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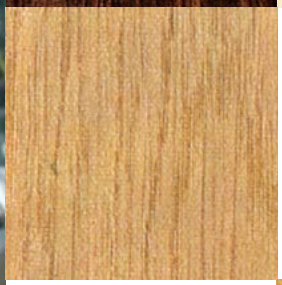
Laura T. Murphy, Jim Vallette, Nyrola Elimä

BUILT ON REPRESSION

PVC Building Materials' Reliance on Labor and Environmental Abuses in the Uyghur Region



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About the authors:

Laura T. Murphy is Professor of Human Rights and Contemporary Slavery at the Helena Kennedy Centre for International Justice at Sheffield Hallam University. She is author, most recently, of Freedomville: The Story of a 21st Century Slave Revolt (Columbia Global Reports) and The New Slave Narrative: The Battle over Representations of Contemporary Slavery (Columbia University Press, 2019) as well as academic articles on forced labor. She has consulted for the World Health Organization, the U.S. Department of Health and Human Services, and the U.S. Office of Victims of Crime. She has provided expert evidence briefs regarding the situation in the Uyghur Region for the U.S., U.K., and Australian governments, as well as for the Uyghur Tribunal.

Nyrola Elimä is a researcher at Sheffield Hallam University's Helena Kennedy Centre for International Justice. She has published essays in The New Yorker and The Spectator. Her research has contributed to a Pulitzer Prize winning media report. Nyrola testified before U.S. congress about global solar supply chains and Uyghur forced labor. She conducts research in Chinese, Uyghur, English, and Swedish. As a consultant, she provides research on Chinese corporate structures, supply chain mapping, and ESG risk assessment to scholars, investment firms, and international media organizations.

Jim Vallette is president of Material Research L3C, a charitable and educational business based in Maine and present on three continents. Material Research works in service to impacted communities, in collaboration with community members, reporters, academics, data scientists, and campaign organizers. Jim and the Material Research team investigate industrial practices, global supply chain connections, and their societal, public health, and environmental impacts. Advances that followed Jim's research include the Basel convention ban on toxic waste trade, the end of World Bank financing of fossil fuel extraction, and the removal of some toxic chemicals from building materials. Jim is the lead author of an extensive catalog of plastics-related reports, including Chlorine and Building Materials: A Global Inventory of Production Technologies, Markets, and Pollution (Healthy Building Network, two parts, released in 2018 and 2019), Post-Consumer Polyvinyl Chloride in Building Products (Healthy Building Network/StopWaste, 2015), and The New Coal: Plastics and Climate Change (Beyond Plastics, 2021).

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Material Research is a charitable and educational company based in Maine, USA. It was launched in 2019 to expand public knowledge of environmental, public health, and human-rights abuses and solutions. Its international team of researchers connects the dots of many supply chains.

Much of its work is focused on toxic chemicals and climate pollution. It researches the movement of harmful materials, such as tar sands oil from Alberta, leather from the Amazon, and disinformation funded by fossil fuel and other industries. Material Research identified the contribution of plastics to greenhouse gas emissions in Beyond Plastics' 2021 study, The New Coal: Plastics and Climate Change.

It works with leading environmental organizations, including Center for Environmental Health, Blue Green Alliance, ChemSec, Coming Clean, Environmental Justice Health Alliance, Earthjustice, Public Health Watch, Women's Voices for the Earth, Defend Our Health, Greenpeace, Toxic Free Future, Black Women for Wellness, Breast Cancer Prevention Partners, and International Sustainable Chemistry Collaborative Centre.

Collaborative investigations form the basis for positive actions, lead to policies that reduce harm to communities that suffer the most severe impacts, and increase the proportion of ecologically-sound, socially-just production worldwide.

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Executive Summary

Over the course of the last five years, the People's Republic of China (PRC) government has embarked on a campaign of repression that nine governments have determined to be either "genocide" or "crimes against humanity." The PRC has further instituted a massive state-sponsored system of forced labor throughout the Xinjiang Uyghur Autonomous Region (the XUAR or Uyghur Region). Because refusal to participate in government assistance can be considered a sign of religious extremism and punishable with internment or prison, Uyghur and other minoritized workers from the region are unable to refuse or voluntarily exit jobs assigned to them by the government. For this reason, experts have agreed that the PRC government's programs of labor transfers and surplus labor employment transfers meet the standards of the definitions of forced labor instituted in international law and protocols. **The United States legislature has found the evidence of forced labor so convincing and overwhelming that it has taken the unusual step of prohibiting the import of any product made in whole or in part in the Uyghur Region beginning in June 2022.**

Despite the rights violations that have been documented in the Uyghur Region and increased awareness and wariness of the products of forced labor entering international supply chains, products made with Uyghur forced labor continue to pour across international borders, at times even directly from the Uyghur Region. While solar-grade polysilicon-, cotton-, and tomato-based products have garnered intense scrutiny because of the Uyghur Region's significant share of production within those sectors, the PRC has guaranteed that avoiding Uyghur forced labor made products will be challenging for governments, corporations, and consumers by incentivizing manufacturers to move out to the region and utilize the forced labor programs sponsored by the state. **The Uyghur Region is now home to a constantly growing number of industries, including but not limited to agricultural products, apparel, electronics, technology, green energy solutions, mining, pharmaceuticals, and chemicals.**

As the United States and other countries ponder how to prevent Uyghur forced labor made goods from reaching consumers, China has moved yet another practically unnoticed product to the Uyghur Region: polyvinyl chloride (PVC).

What is PVC?

Polyvinyl chloride, commonly known as vinyl or PVC, is a plastic with a wide range of applications. People encounter it every day in products from shower curtains to shoes soles to credit cards. Most products made from PVC are used in building and construction. China is the world's largest producer (and consumer) of PVC. 20% of China's PVC comes from the Uyghur Region.

This report investigates the increased manufacturing of PVC in the Uyghur Region, the manufacturers' use of state-sponsored labor transfers, the environmental damage this manufacturing is causing, and the routes by which the resulting PVC-based products may make their way into international markets.

The evidence reviewed in this collaboration between the Helena Kennedy Centre for International Justice at Sheffield Hallam University and Material Research indicates the following:

- The Uyghur Region has become a world leader in the production of PVC plastics in recent years.
- The two largest PVC manufacturers in China are both state-owned enterprises based in the XUAR:
    - Xinjiang Zhongtai Chemical (2.33 million tons per year)
    - Xinjiang Tianye (1.4 million tons capacity per year).
- Together the XUAR's PVC manufacturers produce 10% of the world's PVC.

All of these companies have been active participants in the XUAR's notorious labor transfer programs. The report focuses on Zhongtai Group, a prolific participant in the government's schemes.

- Zhongtai Group has transferred more than 5,000 citizens deemed to be surplus laborers," according to its own reports—more than perhaps any other company described in academic or journalistic accounts of labor transfers in the XUAR.
- Zhongtai runs ideological and vocational training schools that have trained thousands of rural farmers to become compliant factory laborers.
- Despite significant mechanization, Zhongtai continues to bring in transferred low-skill laborers who work directly in the production of the PVC and their other products.
- During the COVID-19 pandemic lockdown, Zhongtai Group reported having received 1,180 transferred employees from Uyghur and other Indigenous communities in the XUAR in only two weeks. The company claimed to have taken advantage of their access to Uyghur workers and the government's permission to assign them to work, putting them at extraordinary risk. The company celebrated that this allowed them to increase their international sales reach.
- Though it is a state-owned enterprise, Xinjiang Zhongtai has raised significant financing from international banks and pension funds, including the Norway Pension Fund, Vanguard, and the Alaska Permanent Fund.

Even in state media and corporate publicity, reports reveal clear indicators that Indigenous people transferred from the southern XUAR are not voluntarily working at Zhongtai.

Furthermore, the manufacturing methods used by the XUAR plants are so dependent on both coal and mercury that **the Uyghur Region is one of the very few places on earth where these extraordinarily hazardous methods of PVC manufacturing are allowed to persist.** The production processes present extraordinary hazards, including

- PVC production in the XUAR currently consumes an estimated 340 tons of mercury per year, of which 9.3 tons are released into the air.
- The seven Uyghur Region-based PVC plants' estimated air emissions are equal to more than half of the air releases of mercury (14.8 tons) reported in all manufacturing in all of the United States in 2020.
- The estimated 340 tons of mercury consumed by the seven PVC plants in the XUAR accounts for 15% of all mercury produced worldwide in 2021 (2,300 tons).
- PVC plants have been built in the Uyghur Region in part to take advantage of the extraordinary coal resources in the region. As a result of basing manufacturing on dirty coal, PVC plants in XUAR, running at full capacity, will release an estimated 49 million tons of global warming gases, each producing more than any other similar plant.
- Xinjiang Zhongtai is a contender for the most polluting plastics producer in the world.

What is Luxury Vinyl Flooring?

The top export application for China-originating PVC is luxury vinyl floor coverings. These are the synthetic wood and stone floors that we see all around us. People work, play and live on plastic sheets, tiles, and carpeting made of PVC. PVC is utilized in the production of basketball court flooring, and the floors of schools, nurseries, and hospitals, as well as in common domestic home flooring.

This PVC is being shipped internationally to serve as the base material for a wide variety of products, the most prevalent of which is luxury flooring. Many people building or remodeling homes in the U.S. would likely be surprised to learn the following:

- XUAR-manufactured PVC is so inexpensive, it has become the most common material of all floors sold in the United States.
- PVC flooring resins made in China are present in more than one-quarter of all flooring sold in the U.S. The XUAR produces the lion's share of PVC resins used in that flooring.
- PVC flooring shipments from China to the U.S. increased by 300% in the last several years.
- PVC made by Xinjiang Zhongtai is shipped directly to Vietnamese flooring manufacturer Jufeng New Materials, which then ships luxury PVC-based flooring to the top U.S. flooring brands sold in ma-

jor home improvement outlets and online. Brands selling flooring at very high risk of Xinjiang inputs include Home Legend for Home Depot, Armstrong, Mannington Mills, Mohawk, Lumber Liquidators, Congoleum, and many others.

- Zhongtai is a primary supplier of PVC to Zhejiang Tianzhen, which is a major Chinese flooring manufacturer and also a parent company of Vietnam's Jufeng New Materials, presenting a potential opportunity for transshipment of XUAR-made PVC and PVC-based flooring that should be monitored.
- Zhongtai's PVC is also highly likely being used in the production of PVC piping, which is then shipped to distributors across Africa, Asia, the Middle East, Europe, the U.K., and South and Central America.

The Uyghur Region is being used as both a source of cheap labor and cheap coal, and also as a dumping ground for the most hideous of environmental hazards. The abuse of human labor and the environment in the XUAR has significantly reduced the price of manufacturing PVC and thus of manufacturing luxury flooring and other building materials worldwide.

Through these abusive practices, Uyghur forced labor makes its way into our homes, schools, and hospitals, serving as the very literal foundations upon which we work and play. PVC is not alone on these counts. Uyghur forced labor also makes its way into the food we eat, the computers we work on, the toys we play with, the clothes we wear.

Understanding the underlying circumstances that make manufacturing in the XUAR so incredibly profitable for companies is critical to recognizing the high costs that people and the planet pay for consumers to have access to ever-cheaper products. Human rights abuses and environmental degradation of the very worst kind are being perpetrated in the XUAR, and the products of those abuses are being shipped all around the world. It's the flooring industry's turn now to identify its risk and extract themselves from complicity in Uyghur forced labor.

But it cannot stop with them. We must investigate our supply chain connections to Uyghur forced labor from the floor up. Every company that sources from China should be conducting research similar to that presented in this report to identify exposure and eliminate it. The following report can serve as a sort of roadmap for that necessary and urgent work.

"In order to allow employees to integrate into the new environment more quickly, the company provided them with Han supervisors," reports China News. Maynur, pictured here, only had a junior-high-level education when she was transferred to Zhongtai's Huatai plant. Here, she inspects a package and manages machinery. Credit China News, Online.

Introduction

Polyvinyl chloride, commonly known as vinyl or PVC, is a plastic with a wide range of applications. People encounter it every day in products from shower curtains to shoes soles to credit cards. The more rigid form is used in construction materials like pipes and vinyl siding, as well as for plastic bottles. Flexible forms are used in the manufacturing of inflatable toys and coatings on wire racks.

Most products made from PVC are used in building and construction. By far the most common use of this plastic is in water, sewer and other pipes. Another leading application is flooring. People work, play and live on plastic sheets, tiles, and carpeting made of PVC. PVC is utilized in the production of basketball court flooring, and the floors of schools, nurseries, and hospitals, as well as in common domestic home flooring.

China is the world's largest producer (and consumer) of PVC.[1] Most China-origin PVC is consumed domestically (especially as PVC pipes), but the top export application for China-originating PVC is floor coverings, and the leading destination is the United States. Indeed, a flood of PVC made in China has transformed the flooring industry in the U.S. over the past decade.

