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WASTE AND POLLUTION CRIMES

BEST PRACTICES GUIDE

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DISCLAIMER

Sections of this report were drafted with the assistance of ChatGPT 6. All analysis, fact-checking and conclusions are the author's own.

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CONTENTS

SUMMARY ... 1

Methodology ... 3

Key findings ... 3

PRINCIPAL CRIME TYPES ... 5

Hazardous waste, chemicals and other dangerous substances ... 5

Plastic waste ... 6

Waste electrical and electronic equipment ... 7

End-of-life vehicles and tyres ... 7

Fluorinated gases and ozone-depleting substances ... 8

Textiles and paper waste ... 8

Illegal shipbreaking ... 9

Plant-protection products and biocides ... 9

REGIONAL PICTURE ... 10

UPSTREAM ENABLERS AND STRUCTURAL CONDITIONS ... 13

Regulatory arbitrage and fragmented governance ... 13

Legitimate commercial infrastructure as a crime enabler ... 14

Persistent demand and market incentives ... 15

Market resilience and criminal adaptation ... 16

Financial systems and criminal concealment ... 17

Digital platforms and intelligence opportunities ... 19

STRATEGIC IMPLICATIONS FOR THE NEXT WAVE OF CRIMES ... 20

BUILDING A PREVENTATIVE INTELLIGENCE MODEL ... 24

Notes ... 26



SUMMARY

This guide provides a strategic overview of waste and pollution crime as an increasingly interconnected form of organized environmental crime, drawing on open-source literature. It is not intended to be exhaustive but to identify recurring patterns across major waste and pollutant streams. It focuses on the structural vulnerabilities exploited by criminal networks and their implications for EU law enforcement in particular.

Waste and pollution crimes are no longer best understood as isolated environmental offences. Criminal actors increasingly operate through legitimate commercial structures, using licensed companies, brokers, logistics providers, online marketplaces and cross-border trade routes to disguise illicit activity as lawful trade. Across the crimes examined in this guide, the same methods recur: misdeclaration of shipments, falsified documentation, manipulation of customs procedures, exploitation of regulatory differences, and financial fraud. These activities may also intersect with other criminal markets, including illegal resource extraction, reflecting the interconnected nature of organized environmental crime.

The principal crime types covered in this guide include the trafficking of hazardous waste and chemicals, plastic waste, waste electrical and electronic equipment (WEEE), end-of-life vehicles (ELVs) and tyres, fluorinated gases (F-gases) and ozone-depleting substances, and textiles and paper; illegal shipbreaking; maritime pollution; illegal gold mining involving mercury and cyanide; and counterfeiting of plant-protection products and biocides. Although the commodities differ, the underlying operating logic is similar: offenders exploit the gap between legal classification and physical reality, moving material through legitimate supply chains before diverting it towards unlawful treatment, disposal or commercial exploitation. The integration of legal and illegal activities within the same commercial networks makes detection and disruption particularly challenging.

The regional picture shows that Europe operates simultaneously as a source, transit and redistribution region. Belgium, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden and the UK appear as source or consolidation states across different waste and pollutant streams, while Bulgaria, Romania, Serbia and Türkiye often function as transit or redistribution points, as does the UAE. Ghana and Nigeria are major destination and redistribution hubs for WEEE, while countries across Asia, Africa and Latin America receive a range of waste and secondary materials. The problem goes beyond a one-way flow of waste from Europe to the Global South. This is a multi-directional criminal ecosystem that exploits established trade flows, regulatory differences and market demand, with routes adapting as conditions change.

The guide identifies several upstream enablers that are central to the threat landscape. Regulatory complexity and fragmented governance create opportunities to exploit weaknesses in oversight and enforcement. Criminal actors infiltrate legitimate commercial infrastructure, embedding illicit activities within routine business operations. Persistent demand operates at three levels: commercial pressure to minimize waste management and disposal costs; demand for affordable secondary raw materials; and demand for inexpensive second-hand goods in destination countries, where limited waste management and recycling infrastructure can create additional vulnerabilities once these products reach the end of their useful life. Together, these pressures create opportunities for criminal profit, particularly where the perceived risks of detection and punishment remain low. Criminal networks demonstrate considerable resilience, adapting their business models, commercial relationships and operating methods following enforcement interventions. Financial systems and digital platforms further enable concealment, monetization and coordination, while limited enforcement resources and the costs of seizing and safely disposing of illicit materials can constrain effective responses.

Looking ahead, technological expansion, the green transition, climate-related demand pressures and growing competition for natural resources are likely to create further opportunities for criminal exploitation. Rising consumption of products that are not designed for durability, repair, reuse or recycling is likely to drive increasing volumes of plastics, textiles and electronic waste. These growing waste streams, alongside increasing demand for critical raw materials and regulated commodities, may outpace legitimate treatment capacity and regulatory oversight. Criminal networks are likely to respond by diversifying across commodities, commercial structures and criminal markets, reinforcing the need for prevention strategies that anticipate emerging vulnerabilities rather than respond only to established offences.

For EU law enforcement, the principal strategic implication is that effective disruption requires more than seizures or increased border controls. Priority should be given to identifying the commercial and financial infrastructure supporting multiple crime types, including repeat brokers, logistics providers, waste contractors, online traders, corporate structures and financial facilitators. This requires structured intelligence-sharing, common risk indicators and closer cooperation between customs, environmental regulators, police, prosecutors, financial intelligence units, civil society and the private sector. However, improved intelligence must be matched by adequate enforcement capacity and translated into practical interventions that address the conditions sustaining criminal markets. Ultimately, success should be measured not only through immediate enforcement outcomes, but through sustained disruption of criminal business models and the prevention of future criminal opportunities.

Methodology

This guide is based on desk-based research and a review of publicly available literature, including research reports, policy documents, regulatory assessments and open-source intelligence relating to waste and pollution crime. The review is not intended to be exhaustive but seeks to identify recurring criminal methods, structural vulnerabilities and opportunities for crime prevention across major waste and pollutant streams.

The analysis was further informed by a stakeholder engagement workshop convened by ECO-SOLVE in Madrid, Spain, in September 2026. The workshop brought together 27 stakeholders from law enforcement agencies, regulatory authorities, financial intelligence units and civil society organizations to examine emerging threats and explore practical approaches to preventing waste and pollution crime across Europe. Participants reviewed and validated the key findings, contributed operational insights and identified additional vulnerabilities and prevention opportunities. Their feedback informed the refinement of the analysis and the development of this best practices guide.

