BROCHURE

Managing POPs:
Stakeholders in the Transport Sector

Subject to Output 4.1 of the GEF ID 10785 project titled: "Global Development, Review and Update of National Implementation Plans (NIPs) under the Stockholm Convention (SC) on Persistent Organic Pollutants (POPs)"

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This brochure was developed by Anastasiya Buchok (Senior Project Associate, GGKP, GGGI), summarizing guidance authored by Dr. Roland Weber: "Sectoral guidance for inventories of POPs and other chemicals of concern in buildings/construction, electrical and electronic equipment, and vehicles". Technical review was provided by Dr. Roland Weber, an international consultant specializing in Persistent Organic Pollutants (POPs) and National Implementation Plans for POPs reduction and control.

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Introduction

This brochure highlights stakeholders involved in the management of Persistent Organic Pollutants (POPs) in the transport sector. It is part of a series, with additional brochures exploring the electronics and construction sectors (GGKP 2024a; GGKP 2024b).

POPs present a significant global concern, especially in the transport sector, where their extensive use poses serious environmental and health risks. The effective management of POPs is critical and identifying key stakeholders in the transport sector is essential to addressing this challenge. By examining the stakeholders involved at each phase of the vehicle lifecycle, this brochure aims to help:

- Identify potential groups of stakeholders for effective POPs management and awareness raising
- Identify potential sources of POPs and period of their use in vehicles
- Identify other Chemicals of Concern (CoC) in vehicles
- Implement preventive measures and sustainable practices

This informative resource is tailored to a diverse audience within the transport sector, including:

- National focal points of the Stockholm Convention
- Policymakers and government officials involved in the NIP review and update process
- The general public
- Stakeholders in the transport industry

Join us in this journey towards a cleaner, safer construction, renovation and demolition industry. Together, we can build a future where progress harmonizes with environmental stewardship, and where every stakeholder plays a vital role in achieving this vision.

POPs in the Transport Sector: Overview

Vehicles represent a significant material flow encompassing cars, industrial vehicles, trains, ships and airplanes. Globally, there are approximately 1.45 billion vehicles, with passenger cars alone accounting for 1.1 billion. These cars contain around 200 million tonnes of plastics. Over their average lifespan of about 15 years, they collectively generate approximately 14 million tonnes of plastic waste annually, necessitating effective management within an Environmentally Sound Management (ESM) framework.

While valuable metals like ferrous and non-ferrous metals, including precious metals, are extensively recovered through formal and informal recycling processes, plastics and synthetic textiles within vehicles are often overlooked and end up as automotive shredder residues (ASR), amounting to roughly 300 kg for a midsize car, including POP plastic additives.

Recognising the imperative to transition towards a more circular economy and enhance resource recovery, there is a growing need to improve the reuse, recycling and recovery of plastics and other polymers from vehicles, as mandated by the EU Directive on end-of-life vehicles (European Commission 2023; European Union 2000).

Enhancing recovery and recycling rates requires careful attention, as vehicles contain a range of hazardous chemicals, including POPs and other CoC found in certain plastics and synthetic textiles. Meticulous consideration and environmentally sound management are essential to prevent contamination.

While most POPs literature often focuses on stakeholder engagement for inventory development, this brochure goes beyond the data collection exercise. It examines key stages of a vehicle's lifecycle, involving both direct and indirect stakeholders for comprehensive POPs and other pollutant management and awareness raising.

The subsequent sections offer an overview of the areas of application, products, materials and substances in the transport sector that utilizes or contains POPs (*Table 1*); the periods of use of POPs in the sector (*Table 2*); relevant groups of stakeholders throughout the lifecycle of transport (*Table 3*); and other CoC present in vehicles (*Table 4*).

POPs in the Transport Sector: Areas of Application

Table 1: Overview of the areas of application, products, materials and substances in the transport sector that utilise or contain POPs

