funding, investors hold significant power in the energy transition. However, research conducted by Anti-Slavery International, the Investor Alliance for Human Rights and Sheffield Hallam University in 2023 found that meaningful company and investor action on Uyghur forced labour in green technology is hindered, alongside other factors, by the ongoing failure of governments to act.

This policy briefing is published in parallel with detailed [guidance](#) for investors on Uyghur forced labour in green technology. The policy briefing includes a range of recommendations for the UK Government on how to close policy gaps and what legislative and policy measures could support a transition away from the Uyghur Region. Many of these measures were specifically requested by the investors who participated in the research.

Investors highlighted that import control regulation in the US, i.e. the Uyghur Forced Labor Prevention Act, is current-

ly the primary stimulus for company and investor action on Uyghur forced labour. They also noted that the absence of comparable regulation elsewhere limits investors' ability to exercise their leverage when engaging with companies not exposed to the US market. With the European Union anticipated to introduce its own Forced Labour Regulation, **the UK is overall set to become a dumping ground for green technology imports which cannot be imported into the US or EU market.**

The UK Government should introduce a **smart mix of measures**, which incentivise and **mandate meaningful corporate and investor action** through stronger regulation, and **support the green technology industry to access alternative sources** of supply to the Uyghur Region. Overall, the UK Government should:

- cooperate with international partners in key international fora, including the G7, G20, the Commonwealth and others on the crisis of Uyghur forced labour in green technologies
- examine the potential for financial incentives and subsidies to support supply chain diversification
- work with development and trade partners to develop alternative markets to the Uyghur Region, while examining how to make sure alternatives have high human rights and environmental standards
- regulate public procurement, corporate and investor practice, including through the use of import controls and the introduction of a [Business, Human Rights and Environment Act](#).

Action in this area by the UK Government will support the UK to meet its climate change commitments, improve the UK's energy resilience, and offer opportunities to support job creation, both in the UK and in the UK's development and investment country partners.

Overview

The world's temperature has increased [by about 1°C since pre-industrial times](#). It is vitally important that governments worldwide commit to limit the global temperature rise to 1.5°C by the end of the century. But this commitment is under serious threat: current Nationally Determined Contributions and the COP27 decision lack ambition, as evidenced by the significant gap between current national climate plans and the action needed under the IPCC emissions scenario to meet the 1.5°C target.

According to a 2022 [Intergovernmental Panel on Climate Change \(IPCC\) assessment](#), the 1.5°C commitment can only be met by rapidly transitioning away from fossil fuels, reducing greenhouse gas emissions to 45% below their 2010 levels by 2030, and putting the international community on track to reach net zero emissions by 2050. The IPCC has [declared](#) that the solar and electric vehicle (EV) sectors play a critical role in this urgent transition away from fossil fuels. The UK Government's current plans [aim](#) to scale up to 70 GW of solar power capacity by 2035.

However, the Xinjiang Uyghur Autonomous Region (Uyghur Region), northwest China, is the [dominant](#) global sourcing location for critical inputs for the solar industry. [35% of global polysilicon](#) and as much as [32% of metallurgical-grade silicon](#)—both essential components in almost all the world's solar panels—is produced in the Region. China is also now [estimated](#) to process 44% of the world's chemical lithium and 70% of lithium-ion battery cells, as of 2022 according to Benchmark Mineral Intelligence. The percentage of these processes performed in the Uyghur Region is [growing](#).

The Chinese Government is subjecting Uyghurs and other Turkic and Muslim-majority peoples in the Uyghur Region to an unprecedented system of state-imposed forced labour (see reports compiled [here](#) by the Coalition to End Forced Labour in the Uyghur Region). State-imposed forced labour is part of the Chinese Government's [broader campaign](#) to suppress the rights of marginalised groups through mass surveillance, cultural repression, and arbitrary detention, in which detainees face routine torture and systematic sexual violence. The UN Special Rapporteur on Contemporary Forms of Slavery has concluded that “instances [of Uyghur forced labour] may [amount to enslavement as a crime against humanity](#)”.

The scope, scale and severity of the Chinese Government's policies mean virtually any workplace in the Uyghur Region, whether industrial or agricultural, is at risk of state-imposed forced labour. This includes both the [solar](#) and EV [battery](#) industries. Robust academic and industry research has found that mining, processing and/or manufacturing for both industries in the Uyghur Region are heavily implicated in Uyghur forced labour. In order to facilitate a widespread system of forced labour, the Chinese Government has made it impossible for any companies to conduct credible due diligence on the ground in the Region. As such, there are no valid means for companies or investors to verify that any workplace in the Uyghur Region is free from forced labour, nor to prevent, mitigate or remedy the use of forced labour in line with the principles of human rights due diligence.

The dominance of the Uyghur Region in the solar and EV battery industries raises a clear conflict of interest and threatens UK and G7 commitments on the transition away from fossil fuels:

- **A ‘just transition’ away from fossil fuels cannot be achieved as long as countries are reliant on the Uyghur Region for green technology.** The reliance on systemic state-imposed forced labour to achieve climate goals runs counter to UK and G7 [commitments](#) to eliminate forced labour from global supply chains and achieve a ‘just transition’ to clean energy. The 2023 G7 Clean Energy Economy Action Plan [states](#): *We will promote supply chains in line with high environmental, social and governance (ESG) standards that ensure benefits to local communities and advance a just energy transition rooted in social dialogue, social and environmental protection, rights at work and employment.* This commitment to a just transition was further stressed in the G7 Hiroshima Leaders' Communiqué, which [underscored](#) commitments to workers' rights in critical mineral supply chains.
- **In the Uyghur Region, the solar industry is powered by subsidised [coal](#), undermining the ‘green’ credentials of the solar industry.** This dependence on cheap coal-generated electricity is key to [the “cost competitiveness”](#) of the Uyghur Region's solar industry. The ability of companies in the Region to undercut prices offered elsewhere is bolstered by high investment by the Chinese government, subsidised state labour schemes, through

the Uyghur forced labour programmes, and relaxed [regulations](#) which have allowed for short lead times compared to other markets. This “cost competitiveness” is [perceived](#) to have constrained the growth of alternative supply chains and technologies in the solar sector.