Key findings

- **Waste and pollution crimes are embedded in legitimate commerce.** Criminal networks use registered businesses, brokers, logistics providers and routine trade to move illicit materials, making it more difficult to distinguish illegal activity from lawful operations and increasing the value of targeting repeat commercial facilitators.
- **Regulatory complexity creates opportunities across waste and pollution streams.** Offenders exploit gaps between a commodity's physical characteristics and its legal classification, as well as differences in licensing and inspection. More consistent standards and intelligence-led oversight could reduce these opportunities.
- **Europe is a source, transit and destination region for waste and pollutant flows.** Flows move in multiple directions, with routes shifting following regulatory changes or enforcement action. Cross-border coordination and monitoring emerging transit routes are therefore central to prevention.
- **Persistent market demand limits the effect of enforcement alone.** Demand for low-cost disposal, secondary materials and regulated products sustains illicit trade, while restrictions often redirect routes rather than eliminate them. Prevention also depends on strengthening legitimate treatment and recovery markets.
- **Financial crime is integral to waste and pollution crime, but this connection is underused in investigations.** False declarations, tax offences, money laundering and opaque company structures help conceal activity and profits. Earlier use of financial intelligence and ownership analysis could help identify organizers and support asset recovery.
- **Digital platforms create both new risks and intelligence opportunities.** Online marketplaces and social media can connect buyers and sellers across borders, while their records can reveal repeat actors and emerging methods. Systematic monitoring and cooperation with platforms could support earlier intervention.

- **The green transition may create new criminal opportunities.** Growing demand for critical materials and new waste streams, including batteries and electronics, may outpace oversight and legitimate treatment capacity. Integrating crime prevention into emerging market rules could help address vulnerabilities early.
- **Long-term disruption depends on coordination and capacity.** Shared intelligence across enforcement agencies, regulators, financial bodies, civil society and industry can reveal risks that no single actor sees alone. Success should be assessed through sustained disruption of criminal business models, alongside adequate resources to act on intelligence.



PRINCIPAL CRIME TYPES

Although waste and pollution crimes involve diverse commodities and regulatory frameworks, they share common characteristics as forms of organized environmental crime. Offending may involve organized criminal groups, otherwise legitimate companies acting unlawfully, or networks of brokers and commercial intermediaries, sometimes operating in combination. Criminal actors increasingly exploit legitimate commercial infrastructure, international trade routes and regulatory complexity to generate profit while externalizing environmental and public health costs.[1] The following categories provide a common operational understanding of the principal crime areas.

Hazardous waste, chemicals and other dangerous substances

Hazardous waste trafficking remains one of the most extensively documented forms of transnational environmental crime. It encompasses the illegal movement, storage, treatment or disposal of wastes and chemicals that present significant risks to human health or the environment, including industrial residues, contaminated soils, chemical by-products, mercury-contaminated waste from illegal mining, and hazardous manufacturing waste. Criminal groups and complicit commercial operators exploit differences in national regulations, inspection capacity and disposal costs to move hazardous waste towards jurisdictions where treatment is cheaper or enforcement is weaker, generating profits primarily by avoiding the costs of lawful treatment and disposal.[2]

The predominant modus operandi involves concealing the hazardous nature of shipments through false declarations, manipulated customs codes, fraudulent laboratory reports or misclassification as recyclable or non-hazardous material. Rather than relying on clandestine trafficking alone, offenders frequently operate through legitimate waste management companies, brokers and logistics providers, embedding illegal shipments within lawful

commercial trade. Increasingly, hazardous waste trafficking forms part of diversified organized crime portfolios involving document fraud, tax offences and money laundering, making it both an environmental and financial crime threat.[3] European waste trafficking routes have included shipments originating in Western Europe and destined for countries in West Africa and parts of Asia, although patterns vary by waste stream.

Plastic waste

Plastic waste trafficking has developed alongside the global transition towards a circular economy, which aims to keep materials in circulation for as long as possible. Criminal actors exploit differences between declared recyclability and the actual quality of exported plastics, allowing contaminated, mixed or non-recyclable material to enter international recycling markets under the guise of legitimate recovery.[4] Profits arise primarily from avoiding domestic treatment and disposal costs, while generating revenue through waste collection, brokerage and purported recycling services.



Plastic waste collected from the banks of the Buriganga River in Dhaka, Bangladesh. *© Zabed Hasnain Chowdhury/NurPhoto via Getty Images*

The principal modus operandi involves mislabelling low-grade or mixed plastics as recyclable feedstock, including through misuse of Basel Convention waste classifications,[5] before exporting them through networks of licensed waste brokers, shipping companies and other intermediaries, including unlicensed or minimally established companies. The involvement of multiple intermediaries can obscure the origin and destination of shipments, reducing traceability and diluting accountability. Once received, significant volumes are dumped, openly burned or abandoned because recycling proves economically or technically unviable. Contaminated or low-grade plastics may also enter manufacturing processes, potentially introducing hazardous substances into finished products or packaging. Regulatory changes and import restrictions, including restrictions on exports to non-OECD countries, have displaced trafficking routes towards intermediary countries and more complex logistics chains, rather than eliminating the underlying demand for illicit disposal. Türkiye and countries in South East Asia, including Malaysia, have emerged as important destinations for European and other internationally traded plastic waste, reflecting shifts in trade following import restrictions elsewhere. The market illustrates how organized crime exploits legitimate circular economy mechanisms while undermining both environmental protection and market confidence.[6]

Waste electrical and electronic equipment

WEEE trafficking exploits the blurred legal distinction between reusable second-hand equipment and waste. Growing global demand for affordable electronics and critical raw materials has created profitable opportunities to export obsolete or non-functional equipment while avoiding the costs of compliant recycling, with additional revenues generated through the resale of usable components and recovery of valuable metals.[7]

The most common modus operandi involves misdeclaring WEEE as used electrical and electronic equipment through incorrect customs classifications, falsified or insufficient testing documentation, or the concealment of undeclared equipment within mixed shipments. These activities involve actors ranging from small-scale opportunistic exporters and commercial intermediaries to larger companies and organized networks, making detection difficult, particularly where shipments are fragmented across multiple operators. Once imported, valuable metals such as copper, gold and palladium are recovered using informal recycling techniques, while hazardous residues containing lead, mercury and brominated flame retardants are burned, dumped or abandoned. Trafficking routes have historically linked Europe and North America with destinations in West Africa, notably Ghana and Nigeria, and parts of Asia, where informal dismantling and material recovery may take place. Growing electronics consumption, AI infrastructure and demand for critical minerals, as well as expanding online marketplaces, are likely to increase waste volumes and trafficking opportunities.[8]

End-of-life vehicles and tyres

Criminality involving ELVs exploits regulatory and enforcement gaps in distinguishing used vehicles intended for repair or reuse from vehicles that should be classified as waste. These vulnerabilities affect both passenger and heavy-duty vehicles, although the applicable regulatory frameworks and enforcement challenges differ. Vehicles that should undergo environmentally compliant depollution and dismantling are instead exported as repairable vehicles or reusable parts, allowing operators to avoid treatment costs while extracting valuable components and generating additional revenue through the resale of vehicles and parts.[9]

