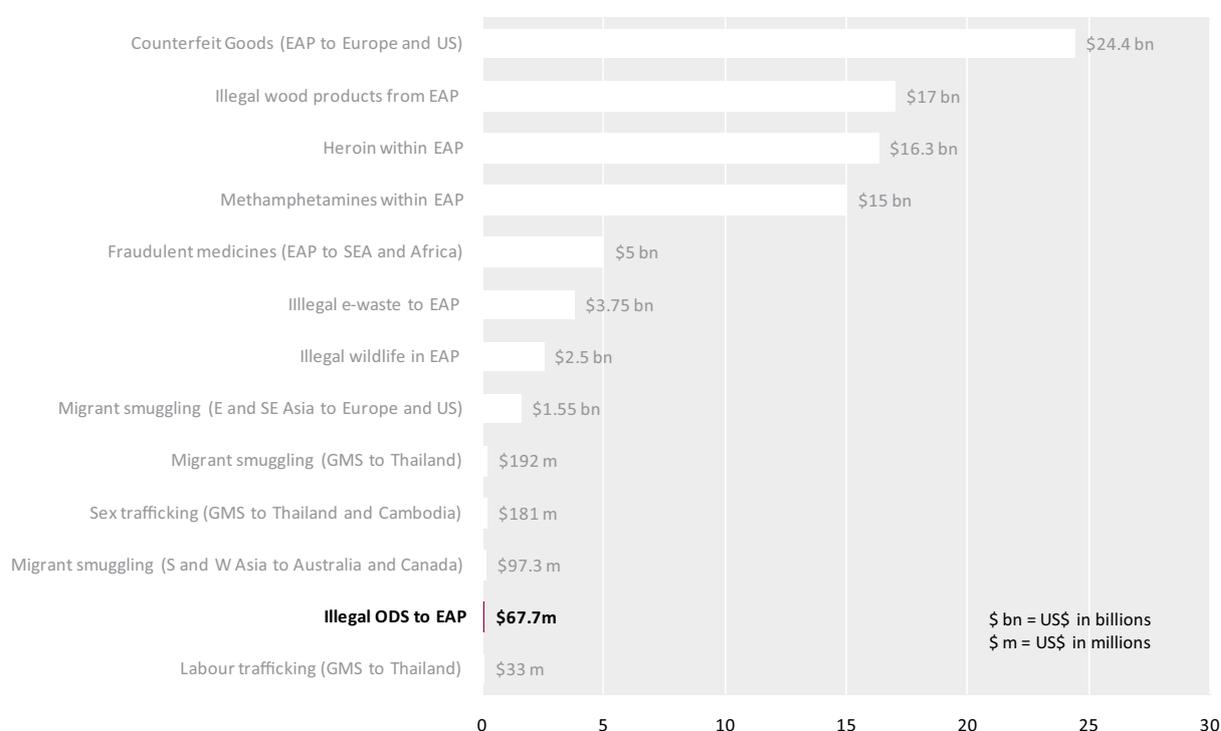


# Chapter 10

## Illicit trade in ozone-depleting substances (ODS) from East Asia to the world



*This chapter has been developed with the kind contribution of the United Nations Environment Programme.*

## NATURE OF THE THREAT

<p><b>1. Environmental disruption:</b> pollution of soil and water systems, emission of greenhouse gases, thinning of ozone layer, negative impact on marine and forest ecosystem by ultraviolet radiations.</p>	<p><b>2. Negative impact on human health:</b> toxic metals and ultraviolet radiations affecting immune, respiratory and digestive systems, including high risk of skin cancer and eyes diseases.</p>
<p><b>3. Socio-economic impoverishment:</b> increase costs for public health, reduced agriculture productivity, food insecurity and poverty.</p>	

### 1. What is the nature of this market?

All life depends on the ozone layer to shield the planet from harmful ultraviolet radiation. In the 1980s, global concern over the thinning of the ozone layer, caused by emissions of a range of chemical gases, led to the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987. This landmark multilateral environmental agreement regulates the gradual phase-out of ozone-depleting substances (ODS). These are principally chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) (which are mainly used for refrigeration and air-conditioning), halons (used for fire-fighting) and methyl bromide (used as a crop fumigant).

