

The Carbon and Chemical Footprint of PVC



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Presentation Agenda

- Overview of PVC/LVT
- Issues with conventional assessments
- Carbon footprint
- Chemical footprint
- Alternatives
- Q & A



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Jim Vallette

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2012: The LVT flood begins



Home » LVT is H-O-T: The Next Step for Luxury Vinyl Tile

Q&A on Flooring

LVT is H-O-T: The Next Step for Luxury Vinyl Tile

Few flooring materials have stormed the industry ramparts like luxury vinyl tile. At home in commercial as well as residential settings, LVT is expanding options for designers and specifiers alike.

October 1, 2012

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New players fuel LVT growth in 2012
Issue: February 20/27, 2012, Posted Date: 2/22/2012
Author(s): Raymond Pina

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Shaw launches durable luxury plank

October 21, 2012

News » Shaw launches durable luxury vinyl plank



Where Great Floors Begin

Dalton, Ga. — On the heels of winning "Best of Necon" Gold for Q Commercial Hard Surfaces announces the most recent addition to its product collection. There is now demand for color in the industry.

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Luxury vinyl tile takes charge

October 25, 2012

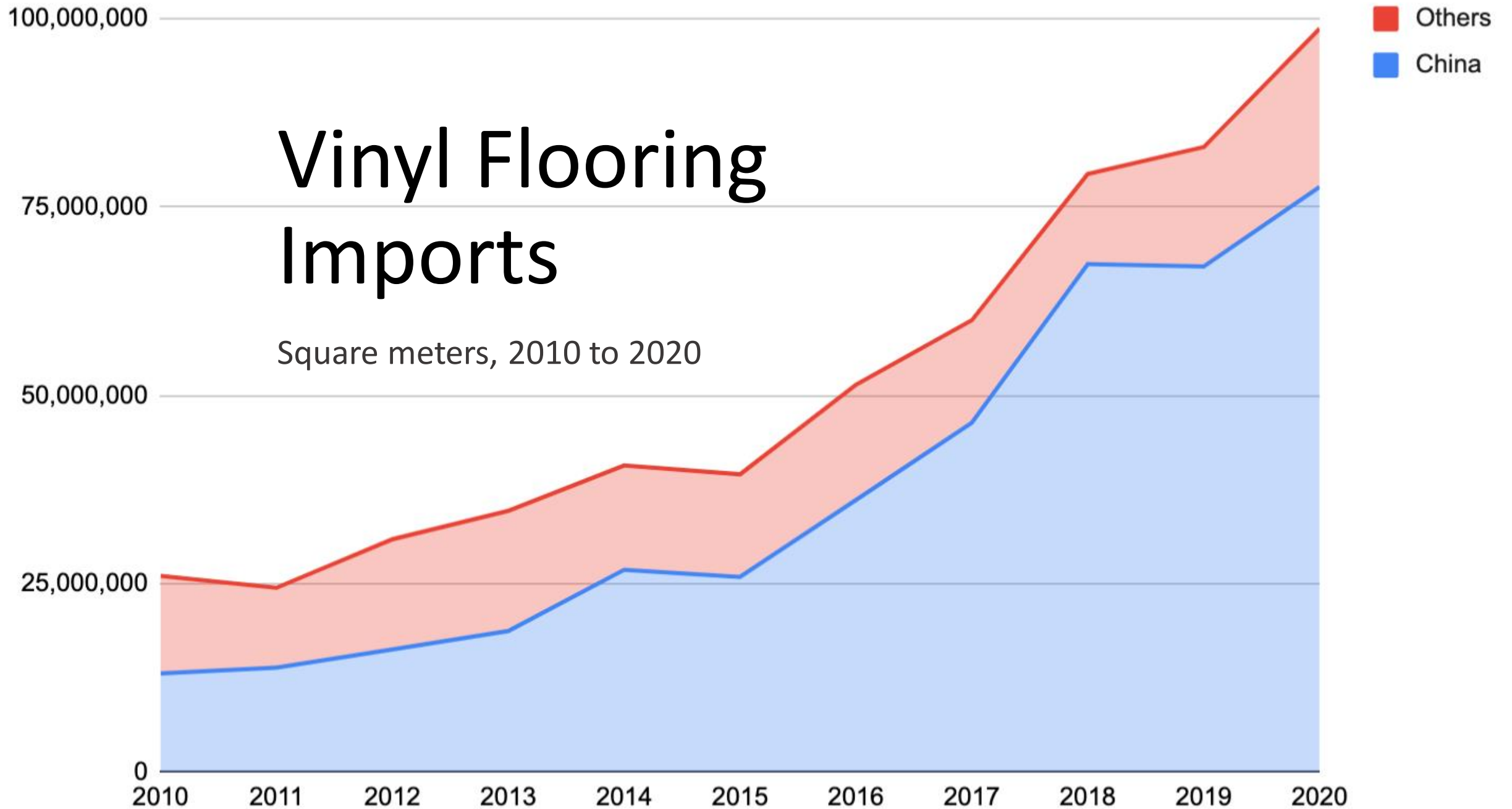
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Luxury vinyl tile takes charge