The predominant modus operandi involves exploiting ambiguous end-of-waste classifications to export unroadworthy vehicles as reusable goods, dismantling high-value components before export, or selectively recovering metals while abandoning hazardous materials including oils, batteries, airbags and refrigerants. Heavy-duty vehicles present additional vulnerabilities where regulatory controls are less developed, including the export of used trucks carrying spare parts, tyres or other goods. Similar methods are used for waste tyres, which are exported for nominal recovery but frequently accumulate in illegal stockpiles or are openly burned. Exports of used and end-of-life vehicles from Europe to West Africa, including Nigeria and Ghana, illustrate the importance of international second-hand vehicle markets, while illicit tyre movements similarly exploit differences in disposal costs and enforcement between jurisdictions. Growing demand for electric vehicle batteries and critical minerals is expected to increase criminal interest in this sector while creating additional safety risks associated with lithium-ion battery handling.[10]

Fluorinated gases and ozone-depleting substances

The illicit trade in F-gases and ozone-depleting substances demonstrates how environmental regulation can unintentionally create highly profitable criminal markets. Progressive reductions in the legal supply of these substances under international climate agreements and regional regulatory frameworks have increased market prices, creating incentives for organized trafficking, counterfeit products and quota fraud, with profits generated through the price differential between illicitly sourced gases and legally supplied products.[11]

The principal modus operandi includes illegal imports into the EU outside quota systems, false declarations, transit fraud, mislabelling of virgin refrigerants as reclaimed material, and counterfeit cylinders. Limited downstream traceability allows illicit gases to circulate through otherwise legitimate supply chains. Investigations also demonstrate increasing use of legitimate distributors, online marketplaces and commercial supply chains to introduce illegal refrigerants into mainstream markets.[12] Within Europe, trafficking has involved refrigerants entering EU markets through external borders and being distributed across member states, with routes and entry points adapting to enforcement and quota restrictions. The market increasingly combines environmental crime with customs fraud, value-added tax (VAT) evasion and document forgery, making financial investigation central to effective enforcement.[13]

Textiles and paper waste

Trafficking in textiles and paper waste exploits weaknesses in waste classification, end-of-waste verification and supply chain traceability, enabling waste to be misrepresented as reusable goods or recyclable feedstock. Growing fast-fashion waste and demand for recovered textiles in manufacturing, alongside fluctuating recycled paper markets, create opportunities to disguise low-quality waste as legitimate reusable goods or recyclable feedstock, allowing operators to collect fees for waste management while avoiding the costs of proper sorting, treatment or disposal.[14]

The principal modus operandi involves declaring unusable or contaminated materials as reusable second-hand goods or recyclable commodities. In the textile sector, mixed shipments containing clothing, footwear, accessories and other goods can further complicate classification and enforcement. Once exported, substantial proportions prove unsuitable for recovery and are dumped, burned or abandoned in countries lacking sufficient waste management infrastructure. Criminal groups exploit weak quality verification procedures, inconsistent classification standards and limited oversight beyond the point of export. For textiles, international flows from Europe to countries such as Ghana and Kenya illustrate how second-hand clothing markets can also become destinations for low-quality or unusable material, while recovered paper trade follows distinct international recycling routes. Growing producer responsibility obligations and circular economy targets may increase incentives for fraudulent declarations unless supply chain traceability improves.[15]

Illegal shipbreaking

Illegal shipbreaking involves the dismantling of end-of-life vessels in facilities that fail to meet environmental and occupational safety standards. Although presented as legitimate recycling, these operations frequently result in uncontrolled releases of asbestos, hydrocarbons, heavy metals and persistent organic pollutants while exposing workers to significant health risks.[16] The financial incentive lies primarily in reducing dismantling, labour and hazardous waste management costs, while retaining revenue from the sale of recovered steel and other materials.

The principal modus operandi involves reflagging vessels before disposal, manipulating ownership structures and exporting ships to jurisdictions with weaker enforcement before dismantling them through labour-intensive beaching operations. Criminality frequently relies on complex corporate ownership arrangements, allowing operators to distance themselves from environmental liability while benefiting from lower dismantling costs. Major shipbreaking destinations include Bangladesh, India and Pakistan, where differences in labour costs, infrastructure and regulatory enforcement have historically shaped the international market for end-of-life vessels. The sector illustrates how international maritime regulation, waste legislation and corporate structures intersect to create opportunities for regulatory arbitrage.[17]

Plant-protection products and biocides

The illicit trade in plant-protection products and biocides combines elements of environmental and public health risks, while also involving intellectual property offences. Counterfeit pesticides, herbicides, fungicides and disinfectants undermine agricultural productivity, damage ecosystems and expose users to unknown chemical risks while generating substantial profits for organized criminal groups and illicit commercial operators, who benefit from lower production and compliance costs while selling products at prices associated with legitimate brands.[18]

The principal modus operandi involves the manufacture, importation or distribution of counterfeit or unapproved products that imitate legitimate brands through falsified packaging, labels and documentation. Criminal actors exploit differences in national authorization frameworks and weaknesses in supply chain oversight, including through legitimate wholesalers, agricultural suppliers or online marketplaces, making detection difficult without specialist testing. Trafficking ranges from small, fragmented e-commerce shipments to larger-scale trafficking operations, with international production and distribution chains complicating detection and enforcement. European markets are supplied through both intra-European distribution networks and international supply chains, including products originating in Asia, with trafficking exploiting differences in national authorization and enforcement systems. Climate-related agricultural pressures may increase demand, reinforcing the convergence between environmental crime, counterfeiting and organized commercial fraud.[19]



REGIONAL PICTURE

The available evidence identifies recurring geographical roles across waste and pollution crime markets, including source countries, transit and redistribution hubs, and destination markets. These roles frequently overlap and may change in response to regulatory reforms, enforcement activity and market conditions. The presence of significant waste trade flows does not itself indicate criminality but may highlight commercial infrastructure and regulatory vulnerabilities exploited by illicit operators.

As Figure 1 illustrates, waste and pollution crime cannot be understood solely as the export of waste from Europe to developing countries. Europe itself functions as a source, a transit and redistribution market, as well as a destination market for illegal environmental commodities. These roles are fluid, with criminal networks exploiting regulatory differences, treatment cost disparities and established logistics infrastructure to redirect trade.