While the Montreal Protocol has rightly been hailed as a major success in terms of tackling ozone layer depletion, it has been partly undermined by the illegal trade in ODS. In creating a phase-out system with differing schedules between developed (Article 2 countries under the treaty) and developing countries (Article 5), the architects of the protocol unwittingly created the conditions for the emergence of a black market in ODS.

Illegal trade involves brokers diverting ODS which are produced in countries with longer phase-out schedules onto markets where ODS import and use is more strictly regulated but where demand remains steady. The first cases of illicit trade involved CFCs. Production of CFCs was halted in developed countries in the mid-1990s and imports were banned, except for used CFCs. Yet due to the large installed capacity of equipment which is reliant on CFCs, demand in the United States and in the European Union remained buoyant. While CFC production was winding down in developed countries, it was rising dramatically in developing countries, notably China and India. Such supply and demand conditions created opportunities for brokers to step in. And the illegal trade began.

In response to this threat, the Montreal Protocol put in place a licensing system for ODS in 1997 to further regulate trade. Significant efforts have also been undertaken to train customs officials and environment officials in combating ODS smuggling. Nonetheless, despite such efforts the illegal trade in ODS continues to be a threat, especially in East Asia and the Pacific, where both production and consumption of ODS is still present.

#### *The Impact of Ozone Layer Depletion*

The ozone layer is formed by a band of ozone molecules in the stratosphere. This layer effectively screens the Earth from harmful ultraviolet radiation. Chlorine and bromine particles contained in ODS react with the stratospheric ozone when emitted, causing thinning of the ozone layer. One manifestation is the so-called ozone hole which emerges over the South Pole during the austral spring. In 2011, the southern hole peaked in September, extending over 10 million square miles, the ninth biggest ozone hole on record.<sup>1</sup>

Ozone layer depletion has a series of adverse impacts on the environment and health:

- **human health:** increased ultraviolet radiation suppresses the immune system, damages eyes including cataracts, and increases the risk of skin cancer
- **marine ecosystems:** increased ultraviolet radiation reduces the productivity of small organisms such as plankton which form the base of the marine food web
- **terrestrial ecosystems:** increased ultraviolet radiation affects the yield of a host of crops as well as impacting forest ecosystem.

In addition to damaging the ODS layer, some ODS are potent climate change gases. The Montreal Protocol has delayed global warming by an estimated 7-12 years by reducing greenhouse gas emissions by 135 billion tonnes of carbon dioxide equivalent between 1990 and 2010.

The current global demand for illegal CFCs and – increasingly – HCFCs is not for manufacturing purposes, but rather for refrigeration and air-con servicing. The phase-out process is based on the ozone-depleting potential of the different chemicals in terms of the severity of their impact on the ozone layer. The first category to be phased out was CFCs, which were widely used for refrigeration and air-conditioning. CFCs were followed by halons, then methyl bromide and then HCFCs. The latter had been seen as a transitory replacement for CFCs due to their lower ozone depleting potential.