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Vinyl Flooring Imports

Square meters, 2010 to 2020

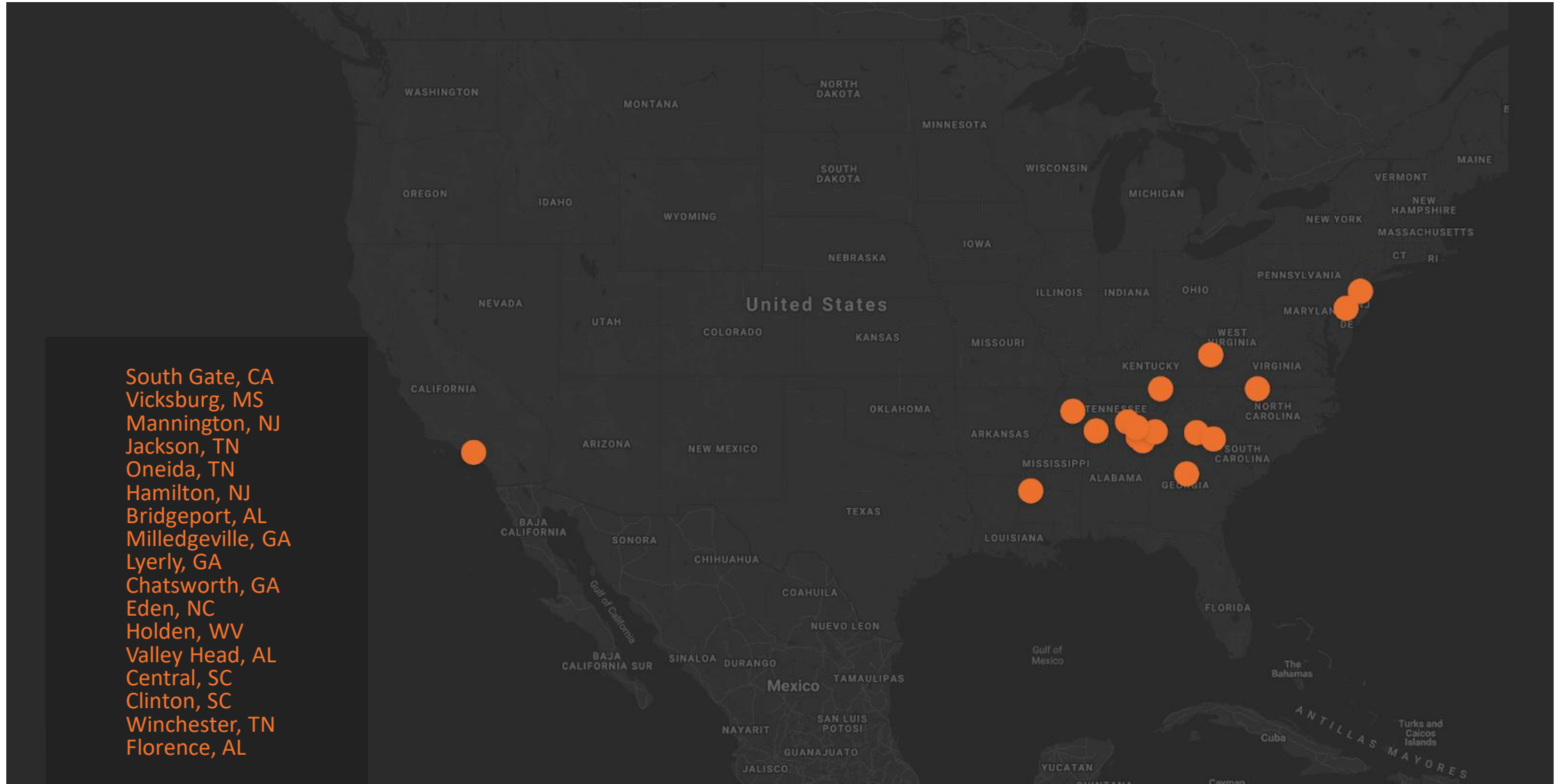


LVT is labor intensive

“The majority of the LVT flooring sold in the U.S. today is sourced out of Asia. These foreign-made products not only have a 16-week lead time, but they are produced using a labor-intensive batch-pressing method that would be cost prohibitive here in the U.S.” (Floor Daily 2014)

“The traditional LVT floor has complex production processes, high energy consumption, long labor time, and is not conducive to environmental protection.”
(Jiahao Group of China)