In 2020, the U.S flooring industry sold 1.77 billion square meters of product. About 20% of those floors – 406 million square meters – came directly from China.[2] In addition, China established relationships with factories in Vietnam and India to turn PVC made in China into flooring for the U.S. market.

PVC MANUFACTURING IN THE UYGHUR REGION

The production of PVC is extremely energy consuming. In order to transform chlorine into PVC, manufacturers require a carbon-based feedstock. Chinese plants use coal as the primary source of energy for manufacturing PVC and the chemicals used to make it: chlorine and vinyl chloride monomer.

The Xinjiang Uyghur Autonomous Region (XUAR or the Uyghur Region) is home to 40% of China's coal reserves. As a result, **the Uyghur region has become a world leader in the production of PVC plastics (and other energy-consuming manufacturing processes) in recent years.**

The two largest PVC manufacturers in China are based in the Uyghur Region: **Xinjiang Zhongtai Chemical Co.** (新疆中泰(集团)有限责任公司) produces 2.3 million tons of PVC per year from four locations, and **Xinjiang Tianye Group Co.** (新疆天业集团有限公司) produces 1.4 million tons per year from one location.[3] Both are state-owned, one by the XUAR government, the other by the Xinjiang Production and Construction Corps, a state-run paramilitary government and corporate conglomerate. The XUAR is home to at least two other coal-to-PVC plants. Combined, the seven PVC plants of the XUAR have the capacity to produce 4,120,000 tons a year, and a planned expansion and a new plant are projected to add another 1.23 million tons by 2024. See Table 1.

These coal-to-plastics facilities in the Uyghur Region are mostly self-contained systems. The PVC manufacturers own the coal mines and power plants that feed their factories, which they operate in industrial parks in symbiosis with other industries.

China's boom in building and construction drove the rapid expansion of PVC production in the Uyghur Region, but demand slackened in the late 2010s. Capacity exceeded demand, and the buildout paused. The pandemic turned out to be valuable for positioning XUAR-manufactured PVC in the international market. Unlike the rest of the world, even during the most serious COVID-19 lockdowns, these manufacturers promised non-stop production and found new customers overseas.

By 2021, foreign demand allowed Xinjiang Zhongtai to revive a project to build a one-million-ton plant in Aksu Prefecture in XUAR. On April 11, 2022, Zhongtai issued a tender for bids to build the complex. It will be one of the world's four largest PVC plants upon completion[4] and is the largest new PVC project planned anywhere in the world,[5] set to produce 1 million tons of PVC per year.[6]

China became the world's largest PVC producer in 2006 and has kept growing since. The "extreme cheapness of

Table 1. PVC Capacity in Xinjiang Uyghur Autonomous Region

NAME	LOCATION (XUAR)	OWNER	CAPACITY (TONS/YEAR)	YEAR OPENED
Xinjiang Tianye	Shihezi	Xinjiang Tianye	1,400,000	1995
Fukang Energy	Fukang	Xinjiang Zhongtai	800,000	2012
Zhongtai Huatai	Ürümqi	Xinjiang Zhongtai	700,000	2006
Xinjiang Mahatma/ Shengxiong	Turpan	Xinjiang Zhongtai	300,000	1958
Zhongtai Toksun	Turpan	Xinjiang Zhongtai	300,000	2019
Xinjiang Yihua	Zhundong	Hubei Yihua Chemical	300,000	2015
Xinjiang Qingsong	Aral, Aksu Prefecture	XPCC/Qingdao Haiwan	120,000 (*)	2015
Xinjiang Jinhui Zhaofeng Energy	Baicheng Industrial Park, Aksu	Xinjiang Zhongtai	1,000,000	planned for 2024
Total current			**4,120,000 (**)**	
Total planned			1,230,000	

(*) Expansion to 350,000 tons planned.

(**) Xinjiang Zhongtai states that its total capacity is 2.3 million tons PVC. Production capacity figures found for the four existing plants total 2.1 million tons, indicating that a potential 200,000 tons of additional capacity exists at these plants.

coal" in the Uyghur Region sparked a renewal in the acetylene PVC manufacturing method that had almost disappeared worldwide, according to industry analyst Charles Fryer in 2006.[7] By 2018, the industry had grown so large that "Chinese production and consumption dominates [the] global market structure," according to Ana Lopez, another industry analyst.[8]

The current 4.12 million tons of capacity in the Uyghur Region equals more than 16% of China's total PVC production capacity (estimated to be 25.1 million tons in 2019),[9] and could be more than 20% when Zhongtai's new plant comes online. This means that PVC made in the Uyghur Region currently constitutes about 10% of all PVC production worldwide (estimated to be 41.8 million in 2019).[10]

The PVC industry's pace of expansion in the Uyghur Region correlated with the growth of building and construction in the whole of China. The pace of construction has slackened in recent years. By 2016, according to analysts, China's PVC capacity exceeded domestic demand by nearly 10 million tons.[11] Producers, especially those in the XUAR, turned to international markets in which their price points are highly competitive.

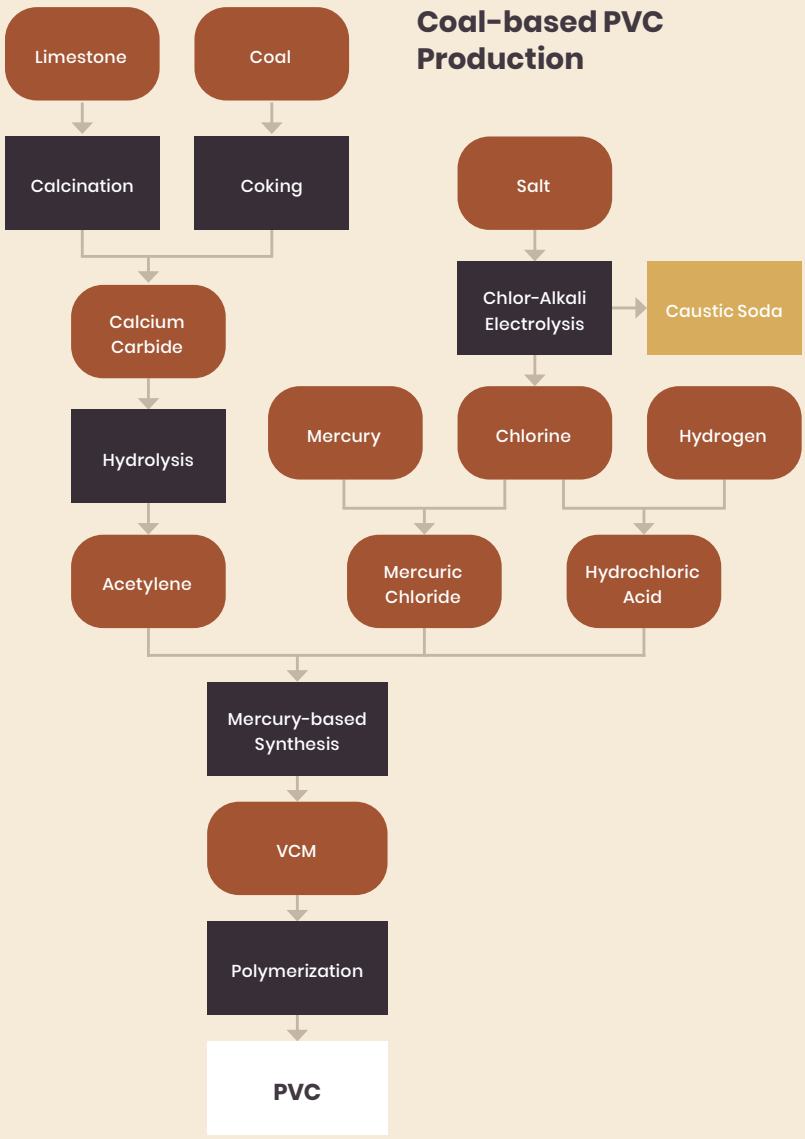
Xinjiang and other coal- and mercury-based PVC from China is so inexpensive that it has become the most common material of all floors sold in the United States. The Center for Environmental Health's May 2022 report on the climate impact of vinyl flooring found that PVC resins made in China are present in more than one-quarter of all flooring sold in the U.S. From 2012 to 2021, PVC flooring shipments from China to the U.S. "increased by 300% and now exceed 5.1 billion square feet per year," CEH's study calculated. "If each square foot were connected end-to-end, [flooring] shipments that arrived [from China] in 2020 would run 1,040,000 miles: that's enough vinyl flooring to connect Earth to its Moon, four times over."[12]

And that only accounts for the PVC flooring shipped directly from China. While in the first quarter of 2022, China manufactured 63% of all vinyl floor and wall coverings shipped to the United States, Vietnam is an increasingly significant player. **In early 2020, it supplied less than 2% of these products, but by 2022 it was supplying nearly 20% of the PVC tiles sold in the U.S.**[13] While we are unable to access Chinese shipping records, and the United States' own records regarding flooring is unusually opaque, we do have access to Vietnam imports and exports that provide a clearer image of Zhongtai PVC's international reach.

Xinjiang and other coal- and mercury-based PVC from China is so inexpensive that it has become the most common material of all floors sold in the United States.

STAGES OF MANUFACTURING PVC IN XUAR

Most of the world's PVC is made via the so-called ethylene route of production. In the typical factory, natural gas liquids containing ethane are "cracked" to make ethylene which is then reacted with chlorine to produce vinyl chloride monomer (VCM), the precursor to PVC. In Xinjiang, instead of natural gas liquids, PVC producers react chlorine with coal to make VCM. This reaction is fostered by the "acetylene" process. This requires "much less capital investment than the ethylene route," according to chemical industry analysts.[14] It is in part the reliance on dirty coal that makes that low price possible.



Stage 1: Extraction

Raw materials are mined.

- Coal is mined adjacent to or near the PVC plants in the XUAR.
- Limestone is mined near the PVC plants in the XUAR.
- Salt is extracted near the PVC plants in the XUAR.
- Mercury is mined and refined in Guizhou province, southeast of the XUAR.

Stage 2: Conversion to PVC.

Minerals are converted into chemical feedstocks, which are then manufactured into PVC.

Acetylene Production:

- Coal is heated for up to 36 hours to create coke.
- Coke is then mixed with lime in an electric arc furnace to produce calcium carbide.
- The resulting calcium carbide is reacted with water to form acetylene.

Chlor-Alkali Production:

- Salt is converted to chlorine and caustic soda at chlor-alkali plants. (The caustic soda by-product of this process is used for non-PVC products and sold internationally.)
- Chlorine from the chlor-alkali plants is reacted with hydrogen to form hydrochloric acid.
- Separately, chlorine is also reacted with mercury to form crystals of mercuric chloride, which are used as catalysts.

PVC Production:

- Hydrochloric acid is reacted with acetylene, in the presence of mercuric chloride, to form vinyl chloride monomer (VCM) droplets. Initiators are mixed into the droplets, starting a chain reaction called polymerization that forms PVC plastic resins.

In addition to being used as a chemical feedstock, coal is burned in on-site power plants that provide energy for each of these processes.

Adapted from Ran Hongtao, Zhou Wenji, Marek Makowski, and Yan Hongbin, "Incorporation of life cycle emissions and carbon price uncertainty into the supply chain network management of PVC production," Annals of Operations Research, May 2021, Online.

XUAR-manufactured PVC is now often shipped first to Vietnam, where one of Zhongtai's biggest customers set up a flooring factory in 2019. In recent months, PVC resin shipments from manufacturers with plants located in the Uyghur Region appear to have surged to this particular factory in Vietnam called Jufeng New Materials. Jufeng makes vinyl floorings for most of the major flooring companies in the U.S., which sell them under their own brand names. (See the chapter on supply chains below for more details.)

ENVIRONMENTAL AND HEALTH HAZARDS OF MANUFACTURING PVC

The growth of PVC manufacturing in the Uyghur Region exacerbates pollution in a region that, by 2008, was already plagued by some of the worst air in China.[15] These coal-to-plastics factories use and release extremely toxic substances and vast amounts of greenhouse gases. The PVC industry worldwide produces many other kinds of toxic air, water, and solid waste pollution. These include persistent, bioaccumulative, toxic chemicals such as polychlorinated biphenyls (PCBs). Air currents distribute these poisons and global warming agents worldwide. This is especially the case in the Uyghur region, where PVC production processes rely upon a combination of coal, chlorine, and mercury.