<sup>1</sup> UNEP OzonAction 2001

Initially the main source for CFCs smuggled into the US was Russia, but by 1997 China began emerging as a significant source, for both CFCs and halons. The European Union's phase-out of CFCs also prompted illegal trade in ODS. The main focus of the illegal trade was CFC12, widely used for servicing refrigeration and air-conditioning. The profitability of this black market was high. One kilogram of CFC could be bought from a broker in China for US\$2. But when smuggled into the EU, the price could reach US\$15. In the US, the price could be up to US\$30.<sup>2</sup>

As the initial phase-out controls came into force in developing countries in 1999, incidences of illegal trade began emerging, especially in South Asia and East Asia. By 2005, seizures of contraband ODS had occurred in India, the Philippines, Indonesia and Thailand, with China being the main source.<sup>3</sup> By 2006 it was estimated by UNEP that up to 14,000 tonnes of CFCs, worth up to US\$60 million were being smuggled into developing countries every year.<sup>4</sup>

The scale of illicit trade in CFCs has fallen in recent years, principally as a result of China – the world's largest producer in the 2000s – ceasing almost all production in 2008. By 2010 the final phase-out of CFCs occurred worldwide, although cases of illegal trade have persisted.

Yet a new enforcement challenge has arisen. There is now a growing illegal trade in HCFCs. In 2007 parties to the Montreal Protocol agreed to accelerate the phase-out of HCFCs due to the negative impacts of this class of ODS on both the ozone layer and the climate. Cases of illegal imports of HCFCs into the United States have been rising since 2009. There are concerns of a substantial risk of illegal trade in HCFCs and technology dumping occurring in developing countries once relevant phase-out deadlines begin in 2013 and end in either 2020 or 2030.<sup>5</sup>

The overlap between ODS and e-waste is one sub-category of electronics, known as "white goods" such as refrigerators, air conditioners and similar

equipment, which contain ODS and become e-waste when they reach end-of-life stage. Environmentally-sound management of these end-of-life products is important not only to avoid or reduce adverse health and environmental impacts but also mitigate climate change impacts.

## *2. How is the trafficking conducted?*

The main response under the Montreal Protocol to the threat of illegal trade has been the implementation of an ODS licensing system. This was agreed in 1997 and became effective in 2000.<sup>6</sup> Under the terms of the system countries are obliged to licence firms importing ODS, with a recommendation that exports are also licensed. This requires that companies wanting to import ODS obtain a licence from the national ozone unit. While the system is extremely useful for quickly identifying companies trying to illegally import ODS without a licence (so-called front door smuggling), and in managing imports through a quota system, it does not capture imports mis-labelled as non-ODS.

The effectiveness of the licensing system has also been reduced by a failure to mandate cross-checking between different countries. This leads to a situation whereby an exporting company can be licensed by its national authority to ship ODS to a customer in a second country which does not have an import licence.

China has been the single largest source of contraband ODS. These were principally CFCs until the final phase-out in 2010. It is predicted that there will be an increase in the illicit movement of HCFCs. This is because China is currently the largest producer of ODS in the world. At the peak, in 1998, China was producing some 55,000 tonnes of CFCs a year. However, after undergoing an accelerated production phase-out by 2007, only one CFC plant remained operational, producing just 550 tonnes per year.<sup>7</sup> Yet while CFC production has declined, China's production of HCFCs has risen dramatically.<sup>8</sup>

While the bulk of ODS manufactured in China is traded legally, due to its prominence as the major

<sup>2</sup> RIIA 2002

<sup>3</sup> EIA 2005

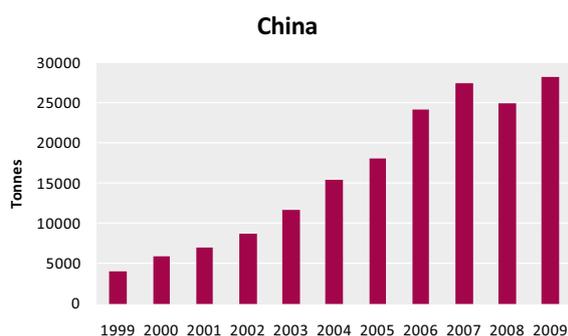
<sup>4</sup> UNEP 2007

<sup>5</sup> Depending on whether the state party is operating, respectively, under Article 2 of the protocol or Article 5. See also UNEP and EIA 2011.