- **As noted by the International Energy Agency** (of which China is an “association country”), **the concentration of the solar supply chain in a single location and with a small number of suppliers has [created](#) considerable vulnerabilities for global energy security** and the clean energy transition. This is due to the potential for disruption, for example, due to natural disasters, pandemics or industrial accidents, among other challenges. Analysts have also highlighted the [risk](#) of “supply chain weaponisation” by the Chinese Government, citing the “geopolitical leverage” the Chinese Government could exert through its control of the global solar industry.

The risks of global reliance on the Uyghur Region for green technology supply chains have been well-known since at least 2021, but have received greater attention since Russia’s invasion of Ukraine in 2022. This is reflected in the emergence of policies promoting domestic green technology production and critical mineral sourcing in the [United States, the EU](#) and elsewhere (see the International Energy Agency policy [tracker](#)). However, at a global level, cooperation on renewables and the problems in the Uyghur Region remains limited, as demonstrated by the recommendations below.

Investors have the leverage to play a key role in the transition away from fossil fuels and the achievement of a truly “just transition”. Global annual investment in energy is [expected](#) to rise to \$5 trillion (roughly £4 trillion) by 2030. Mindful of the important role of the investment community, Anti-Slavery International, Sheffield Hallam University and the Investor Alliance for Human Rights interviewed investors from the United Kingdom, the USA, Canada, continental Europe and Australia to identify how investors can help tackle the crisis of Uyghur forced labour in the green technology sector. **Our research found that investor action on this issue is stymied by the lack of government action, globally, to support the diversification of green technology supply chains and the lack of coordinated government policies on environmental and social standards.**

Responding to this, below we outline recommendations for the UK Government, focused on the need to prioritise investment, financial incentives and policy measures, to:

- improve corporate understanding of Uyghur forced labour and how businesses and investors should respond
- diversify UK green technology supply chains
- eliminate reliance on suppliers in the Uyghur Region.

These recommendations were compiled following the authors’ interviews with investors, as well as broader research and interviews with experts. They seek to respond to the challenges and gaps identified in current government policies, regulations and approaches that are disincentivising more meaningful investor action on Uyghur forced labour in green technology.

The background information that follows supports these recommendations. It summarises additional information on the solar and EV industries in the Uyghur Region, the use of coal in the solar supply chain in the Uyghur Region, current industry and investor responses, and potential alternative technologies and suppliers.

Accompanying this policy briefing is a [research summary](#), which further outlines the findings from the research with investors and the research methodology, and the full [guidance](#) for investors.

Recommendations for the UK Government

The recommendations below, unless otherwise highlighted, are for the particular attention of **the Foreign Commonwealth & Development Office, the Department for Business and Trade, and the Department for Energy Security & Net Zero**. These departments should be seen as jointly responsible for driving policy and action in areas of specific relevance to the issue of Uyghur forced labour in green technology: forced labour in global supply chains, responsible corporate conduct, the green transition, and trade.

Global and National Policy Agenda

The crisis of Uyghur forced labour in green technology threatens global commitments on both human rights and climate change. This fact should put it at the top of all relevant policy agendas, nationally and internationally. The complexity of the challenge posed by Uyghur forced labour in green technology, particularly in the solar industry, has led to inertia among the investor community ([see below](#)). Finding and implementing solutions to this crisis will require cooperation at the international level, and intra-departmental coordination at national levels.

The UK Government should:

AT AN INTERNATIONAL LEVEL:

- **Take a global leadership role by raising the crisis of Uyghur forced labour in green technology at international forums** (through the relevant departments representing the UK). Key forums include¹:
 - the United Nations
 - the G7, and the G20
 - regional forums, such as the Association of South-east Asian Nations, the African Union, and the Organization for Security and Co-operation in Europe (OSCE)
 - other groupings, such as the Five Eyes² and the Commonwealth.

Interventions should promote international collaboration on solutions to reduce reliance on the Uyghur Region for the solar and EV battery sectors. Such collaboration could take the form of cooperation on financial incentives and technological innovation, as described below, to challenge the dominance of the Uyghur Region in these supply chains. International cooperation will also help avoid protectionist policy solutions and make sure that markets have equal access to affordable renewable energy options with high labour, human rights and environmental standards. Cooperation should, above all, seek to enable a truly just transition to meet net zero commitments.

- Engage with partner G7 and other countries to **urgently convene experts in key sectors to support solutions-orientated approaches to reducing reliance on the Uyghur Region**. Experts should be drawn from fields including clean technology manufacturing, green finance, engineering and international economic development. Other [analysis](#) has suggested that the **G7's Partnership for Global Infrastructure and Investment** could be an appropriate forum for such engagement. At all times, the government should consult with the affected populations, including Uyghur rights groups, to ensure that solutions and implementation timelines take their views into account. When considering alternative sourcing locations, it should also consult the relevant independent, free and democratic trade unions in the UK, their Global Union Federations, and representatives of other affected communities—such as Indigenous Peoples—to ensure that workers' and communities' rights are prioritised in new solutions. Doing so will ensure that the problem is not simply moved elsewhere.

AT THE NATIONAL LEVEL:

- **Create a working-level cross-Whitehall taskforce**, co-chaired by the Foreign, Commonwealth & Development Office, the Department for Business and Trade, and the Department for Energy Security & Net Zero, specifically on the issue of Uyghur forced labour in green technologies. The taskforce should oversee the design and implementation of the recommended policy

1. See also debate in [The Energy of Freedom](#), p80–85, on potential approaches to create trusted forums for dialogue on the solar sector.

2. The intelligence alliance comprising Australia, Canada, New Zealand, the United Kingdom, and the United States.

responses outlined below. It should include representatives from the Home Office Modern Slavery Unit, the Financial Conduct Authority (noting said department’s authority on regulation relating to green investments), UK Export Finance, the Department for Science, Innovation and Technology, the Department for Work and Pensions, HM Treasury, the Ministry of Defence (noting said department’s tendering of solar installations), and the Cabinet Office, among others.