The scale and intensity of pollution from PVC production in the Uyghur Region is greater than in any other part of the world and even in the rest of China, yet in the last decade, this is where the U.S. flooring has shifted its sourcing. Dozens of flooring factories in the U.S. have closed as the industry has chosen to offshore production to the dirtiest production method. PVC is formed from a chemical called vinyl chloride monomer or VCM. Two different technologies are used to produce VCM: the acetylene route, which uses coal and a mercury-based catalyst to react it with chlorine, or the ethylene route, which uses ethylene from natural gas or oil and reacts it with chlorine without the use of mercury. The latter is predominant worldwide; according to a 2019 study by the Healthy Building Network, the only countries where the acetylene route is still used are China, India, and Russia.[16] The twenty largest producers using the acetylene route are in China. Seven are located in the XUAR. The mercury-based acetylene route is much more polluting than the ethylene route of production. It is also less expensive, often by $100 per ton or more.[17] PVC made in the XUAR, if produced at full capacity, offers customers a potential $400 million in savings, but those savings are based on a lack of environmental protections that make the ultimate cost much, much higher.[18] (See text box for the process of manufacturing PVC in XUAR.)

Mercury Pollution

To accommodate the industry's quest for cheap PVC, mercury mining has made a startling comeback. The use of mercury in XUAR-manufactured PVC factories leads to the widespread release of mercury locally and globally. Mercury is emitted into the air, poured into water and deposited in soil throughout the course of its production use and disposal for the PVC industry.

Mercury is also absorbed by people living at the fence line of mines. Children living near the mercury mines of China are in particular danger. A study of people in Wanshan, where most of the mercury is mined and refined for the PVC industry, found that 18% of children have levels of mercury exposure that are higher than U.S. standards for action.[19] Mercury in the air around these operations is "highly elevated."[20]

But it is not merely in mining that mercury is a hazard. The Center for Environmental Health notes, "The use of mercury in the production of vinyl chloride monomers not only poses a health risk to workers, but also to populations both proximate and distant to these plants as mercury vapors can be transported long distances in the atmosphere. Inorganic mercury is highly volatile and can be aerosolized in the production process, exposing workers to gaseous elemental mercury - known to cause lung damage in the form of chemical pneumonitis and bronchiolitis. Moreover, this gaseous elemental mercury can escape into the atmosphere, where it can be transported over long distances and redeposited in terrestrial environments far from the point source of pollution."[21]

An estimation of mercury pollution created by PVC plants in the Uyghur Region points to an untenably hazardous situation. The World Bank reported in 2017 that, on average, 86.9 grams of mercury is consumed in the production process of every ton of PVC made via the acetylene method in China.[22] In the early 2010s, independent German scientists studied pollution at Xinjiang Zhongtai's plant near Ürümqi. They determined that, for every ton of PVC produced, Zhongtai released 2.4 grams of mercury to the air.[23] Considering the magnitude of PVC production in the region, this amounts to significant pollution. See Table 2.

Using the World Bank's calculations, PVC production in the XUAR currently consumes an estimated 358 tons of mercury per year, of which 9.9 tons are released into the air. XUAR PVC manufacturing alone accounts for the consumption of 15% of all mercury produced worldwide in 2021, based on U.S. Geological Survey estimates of China's production.[24]

Furthermore, the seven Uyghur Region-based PVC plants' estimated combined air emissions are equal to more than 60% of the air releases of mercury reported in all manufacturing in all of the United States in 2020 (14.8 tons).[25]

Greenhouse Gases

The German study also calculated rates of carbon dioxide releases from Xinjiang Zhongtai's Huatai plant. Researchers found that that the Huatai plant released 12 tons of carbon dioxide gas for every single ton of PVC production. At this rate PVC plants in XUAR, running at full capacity, will release an estimated 49.4 million tons of carbon dioxide-equivalent gases. This measure, CO2e for short, weighs the global warming potential of each gas in relation to carbon dioxide. **For comparison, 140 plastics factories in the U.S. reported releasing a combined 114 million tons of CO2e gases in 2020, which is a little more than twice the climate impact caused by the seven PVC plants in the XUAR.**[26]

Xinjiang Tianye's estimated 16.8 million tons of carbon dioxide-equivalent gas emissions are higher than any petrochemical plant reported in the United States in 2020. Zhongtai's four plants' combined estimated emissions total 27 million tons. See Table 3. Both companies' emissions exceed what is expected from a massive plant planned by Formosa Plastics in Louisiana, which has become a rallying point for climate justice.[27]

Table 2. Estimated annual mercury pollution from PVC production in XUAR, in metric tons

(Calculations based upon 100% production rates and World Bank and German studies)

PVC FACTORY	OWNER	PVC CAPACITY (TONS)	MERCURY USE	MERCURY AIR POLLUTION
Xinjiang Tianye	Xinjiang Tianye	1,400,000	121.7 tons	3.4 tons
Fukang Energy	Xinjiang Zhongtai	800,000	69.5 tons	1.9 tons
Zhongtai Huatai	Xinjiang Zhongtai	700,000	60.8 tons	1.7 tons
Zhongtai Toksun	Xinjiang Zhongtai	300,000	26.1 tons	0.7 tons
Xinjiang Mahatma	Xinjiang Zhongtai	300,000	26.1 tons	0.7 tons
Xinjiang Yihua	Hubei Yihua Chemical	300,000	26.1 tons	0.7 tons
Xinjiang Qingsong	XPCC/ Qingdao Haiwan	120,000	10.4 tons	0.3 tons
Total current		**4,120,000**	**358 tons (*)**	**9.9 tons (*)**

(*) Totals factor in an additional 200,000 tons Xinjiang Zhongtai production capacity not allocated above. Xinjiang Zhongtai states that its total capacity is 2.3 million tons PVC. Production capacity figures found for the four existing plants total 2.1 million tons, indicating that a potential 200,000 tons of additional capacity exists at these plants.

Table 3. Estimated annual carbon dioxide-equivalent pollution from PVC production in the XUAR

(Calculations based upon 100% production rates and World Bank and German studies)

PVC FACTORY	OWNER	PVC CAPACITY (TONS)	CARBON DIOXIDE-EQUIVALENT RELEASES**
Xinjiang Tianye	Xinjiang Tianye	1,400,000	16.8 million tons
Fukang Energy	Xinjiang Zhongtai	800,000	9.6 million tons
Zhongtai Huatai	Xinjiang Zhongtai	700,000	8.4 million tons
Zhongtai Toksun	Xinjiang Zhongtai	300,000	3.6 million tons
Xinjiang Mahatma	Xinjiang Zhongtai	300,000	3.6 million tons
Xinjiang Yihua	Hubei Yihua Chemical	300,000	3.6 million tons
Xinjiang Qingsong	XPCC/ Qingdao Haiwan	120,000	1.4 million tons
Total current		**4,120,000**	**49.4 million tons (*)**

** Xinjiang Zhongtai states that its total capacity is 2.3 million tons PVC. Production capacity figures found for the four existing plants total 2.1 million tons, indicating that 200,000 tons of additional capacity exists somewhere among these plants.*

Workplace Hazards

Beyond environmental hazards, PVC production presents many health risks for laborers. Among them:

- Coal dust causes chronic obstructive pulmonary disease (COPD), silicosis, coal workers' pneumoconiosis (commonly known as "Black Lung disease"), and other respiratory diseases.[28]
- Workers with prolonged exposure to PVC dust face increased risk of lung cancer.[29] Dormitory style structures in the plant compounds suggest that many workers spend 24 hours in close proximity to these hazards.
- When vinyl chloride monomer was mostly produced using the acetylene process in the U.S., workers were exposed to high levels of this carcinogen, and suffered elevated rates of liver tumors and other cancers.[30]
- The acetylene-based process creates mercury contaminated wastes that impact workers at disposal operations.[31] In the 1990s, Borden Chemicals in the United States was alleged to have illegally shipped mercury wastes to a supposed recycling plant in South Africa, where workers were severely injured and died from mercury exposure.[32] (This case helped lead to the closure of the Borden operation, and the end of acetylene-based PVC production in the United States.) The fate of mercury-bearing waste from XUAR PVC plants is yet unknown.

FORCED LABOR IN THE UYGHUR REGION

Environmental pollution is not the only risk associated with the shifting of significant PVC production to the Uyghur Region. As has been widely documented and publicized, state-sponsored forced labor is practically ubiquitous in the Uyghur Region.[33]

Since at least 2017, the government of the People's Republic of China (PRC) has embarked on a massive systematic program of forced labor in the Xinjiang Uyghur Autonomous Region. Through conscripted seasonal labor, prison and internment labor, and state-coerced labor transfers, the PRC has compelled Indigenous citizens of the Uyghur Region to work in "labor-intensive" industries, as well as on farms and in municipal maintenance both within the region and across China. Significant evidence reveals that labor transfers in the Uyghur Region occur within an environment of unprecedented coercion, undergirded by the constant threat of re-education, internment, and imprisonment. **Because refusal to participate in government assistance can be considered a sign of religious extremism and punishable with internment or prison in the Uyghur Region, Uyghur and other minoritized workers from the region are unable to refuse or voluntarily exit jobs assigned to them by the government. Thus, these state-sponsored labor transfer programs are tantamount to forcible transfer of populations, forced labor, human trafficking, and enslavement.**

Experts have determined that the PRC's internment camp and prison factories, as well as the "surplus labor" and "labor transfer" initiatives as they are practiced in the Uyghur Region, are mechanisms of a massive program of compulsory labor.

State-sponsored forced labor operates through several different (though sometimes overlapping) mechanisms in the Uyghur Region:

Prison Labor. The PRC government requires that all inmates perform compulsory labor. In the XUAR, the majority of prison labor is in agricultural sectors, including cotton planting, harvesting, and ginning. Prisons are attached to farms and factories. Some private and state-owned enterprises locate their factories within the walls of the prisons.

Internment Camp Labor. Beginning in 2016, the PRC began a campaign of mass extra-judicial internment in the Uyghur Region, interning upwards of a million Indigenous citizens of the region, in contravention of numerous international human rights protocols. The internment camps are touted as an anti-terrorist campaign grounded in "vocational training." Many detainees are required to work. Again, companies often locate factories within the walls of these camps, but other companies receive internment camp victim workers each day at factories located in proximity to the camps.

State-Sponsored Labor Transfers. The PRC has placed millions of Indigenous citizens from the Uyghur Region into what the government calls "surplus labor" (富余劳动力) and "labor transfer" (劳动力转移) programs. Through state agency labor recruiters, the PRC government compels people to be transferred to farms and factories across the Uyghur Region. Others have been "trans-

ferred" thousands of miles into the interior of China to work in factories. The XUAR government estimates that it has deployed these programs 2.6 million times (some people may count more than once if transferred more than once).

State Conscription of Laborers. The PRC has made labor compulsory in the Uyghur Region for generations through the "hashar system," through which Uyghur and other minoritized citizens are conscripted to hand pick cotton and other agricultural products seasonally. Children as young as elementary school age are subject to the hashar system, which continues to operate in the most impoverished villages of the southern XUAR.

The government has deployed legions of state-employed labor recruiters and other cadres who assign work to those deemed by the state to be "surplus laborers." Government directives require local governments and labor agencies to meet quotas for labor transfers. The government also enrolls Indigenous citizens in compulsory ideological, vocational, and Chinese language training. A widely circulated government-issued document listed refusal to participate in government assistance programs as a sign of terrorism or extremism, which suggests that refusal of a labor transfer could be punishable by internment or imprisonment.

Hundreds of testimonies from people who have been forced (or whose family members have been forced) to work in the Uyghur Region reveal the strategies of coercion that the government uses to compel people to work. These include threats of being sent to internment camps for refusing government-sponsored labor transfers, repeated (sometimes daily, sometimes even overnight) visits by agents of the state to pressure people to be transferred for labor, coercive land transfers that leave farmers landless and unemployed, false promises that family members will receive reduced sentences if a person accepts a labor transfer, and misrepresentation of the labor as otherwise-required ideological training or poverty alleviation.[34]

These state-sponsored forced labor programs are endemic to the Xinjiang Uyghur Autonomous Region and are present in practically all sectors that mine, farm, or manufacture there, including in the manufacturing of PVC. This report documents the PVC industry's reliance on labor transfers and other worker exploitation in the Uyghur Region. We found that every PVC company operating in the Uyghur Region have engaged in state-sponsored labor transfer programs.

THE HARMS OF PVC MANUFACTURING IN THE UYGHUR REGION

This report examines the high human and environmental cost of manufacturing PVC in the Uyghur Region, even as it achieves rock bottom pricing for customers. Focused primarily on Zhongtai as a case study, the report investigates the evidence regarding the PVC industry's environmental record and its participation in labor transfer schemes in the Uyghur Region. The findings are stark: Zhongtai is both one of the region's worst polluters and one of its most enthusiastic adopters of the state-sponsored labor transfer system. The report also identifies similar environmental and rights violations in other PVC producers in the region. The full extent to which PVC made in the Uyghur Region pervades the global market is unknown. Much of the resin made in the XUAR is shipped by rail to factories in eastern and southern China, where it is turned into plastic products that do not bear a mark that would reveal the PVC's origin. In order to better understand the international reach of PVC made in the Uyghur Region, we analyze shipping records to identify the likely paths XUAR-originating PVC travels as it makes its way to stores and consumers worldwide, particularly in the form of luxury vinyl flooring.