<sup>6</sup> UNEP 1999

<sup>7</sup> The World Bank 2007

<sup>8</sup> UNEP Ozone Secretariat Article 7 Data Reporting.

**Figure 1: HCFC production in China 1999-2009**

Source: Ozone Secretariat of the Montreal Protocol

producer, it is inevitable that China will remain a major source for most of the illicit CFCs and HCFCs diverted to black markets, as shown by seizure records.

Since 2005, the main destinations for illegal shipments of CFCs from China have been Thailand, Indonesia, the Philippines, as well as the Middle East. The main destinations for illicit HCFCs are the United States, Southeast Asia, Taiwan (Province of China), India, the Middle East and Europe.

In 2006, the Regional Intelligence Liaison Office for Asia Pacific (RILO-AP), at the request of China Customs, coordinated the Operation Sky-Hole Patching. Its aim was to target smuggling of ODS and hazardous waste. Between September 2006 and October 2007 the operation led to the seizure of 154 tons of ODS in 27 shipments. Thailand recorded the largest number of seizures, with 65 tons of CFCs and HCFCs. This was followed by China with 51 tons of CFCs and HCFCs, then India with 30 tons of HCFCs and the Philippines with 5 tons of CFCs.<sup>9</sup> Although Sky-Hole Patching became a routine operation after November 2007, ODS seizures continued to be reported by RILO-AP members. In total, between September 2006 and November 2009, 301 cases of ODS smuggling occurred weighing 728 tons, with 99% of the contraband being CFCs.<sup>10</sup> Seizures occurred in China, Indonesia and Thailand.

In 2010, the Sky-Hole Patching concept was adopted by the United Nations Environmental Programme and the World Customs Organisation which coordinated a six-month global enforcement operation against ODS smuggling. During the

<sup>9</sup> RILO-AP 2007.

<sup>10</sup> RILO-AP 2010.

### ***BOX: ODS Smuggling Methods***

#### **False Labelling:**

ODS are smuggled in cylinders or packaging labelled as legal products. Initially cases emerged of CFCs being packaged as HCFC-22 (at a time when HCFCs were not subject to controls). As licensing systems came into force and all ODS were flagged by customs, smugglers switched to concealing CFCs in cylinders labelled as HFC-134a, a non ozone-depleting alternative. In some instances this contraband was actually sold as HFCs due to the higher market prices compared with CFCs. Recently illicit shipments of HCFCs have been falsely labelled as HFCs.

#### **Mis-declaration:**

ODS are disguised by putting the names of other similar, legal chemicals on shipping documents and invoices. This method is often combined with “double-layering”; filling a shipping container with cylinders of illegal ODS except for a layer of the legitimate chemical stated on the Bill of Lading next to the container door. cursory inspection will fail to uncover the ODS at the back of the container.

#### **Fake recycled material:**

Trade in recycled ODS is less regulated than for virgin CFCs. Smugglers claim the material is recycled on shipping documents and permits, when in fact it is virgin chemicals. The suppliers may even deliberately add a small amount of contaminant to the virgin chemical to make it appear the material has been used, should it be tested. It is likely that smugglers will attempt to import back market HCFCs using this ruse again.

#### **Concealment:**

ODS are simply hidden in ships, cars, or trucks and moved across border. This method usually involves small quantities, but is lucrative and the overall volume can be significant.

#### **Transshipment fraud:**

Consignments of ODS ostensibly destined for legitimate end markets are diverted onto black markets. This type of fraud often involves complex shipping routes, passing through transit ports and free-trade zones where customs procedures may be more relaxed.

operation, 108 tons of illicit ODS were seized, mainly in the Asia and Pacific region (including India), with Thailand alone intercepting 26 tons of ODS.<sup>11</sup>

These seizure data provides useful insight into flows of illicit ODS. In China 19 of the 21 seizures were made by customs in Shanghai, Ningbo and Hangzhou. This is due to the strong clustering of China's ODS factories in the eastern province of Zhejiang, which is also home to many ODS brokerage operations. Both Ningbo and Hangzhou are located in Zhejiang, which borders Shanghai. The bulk of illegal shipments of ODS from China are exported via Ningbo and Shanghai container ports. The vast majority of the seizures have involved consignments of ODS packaged in 13.6 kg disposable cylinders, rather than bulk isotanks. While large bulk shipments of ODS require facilities for repackaging, these small cylinders are attractive to smugglers as they can then be sold on the market relatively easily.