Although existing taskforces partially cover this issue—such as the cross-Whitehall forced labour working group and the Solar Taskforce—the crisis of Uyghur forced labour in green technology poses unique policy considerations due to:

- the role of the solar and EV industries in meeting climate commitments
- the role of the Chinese government and the related inability to safely access the Uyghur Region (i.e. approaches that might apply to other contexts of forced labour are not feasible in the case of Uyghur forced labour),
- ensuring globally equal access to alternative sources of supply.

These challenges and the scale of the crisis warrant a long-term, joined-up, focused response across Government. Such a response must approach Uyghur forced labour in green technology as a distinct challenge, requiring cross-industry action and creative policy responses, all while avoiding silos between climate and human rights.

- **Integrate the crisis of Uyghur forced labour in the solar and EV battery supply chains into the activities of all UK policy and working groups on the growth of renewable energy**, such as the existing Critical Minerals Taskforce³, the Solar Taskforce, the Decarbonising Transport strategy, and the anticipated UK battery plant strategy.

Work emanating from these joined-up industrial strategies and the over-seeing role of working groups should be published and made available for stakeholder consultation.

Financial Incentives, Research Funding and Subsidies

The Uyghur Region’s dominance over solar supply chain manufacturing has undercut pricing, preventing other ‘affordable’ alternative technologies and industrial hubs from emerging. However, growing awareness of the industry’s implication in human rights violations among consumers, corporations and governments has the potential to drive market diversification. Research funding, subsidies and other financial incentives will be key to the development and scaling up of cost-effective alternative technologies and sources of supply.

The success of these efforts rests on high levels of coordinated investment by both governments and financial institutions. Low-risk investors, such as pension funds, are unlikely to direct funding towards alternative technologies or innovative green energy solutions that might not offer the same guaranteed return as established investment opportunities with ties to the Uyghur Region. Government support is therefore needed to develop alternative technologies and supply chains, in which ‘traditional’ investors are not—currently—investing.

Diversified investment will also safeguard the future of the EV industry. While the Uyghur Region does not currently dominate the mining or processing of lithium, nickel or other inputs required for EV production, the industry is [changing rapidly](#). There has been a deliberate Chinese government push to consolidate production of these critical minerals in the Region. Given that the PRC government has already taken measures to restrict the export of critical minerals (including [germanium](#) and [graphite](#)), and [indicated it may do so again](#), action is urgently needed to prevent the mistakes of the past and of the solar industry in particular.

The UK Government, led by the Department for Energy Security & Net Zero, the Foreign, Commonwealth & Development Office, and the Department for Business and Trade, should:

- **Evaluate the effectiveness of policy measures introduced by other governments to scale up domestic production and processing of green technology inputs.** Examples include the [EU Net Zero Industry Act](#), the [US Inflation Reduction Act](#), the [German “Easter Package”](#) to improve approval procedures and financial

3. Ensure that Uyghur forced labour is tackled as a specific challenge when designing policies on transition mineral mining and resource demand. This is necessary because existing initiatives to improve working conditions in mineral mining, including through certification, will not work for the Uyghur Region, where programmatic interventions and on-the-ground verification are not possible. For example, the various initiatives to improve working conditions for workers at cobalt mines in the Democratic Republic of the Congo (see, for example, a summary on pp, 52–53 of [The Energy of Freedom](#)).

support for renewables, and the [Indian subsidy initiatives](#) for solar and battery production.

- The UK [does not](#) present the same opportunities for the development of a domestic solar supply chain as, for example the US and the EU. However, the EV sector is [considered](#) to hold more promise (despite a recent stall in investment), if the UK Government provides long-term support to encourage investment in the industry and creates a stable business environment. Any domestic initiatives should uphold labour rights, human rights and environmental standards and seek to mitigate the risks associated with ‘nationalistic’ solutions to the crisis of Uyghur forced labour (see [The Energy of Freedom](#) on ‘Autarky’ responses to Uyghur forced labour).
- **Take action to enable investment in affordable, rights-respecting alternative technologies and supply chains, including by funding research into alternative technologies⁴ and catalysing investment in alternative sources of supply through development finance and private-public partnerships (see below).** Analysts have also [identified](#) the **G7 Partnership for Global Infrastructure and Investment** as an opportunity to instrumentalise UK investment to diversify solar supply chains. Notably, funding through the G7 Partnership is envisioned to be contingent on adherence to high environmental and labour standards.

Development and Trade Policy

Cooperation with the UK’s trade and development partners may offer opportunities to develop alternative sources of supply outside of the Uyghur Region, while contributing to the UK’s trade and development priorities and meeting other UK development commitments on private investment, [job creation](#), energy access and affordability, and inclusive economic development. It would also align with commitments in the UK international development [white paper](#), to support governments and citizens of partner countries to benefit from their mineral resources. These commitments include support to enable an increase in investment in critical mineral processing and downstream manufacturing. Such collaboration could moreover support the development of low-carbon production options and thereby contribute to the achievement of global—and investor—commitments to net zero.

The UK Government, led by the Foreign Commonwealth and Development Office, should:

- **Identify priority partner countries with which the UK Government can cooperate on the development of alternative sources of supply and technological innovation in the EV battery and solar sectors, whether through trade or development support initiatives.** As an example, the International Energy Agency (IEA) notes that countries with high hydropower potential could be key to lowering emissions from polysilicon production. It cites Angola, Ethiopia, Zambia and Mozambique as countries that “all offer cleaner and less expensive electricity than is currently being used to produce wafers and polysilicon” in the Uyghur Region.⁵ However, consideration must be given to ensure that shifting polysilicon production to these countries would not have unintended consequences, such as overburdening their energy infrastructure or encouraging hydropower growth at the expense of displacing local populations and degrading water sources. It is critical that green technology is able to be produced not only without forced labour, but also with free, prior, and informed consent (FPIC) from the communities their operations may impact. Other [analysis](#) has suggested that Vietnam and Malaysia could be a focus for investment in the solar supply chain due to low capital and operational costs. The inclusion of these countries or alternatives here should not be taken as an endorsement of their working conditions, human rights records or environmental standards. Nonetheless, the assessments do emphasise the potential for government action to examine and identify alternatives to the Uyghur Region.
- **Root the development of alternative overseas supply chains in ‘tripartite plus’ [social dialogue](#)**, which includes trade unions, governments and employers and respects **the rights and interests of other relevant stakeholders, such as [indigenous peoples](#)**. Failing to do so would risk merely shifting the problem, if it means other communities’ rights are violated in the name of finding alternatives to the Uyghur Region.