1. Xinjiang Zhongtai Group

(新疆中泰(集团)有限责任公司)

Xinjiang Zhongtai subsidiary Xinjiang Huatai Heavy Chemical Company's plant in Ürümqi, XUAR. Photo © J. Carl Ganter / Circle of Blue

Xinjiang Zhongtai Group is a wholly state-owned company funded by the People's Government of Xinjiang Uygur Autonomous Region (XUAR) and directly supervised by the State-owned Assets Supervision and Administration Commission (SASAC) of the Autonomous Region. It is headquartered in the Ürümqi Economic and Technological Development Zone. The company was listed on the Shenzhen stock exchange in 2006. The company employs as many as 54,000 people and is one of the PRC's "Top 500 Enterprises."[35] It reports annual revenue of CNY 62 billion.[36] The XUAR is a strategic location because of its centrality as a hub in the PRC's Belt and Road initiative.

Xinjiang Zhongtai wholly owns at least 43 subsidiaries and 38 joint-stock companies.[37] The Zhongtai Group's leading product, in volume and impact, is polyvinyl chloride plastic, of which it produces more than two million tons per year at four different plants. It is the largest PVC producer in China, with a total capacity of 2.33 million tons, according to a 2019 study.[38] In support of this production, Zhongtai owns coal mines, coal-fired power plants, and other infrastructure.

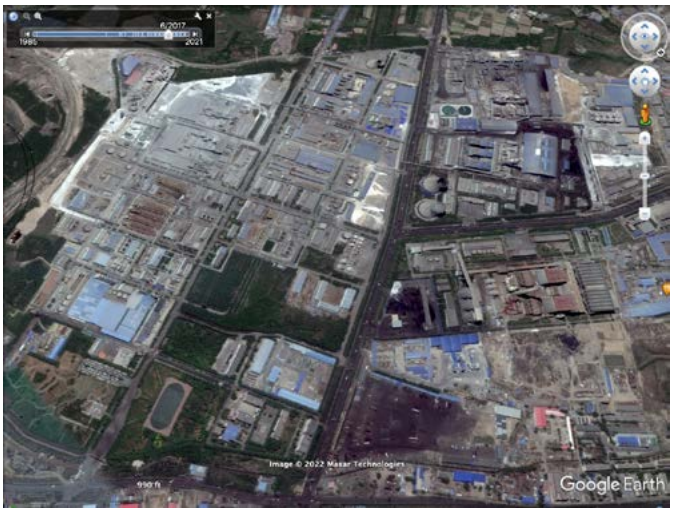
The Zhongtai Group produces other chemicals and plastics. These include caustic soda (also called sodium hydroxide) which it uses in the production of viscose staple fiber (rayon) for textiles. Zhongtai is also a leading rayon producer in China.[39] In Karamay, Zhongtai Chemical makes Purified Terephthalic Acid (PTA), an essential feedstock for polyester. It is China's largest producer of butanediol (BDO), through a joint venture with global chemical giant, BASF, in Korla.[40] BDO is used in the production of spandex and polyurethane plastics. Xinjiang Zhongtai also produces biodegradable plastics and petroleum.[41]

Xinjiang Zhongtai grows tomatoes, grapes, peppers, and other agricultural products as well. It claims to have a million mu (more than 257 square miles) of cotton fields in Yuli, Shaya, and elsewhere.[42]

Zhongtai's core operations are its coal-to-plastics factories, where it uses a mercury-based process to turn chlorine and coal into polyvinyl chloride resin. Zhongtai alone produces about 10% of all PVC made in China.[43]

Zhongtai produces PVC in four facilities:

Xinjiang Huatai Heavy Chemical Company (新疆华泰重化工有限责任公司), is located in Midong District, a large district of Ürümqi Prefecture. Zhongtai Chemical opened this plant in 2006. It started with 120,000 tons of PVC production annually.[44] By 2010, Xinjiang Huatai had the capacity to produce 300,000 tons of PVC. It then completed a second phase of development in 2010, adding another 360,000 tons of capacity.[45] Zhongtai Group's website reports the Huatai plant's current PVC capacity as 700,000 tons per year.[46]



Xinjiang Huatai in the Midong District Industrial Park near Ürümqi.[47] Coordinates: 43.942935, 87.664081.

Xinjiang Zhongtai Chemical Fukang Energy Co. (新疆中泰化学阜康能源有限公司) in Fukang opened in 2012.[48] Zhongtai's Fukang production capacity is 800,000 tons of PVC resin and 600,000 tons of caustic soda.[49] Another subsidiary, Zhongtai Mining and Metallurgical Co., produces 380,000 tons of calcium carbide a year, 1.3 million tons of lime, and also operates a massive coal mine,[50] supporting the production of PVC at this location.

Fukang Energy in Fukang City, Changji Hui Autonomous Prefecture.[51] Coordinates: 44.08098, 88.588901.

Xinjiang Mahatma Energy (新疆圣雄能源股份有限公司) is located in Turpan. Zhongtai acquired the plant in 2001. As of 2015, it has the reported capacity to produce 300,000 tons of PVC.[52] The facility also has been called Shengxiong Energy Resource Company.

Xinjiang Mahatma complex in Alehui Town, Toksun (Tuokexun) County.[53] Coordinates: 42.824936730621, 87.91506344380534

Xinjiang Zhongtai Chemical Toksun (新疆中泰化学托克逊能化有限公司) is also located in Turpan, China. Plant construction is ongoing. It has the capacity to produce 1.8 million tons of calcium carbide (used in the production of PVC), 300,000 tons of vinyl chloride monomer, and the same amount of PVC. Its production of PVC resin started in 2016.[54] Located in the same industrial park as a highly polluting lead acid battery manufacturing and recycling plant run by Camel Group, this plant is situated atop a traditional irrigation system that has fed local farmers for generations and is likely a significant contaminator not only for the farms situated only a little over a thousand meters away but also for the crops grown on those farms.[55]

Xinjiang Toksun in Toksun county, Turpan prefecture.[56] Coordinates: 42.736979, 88.645011.

(The capacity listed above for at least one of these plants likely is undercounted because the Chinese chemical consulting firm CNCIC conducted a study that places Zhongtai's total capacity at 2.33 million tons, and Zhongtai itself states its capacity as 2.3 million tons.)[57]

Xinjiang Zhongtai also controls coal mines that feed PVC production. In 2021, the company said it had the capacity to produce 7.3 million tons of coal per year, including 4.9 million tons at Mahatma/Shengxiong Energy. It noted that the XUAR's abundant coal resources give the company "a certain cost advantage."[58] A German study in 2014 found that the low cost of coal was key to the industry's growth in the Uyghur Region. "PVC production from the carbide process yields high profits…mainly due to the low cost of coal in Xinjiang…This situation makes it difficult to implement energy-efficient solutions."[59]

Zhongtai Group has transferred thousands of citizens deemed to be "surplus laborers"—more than practically any other company described in academic or journalistic accounts of labor transfers in the XUAR.

LABOR TRANSFERS AND CORPORATE PARTICIPATION IN REPRESSIVE GOVERNMENT CAMPAIGNS

The public record indicates that Zhongtai Group is an avid participant in state-sponsored labor transfer programs and publicizes its engagement regularly. As an XUAR state-owned company, Zhongtai Group is directly engaged in party programs and government initiatives, including ideological programming, political activism, poverty alleviation, and labor transfers.[60]

In 2017, as internment camps were being built across the Uyghur Region, Xinjiang Zhongtai staged a public event on maintaining "social stability" and fighting terrorism, in which all attending villagers were first required to bring their thoughts "in line with the Central Party's analysis of the situation in Xinjiang and in line with the plans of the Autonomous Region Party Committee.[61] These practices continued with required corporate oaths against "two-faced" people and the "three evils," "Speak Up" ceremonies, and patriotic flag raising ceremonies.[62] The Zhongtai Group dispatched its own employees to surveille Uyghur villagers through the "Visit Huiju" program, through which state employees monitor Uyghur behavior and regularly visit households to collect data for the government. The Zhongtai employees input data on Uyghur families through the Xinjiang Household Village app and the notorious Integrated Joint Operations Platform (IJOP) app. Zhongtai employees were deployed to ensure that every household and person is accounted for and that "micro-clue information" is verified. These platforms are used for "prediction and prevention work," which is a local government method for detaining people they deem likely to be guilty of supposed pre-crimes or criminal thought.[63]

Zhongtai Group has transferred thousands of citizens deemed to be "surplus laborers" – more than practically any other company described in academic or journalistic accounts of labor transfers in the XUAR. Indeed, by June of 2021, Zhongtai was reporting that the company had engaged a total of 5,502 transferred laborers from southern XUAR, achieving the status of the state-owned enterprise that had "solved the most surplus labor in urban and rural areas." At that time, after international scholars and journalists had identified these labor transfers as coercive state-sponsored programs, state-owned Zhongtai celebrated that the company "regards receiving and relocating the employment of organized labor transfer in southern Xinjiang as an important political task."[64]

Starting as early as spring 2017, in order to assist in the XUAR's plan to transfer 100,000 people from Kashgar and Hotan within three years,65 Zhongtai Group alone transferred 2,000 minoritized citizens from the southern XUAR. Of the first thousand, 440 people were assigned to Zhong-

Workers arrive at Zhongtai facilities in Toksun
Credit: Zhongtai Zero Distance, Online.

tai Group's facilities in the Korla industrial Park, which produces chemicals for spandex, while the remaining 560 went to nine of Zhongtai's other facilities in Ürümqi.

In June of 2017, the company received a second "batch" of 1,000 transferred workers, who they first sent to the Xinjiang Light Industry Vocational and Technical College for training. The new workers were subjected to six months of compulsory training, including "military training in 'feeling gratitude for the party and studying [Xi Jinping's] speeches.'"[66] Zhongtai was integral in the establishment, building, and equipping of this school.[67] College staff were sent out to villages to coordinate the transfer of the laborers, as part of a team that simultaneously "coordinated the care of the elderly and children of the migrant workers, and the transfer and management of their land and livestock," in an apparent effort to solve the issue that many people are not willing to be transferred due to their need and desire to tend to family and property.[68] The work team used the institutionalization of workers' family members and expropriation of their land as a strategy for reducing their resistance to transfers.

The Xinjiang Light Industry Vocational and Technical College does not appear to be one of the internment camps that were euphemistically called "vocational and technical training" institutes.[69] However, in 2018, student representatives of the College were taken on a tour of the internment camps, where they saw the victims of the camps working and were introduced to the consequences the internees faced because they had been accused of "religious extremism." One of the students on the internment camp study tour reflected: "I can feel the great harm of religious extremism from their experiences, and also feel the happiness after they completely get rid of religious extremism. We young students must keep their eyes open, distinguish right from wrong, resist and guard against 'double-pan' [pan-Islamism and pan-Turkism] thinking and religious extremism, and be a new force in maintaining social stability and long-term stability in Xinjiang." The deputy dean of the Light Industry Vocational and Technical College noted: "Living examples show that vocational skills education and training is an effective measure to help people who have been eroded by religious extremist ideology to return to normal life, and an innovative move in social governance." This kind of scared-straight exposure to internment camps likely conditions Zhongtai's transferred laborers to recognize the consequences of refusing government orders.[70]

The company also established the Zhongtai University Vocational Skills Training School, where thousands more transferred workers are trained in vocational skills, but also in anti-terrorism drills, labor discipline, ethnic unity, patriotism education, cultural skills, legal knowledge, and "to bear hardships and stand hard work." Those workers are then assigned to Zhongtai and other companies in the area.[71]

In June 2017, Zhongtai Group and its subsidiary Mahatma Energy/Shengxiong Energy announced that, as a state-owned corporation, it would take the lead "to receive and resettle the surplus labor of ethnic minorities in southern Xinjiang, which fully reflects the mission of Zhongtai Group as an influential state-owned backbone enterprise in the autonomous region." Its first efforts were focused on developing pre-assignment training for transferred laborers from Kashgar and Hotan regions. The training the company designed was an intensive 3-month "paramilitary and all-round training" that involved

> fully respecting the religious beliefs and living habits of the transferred employees, through training and education in laws and regulations, corporate culture, ideology and ethics, etc., gradually changing their ideological concepts, thinking patterns and behavior habits, improving their ideological awareness, and improving their comprehensive quality, so that they can be transformed into workers in line with modern enterprises as soon as possible and integrate into the new working environment.

In the guise of respecting religion, the company imposed ideological and political training upon all of its transferred Uyghur workers, with a mind to transforming them into workers suited to the company's own needs.