One puzzling aspect of the seizure data is the continuing prevalence of CFCs. Production of virtually all CFCs was halted in China by 2008, and the final global phase-out occurred in 2010. Yet CFCs continue to appear on the black market. Possible explanations include stockpiling prior to the production halt, or the existence of unregulated illicit production facilities. Several such plants have been discovered and dismantled in China.<sup>12</sup>

Most instances of ODS smuggling involve transport in shipping containers. Smaller vessels are occasionally used. In 2010 authorities in Taiwan (Province of China) seized 40 tons of illicit CFCs and HCFCs transported in specially adapted fishing vessels from mainland China.<sup>13</sup> Smuggling by road also takes place. In June 2011 Thai customs intercepted 574 cylinders (13.6 kg each) of CFC12 smuggled across the border from neighbouring Lao PDR.<sup>14</sup>

A range of techniques are used to smuggled ODS, mainly mis-declaration, false labelling, and concealment (see Box: ODS Smuggling Methods).

<sup>11</sup> WCO and UNEP 2010

<sup>12</sup> RILO-AP 2010

<sup>13</sup> ITRI 2010

<sup>14</sup> UNEP Regional Office for Asia-Pacific, communication, June 2011.

Analysis of prosecutions for illegal import of HCFCs in the United States provides information on the techniques adopted. In two cases, Florida-based companies imported significant amount of HCFCs by transshipping them from China via an off-the-shelf company in the Dominican Republic to disguise the origin of the shipment<sup>15</sup> or via Caribbean islands to avoid detection.<sup>16</sup>

Another aspect of ODS smuggling in the East Asia and Pacific is illicit trade in counterfeit refrigerants, whereby branded cylinders labeled as HFC134a (a legal refrigerant) are found to contain a mixture of chemicals, such as CFCs, HCFCs and HCs. Cases have been detected in Africa, Latin America, the Middle East and Asia Pacific.<sup>17</sup> Contaminated mixtures found in counterfeit products can pose a threat to the safety of servicing technicians. For example, in 2011, three cases occurred where refrigerated containers exploded in Brazil and Vietnam, killing three people. While the precise causes for the explosions are still under investigation, preliminary analysis appears to confirm suspicions that the cause of the explosions was contaminated gas; a mixture of R-134a (legal refrigerant) with the counterfeit refrigerant R-40 was identified, with the latter blamed for the explosion.<sup>18</sup>

### 3. Who are the traffickers?

As the world's largest manufacturer of ODS, China is the origin of much of the illicit CFCs and HCFCs traded within the East Asia Pacific region and beyond. The main production facilities are clustered in the province of Zhejiang, with a group of around 10 companies dominant in the sector. While these large companies usually have export

<sup>15</sup> A Miami-based trading company dealing in commodities including refrigerant gas was found guilty of importing 418 tonnes of HCFCs in 11 separate shipments. The firm was set up in 2007, and began illegally importing HCFCs in the same year. The company used a web of connections to sell the refrigerant gas on to distributors in Florida and beyond. Source: US Attorney's Office for the Southern District of Florida Press Release, 11 February 2010.

<sup>16</sup> A major case came to light in 2009. A Florida-based company was found guilty of importing 29,107 cylinders containing 418 tons of HCFC-22 in 11 separate shipments with a market value of almost \$4 million. Although the shipments originated in China, the US importer transhipped the contraband via a Caribbean island to avoid detection. The head of the company was sentenced to 30 months imprisonment and ordered to return US\$1.3 million from the proceeds of the crimes. Source: US Attorney's Office District of Florida, Press Release, 11 February 2010.