4. The Friedrich Naumann Institute and the China Strategic Risks Institute, for example, [recommend](#) that the UK Research and Innovation Fund and its Innovate UK programme should identify and fund projects that will help British firms conduct further research and development into the commercialisation of perovskite solar cells, an alternative technology to silicon-based solar cells.

5. NB: At least one of these countries uses nuclear power in its energy mix.

Corporate Regulation and Public Procurement/Tender Criteria

The UK has not adopted any robust legislation that would require solar and EV companies or public procurement managers to remove Uyghur forced labour from their supply chains. In contrast, in 2022, the USA introduced the Uyghur Forced Labor Prevention Act (UFLPA). This Act establishes a rebuttable presumption⁶ ban on the import of products made in the Uyghur Region and from specific companies. It has incentivised companies importing into the USA to rapidly find alternative sources of supply. However, this does not mean that these importers have cut ties with the Uyghur Region; they have merely created purportedly forced-labour-free supply chains specifically for the US market. The EU is anticipated to introduce a similar ban on the import, market placement and trade of products made using forced labour.

With such developments, the UK market is set to become a dumping ground for products made with forced labour that cannot be exported to the USA or the EU. Many of the investors we interviewed stated that the UFLPA is the primary incentive for meaningful investor action on Uyghur forced labour. They also noted that the absence of comparable regulation elsewhere limits investors' ability to exercise their leverage when engaging with companies not exposed to the US market.

Investors would like clarity from international standards—namely the UN Guiding Principles on Business and Human Rights—on how to respond to Uyghur forced labour and how these standards might translate into emerging due diligence regulations in the EU (see [Section 4 of the accompanying Guidance](#) for details).

Accordingly, the UK Government should:

- **Enact a Business Human Rights and Environment Act that establishes a duty for companies, financial institutions and the public sector to prevent adverse human rights and environmental impacts.** This would compel the public sector, companies—including solar and EV companies—and investors to take proactive action to identify and address forced labour, other human rights abuses and environmental harms in their value chains through human rights and environmental due diligence. Please see the detailed Anti-Slavery International [briefing](#) on the proposed Business Human Rights and Environment Act, which also covers the investor support for this proposed law.
- **Introduce human rights and environmental criteria to procurement requirements and tender evaluations for solar installations and EV manufacturing, and the existing Contract for Differences scheme.** Such requirements should include 1) ensuring no products, in whole or in part, are made with forced labour, and 2) analysing and providing the embodied carbon footprint of products. Although the [UK Procurement Act](#) will require departments to take stronger action on modern slavery, it is unclear how this will be enforced or managed by procurers. Other legislation and policies on energy procurement and government support for the sector—such as the [Energy Act](#) and the [Contracts for Difference scheme](#)—offer opportunities to more specifically address the issue of Uyghur forced labour in green technology, if amended to include these requirements. The IEA notes that:
 - *France and Korea have already begun to include the embodied carbon footprint of solar PV panels as a criterion in their competitive tender evaluations for new power plants [...] greater scrutiny of the emissions intensity of manufacturing could encourage domestic manufacturing, which would contribute to supply chain diversification.*
- **Publish specific guidance for the UK solar and EV industries on Uyghur forced labour in their industries,** building on the [existing UK guidance](#) on overseas business risk for China and learning lessons from the US [Xinjiang Supply Chain Business Advisory](#).

6. This means that US Customs authorities work under the assumption that all products produced in the Uyghur Region, or using content (such as raw or processed materials, like metallurgical-grade silicon) from the Uyghur Region, or from specific named entities are made with forced labour, unless importers are able to prove otherwise. <https://www.csis.org/analysis/uyghur-forced-labor-prevention-act-goes-effect>

Sustainable Finance Policies

Research undertaken for this project indicates that investors, ESG data providers and regulators tend to view social and environmental harms in silos. Investment in the solar and EV sectors has largely failed to consider the human rights implications of the industries' reliance on the Uyghur Region. Sustainable finance regulations have inadvertently incentivised investors to segregate climate considerations from human rights. See, for example, regulations governing green investment classifications, particularly in the EU via the EU Taxonomy. Similarly, investors are not considering the carbon footprint of Uyghur Region production, as regulation incentivising investment into green technology rarely requires investors/companies to consider carbon emissions at lowest tiers of the supply chain. Finally, as discussed below, investors identified the limitations of the information provided by ESG data providers as a key obstacle in more meaningful investor responses to Uyghur forced labour risks.

The UK Government, led by the *Financial Conduct Authority and HM Treasury*, must learn from the gaps in other countries' regulatory frameworks and should:

- **As soon as feasible within the policy agenda, review the anticipated [UK Green Taxonomy](#) and [UK Sustainable Disclosure Requirements](#) to incorporate social requirements** across all tiers of supply chains. These regulations are not expected in their current form to require investors to assess social impacts nor to include social impacts within definitions of 'do no harm', sustainability and impact. This was a missed opportunity to incentivise meaningful action by the financial sector on the issue of Uyghur forced labour and green technology.
- **Ensure that these regulations require companies to assess the carbon payback/emissions of suppliers and manufacturers at the lowest tiers of the supply chains when determining the sustainability or green credentials of products.**
- **Ensure that the proposed [legislation](#) on the ESG ratings industry** not only considers ESG providers' assessments of environmental sustainability but also **addresses problems concerning the poor quality of human rights data** provided by the industry. For more details, see investor [commentary](#).

Conclusion

Tackling the green technology industry's exposure to Uyghur forced labour is an essential step towards building a more equitable world that protects both the planet and the rights of its inhabitants. But this can only be achieved through concerted international action. The UK has the opportunity to play a global leadership role on this issue, in partnership with allied countries the world over. Doing so will help the UK to meet its climate change commitments, improve its energy resilience and support job creation in the UK and in partner countries prioritised for UK investment and development assistance.

For more information, please contact Chloe Cranston, c.cranston@antislavery.org or info@antislavery.org.