Many of the employees were then assigned to work directly in the production of the PVC that is exported globally. Workers were assigned to particular jobs based on their uptake of the training, their skills, and their interests, in coordination with the needs of the company. Those with the highest skills would be assigned to front-line production roles; those with poor performance would be relegated to logistics, janitorial, gardening and company security.[72] Zhongtai implemented a quantitative scoring system, by which the workers would be evaluated, according to which the company "regularly commends the advanced and criticizes the backward."[73]

Two transferred Uyghur workers test chemical samples at Mahatma Chlor-Alkali Plant credit: Mahatma Chlor-Alkali, Online.

Within a couple of weeks of the story announcing the development of training for transferred laborers, Mahatma Energy announced that it had received 200 transferred surplus laborers. The workers were received with a banner announcing that "national unity is the lifeline of people of all ethnic groups." The workers, outfitted with camouflaged military uniforms, were disciplined in their comportment toward the company and the government. They were told they should "cherish the opportunity of transferring employment, appreciate the kindness of the party, keep in mind the entrustment of relatives in their hometown, and use their hard-working hands to create a better and happy life." The workers responded obediently with formulaic statements of gratitude to the company and the party.[74] Similar oaths were required of the more than 100 workers who were assigned to Zhongtai's Huatai factory that summer and in 2018.[75] There is no room for dissent from these ideological standards, and all transferred Indigenous workers are subject to these trainings and recitations.

Despite the fact that Zhongtai's Mahatma Energy plant in Turpan had automated much of its operations, the factory became one of the primary sites to which Zhongtai would deploy transferred laborers. This suggests that, even as automation or modern industrial manufacturing reduces the need for laborers, it does not in fact obviate the deployment of low-skilled transferred laborers from southern XUAR.[76] Zhongtai Group's various social media accounts and media publicity stories have recorded stories of Uyghur transferred laborers working in quality inspection and conducting testing of the products manufactured by Mahatma.[77] In the Zhongtai Fukang plant's new materials workshop, transferred laborers also work in quality control, as well as in crushing the materials for the mixing process.[78] At Xinjiang Zhongtai Chemical Toksun Energy, a transferred laborer is reported as feeding the furnace for the production of calcium carbide.[79] At the Xinjiang Zhongtai Chemical Fukang Energy Co. plant, a transferred laborer was gradually promoted to become the chief operator of the production team in the PVC new material workshop (and he also served as an unofficial "propagandist," sharing the news of the company and government with his colleagues).[80] At Mahatma's caustic soda workshop, minoritized citizens of the region make up 40% of the staff, at least some of whom are transferred through state-sponsored programs and monitored through "relative" pairing programs.[81] Advanced mechanization does not seem to have slowed Zhongtai's labor transfers.

Even in state media and corporate publicity, reports reveal clear indicators that Indigenous people transferred from southern XUAR are not voluntarily working at Zhongtai. In one story celebrating a Han employee's dedication to his job, Mahatma's publicity arm indicated that one of the things that this worker does is "stabilize the emotions" of the transferred employees who feel "the change of identity is too fast and inevitably experience mood fluctuations and confusion."[82] Another Zhongtai publicity piece told the story of Hasan Imin whose "most common words" were "I want to go home" and "I really can't learn." It is clear that Imin had not been allowed to return home when he expressed his desire to do so.[83] In 2019, Xinhua, a state-run news agency, told the story of how, based on the "employment transfer policy vigorously promoted" in the XUAR, a Uyghur woman named Maynur from Ketiki Village, Keriya County was deemed "surplus labor" by the state. Maynur was assigned to work at Zhongtai's factory in Ürümqi, over 1,000 miles from her home. She and her parents resisted the placement that would transfer her so far from home, according to Xinhua. Maynur was reported to be working in the production workshop at the time of the report. The reporting about her situation indicates both that she was unwilling to accept the transfer and that she was nonetheless sent

As automation...reduces the need for laborers, it does not in fact obviate the deployment of low-skilled transferred laborers

to work directly in the manufacturing of the goods produced by Zhongtai.[84]

In its 2018 annual report, Zhongtai Group detailed its participation in the XUAR government's poverty alleviation programs and set explicit objectives. The company's poverty alleviation strategy included "accepting and relocating surplus laborers from Southern Xinjiang and striving to achieve the goal of transferring 3,000 minorities for employment within three years."[85]

According to state media, Zhongtai Group achieved its goals. The company received 3,160 "surplus labor" transfers from the southern XUAR across its various companies between 2017 and 2019. To transform the laborers from "farmers to industrial workers," Zhongtai Group systematically trains all transferred laborers in a "training plan covering ideology, culture, and skills." The workers are typically assigned to jobs in packaging, forklifting, or cleaning at first.

Workers arrive from Keriya County to Ürümqi Railway Station to work for Zhongtai Credit: Wu Jun for Huatai Zero Distance, Online.

In March 2020, in the midst of the COVID-19 pandemic, Zhongtai Group announced that they had received 150 transferred laborers from Keriya County by train, when other people were not allowed to take the train for fear of COVID transmission. [PetroChina, Sinopec, Xinjiang Energy Group, Xinjiang Nonferrous Metals Industry Group, and the Xinjiang Airport Group also participated in the welcome of transferred laborers.] According to the state media, the pandemic provided the company "advantages" in global trade. A press release declared that "in the face of the sudden outbreak [of COVID-19]," the company was committed to "making full use of Zhongtai Group's non-stop advantage during the epidemic period, continuing to carry out in-depth foreign trade business," noting that both PVC and caustic soda sales had soared over their performance the previous year.[86]

One of Zhongtai's cotton processing factories receives over 100 transferred laborers. Credit: China Yarn News, Online.

By mid-March 2020, Zhongtai reported having accepted a total of 4,432 laborers from the southern XUAR and purportedly having transformed them "from the countryside to the city, from ordinary villagers to modern industrial workers."[87] Then, on March 29, 2020, Zhongtai Group reported having received an additional 1,180 transferred employees in the two weeks since March 15 alone, including at least one who had been not been a poor farmer at all but instead was a car salesman who had fallen on hard times because of the pandemic, and another who had just gotten married a year before and had to leave a newborn at home.[88] During this period, the XUAR and central governments strove to continue manufacturing in the midst of COVID by deploying Uyghur and other minoritized citizens of the Uyghur Region to work while Han people were on full lockdown. It appears that in some of its operations, Zhongtai reduced its workforce significantly, sometimes leaving Uyghur workers alone to complete the work of many people.[89] Uyghur workers were treated as expendable while other workers were protected by the government lockdowns.

Zhongtai also owns textile manufacturing companies that create cotton, rayon, and other fabrics. At Zhongtai's Aral Fulida cotton and cellulose processing plant, which is celebrated for its advanced mechanization, Uyghur workers were transferred to work on the production line as early as 2017, starting with 1,000 transfers in the first year.[90] In 2018 Aral Fulida claimed to be the company in Aral with the highest number of transferred laborers on staff.[91] A March 2021 South China Morning Post article revealed a high risk of forced labor and environmental hazards in Zhongtai's viscose fabric production.[92]

ENVIRONMENTAL AND HEALTH HAZARDS

Xinjiang Zhongtai is a contender for the world's most polluting plastics producer. It releases unmatched amounts of carbon dioxide and mercury because it uses dirty coal as an essential feedstock and mercury as a chemical processing agent.

Xinjiang Zhongtai owns a portion of the Zhundong coal field through its subsidiary, Xinjiang Zhongtai Chemical Zhundong Coal Industry Co.[93] Two major U.S. mining industry corporations – Peabody and Caterpillar – helped to develop the Zhundong mine.[94] In 2013, China Daily reported, "Zhundong aims by 2015 to produce and process 118 million tons of coal every year; the installed capacity of coal-fired power generators is expected to reach 22 million KW. Its projected annual output goals include 4.8 million tons of metallurgy, 1.2 million tons of olefin, 1.2 million tons of carbamide, 600,000 tons of PVC, and 12 billion cubic meters of coal-derived natural gas."[95] (For more on Zhundong, see text box in next chapter.)

In 2014, the *People's Daily* reported that the use of mercury catalysts contaminated soil at the Xinjiang Huatai plant in Ürümqi and poses "a safety hazard to the health of residents in the area."[96]

A German study, published in 2014, warned that plans to increase PVC production in the Uyghur Region by five million tons would increase greenhouse gas emissions by 60 million tons per year.[97] Since then, Xinjiang Zhongtai has increased its capacity by one million tons of PVC, releasing 12 million tons of greenhouse gases per year, based on the study's estimated predictions.

Zhongtai's buildout continues. In June 2021, Shanxi Jinhui Energy Group and Zhongtai announced that the companies planned to build a 1-million-ton PVC plant in Aksu Prefecture that had initially been approved in 2011.[98] On April 11, 2022, construction bids were opened. The plant, named Xinjiang Jinhui Zhaofeng Energy, is expected to come online in Baicheng Industrial Park in 2024.[99]

When complete, Zhongtai's Baicheng plant will be one of the five largest PVC factories in the world and will elevate the Zhongtai Group into second place among all producers of PVC worldwide. Only Shin-Etsu (4.3 million tons per year) will exceed Xinjiang Zhongtai's 3.3 million per year production capacity. **No PVC manufacturer in the world will match Zhongtai's potential release of 40 million tons of carbon dioxide-equivalent gases.**

INTERNATIONAL INVESTMENTS

Though it is a state-owned enterprise, Xinjiang Zhongtai has raised significant financing from international banks and pension funds. According to the Global Coal Exit List, as of November 2021, the Government Pension Fund of Norway owned $16.62 million in shares of Xinjiang Zhongtai. Vanguard held over $7.78 million in shares; Dimensional Fund Advisors held $4.48 million; the Netherlands Algemeen Burgerlijk Pension Fund held $2.38 million. See Table 4 for a list of Zhongtai's international investors.[100] Some of these investments are quite small and may represent only one investor, but several banks and funds hold millions of dollars in shares.

In addition to these major bank investors, as of Sept. 30, 2021, the Alaska Permanent Fund Corporation held 43,400 shares, with a market value of $89,994.82.[101]

Xinjiang Zhongtai is a contender for the world's most polluting plastics producer.

Table 4. International investors and total investments in Xinjiang Zhongtai Chemical Co.

INTERNATIONAL INVESTOR	HEAD-QUARTERS	TOTAL INVESTMENT
Norwegian Government Pension Fund Global	Norway	$16.62m
Vanguard	U.S.	$7.78m
Dimensional Fund Advisors	U.S.	$4.48m
Algemeen Burgerlijk Pension Fund	Netherlands	$2.38m
BlackRock	U.S.	$1.77m*
Arrowstreet Capital	U.S.	$720,000
Eaton Vance	U.S.	$590,000
Invesco	U.S.	$480,000
Charles Schwab	U.S.	$400,000
Orix Corporation	Japan	$300,000
Prudential Financial	U.S.	$250,000
State Street	U.S.	$220,000
Legal & General	U.K.	$90,000
Credit Suisse**	Switzerland	$70,000
Franklin Resources	U.S.	$50,000
We Capital	Brazil	$30,000
Fubon Financial	Taiwan	$30,000
Mercer Global Advisors	U.S.	$30,000
Northern Trust	U.S.	$20,000
JPMorgan Chase	U.S.	$20,000
HSBC	U.K.	$10,000

** $1.54m in bonds; $220,000 in shares*
*** Source: Global Coal Exit List, November 2021*

CONCLUSION

In December of 2021, several Zhongtai Group employees from Indigenous communities participated in a propaganda campaign, published in English, designed to defend against the claims that forced labor is pervasive in the XUAR.[102] These protests against international outrage at the use of forced labor are not adequate to erase the significant body of evidence Zhongtai itself has created in its promotion of its participation in state-sponsored labor transfer schemes, and indeed in the role the company has played in managing labor transfers for other companies in the region. Indeed, **due to its accepting thousands of transferred laborers from southern XUAR, its active village recruitment of Indigenous people through the institutionalization of their family members and the expropriation of their land, and its training school that provides ideological indoctrination before it sends workers to its own and other companies' factories, it appears that Zhongtai is a company that is, more than most others, directly responsible for the facilitation of the XUAR's system of state-sponsored transfer of labor.**

Recent U.S. legislation banning the import of XUAR-made goods (and other bills pending internationally, including regarding importing goods and financing of projects that are connected to human rights abuses) means that understanding how Zhongtai's products move into international markets is critical. In the third chapter of this report, we examine the routes XUAR-manufactured PVC takes as it enters international markets.

2. Xinjiang Tianye and Other PVC Manufacturers in the Uyghur Region

XINJIANG TIANYE GROUP (新疆天业(集团)有限公司)

Xinjiang Tianye chemical complex in Shihezi City.[103] Coordinates: 44.35801375500167, 86.0427517885306.