<sup>17</sup> UNEP and EIA 2011

<sup>18</sup> UNEP ROAP 2012

sales departments and deal directly in legitimate trade with customers around the world, illegal trade usually involves smaller brokers who obtain supplies of ODS from manufacturing facilities and divert it onto the black market.

Some of these brokering operations, which are usually run by a handful of people, have been involved in trading ODS for at least a decade and specialise in refrigerants, even having facilities to decant ODS from bulk containers into smaller cylinders. Others are more opportunistic and offer ODS amongst other commodities as general import and export operations. These brokers tend to have less history in ODS trade and function as classic middlemen between producers and buyers.

In addition to Chinese-based brokers, similar operations exist in trading centres such as Singapore and the United Arab Emirates. Both of these hubs have been used to repackage and mis-declare consignments of ODS originating in China. Use of free trade zones helps to obscure the origin of the chemicals and to divert shipments.

Analysis of seizures made in the Philippines and Indonesia show that importers of ODS are often fake companies with no legal registration and fictitious addresses. One study carried out in Indonesia into imports of ODS found a host of importing companies whose stated offices in shipping documents proved to be false.<sup>19</sup>

In general most importers of illicit ODS have legitimate refrigeration businesses as well. Through networks of business contacts, these importers are able to sell the disposable cylinders of ODS onto end users in sectors such as servicing of refrigeration equipment and automobile air-conditioning.

The illegal trade in ODS also exhibits evidence of transnational criminal networks spanning different continents and nationalities. Some of the relationships between individuals in these networks are long-standing. For instance, analysis of the foiled attempt to smuggle 39 tons of “recycled” CFCs from China to Russia revealed the involvement of individuals in three countries, some of which have been conducting illicit trade in ODS since the mid-1990s.

<sup>19</sup> Institut Teknologi Bandung 2003

#### 4. How big is the flow?

During the first phase of illegal trade of ODS in the mid-1990s, it was estimated that up to 38,000 tons of CFCs were being traded illegally every year, equivalent to 20% of legal commerce and worth up to US\$500 million. At this time, a single shipping container of CFCs smuggled into the United States could yield profits of \$250,000 due to price differentials between the amount paid to buy CFCs in countries like China or Russia and the high market price in the United States due to import taxes.<sup>20</sup>

By 2006 smuggling of ODS into developed countries in Europe and the United States had declined, but it had grown in developing countries.

The current magnitude of the flow of illicit ODS in East Asia and the Pacific can be estimated from the analysis of seizure data. The Sky-Hole Patching Operation in East Asia between 2006 and 2010 is reported to have conducted 51 seizures of illegal ODS totalling approximately 730 tons – an average of 183 tons seized per year.<sup>21</sup>

Based on an estimated 5% seizure rate, this would translate into 3,660 tons of illegal ODS flowing from and within the East Asia region on an annual basis.