More details on this project can also be found on Anti-Slavery International's [website](#).

Background Context

1. THE DOMINANCE OF THE UYGHUR REGION IN THE SOLAR AND ELECTRIC VEHICLE SUPPLY CHAINS

The production and processing of critical inputs for the solar industry is concentrated in the Uyghur Region and an increasing share of the inputs for lithium-ion batteries—used in EVs—are being processed and manufactured in the Region.

Approximately 97% of the global solar industry [uses](#) crystalline silicon modules, and crystalline silicon is projected to remain the dominant technology in the medium term.

The solar module supply chain can be summarised as [follows](#):

1. High-grade quartz is mined.
2. The quartz is processed into metallurgical-grade silicon.
3. This silicon is converted to polysilicon.
4. Polysilicon is then processed and manufactured into ingots, wafers, cells and, finally, into modules (aka panels).

[According](#) to IEA estimates, in 2022, the Uyghur Region accounted for 40% of global polysilicon manufacturing. More recent analysis of shifts in the market have [estimated](#) that the Region's share of polysilicon production has shrunk to 35%. However, non-Uyghur Region polysilicon production still relies on sourcing metallurgical-grade silicon from the Uyghur Region. As much as [32% of the world's metallurgical-grade silicon](#) is produced in the Region.

The polysilicon supply chain is also concentrated in a small number of suppliers. The IEA [stated](#) in 2022, for instance, that one polysilicon plant in the Region alone accounts for 14% of global production capacity.

In parallel, the Chinese Government has in recent years actively expanded EV battery production in the Uyghur Region. Although the raw materials for EVs—nickel, cobalt, graphite, lithium, manganese, and others—are sourced globally, min-

eral processing and manufacturing in the EV supply chain is increasingly concentrated in China. China is now [estimated](#) to process 44% of the world's chemical lithium, and produces 78% of cathodes, 91% of anodes, and 70% of lithium-ion battery cells. A growing percentage of these processes are located in the Uyghur Region.

This dominance of the industrial landscape for green technology inputs and the concomitant [undercutting of pricing](#) feeds into the perception that there is little space to innovate in the sector. Multi-stakeholder cooperation will be essential, if we are to change this sentiment and lay the groundwork for the emergence of diverse manufacturing hubs.

2. THE INDUSTRIES' LINKAGES TO UYGHUR FORCED LABOUR

The production of critical inputs for solar modules and EV batteries in the Uyghur Region is heavily implicated in Uyghur forced labour perpetrated by the Chinese Government. Human rights due diligence on the ground—to identify, prevent, mitigate or remedy the forced labour—is impossible.

As part of our transition to renewable energy the UK Government should enact concrete measures to ensure that companies comply with responsible business standards and end their reliance on state-imposed forced labour.

The Government of China is perpetrating human rights abuses on a massive scale in the Uyghur Region, targeting the Uyghur population and other Turkic and Muslim-majority peoples (Kazakhs, Kyrgyz, Hui) on the basis of their religion and ethnicity. Abuses have included the arbitrary mass detention of an estimated 1 million to 1.8 million people and an extensive programme of “re-education” and forced labour (See [Amnesty International](#), [Human Rights Watch](#), [Congressional-Executive Commission on China](#) and the [Australian Strategic Policy Institute](#) reports). The forced labour programme involves both detainee labour inside internment camps and prisons and multiple forms of involun-

tary labour at workplaces across the Region and in cities across China.⁷ These repressive policies are bolstered by a pervasive, technology-enabled system of [surveillance](#).

In this context, the Chinese state's forced labour programmes should be understood as a violation of [ILO Convention 1957, No 105](#).⁸ This convention is focused specifically on state-imposed forced labour. It specifically prohibits the use of forced labour:

- as a means of political coercion or education or as a punishment for holding or expressing political views or views ideologically opposed to the established political, social or economic system;
- as a method of mobilising and using labour for purposes of economic development;
- as a means of labour discipline;
- as a punishment for having participated in strikes;
- as a means of racial, social, national or religious discrimination.

In August 2022, the Office of the UN High Commissioner for Human Rights [concluded](#) that the violations in the Uyghur Region “may constitute international crimes, in particular crimes against humanity”. In July 2022, the UN Special Rapporteur on Contemporary Forms of Slavery, including its causes and consequences, [found](#) that some instances of Uyghur forced labour “may amount to enslavement as a crime against humanity”. In June 2022, the International Labour Organization (ILO) Committee on the Application of Standards “[deplored](#) the use of all repressive measures against the Uyghur people, which has a discriminatory effect on their employment opportunities and treatment as a religious and ethnic minority”. Legal and human rights experts have [concluded](#) that aspects of the abuses may amount to genocide, and the US [Government](#) and various national [parliaments](#), including the [UK's](#), have recognised the abuses as genocide.

The UK Government's Overseas business risk: China [Guidance](#) states that due to the nature of the situation in the Uyghur

Region, traditional due diligence methods may not effectively identify human rights violations. Experts have determined that neither audits, accreditation schemes nor supplier attestations should be taken as sufficient evidence that a supplier (and its sub-suppliers) are not using Uyghur forced labour.

Robust research by Sheffield Hallam University and other researchers has found that the Uyghur Region-based mining, processing and manufacture of inputs for the solar module and EV battery industries are heavily implicated in the state-imposed forced labour programmes. Key actors in [lithium processing and distribution, manganese mining and processing](#) (for the manufacture of EV batteries and other alloyed metal car parts), lithium battery anode manufacturing, and the sale of battery-grade lithium materials are all deeply implicated in the Uyghur Region's state-sponsored labour transfer programmes. Of note, the same research finds that graphene—a potential alternative to the dominant lithium-ion EV batteries—is also [produced](#) in the Uyghur Region.

In the solar industry, Sheffield Hallam University's [research](#) and [other](#) research by Horizon Advisory has found that the world's largest metallurgical-grade silicon producer is heavily implicated in Uyghur forced labour, and that all four of the Uyghur Region's polysilicon manufacturers, which, at the time of publication, were estimated to produce 45% of the global solar industry, are implicated in Uyghur forced labour either through direct participation in forced labour schemes, and/or through their raw material sourcing.