Flooring factory closures since 2012



“Environmental Product Declarations” and Greenwash



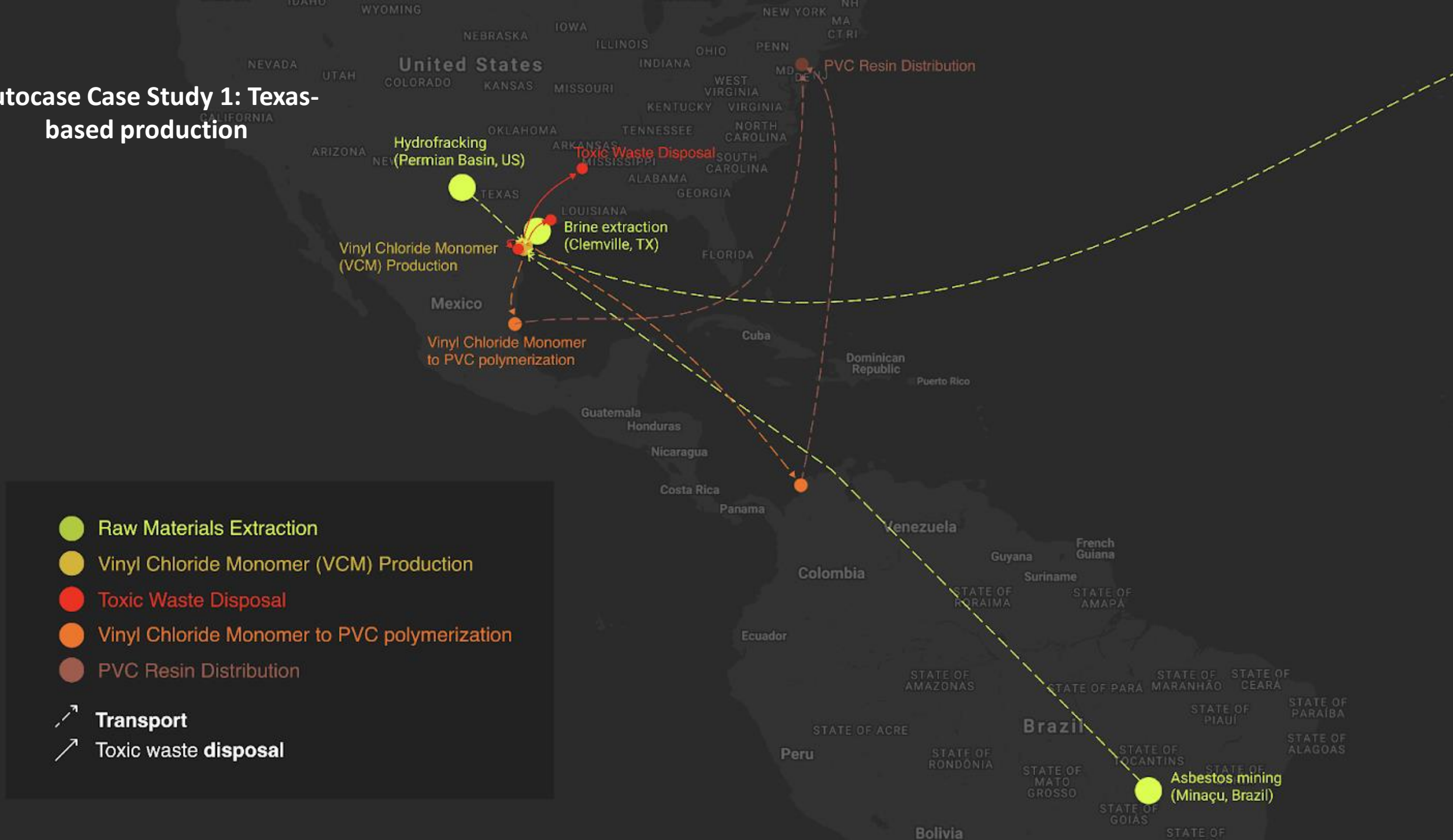
Guidelines, Codes &

Environmental Product Declaration

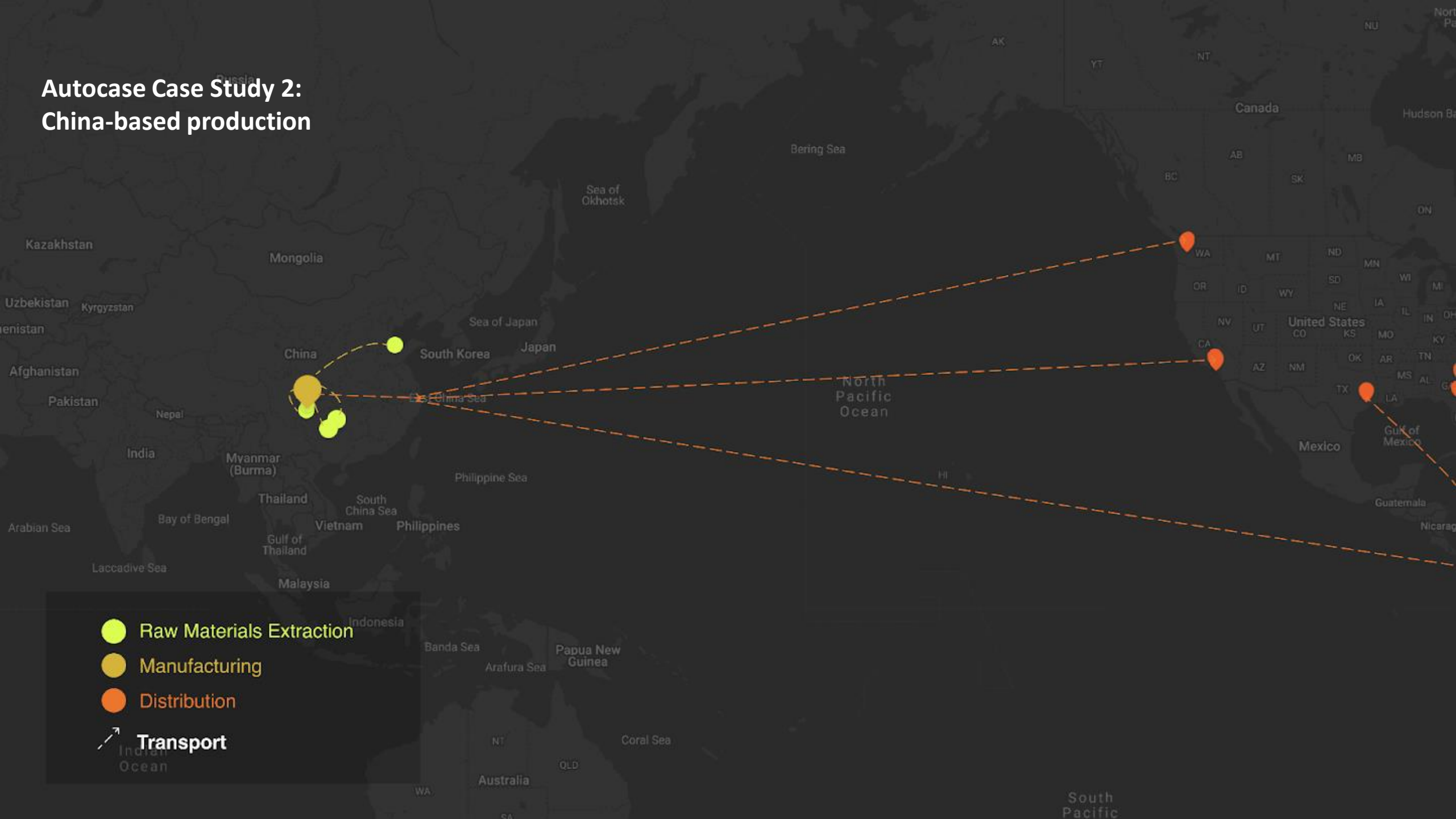
By Jane Rohde

In the effort to increase transparency in building materials, Environmental Product Declarations (EPDs) are becoming a standard requirement for LEED V.4 and Green

Autocase Case Study 1: Texas-based production



Autocase Case Study 2:
China-based production