A scrapyard for end-of-life vehicles in Dresden, Germany. Many cars that should be depolluted and dismantled in such yards are instead exported as repairable vehicles or spare parts. *© Sebastian Kahnert/picture alliance via Getty Images*

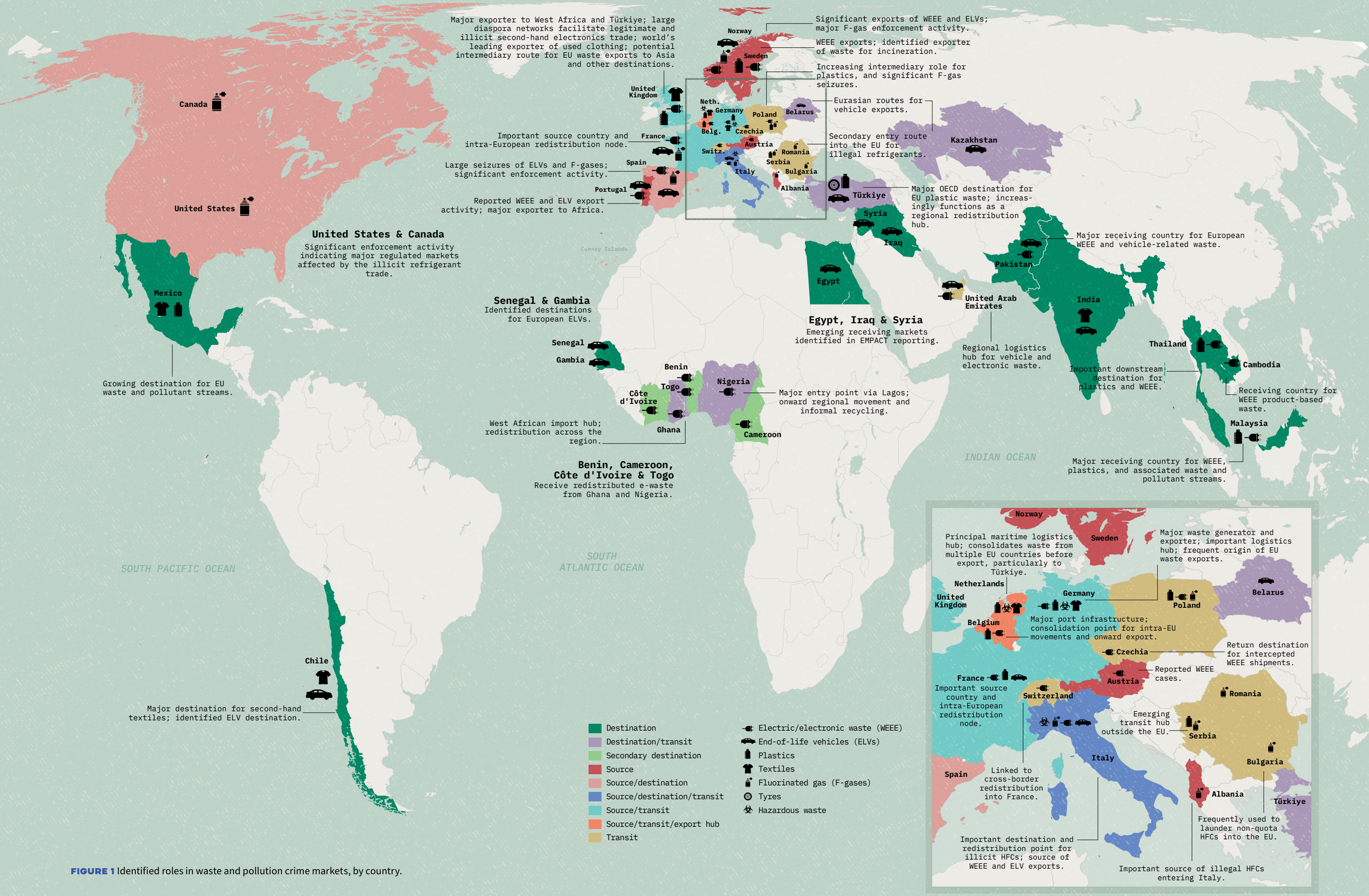


FIGURE 1 Identified roles in waste and pollution crime markets, by country.