Xinjiang Tianye Group is a highly diversified enterprise owned by the Xinjiang Production and Construction Corps (XPCC or Bingtuan, see text box). It is a significant manufacturer of chemicals, and also has holdings in companies that specialize in a range of industries that have a strong presence in the Uyghur Region, including irrigation, tomato processing, packaging, logistics, technology, and new materials. Xinjiang Tianye Co., Ltd. (新疆天业股份有限公) is a Tianye Group subsidiary and one of the XPCC's listed companies.

Its chemical complex in Shihezi is the world's second largest PVC producer.[104] It can make 1.4 million tons per year.[105]

Labor Transfers and Corporate Participation in Repressive Government Campaigns

Xinjiang Tianye Group has won government awards for its so-called "poverty alleviation" efforts.[106] As part of the company's drip irrigation manufacturing, it extends that technology to farmers in southern XUAR, which may be a benefit to the under-developed rural villages where that program has been implemented. However, Xinjiang Tianye also participates in many of the oppressive programs that are labelled as poverty alleviation by the government. Xinjiang Tianye's 2018 annual report indicates participation in a wide array of so-called poverty alleviation programs, including labor transfers and vocational training programmes. While the Tianye PVC project is not mentioned explicitly as receiving workers, it is likely that the plant has been part of the labor transfers, as it is one of Tianye's larger subsidiaries and Tianye is so actively engaged in poverty alleviation across its portfolio of subsidiaries.

The company reports that it established a subsidiary in Shache Farm and invested CNY 20 million in a factory there that has "absorbed" (吸纳) 100 local workers, which are likely to be Indigenous farmers involved in labor transfers (though the annual report does not make the ethnicity of the workers clear other than by calling the people "local," which typically refers to Uyghurs).[107] State media has celebrated Tianye's program of stationing cadres in southern XUAR villages to carry out labor transfers on behalf of the company as part of their poverty alleviation programming.[108] Furthermore, a state media report in 2020 provides evidence that the company has been the recipient of surplus labor transfers as a "paired poverty alleviation work unit" (对口帮扶单位).[109]

In its 2019 annual report, Tianye also reported that the company is actively engaged in the "Becoming Family" program. The company has stationed Han workers from the company in Uyghur villages, where they are assigned families to surveille. The Tianye workers determine plans for the families to alleviate poverty, which included directing them to engage in new agricultural enterprises. The Tianye cadres set up mushroom planting cooperatives, despite that fact that the local people were resistant and were already growing pomegranates and grapes, which are local traditional crops consumed widely in the region. In yet another village, an agent of Tianye went to a village and prescribed that the villagers must turn to monocrop farming, meeting significant resistance from the farmers, but the Tianye cadre insisted on the implementation of his plan nonetheless, and the villagers were required to comply. He also developed ideological programming for the villagers, to "stimulate farmers' endogenous motivation for poverty alleviation and establish a correct concept of honor and disgrace."[110] These programs, which are touted as "poverty alleviation," are both coercive and pay far under the state-mandated wages.[111] The company's agents enforce their own pro-

grams on Indigenous people, without regard for community input, and these programs often lead to dangerous monocrop agriculture in areas that had previously had a diverse agricultural output. Furthermore, the programs represent a systematic effort to eradicate Uyghur cultural traditions and farming techniques/preferences.

In another example, the company set up flour mills in a small southern village in the Uyghur Region, where it employed approximately twenty-five farmers. While it is unclear to what extent coercion was used to pressure workers in this situation, it appears that the company is not meeting the minimum wage requirements in the region. Xinjiang Tianye annual reports indicate that the company paid forty rural workers in flour mills and mushroom farming operations a total of CNY 390,000 between March/April and the end of the year, which means that the workers each received at most CNY 1,083 a month, far below the XUAR-mandated minimum wage of CNY 1920.[112]

Environmental and Health Hazards

As the Xinjiang Tianye PVC complex grew, so too did its impact on the local community, as reported in China Youth Daily in 2008. One resident told reporters: "There are constant loud noises and foul smells. It's like living in a war zone." A group of retired workers protested that Tianye had devastated their previously fertile farmland and transformed it into "a polluted wasteland." Tianye had built its factories merely 200 meters from residential housing, and residents were forced to keep their windows closed at all times to avoid all of the pollutants in the air, but they reported that they were unable to protect their crops or land. The report indicated that "the leaves of their cotton plants are dark grey instead of green. Cotton output has dropped by a third, from 300 kg per mu to 200 kg per mu. Their sunflowers wither and die after being watered. Those given less water survive longer. Residents say wastewater discharged by the factories has polluted local water sources." 68-year-old Wang Lixian said, "We can't go on living here. It's literally killing us." He continued: "There used to be eighteen retired living workers here. Seven moved away and are all still alive, but eight of the eleven who stayed have died. Living here is a death sentence."[113] Tianye is an XPCC company, so many of the residents affected by their manufacturing are Han migrant settlers who have been stationed in Shihezi. They were able to complain to the media in 2008 about the effects of living near a PVC plant. There are no such published accounts of the pollution from PVC production that communities near other plants experience, but this Tianye story provides significant insight into what the effects of PVC production might be for affected communities.

> *"We can't go on living here. It's literally killing us."*

THE XINJIANG PRODUCTION AND CONSTRUCTION CORPS

The Xinjiang Production and Construction Corps (XPCC or Bingtuan) is a settler colonial paramilitary force of the PRC government, the mission of which is to stabilize the Uyghur Region. It has governmental control over an archipelago of territories, ranging from farmland to large cities. It is also a major corporate conglomerate, with thirteen listed companies and thousands of corporate holdings. It owns and operates mines, logistics centers, and farms, and it is involved in the manufacturing of textiles, apparel, electronics, chemicals, pharmaceuticals, beverages, food products, and, notably, PVC. Xinjiang Tianye is one of the XPCC's listed companies.

The XPCC has been accused of facilitating oppression in the Uyghur Region through the operation of internment camps and forced labor schemes. For these reasons, the U.S. government has specifically prohibited the import of any goods made in whole or in part by the XPCC. The U.S., U.K., and E.U. have placed sanctions on members of the XPCC and/or particular arms of the organization.

International Investments

Xinjiang Tianye Group has come under scrutiny due to recent international investments. The 2019 U.S. Customs and Border Protection's Withhold Release Order banning the import of XPCC-made goods, and the Treasury Department's Office of Foreign Assets Control (OFAC) sanction on the XPCC prohibiting the "making of any contribution or provision of funds, goods, or services by, to, or for the benefit" of the named entity[114] led to withdrawal of investments from XPCC companies. However, in September of 2021 HSBC's wholly owned Hong Kong subsidiary bought 20,000 shares of Xinjiang Tianye stock, costing CNY 16.68 million.[115] In January 2022, the U.K. government debated the ethics of a London-headquartered investment corporation profiting from an investment in the XPCC. HSBC has responded that the investment was for one anonymous client alone.[116]

Xinjiang Yihua Chemical Co. (新疆宜化化工有限公司)

Open pit mine owned in part by Xinjiang Yihua, and related power and chemical complex, in the Zhundong Coalfield. According to Global Energy Monitor, "The coal mine project was an illegal coal mine that started construction without approval."[117] Coordinates: 44.933507 · 89.184722.

Xinjiang Yihua Chemical Co. is a subsidiary of state-owned Hubei Yihua Chemical Group. As of 2020, Hubei Yihua was the world's eighth largest PVC producer.[118] Hubei Yihua's coal-to-plastics complex in the XUAR has an annual PVC production capacity of 300,000 tons of PVC, representing about one-quarter of Yihua's 1.35 million tons of PVC production.[119] Xinjiang Yihua is located in the Zhundong Economic and Technological Zone on the edge of the Zhundong Coalfield, and benefits from the cheap energy accessible there.

In 2017, Xinjiang Yihua had two fatal explosions. In February, a gas leak led to an explosion in its calcium carbide facilities, killing two people, seriously injuring seventeen others and injuring another thirteen.[120] In July, an explosion in Xinjiang Yihua's South Gas Plant killed two people and injured 30 people.[121]

Xinjiang Yihua had its safety license revoked and was put on a blacklist of operations with poor safety production records. The parent company was forced to suspend production at that facility and also suspend expansion, reorganization, or merger plans for high-risk projects and enterprises for three years. Following inspections initiated in the aftermath of the explosion, Xinjiang Yihua had to suspend production in the majority of its facilities, including the PVC manufacturing facility.[122] Xinjiang Yihua's facilities came back online by April 2019, and then another explosion rocked another Yihua plant's carbide production area.[123] As of April 2022, Xinjiang Yihua was selling PVC on the open international market.[124]

Fatal explosion, February 12, 2017, at the Xinjiang Yihua carbide plant. Uncredited photo published by The Hans India.

Xinjiang Yihua receives transferred surplus laborers "exported" to the Zhundong Economic and Technological Development Zone.[125] In a 2021 article posted to social media, Xinjiang Yihua was held up as an example of a company that has participated in a program in Zhundong Economic and Technological Development Zone that had transferred eight "batches" of 175 Uyghur people each from one neighboring county, and had transferred more from other communities.[126] See the text box about Zhundong Economic and Technological Development Zone for more on the region's prolific use of labor transfers.

Zhundong Economic and Technological Development Zone

Spanning 15,500 square kilometers across the Gobi Desert, the Zhundong Economic and Technological Development Zone provides the vast coal reserves – 7% of the PRC's total coal reserves – necessary for the cheap production of a wide range of industrial products.[127]

To encourage companies to make the distant move out to the XUAR in the mid-2010's, the PRC government promoted the development of the Zhundong Coal Power Base, which has powered the corporations that moved into the region (and will eventually power a great deal of the PRC).[128] To better facilitate the growth of the economy in Zhundong, the government planned an expansion of the railroad and airports into the otherwise largely deserted region as well.[129]

The Zhundong Zone employs 80,000 people.[130] The Zone also has a strong relationship with the local labor transfer programmes. The Wucaiwan Industrial Park, where Xinjiang Yihua is located, is just one park located inside the enormous Zone. It operates its own Wucaiwan Supply and Marketing Cooperative Member Service Center that "actively communicates with the transfer of labor in various towns and villages in Jimsar County" and with the corporations located in the park to determine matches between workers and available jobs. The Center had successfully matched companies with 9,000 rural surplus laborers by 2016, before the internment camp system was operational. Since 2016 and the increasing rise of repression in the Uyghur Region, labor transfers continued apace upon a backdrop of internment camps, supplying the park's resident companies with laborers who were compelled to participate.[131] The Human Resources and Social Security Bureau of Changji Prefecture boasted in 2018 that it had conducted 11,631 transfers of surplus labor to date.[132] The programs continue even now, supported by incentives provided by the Bureau to companies within Zhundong for "absorbing" the transfers. By 2020, the Bureau announced that it had distributed "1.6 million yuan in rewards and subsidies to 52 labor service cooperation organizations and allocated 800,000 yuan in special funds for small factories... to absorb poor laborers."[133]

Aral Qingsong Chemical Co. (阿拉尔青松化工有限责任公司)

Xinjiang Qingsong Building Materials complex, including Aral Qingsong, near Aral city.[134] Coordinates: 40.592904, 81.197462.

Xinjiang Qingsong Building Materials Group Co. is one of the XPCC's listed companies. It produces a wide range of products, including being the XPCC's largest producer of cement.[135] Aral Qingsong Chemical Co. was established in 2010 as a joint venture between Xinjiang Qingsong and the Qingdao Haiwan (sometimes translated as Haijing or HyGain) Chemical Group. Located in Aral, considerably southwest of the rest of the PVC industry in the Uyghur Region, the Qingsong plant started production in 2012. As of 2019, the two companies, along with the XPCC's Xinjiang Tarim Agricultural Development Co., jointly operated the facility, with an annual production capacity of 120,000 tons of PVC. A 230,000-ton expansion is planned.[136]

In its 2020 annual report, Qingsong noted that the Aral Qingsong Chemical Co. had conducted an "overhaul" of the plant in the previous year, but the company continued to experience some setbacks in production due to its relatively small scale and its aging equipment.[137] PVC accounts for less than 10% of Xinjiang Qingsong's sales.[138]

The company's 2020 Annual Report states that it "has established a labor export relationship with the local government to solve the employment of local ethnic minorities," indicating that the company participates in state-sponsored surplus labor programs. Though the Aral Qingsong subsidiary is not named explicitly, it is possible that it has received transferred laborers.[139] Evidence suggests that various subsidiaries of Xinjiang Qingsong have engaged in these labor transfers for several years.[140] In addition, in the 2019 corporate annual report, Qingsong reported that it had matched over 320 cadres from among the company's employees with local ethnic minority workers, who "eat, study, and work with the matched households" in a corporate effort to "ensure long-term stability" in the region.[141]

3. Tracing XUAR PVC to International Markets

Companies that import the goods that are produced through these programs are at significant legal, economic, and reputational risk. They risk breaking U.S. laws, including the Tariff Act, the Trafficking Victims Protection Act, the Uyghur Forced Labor Prevention Act, and the laws of other countries within which they operate or ship. Companies that import goods made in whole or in part in the XUAR also risk being in non-compliance with their own internal social responsibility policies or Modern Slavery Statements prohibiting the use of forced labor in the manufacture of goods. They further risk contributing to the oppression of minoritized people in China, legitimizing the PRC government's repressive regime in the region and economically benefiting the private, public, and state-owned suppliers in China that profit from forced labor.