On Nov. 10, 2021, a ship delivered 140 shipping containers to Portland, Oregon. They were filled with vinyl floors from Yibin, China, weighing 4.6 million pounds.

Autocase findings

Flooring Options Cradle-to-Site Carbon LCA⁴

| Flooring Option | Value | Units |
|---|--------|--------------------|
| PVC Flooring (Yibin, China) | 11.879 | CO2e kg/kg product |
| PVC Flooring (Occidental, U.S.) | 10.887 | |
| PVC Flooring (EPD) | 8.801 | |
| Armstrong Flooring - Biobased Resin | 3.640 | |
| Upofloor/Kährs Group - Thermoplastic Polyolefin | 6.410 | |
| Artigo - Synthetic Rubber | 14.136 | |
| Tarkett - Linoleum | 3.790 | |

35% higher
than industry
EPD

24% higher
than industry
EPD

Plastics are the New Coal

The offshoring of plastics production for U.S. consumption adds to the industry's climate impact. For some products, U.S. manufacturers have shut down their domestic production in favor of China's coal-based plastics. Today, about half of all floors sold in the U.S. are imported vinyl tile and carpet³⁶. These imports contain an estimated 6.7 million tons of plastic (see Appendix 2. Methodology). The manufacturing of this much plastic releases about 17 million metric tons of greenhouse gas overseas³⁷.