Many essential inputs for EV and solar technologies, from polysilicon to lithium, graphite and other critical minerals, are heavily exposed to Uyghur forced labour. Governments all around the world must make concerted efforts to sever their green technology industries' ties to a Region with inextricable links to state-imposed forced labour.

3. COST COMPETITIVENESS OF THE INDUSTRIES

China's dominance of the solar industry has been [achieved](#) through subsidised coal and low labour costs. These factors have allowed suppliers in or with ties to the Region to undercut prices elsewhere.

7. Specific cases of forced labour have been documented by research organisations, including the Center for Strategic and International Studies, the Worker Rights Consortium, the Helena Kennedy Centre for International Justice at Sheffield Hallam University, and the Australian Strategic Policy Institute, and investigative journalists from The Wall Street Journal, the BBC Associated Press, The New York Times, The Globe and Mail, ABC Australia, Radio Free Asia, Reuters, the Outlaw Ocean project and other outlets. These cases affect several industries in the Uyghur Region and wider China: apparel and textile, solar, automotive, electronics, hair products, seafood, and tomato processing, among others. Uyghur survivor testimonies are also available in [evidence](#) provided to the Independent Uyghur Tribunal. Case studies of Uyghur forced labour are also included [here](#) through the Coalition to End Forced Labour in the Uyghur Region.

8. Forced labour is defined by the ILO under the ILO Forced Labour Convention 1930 (No. 29) as “all work or service which is exacted from any person under the threat of a penalty and for which the person has not offered himself or herself voluntarily”. Convention 105 cancels certain forms of forced labour still allowed under Convention 29.

They have thus prevented competitive alternative technologies and industrial hubs from emerging. It is necessary to understand this context to analyse the current market and reimagine solar and EV supply chains.

[Research](#) from the Information Technology and Innovation Foundation (ITIF) reveals that China’s polysilicon manufacturing industry was miniscule before 2005. Local governments in China started offering subsidised land and electricity, direct and indirect financial support, and tax relief to encourage the emerging industry, while the central government in Beijing also supported the creation of a domestic silicon industry. The same research confirms that China’s major PV manufacturers have operated for the better part of a decade [without making much profit](#), suggesting that subsidies continue to shape international competition in this industry. Some analysts have also [stated](#) that China’s export strategies include illegal dumping, and other analysis has [pointed](#) to China’s cost advantage drawing on “a seeming indifference to short term financial viability or oversupply issues in these markets”.

A major factor in the Uyghur Region’s dominance of the solar market is the Region’s extensive use of coal as a “cheap” energy source, given the large amount of electricity [required](#) for polysilicon processing. Moreover, China produces around 90% of the coal it consumes, taking advantage of the large coal deposits on its territory. The International Energy Association [states](#) that coal accounts for more than 75% of the annual power supply in the Uyghur Region and Jiangsu, and benefits from favourable government tariffs. An expert assessment has [found](#) that the entire Uyghur Region-based solar supply chain, including every single polysilicon plant in the Region, is powered exclusively by coal.⁹

While the manufacture of solar panels and EVs is always going to generate some CO2 emissions, and carbon payback timeframes for solar panels are considered low, any reliance on coal to achieve cost competitiveness in either industry is at odds with global climate goals. Coal-intensive solar PV manufacturing [may yield](#) solar equipment that takes over five times longer to “pay back” the carbon emitted to manufacture it, compared with solar PV panels produced using cleaner sources of energy. The IPCC reports provide solid evidence of the urgency of divesting from carbon to avoid harmful climate impacts, stressing how it is far [“less expensive” to avoid further emissions and work towards coordinated adaptation](#).

The Uyghur Region’s current reliance on coal-based energy threatens to undermine the solar and EV industries’ green cre-

entials. Opportunities to support diversification away from the Uyghur Region, while reducing carbon emissions, are discussed further below.

4. CURRENT INDUSTRY RESPONSE

The response from the solar and EV industries has been weak, demonstrating that they are struggling to address human rights abuses within their supply chains. Industry associations have also offered only weak responses that fail to overcome the impossibility of conducting audits in the Uyghur Region. Industry leaders must urgently step up and tackle this issue in their supply chains, so that the future of green energy is decoupled from egregious human rights violations.

The solar industry’s response to the crisis of Uyghur forced labour has been inadequate. The USA’s Solar Energy Industries Association’s (SEIA) [Supply Chain Traceability Protocol](#) fails to mention Uyghur forced labour, let alone codify any action to mitigate the sector’s exposure, despite the industry body’s [purported](#) opposition to Uyghur forced labour. The lack of specificity on Uyghur forced labour in the Protocol means it cannot effectively drive meaningful action in the industry. In fact, following the passage of the UFLPA, SEIA’s CEO released a [statement](#) criticising the legislation for “hindering” the solar industry with “unnecessary supply bottlenecks and trade restrictions”. This rhetoric disregards the importance of building sustainable supply chains and reinforces the silo between human rights and climate impacts.

Solar Power Europe and Solar Energy UK’s joint [Solar Stewardship Initiative](#), designed to “enhance end-to-end transparency, sustainability, and ESG performance across the solar supply chain”, similarly fails to address the industry’s exposure to Uyghur forced labour. The Initiative focuses on audits and traceability, but does not explain how its approach will tackle the crisis of Uyghur forced labour in the solar industry. Given the specific challenges of tackling Uyghur forced labour—due to the impossibility of conducting due diligence on the ground—this lack of clarity is concerning and calls into question whether the initiative is robust enough to address Uyghur forced labour. Le Monde has also [reported](#) that Solar Power Europe has undertaken efforts to weaken the proposed EU Forced Labour Regulation.

In contrast, the European Solar Manufacturing Council has actively [called](#) for the EU to introduce sustainability initiatives for PV modules, inverters and systems that address the human rights violations perpetrated against the people of the Uyghur Region. The Council’s response to the crisis proves that indus-

9. This assessment was conducted by an industry expert, based on the co-author’s knowledge of the industry, the role of coal in the Region, as stated, and satellite imagery, see [Over-Exposed](#).

try bodies can provide the progressive leadership necessary to bring about change.