POPs	Application
C-pentaBDE (tetraBDE and pentaBDE)	Flame retardants in PUR foam (seats, head rest) and textiles in a share of vehicles produced in the United States before 2005.
C-decaBDE	Private and public means of transport: fabric, reinforced plastics, under the hood or dash polymers (terminal/fuse block, higher amperage wire and cable jacketing (sparkplug wire), electrical and electronic equipment, harnesses, power cords, trim components, some acoustic material, seat belts, seat covers, cooling fans and hoses, heat shrinking tubing, fuel systems, tunnel insulations, and sealing. Maritime and astronautics: electrical wiring and cables, electric and electronic equipment, air ducts for ventilation systems, electrical ducts and fittings, switches and connectors, adhesive tape, composite materials (epoxy).
HBCD	EPS/XPS insulation in refrigerator trucks. Minor use in transport textiles (seat or floor covering)
SCCPs and MCCPs	Plasticizer and FR in cables and other PVC and rubber parts in vehicles. Textile finishing as flame retardant and water-repellent agents for back-coated textiles, including seating upholstery in transport applications, and interior textiles such as blinds and curtains.
PFOA, PFOS, PFHxS	Side-chain fluorinated polymers in textiles and carpets; impurity in fluoropolymers, used in wiring, tubing, piping, sealing, gaskets, cabling), O-rings, V-belts and plastic accessories for car interiors, raw materials for components such as low-friction bearings and seals.
PCBs	Used in brake fluids, coolants in cars. Contained in capacitors installed in electrical equipment of the vehicles, e.g. in lighting and headlamps.*
Dechlorane Plus	Used as non-plasticizing flame retardant in thermoplastic and thermosets. Can be contained in plastics in vehicles (wire and printed circuit board) and aviation (e.g. cabin interior panels, ducting, engines).**
UV-328	Used in optical polarizing plate and polarizing film for liquid panels and meters mounted in vehicles, paints, resin for interior and exterior parts (e.g. door handles, levers, bumpers and grill).

* Used in transport sector before 1990. Only cars produced before 1990 and automotive shredder residues are subject to consideration.
** Vehicles and airplanes are exemptions for use of Dechlorane Plus limited to replacement of parts, repair, articles in aerospace and motor vehicles.

POPs in the Transport Sector: Period of Use

In the transport sector, POPs, such as c-decaBDE, SCCPs, PFOA, Dechlorane Plus and UV-328 have been used from the 1950s to present. While the use of most POPs has been restricted, assessing their presence in older vehicles, modes of transport and those entering the waste stream remains a critical public policy priority.

Engaging stakeholders in the context of POPs application in the transport sector requires an understanding of the historical periods when these chemicals were used in vehicle production. Identifying the timeframes of POPs use is crucial for pinpointing relevant stakeholders and supporting effective data collection and inventory efforts.

For POPs no longer in use, efforts should focus on assessing their current in-use stock and managing waste and recycling processes. For POPs still in use, a comprehensive lifecycle assessment is necessary, covering design and production, operation and maintenance, repair and end-of-life stages where POPs may be present. Understanding the period of use ensures that vehicles produced during these times are included when identifying the stakeholders. *Table 2* provides a summary of POPs usage periods in the transport sector.

Table 2: Overview of the periods of use of POPs in the transport sector

Chemical	Current use	Former use	Period of use
C-decaBDE			1970s to present
C-pentaBDE (tetraBDE and pentaBDE)			1970s - 2000s
HBCD			1970s - 2010s
SCCPs (and MCCPs)			1970s to present
PCBs			1950s - 1970s
PFOA and PFOA-related compounds			1970s to present
PFOS and PFOS-related compounds			1970s - 2010s
PFHxS and PFHxS-related compounds			1970s - 2020s
Dechlorane Plus			1960s - 2020s
UV-328			1970s to present

Source: GGKP (2024c)

Use of chemical

POPs in the Transport Sector: Why Stakeholders?

POPs that are still used in the transport sector include c-decaBDE, SCCPs, PFOA, Dechlorane Plus and UV-328. Effective management of these chemicals in public and private transport requires considering all key lifecycle stages: design and production, operation and maintenance, repair and end-of-life stages. This comprehensive approach ensures the identification of all stakeholders involved. Recognizing stakeholders at each stage is not just a bureaucratic exercise; it is an essential step in ensuring the safety and sustainability of transport systems.

Here is why it matters:

Mitigating health and environmental risks
Identifying stakeholders across the vehicle lifecycle – from designers, regulators, importers and retailers to those unaware of POPs in transport – allows for a comprehensive assessment of the potential risks associated with POPs and extended coverage for outreach. This understanding helps tailor preventive measures to minimize health hazards and environmental contamination effectively.

Regulatory compliance
Various regulations, such as the Restriction of Hazardous Substances (RoHS) and multilateral environmental agreements (MEAs), govern the use of POPs in transport and other sectors. Defining stakeholders helps in ensuring compliance with these regulations reducing legal liabilities.

Transparency and accountability
Clearly defining stakeholders fosters transparency in the transport sector. It ensures that everyone involved is aware of the presence and consequences of POPs, promoting collective accountability for their safe handling, and protection of the environment and human health.

Effective communication
Effective stakeholder management facilitates communication between different parties. This open dialogue enables the sharing of knowledge, best practices and safety protocols related to POPs, ultimately enhancing the efficiency of the Stockholm Convention on POPs and other MEAs.

Sustainability and reputation
In today's environmentally conscious world, sustainable transport and vehicles are highly valued. Engaging stakeholders in POPs and other CoC management aligns with sustainability goals, enhancing the industry's reputation and attracting environmentally responsible partners and clients.

POPs in the Transport Sector: Who Are the Stakeholders?