XINJIANG ZHONGTAI DOWNSTREAM SUPPLY CHAIN RISK

The company's website indicates Xinjiang Zhongtai exports to the rest of China and to the U.S., Brazil, the U.K., Spain, Germany, Finland, France, Italy, India, Cambodia, Korea, Japan, and Australia.[142] Zhongtai's Alibaba page suggests even wider distribution, mapping fifty countries on nearly every continent in their sales network. The company takes advantage of the increasingly well-developed railway system between Ürümqi and Central Asia, the Middle East, and Russia to get its products into international markets, but the Alibaba site also makes the products accessible to anyone worldwide.[143]

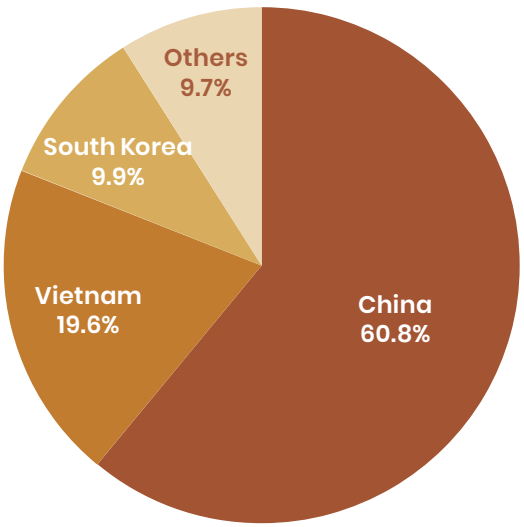
Shipping records paint a more specific portrait of some of the routes Xinjiang Zhongtai products take on their way into international markets. Available shipping records accessed via Panjiva provide access to 19 countries' bills of lading for goods shipped internationally. Zhongtai is certainly shipping via routes that are not publicly published (including within China), but some trends can be identified through what is available.

According to shipping records, it appears that Zhongtai ships its PVC and caustic soda internationally through at least four subsidiaries: Xinjiang Zhongtai Import & Export, Zhongtai International Development (Hong Kong), Xinjiang Zhongtai Chemical, and Xinjiang Shengxiong Chlor-Alkali.[144] Through these various entities, Xinjiang Zhongtai ships to manufacturers in Vietnam, Indonesia, India, the Philippines, U.A.E., Singapore, and Russia. Those companies then ship PVC-based flooring, pipes and fittings, and electronics coverings to the U.S., U.K., Hong Kong, Myanmar, Singapore, China, Taiwan, Belize, Nepal, Tanzania, Seychelles, Bhutan, Zambia, Sierra Leone, Indonesia, Sri Lanka, and Iraq. Caustic soda goes on to be used in manufacturing in Canada, the U.S., India, Spain, Denmark, Hong Kong, England, Russia, Germany, Mexico, Poland, Australia, and the P.R.C. A complete table of these supply chains connections can be found in Annex A on this report's website.

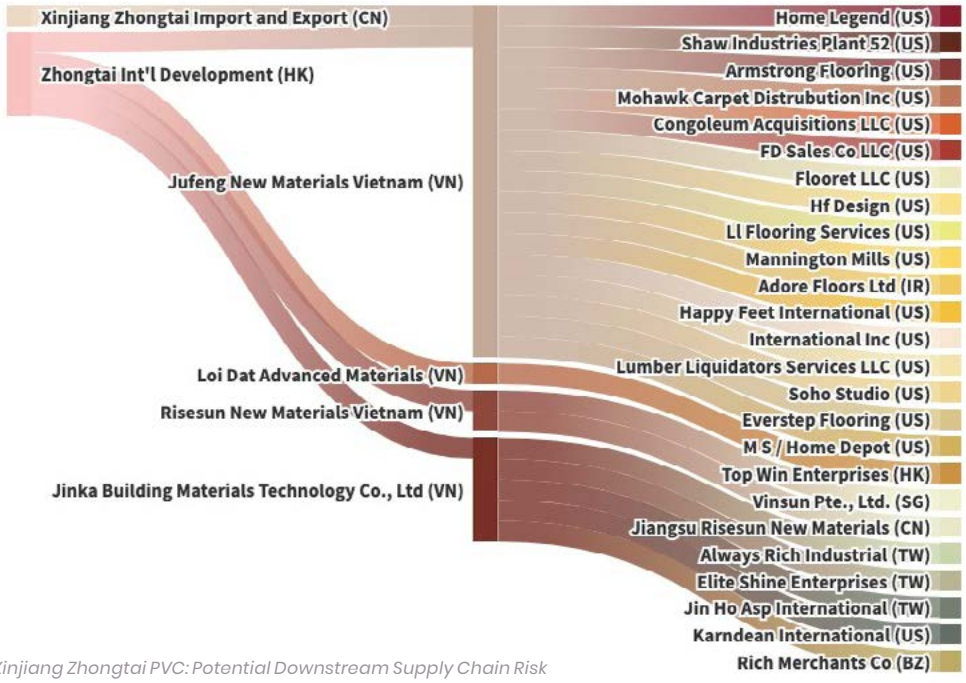
International intermediaries seem to have become more important to Zhongtai in the last few years. In April 2020, a company official reported that the pandemic had encouraged them to diversify geographically. He said, "We are actively coping and adjusting our strategies. We now focus more on Southeast Asian countries where conditions are more stable. We are also planning to set up overseas warehouses to offset future risks."[145]

Zhongtai was added as a supplier for the Vietnamese-based flooring company Jufeng New Materials in

PVC Floor and Wall Covering Shipments to U.S. (March 2022)



2020.[146] In that year, Jufeng purchased "a large amount" from Zhongtai and entered into a cooperative agreement regarding sourcing.[147] Indeed, **between 2020 and 2022, Zhongtai was Jufeng New Materials' second largest supplier of PVC resins, accounting for nearly 35% of all of shipments of the product to Jufeng in terms of value (between all of Zhongtai's varied subsidiaries).**[148] Between March 2020 and February 2022, Xinjiang Zhongtai shipped at least $24.6 million worth of PVC resins to Jufeng Vietnam. In the last quarter of 2021 alone, Jufeng sourced more than $6 million dollars' worth of PVC resin from Zhongtai.[149]



Xinjiang Zhongtai PVC: Potential Downstream Supply Chain Risk

According to US International Trade Commission Dataweb, China accounts for 63% of all vinyl floor tiling shipped to the United States in the last two years, but Vietnam comes in second at 20%.[150] Jufeng (itself a subsidiary of a Chinese company) alone accounted for 81% of all vinyl floor tile (HS code 3918.10.11) shipments from Vietnam to the United States between May 2020 and May 2022.[151] In the first quarter of 2022 alone, Jufeng exported at least 5200 shipments of PVC-based flooring to the US, amounting to a total value of $80 million. Home Legend (largely sold at Home Depot) alone accounted for nearly $20 million – about a quarter of the value of all the imports from Jufeng in the first quarter of 2022.[152] By comparison, Jufeng only exported a total of $203 million worth of flooring to all destinations in the world in all of 2021 (given the available shipping records), suggesting another increase in production in 2022. See Figure 7 for potential PVC supply chain risks related to Xinjiang Zhongtai.

In addition to Home Depot products, Jufeng also shipped PVC-based flooring products to many of the most well-known flooring brands in the United States, including Armstrong, Mannington, Mohawk, Congoleum, Shaw, Lumber Liquidators, Flooret, and more.

Zhongtai is not Jufeng's only supplier of the relevant SG5 grade PVC resins, but Zhongtai is likely even more significant to Jufeng than it initially seems. In fact, **according to shipping records, Jufeng's most significant supplier of PVC is Zhejiang Tianzhen, accounting for 51% of Jufeng's PVC resin sourcing between 2020 and 2022 in terms of value.**[153] Zhejiang Tianzhen is Jufeng New Materials' parent company. Zhejiang Tianzhen's 2021 IPO filings reveal that the company established a Hong Kong subsidiary as an "overseas platform company for investment paths," through which the company established Jufeng New Materials in Vietnam.[154] Zhejiang Tianzhen's does not itself manufacture PVC, but it exports it to its subsidiary in Vietnam, and increasingly so in recent months. According to the companies 2021 IPO prospectus, Zhejiang Tianzhen sources 27% of its PVC from Xinjiang Zhongtai. Zhejiang Tianzhen also reported that the company sources 29% PVC from a firm that deals in PVC futures (apparently not itself a manufacturer), which obscures the actual manufacturer and could mean that the PVC procured through the futures firm could come from XUAR-based producers as well.[155] **This means that Jufeng Vietnam is receiving PVC directly from Zhongtai and likely through Zhejiang Tianzhen as well.**

In addition to supplying Jufeng, Zhejiang Tianzhen ships its own PVC flooring at very high risk of exposure to Xinjiang Zhongtai PVC and its attendant labor practices to a wide swathe of North American flooring retailers. Zhejiang Tianzhen counts among its customers the following

major retailers: Afi Canada, Airbase Carpet Mart, Armstrong Flooring, Derr Flooring, Happy Feet International, Home Depot, Mannington Mills, Mohawk, and Shaw. For the full details of Zhejiang Tianzhen's supply chain and others, see Annex A.

Two clear examples of Jufeng's shipments involve the United States' largest home improvement retailer, Home Depot. Home Legend is a primary supplier to Home Depot. Jufeng Vietnam has made more than 1,300 shipments to Home Legend LLC in two years. Several of the vinyl flooring products available on Home Depot's website and in their brick-and-mortar stores match the product code and thickness in records detailing PVC based flooring (note: SPC stands for stone plastic composite) shipments between Jufeng and Home Legend. Home Depot sells these products under the LifeProof brand name.

Home Depot indicated in correspondence with the authors that Zhejiang Tianzhen, Jufeng's parent company, had assured Home Depot executives that Home Depot products have never contained PVC sourced from the XUAR. Furthermore, Home Depot said that it had been told by Zhejiang Tianzhen that on January 24, 2022, it had "explicitly instructed all their PVC sourcing agents to cease purchasing PVC resin from the XUAR." Clarification has been sought regarding whether or how Home Depot has been able to verify these claims, particularly given that PVC from different sources can be blended at the manufacturing facilities and that Jufeng and Tianzhen both have reported that they source such a significant proportion of their PVC from the Uyghur Region.[156] Further, Vietnamese shipping records indicate that subsidiary Jufeng has received nearly 4,000 metric tons of PVC from Xinjiang Zhongtai since January 24, 2022. Zhejiang Tianzhen's own purchases of PVC are not available for review due to China not publishing internal or external shipping records, and because the company did not respond to our inquiries before publication. However, as public records show that the company's subsidiary did not cease sourcing from the Uyghur Region on January 24, 2022, it remains unclear at the time of publication whether Zhejiang Tianzhen in fact ceased purchasing from Zhongtai and whether the company is able to verifiably exclude Xinjiang products if they continue sourcing from the futures firm. Zhejiang Tianzhen's own corporate

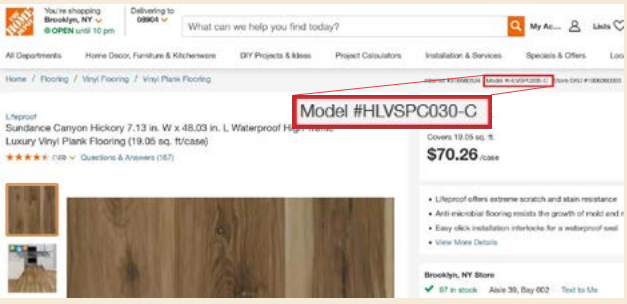
Engineered vinyl flooring model SPC030-C from Jufeng New Materials Vietnam to Home Legend LLC

Shipment of engineered vinyl flooring from Jufeng New Materials Vietnam to Home Legend LLC

Engineered vinyl flooring SPC022-C-3 from Jufeng New Materials Vietnam to Home Legend LLC