<https://www.beyondplastics.org/plastics-and-climate>



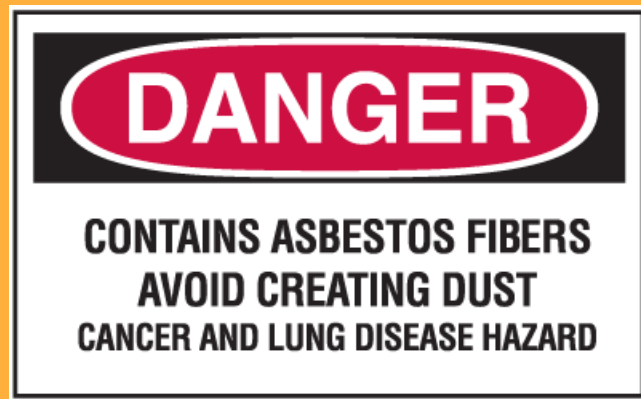
Vinyl flooring's toxic footprint

From raw materials to finished product, the production of vinyl flooring uses toxic chemicals and generates toxic byproducts and waste that harm people and the environment.



Google

Occidental Chemical in Ingleside, Texas



Well-known health hazards associated with asbestos

Asbestosis

Pleural disease

Mesothelioma

Lung cancer





PFAS in the environment

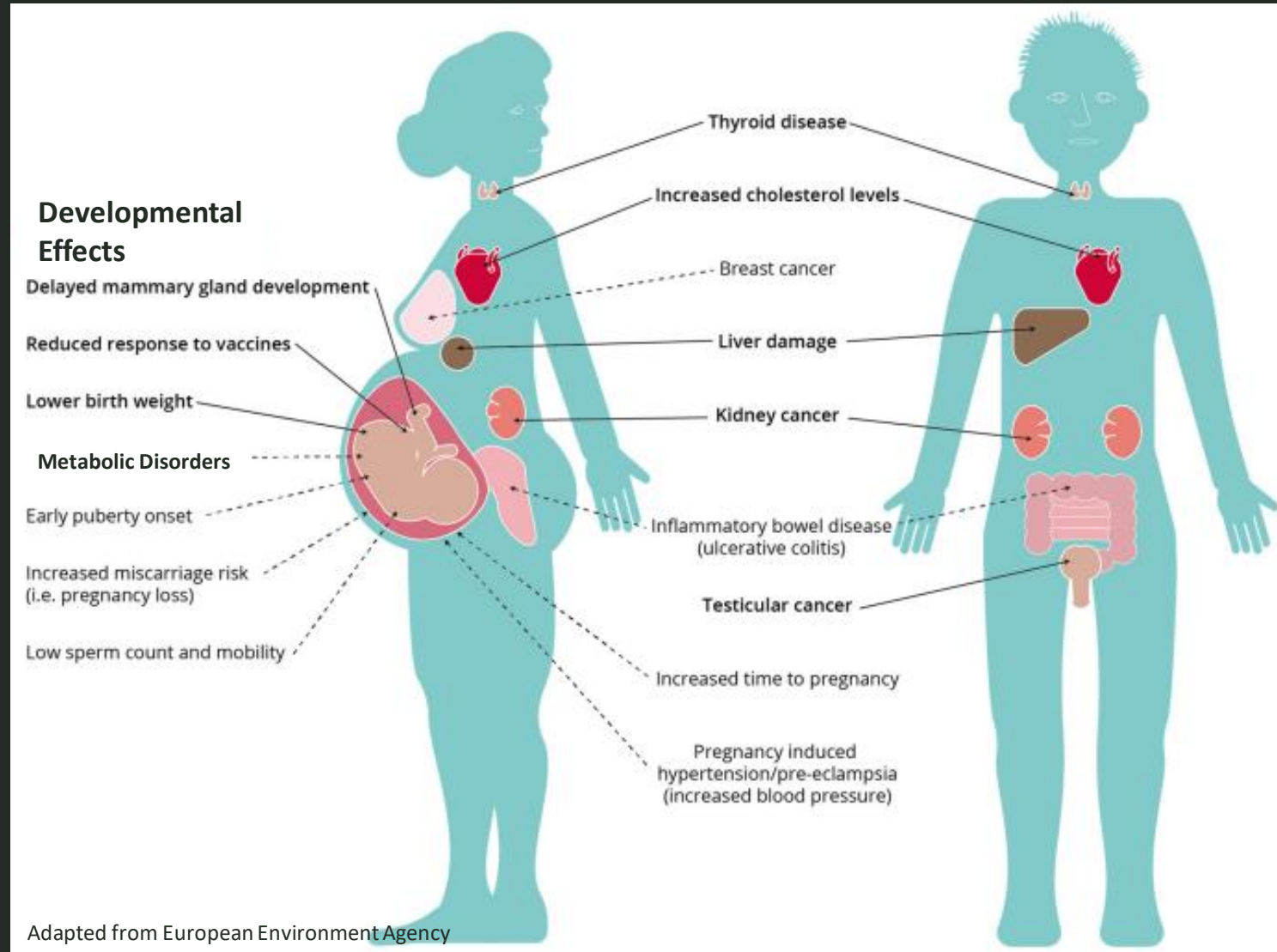
Extremely persistent, don't degrade over time