Table 3 below provides an overview of potential stakeholders directly and indirectly involved in POPs use and management throughout the key stages of the lifecycle of vehicles. Those entail design and production, operation and maintenance, end of life and recycling.

Table 3: Relevant groups of stakeholders throughout the lifecycle of transport

Throughout the Lifecycle	• Ministry of Transport, Ministry of Health, Ministry of Environment and Climate Change, Ministry of Gender, Children and Social Protection • Environmental agencies, Disaster management agency • Community and neighborhood groups • Environmental NGOs • Indigenous people • Youth, women and other gender groups • Civil society organizations

Design and Production	Operation and Maintenance	End of Life and Recycling

• Regulatory Bodies and Authorities
  ◦ Ministry of Defense, Ministry of Science
  ◦ Regulatory bodies and local government agencies that provide permits and ensure compliance with transportation standards
• Procurement and Supply Chain
  ◦ Procurement teams
  ◦ Importers and retailers of raw materials potentially containing POPs
  ◦ Supply chain organizations and companies
• Research and development institutions
• Engineers and designers
• Storage facilities for materials and products containing POPs
• Companies manufacturing cars, air craft and components for military transport
• Manufacturing facilities workers
	• Transport Service Operators
	  ◦ Private companies or public agencies operating transportation services, such as airlines, railways, bus and ships companies
	  ◦ Maintenance and repair companies responsible for keeping public transport in good condition
	  ◦ Transport associations
	  ◦ Car service centres for private vehicles' owners
	• Employees in operation, service and maintenance of transport (cabin crew, drivers, engineers etc.)
	• Transport regulation authorities
	• Research institutions
	• Individual owners of vehicles
	• Passengers and commuters
		• Industry and Technical Service Providers
		  ◦ Dismantling and separation facilities
		  ◦ Scrap yards
		  ◦ Shredder facilities
		  ◦ Traders of plastic recyclables
		  ◦ Recycling facilities
		  ◦ Waste management companies
		  ◦ Transport manufacturers
		  ◦ Materials and parts buyers
		• Vehicles owners and operators (both private and public)
		• Organizations providing accreditation to recycling companies ensuring high standards of environmental responsibility and safety
		• Workforce
		  ◦ Individuals employed in collection, dismantling, separation, recycling and overall waste management
		  ◦ Labor unions

Other Chemicals of Concern: Transport Sector

POPs are only a part of pollutants in the transport sector that need to be managed in an environmentally sound manner. A range of other chemicals of concern (CoC) are present in the vehicles/transport sector, which are listed under other MEAs and/or SAICM. Please consult the sectoral guidance for details on these CoC (GGKP 2024c). In addition, a large amount of plastic and other polymers, as well as other pollutants (e.g. waste oils, gasoline, lithium batteries, and tires), need to be managed in end of life. A Practitioner's Guideline on Depollution on End-Of-Life Vehicles has recently been published (SPREP 2023), and the Stockholm Convention BAT/BEP guidelines for "Shredder plants for the treatment of end-of-life vehicles" have been updated (UNEP 2022).

Table 4 provides an overview of selected CoC, and their major use in the transport/vehicle sector as a basis for their consideration. The collection and evaluation of data on the presence of CoC in the transport sector, coordinated with POPs inventory activities, could serve as a basis for (future) integrated sector-specific management of pollutants.

Table 4: Selected CoC (other than POPs) in vehicles related to MEAs or SAICM

CoC	MEA or SAICM	Short description	Use in vehicles	Relevance
Lead	Lead acid battery activities under Basel Convention; Lead in paints is an SAICM EPI	Lead is a toxic metal that causes adverse effects at very low levels; in particular, neurodevelopment disorders in children	Lead-acid batteries; solder	High
Mercury compounds	Minamata Convention	Harms the nervous system, brain, heart, kidneys. Impacts neurodevelopment	Used in lamps, four-wheel drive anti-lock braking systems (ABSy) and high intensity discharge (HID), active ride control systems (mainly before 2004)	High (for vehicles produced before 2004)
CFCs, HCFCs, HFCs	Montreal Protocol; UNFCCC	Ozone depleting substances; GHG	HFC 134 was widely used as refrigerant for air conditioning in vehicles, high GHG potential	High
Other PFASs (not POPs)	SAICM issue of concern	Very persistent, very mobile (compounds or degradation products)	Additive to electrolyte in lithium-ion batteries; side-chain fluoro-polymers in textile/carpet; NIAS in fluoropolymers (and thermal degradation products)	Medium
Halogenated organo-phosphorous flame retardants (OPFRs)	SAICM EPI*	Certain halogenated OPFR are carcinogen or toxic for reproduction	Major flame retardants in textiles and PUR foam	High

* https://saicmknowledge.org/epi/hazardous-chemicals-electronics

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