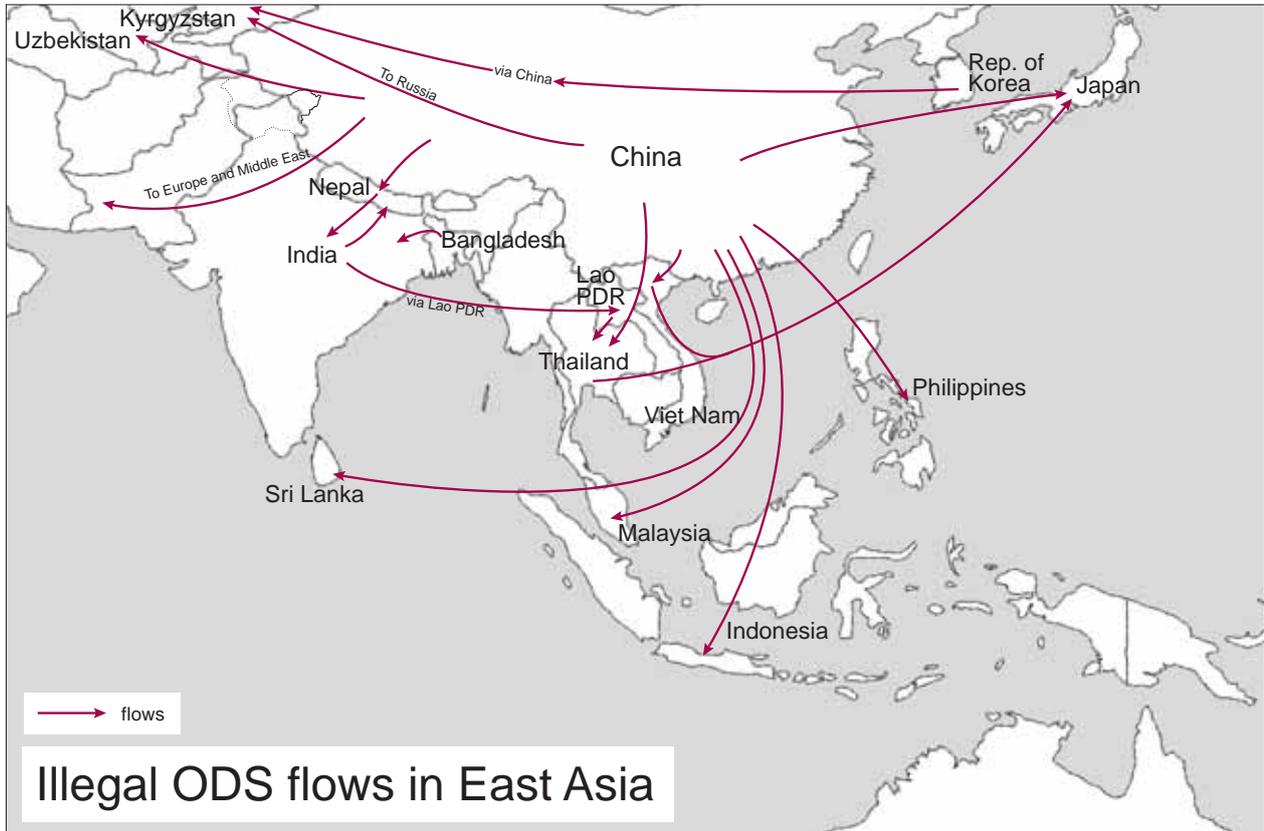
Based on a range of sources, the price of CFCs and HCFCs in China is between US\$2.5 and US\$4.5 per kg. In Europe and the United States the market price for CFCs and HCFCs from China varies from US\$9 to US\$31. An average would be US\$18.5 per kg.<sup>22</sup>

Based on the flow volume of 3,660 tons per year from East Asia, the total value based on average gains of \$18.5 per kg is around **US\$67.7 million per year.**

<sup>20</sup> RIIA 2002

<sup>21</sup> RILO-AP 2010a

<sup>22</sup> Price for HCFC offered by Chinese companies is US\$2.5 to US\$4 per kg. (Source: EIA monitoring of e-commerce websites such as Alibaba between April 2010 and February 2012); US market price for HCFC22 is around US\$30 per kg; price paid for end-users of HCFC22 in Europe in 2009 was US\$25. The US prosecution of Kroy Corporation suggests US\$9 per kg. (Ref: US Attorney's Office for the Southern District of Florida, Press Release, 11 February 2010). Note that this figure is based on the highest global market price in US/Europe. Profitability in markets within East Asia and the Pacific such as Indonesia, the Philippines and Thailand will be substantially lower.



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Source: UNODC elaboration based on information from UNEP 2007 and EIA 2011a