There has been scant response from leading EV industry bodies on the industry’s exposure to Uyghur forced labour. This silence indicates an industry-wide reluctance to take accountability for the sector’s role in human rights abuses and failure to codify action on Uyghur forced labour.

In summary, governments and policy makers should approach emerging industry standards with a degree of caution. They should ensure they conduct their own due diligence on each body’s position, and consult with experts—in particular Uyghur rights’ representatives—on their alignment with industry bodies’ recommendations.

5. CURRENT INVESTOR RESPONSES

Investors have not thus far fully understood the problem of Uyghur forced labour, nor how to address it. The UK Government must work closely with businesses and investors to help them tackle exposure to Uyghur forced labour in their supply chains.

Between March and September 2023, Anti-Slavery International, Sheffield Hallam University and the Investor Alliance for Human Rights undertook structured interviews and a semi-structured workshop with a range of investors and other stakeholders. Based on the findings from the consultations, they produced [guidance](#) for investors on how to tackle Uyghur forced labour in their solar and EV holdings.

To summarise the findings, investors have different levels of understanding of the problem of Uyghur forced labour, including the specific challenges it poses compared to other examples of forced labour. There is, therefore, an ongoing need for the UK Government to raise awareness and improve corporate understanding of Uyghur forced labour in green technology industries, and the particular challenges it poses for net zero commitments. Please see the recommendations above.

Other significant challenges, beyond knowledge and awareness, were identified. While all those investors interviewed¹⁰ understood the scale of the issue, many do not know what to do beyond asking investee companies for information (such as audit reports) and they do not know how to respond when the information provided is poor quality.

Where investors were making clear decisions in response to risks, i.e. to pursue divestment, in the majority of cases this was a response to the US Uyghur Forced Labor Prevention Act, or due to a data provider having flagged a company in limited “controversy” data.¹¹

Investors highlighted many opportunities to improve their approach. Much of this focused on the knowledge they need to inform investment decisions and engagement. At a systemic level, the primary challenge faced by investors is the perceived conflict between climate commitments and social impacts, otherwise articulated as the conflict between the “E” and the “S” in ESG. Investors noted that the failure to incorporate a social dimension into environmental regulation leads to a siloed approach to risk management. This observation was made in relation to the EU Taxonomy in particular:

On the E side, if you want to be a green fund, the EU taxonomy tells you the requirements for your assets—there is no such thing for social aspects, so we haven’t done this engagement.

Moreover, despite a clear need for industry innovation and supply chain diversification, investors told us that China’s dominance of green technology supply chains has bred fatalism within the investor ecosystem. Investors then tend to focus on bolstering green investments in line with internal and external commitments and leave the issue of Uyghur forced labour somewhere on the sidelines.

This fatalism and inertia cannot be undone without significant government action. In particular, government action is needed to support the identification, development and implementation of alternatives to the Uyghur Region.

The investors interviewed recognised that there is an opportunity to develop a more integrated ‘just transition’ approach, but governments must do more to align climate and human rights commitments to this end.

Positive steps governments should take include:

- Focus on new, stronger legislation on forced labour, in particular through the introduction of import controls (such as those under the UFLPA in the USA). There was consensus on this point among the investors interviewed.
- Integrate social impacts into environmental/climate-re-

10. The people interviewed held positions with an internal remit in the area of social impacts. They noted that senior level buy-in and understanding of the severity and scale of the issue of Uyghur forced labour was not widespread.

11. ESG controversy data is compiled by data providers through the analysis of media reports. It thus fails to incorporate information from other reporting (such as academic reports) and information and perspectives directly from affected stakeholders and their representatives.

lated regulations, in particular sustainable finance regulations.

- Regulate ESG data providers.
- Coordinate government action to scale up investment to find cost-efficient alternative sources of critical inputs for green technology supply chains.

The availability of alternatives

Demand is growing for affordable and efficient alternative mineral sources and processing locations that would encourage companies to diversify away from the Uyghur Region. Governments have a crucial role to play in supporting the creation of sustainable alternative supply chains and encouraging businesses and investors to adopt new approaches to procurement and investment.

Many of the current alternatives to polysilicon-based panels are not considered to be sufficiently ‘cost effective’ nor reliable investments. As such, investors feel compelled to hold solar and EV companies at risk of being tainted with Uyghur forced labour to uphold internal and external climate commitments.

However, solar supply chains have shifted in the past two years: the Uyghur Region is now estimated to account for approximately 35% of the world’s polysilicon, down from 45% in 2020. **This shift appears to be at least partly due to the passing of the US Uyghur Forced Labor Prevention Act, which prohibits the importation into the USA of goods mined, produced or manufactured wholly or in part in the Uyghur Region.** This legislation has driven companies with US operations to map their value chains and develop supply lines free from Uyghur forced labour.

However, the dominant approach is to circumvent these regulatory challenges by bifurcating supply chains, i.e. creating one or more purportedly forced-labour-free supply chains, while continuing production on tainted supply chains. [Research](#) has found that some of the world’s largest module manufacturers appear to have created product lines dedicated to the US market that they claim are free from inputs produced in the Uy-

ghur Region, purely with UFLPA compliance in mind.

The bifurcation of supply chains must not be considered an “alternative” or a solution to the crisis of Uyghur forced labour in green technologies. Any ongoing financial relationship with a company directly perpetrating Uyghur forced labour enables the financial profit of an entity complicit in the persecution of the Uyghur people, regardless of whether or not the products sourced from that company are Uyghur forced-labour free.

The UK Government can play a critical role in ending bifurcation, by ensuring that its market does not offer a safe haven for goods produced using forced labour that are banned from import into other markets.

Alternative geographies and technologies

1. SOLAR INDUSTRY

The Uyghur Region is the dominant source of supply for polysilicon/metallurgical-grade silicon and is expected to remain so under current trajectories. Nevertheless, solar companies do exist that either do not use polysilicon¹² or that [appear](#) to have Uyghur Region-free polysilicon supply chains.

Outside of China and the Uyghur Region, there are new large-scale projects in [northwest](#) and [southeast](#) USA, [Norway](#) and [Malaysia](#) (Borneo). Projects in [Malaysia](#) and [India](#)¹³ by South Korean and Indian companies, respectively, plan to expand their polysilicon production.