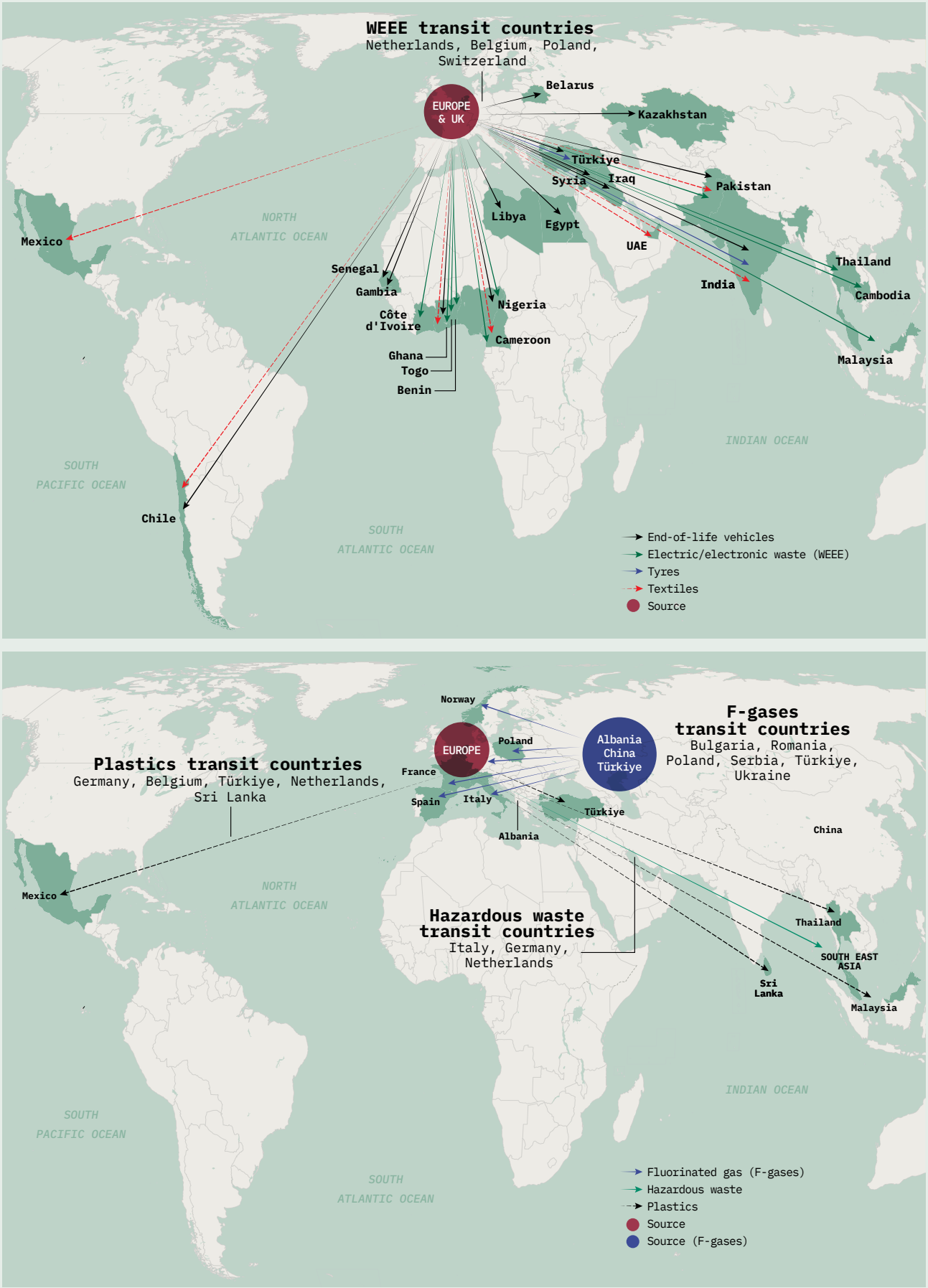


FIGURE 2 Europe's role in waste and pollution crime flows.



UPSTREAM ENABLERS AND STRUCTURAL CONDITIONS

The evidence consistently demonstrates that waste and pollution crime is enabled less by weaknesses at the point of disposal than by vulnerabilities much earlier in the supply chain. Regulatory complexity, commercial pressures, fragmented oversight, corruption and uneven enforcement capacity create opportunities that organized crime exploits long before waste reaches its final destination.[20] Consequently, prevention efforts should prioritize disrupting the enabling conditions that allow criminal markets to emerge rather than focusing solely on downstream seizures, while ensuring enforcement agencies have the resources and disposal capacity needed to act on detected offences.

Regulatory arbitrage and fragmented governance

Rather than exploiting an absence of regulation, organized waste and pollution crime exploits regulatory complexity. Across all waste and pollutant streams, criminal networks manipulate differences between jurisdictions – including definitions of waste, licensing requirements, customs classifications, inspection standards and environmental controls – to create ambiguity that facilitates the illegal trade. Legitimate administrative processes, including permitting, customs declarations and waste classification systems, can be manipulated through fraud, inconsistent oversight or corruption to conceal and legitimize illicit activities.[21]

Within Europe, these differences enable criminal groups to identify and exploit the least restrictive enforcement environments, effectively "shopping" for jurisdictions with lower inspection rates or inconsistent interpretation of regulatory requirements.[22] Outside of Europe, disparities in regulatory capacity and environmental governance create opportunities to divert waste towards countries where inspection systems are less developed or enforcement resources are limited.[23] Regulatory changes can also create unintended criminal opportunities if compliance costs increase without corresponding enforcement. Trafficking routes adapt rapidly to these changes, as well as to enforcement interventions, reinforcing the need for coordinated regional responses rather than isolated national interventions.[24]

Prevention opportunities:

- Harmonize inspection priorities and enforcement practices across EU member states.
- Increase intelligence-led targeting of high-risk trade corridors and logistics networks rather than relying primarily on border inspections.
- Expand real-time information-sharing between customs authorities, environmental regulators, financial intelligence units and law enforcement agencies.
- Promote consistent interpretation, implementation and enforcement of waste classifications, end-of-waste criteria and verification requirements, licensing requirements and evidential standards across jurisdictions.
- Anticipate adaptation of criminal activities by monitoring emerging transit routes and jurisdictions after major regulatory or enforcement interventions.
- Assess potential criminal exploitation and enforcement requirements when designing or amending environmental regulations.
- Strengthen enforcement capacity, including access to funding, specialist expertise, and safe, affordable storage and disposal facilities for seized materials, to reduce the financial and operational barriers to enforcement.
- Strengthen registration, oversight and traceability requirements for brokers and intermediaries handling both hazardous and non-hazardous waste, to prevent the concealment of illicit activities within complex supply chains.

Legitimate commercial infrastructure as a crime enabler

In all main types of waste and pollution crime, criminal actors operate not solely through clandestine organizations but through registered companies embedded within legitimate markets. Waste brokers, recycling facilities, logistics providers, freight forwarders, import–export businesses and distributors frequently provide the commercial infrastructure through which illegal waste and regulated pollutants are moved.[25] Rather than exploiting parallel black markets, organized crime increasingly infiltrates and manipulates lawful commercial systems to facilitate illicit activity.

Unlike traditional organized crime models, many of these businesses simultaneously conduct legitimate and illegal operations. This blurring of lawful and unlawful activity creates a criminal ecosystem characterized by mixed legality, where illicit waste is transported using licensed operators, legitimate shipping documentation and authorized commercial facilities before diverging into illegal treatment, disposal or onward distribution.[26] The environmental crime is therefore concealed within routine commercial activity, making disruption considerably more complex than investigations targeting wholly illicit enterprises.

Commercial infrastructure – including logistics providers, waste brokers and recycling companies – often links multiple environmental crime markets and, in some cases, facilitates convergence with other criminal activities, including illegal resource extraction, fraud and money laundering.[27] This suggests that investigative focus should shift from individual waste or pollutant streams towards the commercial actors and service providers repeatedly facilitating illicit trade across different commodities.

Prevention opportunities:

- Develop sector-specific risk profiles for high-risk businesses, brokers and commercial service providers, rather than focusing solely on individual waste commodities.
- Expand due diligence and supply chain assurance requirements across waste management and recycling sectors.
- Increase scrutiny of repeat exporters, logistics providers and brokers operating across multiple waste and pollutant streams or jurisdictions.
- Strengthen corporate compliance programmes for manufacturers, retailers, waste contractors and logistics companies to improve the detection of suspicious transactions and supply chain anomalies.
- Promote information-sharing between the public and private sectors, with appropriate safeguards for confidentiality, commercial sensitivities and potential conflicts of interest, to identify emerging criminal methods and high-risk commercial actors.

Persistent demand and market incentives

The evidence consistently demonstrates that waste and pollution crime is fundamentally sustained by persistent market demand.[28] Although regulatory measures have successfully restricted the legal supply of many waste and pollutant streams and regulated commodities, they have generally not reduced the underlying economic demand for inexpensive disposal services, secondary raw materials, low-cost refrigerants, affordable second-hand electronics, reusable textiles or recovered vehicle parts.[29] This imbalance creates profitable market conditions that organized criminal networks are well positioned to exploit.