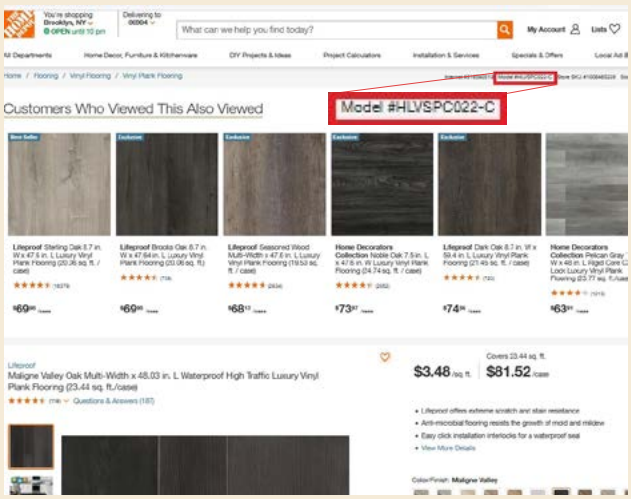
Shipment of engineered vinyl flooring from Jufeng New Materials Vietnam to Home Legend LLC

Home Depot product number SPC030-C

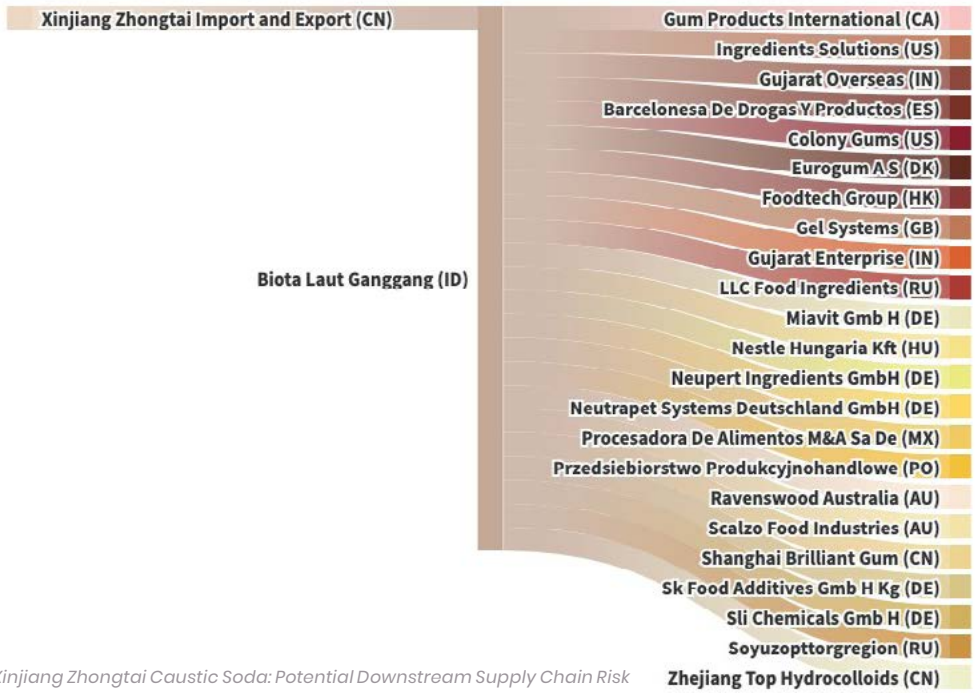


Product sold by Home Depot that includes the same product number (SPC030-C) and product thickness (6.5mm) as in shipping records from Jufeng to Home Legend LLC

Home Depot product number SPC022-C-3



Product sold by Home Depot that includes the same product number (SPC022-C-3) as in shipping records from Jufeng to Home Legend LLC



Xinjiang Zhongtai Caustic Soda: Potential Downstream Supply Chain Risk

reports show Zhongtai and the futures firm accounted for more than 50% of Zhejiang Tianzhen's PVC purchases in the first half of 2021, so the company would have to significantly and swiftly shift its supply chains in order to make good on its promise to Home Depot.

Shipping records reveal hundreds more identifiable flooring models delivered to most of America's largest flooring distributors. See Annex B for a summary of the products that are at high risk of being made with Xinjiang Zhongtai PVC.

In addition to PVC, Zhongtai's other XUAR-made products are also likely affected by the company's engagement in state-sponsored labor transfer schemes and are being shipped internationally. The caustic soda produced by Zhongtai is exported internationally as well and seems to be used in the production of animal feed and a seaweed product called carrageenan. One company that sources caustic soda from Zhongtai is Indonesia's Biota Lau Ganggang. This company produces carrageenan using caustic soda, which international companies typically then use to create a variety of gum products.[157] Zhongtai's 2020 semi-annual report lists Xinjiang Markor Chemical as a subsidiary, the parent company of which is one of the largest furniture manufacturers in China.[158] It is yet unclear whether Zhongtai's PVC is used the manufacture of Markor products, though the two companies entered into a strategic cooperation agreement in 2020.[159] Shipping records show Markor Furniture ships to many U.S. and international furniture companies, though none directly from the XUAR.[160] Siemens was a major investor in the building of Zhongtai's polyester fiber plant in 2018 and provides the company with the requisite technology for production.[161] Corporations around the world are at risk of being connected to forced labor through these investments and supply chains.

Of course, it is highly likely that far more Zhongtai PVC and caustic soda are moving through the rest of China and that it is being used in the production of other flooring and plastic product factories in eastern China, before entering into international markets. It is also likely moving from the Uyghur Region through other countries in Central Asia, Russia, or elsewhere, where shipping records are not publicly available.

In addition to Zhongtai's chemical manufacturing, they are also involved in the manufacturing of cotton and synthetic yarns that are exported globally through its subsidiary Aral Fulida. The Fulida website claims H&M, Zara, Uniqlo, Gap, Lee, Esprit, Polo, Urban Revivo, Levi's, Guess, Jack Jones, Massimo Dutti, Ralph Lauren, Vero Moda, and Banana Republic among their international partners for strategic cooperation.[162]

TIANYE DOWNSTREAM SUPPLY CHAIN RISK

While Tianye sells much of its chemical products domestically (which makes their routes into international markets less traceable), the company also exports internationally. Shipping records suggest that the company predominantly shipped caustic soda flakes and PVC resins internationally to Brazil, India, Indonesia, and Pakistan, where international intermediary manufacturers produce a variety of end products that they sell into the global market. It appears that Xinjiang Tianye ceased exporting directly from its XUAR locations in September of 2020, which could be a result of the U.S. setting a deadline that no products made by the XPCC could be imported after the end of that month.[163] It is likely that Tianye continued to ship their products internationally but through non-XPCC intermediaries.

A review of 2020 shipments, however, suggests that Tianye's products had been shipped to many international destinations. For instance, Xinjiang Tianye Group shipped $457,000 worth of PVC resin to Pioneer Polyleathers in New Delhi, India in April of 2020.[164] Pioneer Polyleathers in the following months sent plastic garments, polybags, and PVC foam boards and adhesive vinyl on to Jeewa Plastic Ltd, plastic accessories to Ami Lanka (which ships fruits and vegetables to Saudi Arabia, perhaps in plastic packaging), and PVC banners to advertising company Tradefirst, all companies in Sri Lanka. Interestingly, when Pioneer Polyleathers stopped buying PVC Resin Suspension Grade SG5 from Tianye in 2020, it began sourcing it from Xinjiang Zhongtai Chemical Co., Tianye's biggest rival. By April of 2021, however, Pioneer Polyleathers began sourcing its PVC SG5 from chemical distribution company Tricon Energy in Texas, but the shipments originated in China, making it more difficult to trace who actually manufactured the PVC.[165] However, because Tricon was the shipper of record for some Zhongtai products originating in the company's Shengxiong factory, there is some risk that Pioneer Polylethers could have sourced from Zhongtai.

Similarly, Indonesian company Mavica Maju Bersama received 4 shipments totaling 35 million kilograms of PVC Resin SG5 from Tianye between August 2019 and August 2020, but in October 2020, the company began sourcing from Sincere Cooperation Material in Zhengzhou. Sree International Indonesia received five shipments of caustic soda flakes totaling 744,000 kg between April and July 2020, after which point the company sourced from other companies, including Zhongtai briefly. The company now sources its caustic soda flakes largely outside of China. Tianye shipped to many other international manufacturers, none of which received shipments directly from Tianye (at least not directly as far as available shipping records can reveal) after September of 2020.

The fact that these companies have shifted their supply chains away from Tianye and then away from the Uyghur Region altogether suggests that the sanctions on XPCC and other XUAR-made products could be significantly affecting sourcing decisions globally. Nonetheless, companies that procure caustic soda and PVC should be aware of the potential risk of sourcing from Tianye indirectly, as Tianye is still in operation and remains China's second most significant producer of those products. Their products are likely continuing to reach international markets through intermediaries.

OTHER PVC DOWNSTREAM SUPPLY CHAIN RISKS

In winter of 2020 and spring of 2021, Hubei Yihua shipped PVC resins to India and Sri Lanka, but available shipping records reveal nothing more recent. Since a quarter of Yihua's PVC production happens in the Uyghur Region, those 2020 and 2021 shipments suggest a risk of XUAR-exposure for Yihua PVC. And since Xinjiang Yihua continues to produce PVC, it is likely that it could still be moving into international markets.

Aral Qingsong does not appear to ship PVC directly from the XUAR to any of the nineteen countries that make their customs records available. However, one of its parent companies, Qingdao Haiwan, ships a variety of PVC resin grades internationally under the HyGain brand, some of which may be sourced from the joint venture in the Uyghur Region, though this cannot be determined for certain with publicly available records.[166] Available shipping records indicate that since March of 2021 Haiwan's PVC shipments have been sent to Abra Logistics (Brazil), Tag Comercio International (Brazil), Cong Ty Co Phan An Thanh Bicsol (Vietnam), Cong Ty Co Phan Nhua Chau A (Vietnam), S Long Lanka (Sri Lanka), and St. Anthony's Industries Group (Sri Lanka). S Lon Lanka then shipped PVC roofing products to Aqua Star in India, and St. Anthony's shipped PVC gutters on to Deluxe Gutters in Kenya. Haiwan produces PVC resins in both Qingdao and the XUAR, so its products likely are entering the global market through other channels as well.[167]

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Of course, there are many Chinese manufacturers of luxury vinyl flooring and other products made of PVC or caustic soda for which we do not have shipping records to identify XUAR PVC sourcing. Any XUAR-manufactured PVC sourcing for those companies is much harder to identify because domestic China shipping records are unavailable, and companies do not declare the source of their PVC publicly. In order to be in compliance with the Uyghur Forced Labor Prevention Act of 2021 and other human rights standards, any company sourcing flooring or other PVC-based products from China should require that its suppliers identify and prove the provenance of the PVC, given the high proportion of the product manufactured in the Uyghur Region.

Conclusion

In a 1991 memo, then-World Bank chief economist Lawrence Summers remarked "a given amount of health impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wage." He said "the problem with the arguments against…proposals for more pollution in [Less Developed Countries] (intrinsic rights to certain goods, moral reasons, social concerns, lack of adequate markets, etc.) could be turned around and used more or less effectively against every Bank proposal for liberalization."[168] Three decades later, the end result of the "impeccable logic" of liberalization expressed by Summers is revealed in the PVC floors beneath the feet of consumers throughout the world.

The XUAR is uniquely suited for manufacturing the lowest cost polyvinyl chloride. The land is topped with stores of coal, limestone, and salt, the plastic's required ingredients. The state owns everything from the mining of these resources to the production of the plastics. Low wages are achieved through forced labor programs under the guise of "poverty alleviation." State ownership of the factories ensures an absence of accountability for mercury and carbon dioxide pollution and labor abuses – all of which are unmatched anywhere, creating vast "polluted wastelands" populated by oppressed minorities. The state kept running these PVC plants even while it shut down the rest of the country's industry during the pandemic, and said it was doing so to capitalize upon the region's position in the global marketplace, which meant treating Uyghur workers as disposable.

The externalized savings of this amoral trade is worth a mere $100 per ton. That is the discount for PVC resin made in region. These slightly lower prices provide the apparent justification for the rapid increase in products being made of materials manufactured through processes dependent that are on health-impairing pollution and state-sponsored labor in the XUAR. It is why international banks and pension funds own shares in Xinjiang Zhongtai while it enthusiastically participated in the ideological programming of Uyghur people in its PVC factories.

This report exposes the "impeccable logic" of this trade and its utter inhumanity and sweeping environmental destruction. The next step is for the marketplace, governments, and law enforcement officials to hold to account those who profit from it.

Notes

Note: Links may expire or be deleted. Most links here are to archived versions of the cited sources. Where cited content cannot be archived in full, it has been archived at the Sheffield Hallam Helena Kennedy Centre website. All companies identified in the report as having a risk of supply chain connections to the Uyghur Region were invited to respond, and their responses can be found in Annex C.

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MURPHY, Laura, VALLETTE, Jim and ELIMÄ, Nyrola

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