Research has also studied potential innovative technologies that could shift the solar market, citing alternatives such as [perovskites](#), [fluidised bed reactors](#) and [upgraded metallurgical-grade silicon](#) (or [epitaxial wafer production](#)), a process that eliminates some stages of module production. There is also the potential for metallurgical-grade silicon and polysilicon producers that currently serve the semiconductor chip industry to [expand](#) into the solar sector. Views differ on the potential of these alternatives.¹⁴ The commercial viability of perovskites, for example, [remains to be](#) proven; however, analysts have [claimed](#) that, with greater research and development support, the UK’s leading role in perovskite solar cell technology has potential to grow this technology as an alternative.

12. Instead using cadmium telluride thin-film PV technology, see the [IEA](#).

13. Note that the IEA [states](#) that: “India’s solar PV ambitions for both demand and supply, supported by concrete policies, are critical for solar PV supply chain diversification and resiliency. In the short term, however, manufacturing the entire solar PV supply chain in India would be almost 15% more emissions-intensive than in China. Therefore, a compromise between total or partial self-sufficiency and lower emissions will need to be reached while high-emissions-intensive countries work towards decarbonising their domestic power generation”.

14. Researchers note that there are currently challenges with these options: fluidized bed reactors produce lower quality silicon and investment costs are higher ([IEA](#) p. 37), and quality challenges remain with upgraded metallurgical grade silicon.

Diversifying the solar industry could also offer opportunities to reduce the carbon emissions of manufacturing. The IEA has estimated that roughly 30 countries offer competitive industrial electricity prices for new polysilicon and wafer production while also offering low manufacturing emissions intensities. As discussed in the recommendations, this presents a clear opportunity for UK investment (NB: some of these countries use nuclear power in their energy mix).¹⁵

2. EV INDUSTRY

Alternatives to lithium-ion batteries are being explored, but research will be required to determine which alternatives can reduce reliance on the Uyghur Region as a processing hub. Demand for critical minerals for EVs, as well as other renewable technologies, is expected to rise exponentially in coming years. This demand is anticipated to pose very high risks of adverse impacts on the communities where the minerals are extracted, as well as huge amounts of [waste](#).

EVs will undoubtedly play a critical role in the move away from fossil fuels. However, environmental and human rights groups have argued that policies must also reduce demand for such minerals, given the human rights and environmental abuses involved. They therefore advocate for policies that shift use away from individual cars, the use of which creates the demand for these minerals, and scale up sustainable travel

and public transport. Analysts have also noted the importance of [lithium recycling](#) in reducing the industry's environmental impact and meeting global demand for EV batteries, in the face of expected shortages.

Governments must play a leading role in supporting innovation and the urgent development of alternatives to Uyghur Region-based supply for green technology supply chains. Their action is needed to counteract the challenges posed by the current cost competitiveness of Uyghur Region production. They must focus on alternatives with strong labour rights, human rights and environmental standards (and with lower carbon emissions) to support a fast, just and equitable transition away from fossil fuels.

Alternatives must be developed through tripartite plus social dialogue that includes [trade unions](#), and consultation with [indigenous peoples](#) and other potentially affected communities, respecting the right to free, prior and informed consent.

15. It is beyond the scope of this guidance to verify this analysis, research potential alternative sources of supply or endorse any specific alternative company, technology or sourcing location for materials, including the working conditions, and human rights and environmental standards. Alternatives to reduce the carbon emissions of manufacturing indicated by the IEA include hydropower and gas, both of which still have a carbon footprint. The IEA [states](#) that: "The greatest number is in sub-Saharan Africa and Eurasia, where several countries have low-carbon shares exceeding 60% thanks to relatively high hydropower use. Hydropower could be key to lower emissions from wafer and polysilicon manufacturing because it offers affordable, carbon-free electricity to manufacture these products competitively. (...) Within China, however, hydropower also makes Qinghai and Yunnan provinces economically attractive sites with low-carbon intensities. (...) In Eurasia, hydropower offers clean, affordable electricity (...). A number of countries in the Middle East and North Africa, where gas makes up a large share of electricity production, also have affordable electricity tariffs for polysilicon and wafer production diversification." Please note that Ethiopia (included in the sub-Saharan Africa group of countries mentioned above) also has nuclear in its energy mix.



ANTI-SLAVERY INTERNATIONAL is the world's oldest human rights campaign, founded in 1839. It exists to challenge contemporary forms of slavery wherever they exist by tackling modern slavery's root causes. Working in partnership with survivors, experts and its members, Anti-Slavery International manages projects in countries worldwide to help communities to understand and eliminate the causes and adverse effects of modern slavery, through legislative change, research and advocacy.



THE HELENA KENNEDY CENTRE FOR INTERNATIONAL JUSTICE AT SHEFFIELD HALLAM UNIVERSITY is a leading centre for social justice and human rights research, practice, and pedagogy. It provides a vibrant environment at the cutting edge of legal and criminal justice practice which prepares students for excellence in their chosen professional careers. The centre is home to a range of social justice and human rights activities that include research, global engagement, impact on policy, professional training, and advocacy. Its central values are those of widening access to justice and education, the promotion of human rights, ethics in legal practice, equality and a respect for human dignity in overcoming social injustice. The centre works on high-profile projects in a variety of human rights and social justice areas. Research and projects concern modern slavery, gender-based violence, hate crime, and many more.



THE INVESTOR ALLIANCE FOR HUMAN RIGHTS is a collective action platform for responsible investment that is grounded in respect for people's fundamental rights. The Investor Alliance's over 220 members include asset management firms, public pension funds, trade union funds, faith-based institutions, and endowments. Collectively, members represent over US\$14T in assets under management and 19 countries. Along with civil society allies, the Investor Alliance equips investors with tools, expertise and opportunities to invest responsibly and put human rights due diligence into practice to address and avoid risk to both investments and the individuals and communities adversely impacted. The Investor Alliance is an initiative of the Interfaith Center on Corporate Responsibility.

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The views expressed in this policy brief are those of the authors, and not necessarily of the Modern Slavery and Human Rights Policy and Evidence Centre, the Arts and Humanities Research Council, or any other individual or organisation which contributed to the project.