Criminal groups exploit these market distortions through illegal exports, document fraud, counterfeit products and unregulated supply chains, particularly when high profits coincide with low perceived risks of detection and punishment. The illicit trade in F-gases provides the clearest illustration of this dynamic: progressive reductions in legal hydrofluorocarbon (HFC) quotas have substantially increased the market prices of HFCs, while demand for refrigerants – which frequently contain HFCs – has remained high, encouraging organized trafficking, counterfeit products, quota fraud and false declarations.[30] Reducing illegal supply also requires addressing this persistent demand. Where technically feasible alternatives are available, earlier bans or restrictions on HFC-dependent equipment can prevent continued reliance on HFCs with a high global warming potential (high-GWP HFCs) and reduce the future servicing demand that sustains illegal supply. Similar market dynamics are evident within plastic, WEEE and textile markets: compliance and disposal costs create continuing incentives to divert waste into illicit export or treatment channels.[31]

Enforcement alone is therefore unlikely to reduce environmental crime if the commercial drivers remain unchanged. Long-term disruption requires interventions that address both the supply of illegal services and the demand conditions that sustain them. For refrigerants, this includes reducing long-term demand for high-GWP HFCs through earlier equipment restrictions where technically feasible alternatives are available. Such measures can reduce criminal profitability while supporting legitimate circular economy markets.

Prevention opportunities:

- Reduce demand for regulated commodities and illegal disposal services alongside strengthening enforcement activity.
- Invest in domestic recycling, recovery and circular economy infrastructure to reduce reliance on lower-cost illicit alternatives.
- Expand extended producer responsibility and product stewardship schemes across high-risk waste and pollutant streams.
- Promote procurement standards and supply chain due diligence that require verification of lawful sourcing, treatment and disposal.
- Monitor emerging market pressures, including price volatility and supply shortages, as indicators of increased risk of criminal market expansion.

Market resilience and criminal adaptation

A recurring finding across all waste and pollutant streams is that enforcement action often results in criminal adaptation rather than sustained market reduction.[32] Waste and pollution crime markets exhibit many of the characteristics of mature organized crime economies, including a strong capacity to regenerate after regulatory change or law enforcement interventions.[33] Organized networks rapidly adapt their business models, supply chains and operating methods, sometimes diversifying into other criminal markets, and successor businesses or newly established companies frequently assume the commercial role of disrupted operators.[34] This resilience is sustained because the underlying market conditions remain largely unchanged: demand for low-cost disposal, recycling or regulated commodities persists, profit margins remain attractive, commercial infrastructure is already established, and legitimate customers continue to require waste management and associated services.

Several consistent patterns of adaptation occur, including the diversion of plastic waste exports after regulatory reforms, the emergence of counterfeit lower global warming potential refrigerants in response to tighter F-gas controls, increased use of intermediary transit countries to circumvent border inspections, the migration from physical marketplaces to online trading platforms, the relocation of illegal treatment or processing activities after enforcement action, and the establishment of replacement companies or logistics arrangements to maintain business continuity.[35] This demonstrates that criminal networks are capable of rapidly reorganizing in response to changing enforcement environments while continuing to exploit persistent structural and systemic vulnerabilities in waste and pollution streams.

These findings suggest that targeting individual offenders or facilities, although operationally important, is unlikely to achieve lasting disruption unless accompanied by measures that address the broader commercial networks and economic conditions enabling criminal activity. Enforcement should therefore assess not only immediate operational outcomes but also patterns of market recovery, criminal adaptation and business replacement. The emergence of new operators, alternative trafficking routes or successor companies after interventions should be regarded as important indicators of illicit market resilience.

Prevention opportunities:

- Monitor emerging trafficking routes, replacement operators and changes in trading patterns after major regulatory changes and enforcement interventions.
- Conduct post-operational assessments to identify evidence of criminal adaptation, market recovery and the emergence of new operators.
- Target shared enabling infrastructure – including brokers, logistics providers, commercial intermediaries and financial facilitators – that supports multiple illicit waste and pollutant streams or other criminal markets.
- Use company ownership, licensing and trade data to identify newly established businesses that may replace disrupted operators.
- Anticipate regulatory arbitrage by identifying jurisdictions or waste and pollutant streams likely to become future displacement routes after policy changes.
- Measure operational success against indicators of long-term market disruption, rather than solely through seizures, arrests or facility closures.
- Combine enforcement activity with regulatory and market interventions that reduce the economic incentives underpinning illegal waste management.

Financial systems and criminal concealment

Evidence consistently demonstrates that waste and pollution crime resembles organized economic crime, with financial offending functioning not as a secondary consequence but as an essential enabler of criminal activity.[36] Rather than generating profit solely through the illegal movement of waste or regulated commodities, criminal networks exploit commercial and financial systems to conceal illicit transactions, maximize profits and integrate illegal proceeds into legitimate economies.[37] Document fraud, tax offences, money laundering, corporate deception and, in some cases, corruption underpin many environmental crime markets, allowing illicit operations to function alongside lawful commercial activity.

Recurring financial offences include the falsification of customs declarations, waste classifications, invoices and shipping documentation to disguise the nature or origin of shipments.[38] Tax offences – including VAT fraud, under-declaration of imports and false invoicing – reduce operating costs while providing additional sources of illicit profit.[39] Money laundering frequently occurs through legitimate waste management, recycling and logistics businesses, with complex company structures and cross-border transactions obscuring beneficial ownership and the movement of criminal proceeds.[40] Corporate fraud further enables offending through the misuse of licences, fraudulent environmental compliance claims and false declarations regarding waste treatment, recovery or recycled content. Investigations into the illicit trade in F-gases have provided a clear illustration of this convergence, identifying operators who allegedly exceeded quota allocations, evaded VAT, falsified invoices and integrated illegal products into legitimate commercial supply chains.[41]

Environmental investigations continue to focus predominantly on the physical commodity rather than the financial systems supporting criminal activity.[42] Yet the commercial infrastructure underpinning waste and pollution crime creates multiple opportunities to identify higher-level organizers who may never physically handle waste.[43] Financial investigation can reveal

wider criminal networks, higher-level players, connections to other criminal markets, illicit financial flows and beneficial ownership structures, while supporting the identification and confiscation of criminal proceeds and assets. Such investigations offer a more sustainable means of disrupting criminal business models than commodity-focused enforcement alone. However, limited reporting of suspected environmental crime through financial intelligence channels suggests that existing detection and information-sharing mechanisms remain underused.

Financial intelligence should be integrated routinely into environmental crime investigations, with particular attention to:

Commercial indicators:

- Disposal or commodity prices significantly below market rates.
- Rapid growth of newly established companies without a corresponding commercial rationale.
- Multiple businesses linked through common directors, shareholders or beneficial owners.
- Frequent changes in company ownership, trading names or corporate structure.

