

Understanding and Mitigating the Impacts of Illegal CFC-11 Use in the Production of Polyurethane Foams

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- Independent charity founded in 1984 that investigates and campaigns against environmental crime and abuse.
- Four programme areas: Climate, Forests, Oceans, Wildlife
- Almost three decades of experience working with international bodies, governments, enforcement agencies and industry to tackle illegal trade in refrigerants.





EIA Investigation

- EIA contacted 25 companies in the PU foam production business
- 18 companies (17 rigid foam/raw material producers and one blowing agent seller) in 10 provinces confirmed use of CFC-11
- Four onsite visits to PU foam factories in Hebei – 3 claimed CFC-11 was used in over 90% of their products, one stated 70-80%.
- Primarily used in construction especially cold storage
- CFC-11 widely produced by small underground factories in Hebei, Shandong and Inner Mongolia
- Four flexible foam producers denied using CFC-11



Location of Enterprises Confirming CFC-11 Use



Lab Tests

- PU foam samples from three companies:
 - Dacheng Aoyang Chemical Co. Ltd.
 - Dacheng Shengshi Tianchuang Chemical Co., Ltd.
 - Dacheng Desheng Chemical Co., Ltd.
- Independent laboratory testing using mass spectrometry analysis confirmed presence of CFC-11 blowing agent in all three samples
- HCFC-141b and HFC-245fa were not detected in the samples

Dacheng Aoyang Chemical Co. Ltd





Image taken at Dacheng Aoyang Chemical Co.Ltd of raw materials used to produce blowing agent.

- Stated CFC-11 is used in 90% of their production (capacity of 100 tonnes/day)
- R11 factories shady, hidden operations in Inner Mongolia, regularly change location
- Claimed to have 100s of tonnes of CFC-11 stockpiled
- Exporting CFC-11 in polyols avoids customs control

Dacheng Shengshi Tianchuang Chemical Co. Ltd.

- Claimed to produce CFC-11 themselves in factory based in Inner Mongolia
- Have exported through a trader to North Korea and Mongolia
- Stated 100% of their white agent production is using CFC-11







Dacheng Shengshi Tianchuang Chemical Co. with a board declaring itself as a "Farming Plant" to disguise CFC-11

Dacheng Desheng Chemical Co., Ltd.



- Claimed to be by far the largest supplier of formulated polyol in the region
- Use CFC-11 in up to 95% of their production
- "F-11 is cost effective."

Government & Independent Corroboration

- New York Times investigation (25 June 2018) identified CFC-11 use in foam insulation in buildings & refrigerators
- 2016: Shandong environment official report "currently there is still a large volume of illegally produced CFC-11 being used in the foam industry".
- 2017 presentation by refrigeration expert: "Currently the most frequent usage of ODS in cold chain industry is CFC-11 as PU foam blowing agent for cold storage and pipe insulation."
- China Enforcement Actions
 - 2010 to 1st half of 2018 14 cases involving illegal production of CFC-11, 84 T of illegal CFC-11 destroyed and production facilities dismantled, fines imposed on four enterprises for illegal CFC-11 use
 - Since EIA's report, 1172 related enterprises were inspected, CFC-11 identified in some batches of material in 10 PU pre-blended polyol enterprises. Local EPBs filing charges.
 - August 2018: two illegal CFC-11 production sites in Liaoning and Henan province. 177.6 tonnes of raw materials and 29.9 tonnes of CFC-11 confiscated.

Estimate of CFC-11 Emissions & Bank – Basis of Calculation

- 1. Widespread (70%) use of CFC-11 in China's PU rigid foam production
- 2. Size of China's rigid PU foam market 1.7MT in 2012 incr to 2.7 MT in 2015 (incr 8.2% CAGR 2016 onwards)
- 3. Spray foam is 11% of the rigid PU foam market
- 4. Emissions on production of the foam 25% for spray foam and 5% for other rigid PU foams
- 5. CFC-11 comprises 10% of the finished foam by weight



EIA Estimate: Potential CFC-11 Emissions & Bank



Figure 2: EIA calculations of the potential emissions and bank of CFC-11 created from the illegal use of CFC-11 in China, based on the assumptions described above.

- 2014-2016 average annual CFC-11 emissions of 12,972 tonnes
- 2013-2017 average annual new bank of CFC-11 in foams of 166,000 tonnes

Bank 2013-17 almost 4GtCO₂e of CFC-11

Key Areas of Uncertainty

- 1. Emissions from the CFC-11 bank pre-illegal use and post (did illegal use occur before the phase-out of CFCs)?
- 2. Size and format of China's PU foam sector
- 3. Proportion of China's PU foam sector using CFC-11
- 4. Proportion of CFC-11 in polyol formulation
- 5. Emissions from foam blowing operations
- 6. Other sources of CFC-11 emissions e.g. during CFC-11 production, use in other foams (e.g. one-component foams), use in other sectors, byproduct?
- 7. What about the CFC-12?



N.W.: 235 KG/DRUM G.W.: 258.5 KG/DRUM (WITHOUT PALLETS) TOTAL PALLETS WEIGHT: 300KG

CFC Seizures

- Seizures of CFCs reported in Russia, Uzbekistan, Turkmenistan, the Netherlands
- Other relatively large CFC-12 seizures known to have taken place in Southern Africa, central and south-east Asia in 2018.
- Questions over scale of demand for & trade in CFC-12 and other banned ODS cannot be answered without timely sharing of information.

Trade in formulated polyols

- Clear potential for export of CFC-11 containing pre-blended polyols;
- Impossible to assess international trade in fully formulated polyols containing ODS or HFCs;
- Multiple HS codes, no mandatory reporting, not included in licensing;
- Potential for significant circumvention of ODS phaseout and HFC phase-down.



Drivers of Illegal CFC-11 Use

- \$\$\$ CFC-11 is cheaper and more productive
- Superior foam blowing agent better product
- Significant growth of demand for PU foam from the cold food chain and construction generally
- HCFC phase-out concerns expressed as early as 2010 about new blowing agents
- Low price of the isocyanate, encouraging new companies to set up rather than purchase expensive formulations from US/Europe
- Building codes from 2013 requiring insulation in new buildings to improve efficiency
- Easy to make, doesn't require much space, can be disguised in existing factories
- Ease at which it is hidden once in the polyol formulation (export)
- Lack of enforcement, penalties, awareness

Recommendations

- Address data gaps and uncertainties
- Carry out targeted market surveillance, testing foam products and pre-blended polyols, including at foam production facilities, construction sites, in buildings (including cold storage) and products (e.g. solar panels)
- Devise testing procedures for CFCs in polyol formulations
- Ensure regular customs checks of pre-blended polyols
- Apply strict penalties for illegal production <u>and</u> use and publicise enforcement efforts
- Require monitoring & reporting of ODS-containing pre-blended polyols (including in licensing systems)
- Investigate & report on all cases of ODS illegal trade to Ozone Secretariat
- Maintain and enhance the science ensure a robust and transparent atmospheric monitoring system





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For more information:

https://eia-international.org/our-work/climate/illegal-trade-of-ods-and-hfcs/

https://eia-global.org/illegal-cfc-production-use/