Trade indicators:

- Repeated exports to high-risk destinations or transit jurisdictions.
- Inconsistencies between customs declarations, waste classifications and physical cargo.
- Frequent amendments to shipping documentation or invoicing.
- Repeated use of the same freight forwarders, brokers or intermediary companies.
- Unusual routing patterns through jurisdictions with weaker regulatory oversight.

Financial indicators:

- High-volume cash transactions inconsistent with normal commercial practice.
- Cross-border transfers lacking a clear business justification.
- Extensive use of intermediaries or layered corporate structures.
- Payment flows that are inconsistent with the physical movement of goods.
- Discrepancies between declared turnover, reported trading activity and observable business operations.

Prevention opportunities:

- Integrate financial investigation and asset tracing into environmental crime investigations from the earliest stages.
- Strengthen cooperation between environmental regulators, customs authorities, financial intelligence units and tax authorities.
- Use beneficial ownership registers and corporate intelligence to identify high-risk commercial networks operating across multiple waste and pollutant streams.
- Prioritize asset recovery, tax enforcement and licence revocation alongside criminal prosecution to increase the cost of offending.
- Develop waste-specific financial risk indicators through cooperation between enforcement agencies, financial intelligence units and the private sector to improve detection and intelligence-led targeting.

Digital platforms and intelligence opportunities

Evidence consistently identifies the digitalization of environmental crime as an emerging structural trend that is reshaping how illicit waste and regulated commodities are traded.[44] Rather than replacing traditional trafficking routes, online marketplaces and social media platforms are facilitating contact between buyers, sellers and intermediaries, reducing barriers to market entry while expanding the geographic reach of criminal networks. Digital platforms have become an integral component of some illicit supply chains, enabling the marketing and coordination of transactions involving F-gases, second-hand electronics, waste equipment, vehicle parts, recyclable materials and textile consignments.[45]

Digital platforms reduce transaction costs by allowing offenders to advertise products with limited oversight, identify buyers across jurisdictions, establish replacement accounts after enforcement action, communicate outside regulated commercial channels and bypass traditional brokerage networks.[46] Online activity therefore complements – rather than replaces – the physical logistics underpinning waste and pollution crime. Investigations into illicit HFC trade, for example, identified traders openly advertising regulated products through online marketplaces while failing to comply with statutory trader transparency requirements.[47] Similar patterns were identified in the trade of second-hand electronics, where social media and online marketplaces facilitate transactions that blur the boundary between legitimate reuse and illegal waste exports.[48]

However, the digitalization of environmental crime creates significant opportunities for intelligence collection and proactive enforcement.[49] Unlike physical shipments, online activity generates persistent digital traces that can support network analysis, identify repeat sellers and intermediaries, map commercial relationships, reveal links to registered businesses and expose emerging trafficking methods before commodities are moved. Although monitoring remains uneven across platforms and jurisdictions, open-source intelligence offers considerable potential to identify criminal networks, detect high-risk commercial actors and monitor market adaptation.[50] Rather than treating online advertisements as isolated offences, digital activity should be regarded as an early warning indicator of wider organized criminal operations.

Prevention opportunities:

- Establish systematic monitoring of online marketplaces and social media platforms used to advertise regulated commodities and waste and pollutant streams.
- Develop automated detection capabilities using multilingual keyword monitoring, image recognition and behavioural analytics to identify high-risk advertisements.
- Integrate open-source intelligence with customs, trade, financial and enforcement data to identify criminal networks, verify suspicious transactions and expose gaps in existing detection mechanisms.
- Strengthen cooperation with online platforms and relevant regulators to improve trader verification, preserve evidence and disrupt illegal listings without compromising investigations.
- Use digital market intelligence to identify emerging trafficking routes, replacement operators and changes in criminal methods before they manifest in physical supply chains.
- Engage Digital Services Coordinators – national authorities tasked with enforcing the provisions of the EU Digital Services Act – as key partners for referrals, information sharing and coordinated action on illegal listings.



STRATEGIC IMPLICATIONS FOR THE NEXT WAVE OF CRIMES

Evidence suggests that the next generation of waste and pollution crime will be shaped less by entirely new criminal business models than by the transformation and exploitation of existing vulnerabilities. Regulatory reforms, technological change, climate change, growing natural resource scarcity and the transition towards a green and circular economy are likely to create new opportunities for criminal exploitation across established and emerging commodity markets.[51] Organized crime is likely to become increasingly embedded within legitimate commercial activity, exploiting the same supply chains, digital platforms and financial systems that underpin lawful trade.[52]

For EU law enforcement, this means that future success will depend less on responding to individual waste or pollutant streams and more on identifying and disrupting the structural conditions that enable criminal markets to adapt and regenerate. Prevention will depend on anticipating emerging market pressures and reducing opportunities for criminal exploitation before waste enters illicit supply chains. The following outlines the six main structural conditions of concern.

1. Waste and pollution crime will increasingly converge with organized economic crime.

Environmental crime is becoming progressively more integrated with wider forms of organized economic crime.[53] Waste trafficking already relies on document fraud, customs offences, VAT fraud, money laundering and corporate deception to conceal criminal activity and maximize illicit profit.[54] As regulatory requirements become more complex, commercial supply chains become increasingly international and financial scrutiny increases, criminal networks may adopt less visible payment channels, more fragmented transactions and more layered corporate structures to evade detection.

Strategic implications: These changes reinforce the need to treat waste and pollution crime as an organized financial enterprise rather than solely as an environmental offence. Financial intelligence, beneficial ownership analysis and asset recovery should become routine components of environmental investigations. Closer cooperation between customs authorities, financial intelligence units, tax authorities and environmental regulators will improve the identification of criminal organizers operating behind apparently legitimate businesses and therefore increase opportunities to disrupt criminal profits as well as the illicit commodity flows. Financial risk indicators will need to adapt to new criminal methods, including the potential use of alternative payment mechanisms and more complex intermediary networks.

2. Digitalization will increase both criminal opportunity and enforcement capability.

Digital marketplaces, encrypted communications and online brokerage are likely to play an increasingly important role in facilitating waste and pollution crime.[55] These platforms reduce barriers to market entry and expand criminal networks internationally, while enabling offenders to migrate towards encrypted or less visible channels as monitoring and enforcement improve. However, digital activity creates persistent intelligence that can reveal emerging criminal networks before physical shipments occur.[56]

Strategic implications: Digital monitoring should become a core environmental enforcement capability rather than a specialist function. Systematic monitoring of online marketplaces, integration of open-source intelligence into investigations, and stronger engagement with digital platforms and National Digital Services Coordinators will enable earlier identification of high-risk actors, emerging trafficking methods and replacement operators. Investment in digital capabilities, specialist expertise and cross-platform intelligence-sharing will be essential to keep pace with changes in criminal methods and identify illicit activity before environmental harm occurs.

3. Criminal networks will continue to diversify.

Rather than specializing in individual commodities, criminal networks are likely to diversify across waste and pollutant streams, commercial assets, intermediary businesses and other criminal markets.[57] Existing commercial infrastructure can facilitate trafficking in plastics, WEEE, hazardous waste, F-gases, textiles, ELVs and, increasingly, batteries and critical raw materials associated with the green transition, while complex networks of brokers and professional facilitators obscure criminal responsibility and financial flows.[58]

Strategic implications: Investigations should focus on criminal business models rather than solely individual waste or pollutant streams. Intelligence-led targeting of repeat commercial actors – including logistics providers, shadow brokers, distributors and professional facilitators – offers opportunities to disrupt multiple waste and pollutant streams and interconnected criminal markets simultaneously. This approach also supports preventative interventions by identifying enabling infrastructure before it is adapted to emerging streams.



Workers sort discarded computer equipment in New Delhi, India. The trafficking of e-waste exploits the blurred legal distinction between reusable second-hand equipment and waste. *© Kuni Takahashi/ Bloomberg via Getty Images*

4. The green transition and circular economy will create new opportunities for criminal exploitation.

The green transition and expansion of circular economy markets will increase demand for critical raw materials, renewable energy technologies and secondary resources, while generating new waste and pollutant streams associated with batteries, solar panels and electronic equipment.[59] Growing competition for natural resources, exacerbated by climate change and geopolitical pressures, may increase opportunities for illegal extraction and the infiltration of legitimate supply chains by criminal networks.[60] Complex recycling, certification and recovery systems can create opportunities to manipulate sustainability claims, misclassify waste as reusable products and fraudulently obtain circular economy incentives.[61] Trade facilitation measures may create additional vulnerabilities if regulatory oversight fails to keep pace with expanding markets.

Strategic implications: Crime prevention should be integrated into green transition and circular economy policies from their design. Stronger supply chain traceability, certification controls and corporate due diligence will help prevent criminal infiltration of emerging markets. Collaboration between regulators, industry and law enforcement should identify vulnerabilities associated with new technologies, recycling incentives and trade facilitation before criminal practices become established.

5. Criminal markets will continue to adapt geographically.

Enforcement and regulatory reform can alter the locations and routes used for waste and pollution crime rather than eliminating it. Criminal networks rapidly exploit regulatory differences and weaker enforcement environments, using intermediary jurisdictions and indirect trade routes to circumvent restrictions.[62]

Strategic implications: Future operational planning should anticipate the displacement of illicit activities, rather than treat it as an unexpected consequence of successful enforcement. Intelligence-sharing between EU member states and with key partner countries will become increasingly important for identifying emerging transit routes, replacement hubs and changing criminal methods. Monitoring geographic displacement should become a routine measure of operational effectiveness, allowing interventions to be adapted before new trafficking corridors become established.

6. Growing market pressures and constrained enforcement capacity will widen criminal opportunities.

Rising consumption, technological expansion and climate-related demand pressures are likely to increase waste generation and demand for regulated commodities. Growth in plastics, fast fashion and AI-related electronic equipment may outpace legitimate recycling and treatment capacity, while tighter F-gas restrictions and changing agricultural conditions could increase incentives for illicit refrigerant and pesticide markets.[63] Yet constrained public finances may limit investment in specialist enforcement personnel, intelligence capabilities and the safe storage and disposal of seized materials. This growing imbalance between market pressures, legitimate waste management capacity and enforcement resources risks creating further opportunities for organized crime.[64]

Strategic implications: Prevention strategies will need to anticipate emerging waste volumes, climate-related demand pressures and changing commodity markets while ensuring enforcement capacity keeps pace with developing threats. Monitoring production trends, resource availability, commodity demand and treatment capacity can help identify future vulnerabilities and inform risk-based enforcement priorities. Sustainable investment in specialist expertise, intelligence capabilities, and legitimate waste management and disposal infrastructure will be essential to ensure that improved detection translates into effective enforcement and lasting disruption of illicit markets.



BUILDING A PREVENTATIVE INTELLIGENCE MODEL

Collectively, the developments outlined in this guide suggest that future waste and pollution crime will become increasingly commercially embedded, financially sophisticated and digitally enabled. The vulnerabilities identified throughout this assessment are unlikely to disappear; instead, they will develop alongside regulatory reform, technological change, shifting market pressures and the green transition.

This presents a strategic opportunity for EU law enforcement to move beyond a predominantly reactive model centred on seizures and regulatory compliance towards a preventative, intelligence-led approach focused on disrupting the commercial, financial and regulatory conditions that enable criminal markets to emerge and regenerate. Achieving this transition will require not only improved intelligence capabilities but also the resources, specialist expertise and operational capacity necessary to translate intelligence into effective intervention.

Central to this approach is making information-sharing a routine, structured capability rather than a supporting activity. No single organization possesses sufficient visibility across the waste supply chain to identify emerging threats independently. Environmental regulators understand compliance and licensing vulnerabilities; customs authorities observe trade flows; financial intelligence units identify suspicious financial activity; police services investigate organized criminal networks; and civil society organizations and investigative NGOs provide valuable intelligence on emerging criminal methods, markets and high-risk actors. Private sector stakeholders, in addition, hold information on commercial transactions and supply chains. Connecting these perspectives through clear information-sharing protocols, appropriate safeguards and practical feedback mechanisms will be essential to developing a more complete and actionable intelligence picture.



A waste picker collects discarded textiles at Nairobi's Dandora dumpsite. Rising demand for fast fashion is increasing the amount of textile waste sent to Global South countries as second-hand clothing.
© James Wakibia/SOPA Images/LightRocket via Getty Images

Such cooperation should support the development of shared risk indicators, earlier identification of repeat facilitators and the integration of financial, commercial and digital intelligence into environmental investigations. Equally, operational intelligence should inform regulatory design and implementation, helping to identify unintended criminal opportunities and strengthen compliance mechanisms before vulnerabilities become entrenched. Prevention strategies must also recognize that improved detection alone is insufficient without adequate enforcement resources, including the capacity to seize, store and safely dispose of illicit materials. Success should therefore be assessed not solely through seizures or prosecutions, but through sustained disruption of criminal business models and the conditions that enable their regeneration.

Ultimately, the next wave of waste and pollution crime will be shaped not only by criminal innovation but also by the ability of regulators, law enforcement, industry and civil society to identify and address emerging vulnerabilities collectively. Translating shared intelligence into a focused set of practical, coordinated prevention measures will be essential to reducing criminal opportunities, strengthening legitimate markets and preventing organized environmental crime from becoming further embedded within Europe's transition to a circular economy.

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