More than 9000 different compounds

Accumulate in bodies and the environment

Linked to a wide range of adverse health outcomes

Human health effects of PFAS exposure



Mercury in the environment

Mercury is mobile and persistent

Mercury can accumulate in wildlife and humans

Potent neurotoxin that is especially dangerous to pregnant women and children

Mercury is hard to clean up, often rereleased in the environment



Who bears the costs of vinyl production?



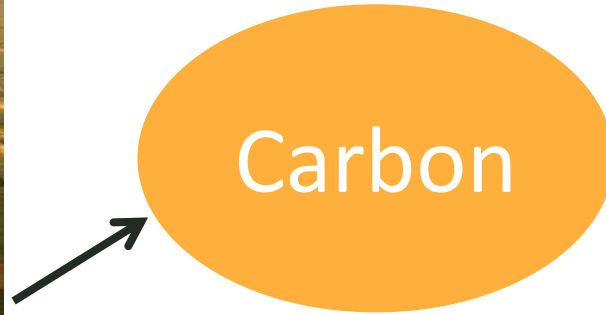
Giles Clark

- Low-income communities
- Communities of color
- Historically marginalized groups
- Laborers in the Global South with few health protections

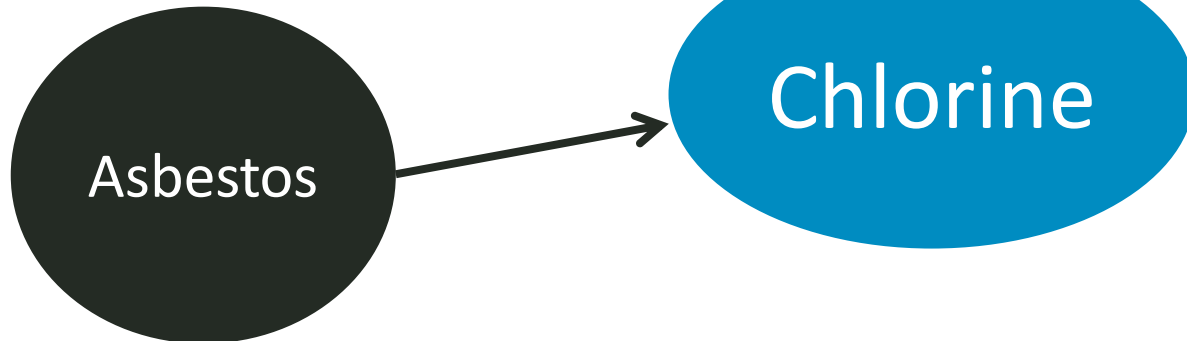
Production Process at Occidental Chemical, Ingleside, Texas



Natural gas



+





Asbestos mine in Minacu, Brazil

Asbestos used in US chlor-alkali plants

- **Last permitted use** of asbestos in the United States
- Asbestos mined in Brazil and Russia
- Asbestos filters are used in production of chlorine gas
- Filters are depleted over time
- Disposal occurs at landfills nearby



Combining carbon and chlorine releases other toxic compounds

Many facilities located along the Gulf Coast, including in Cancer Alley

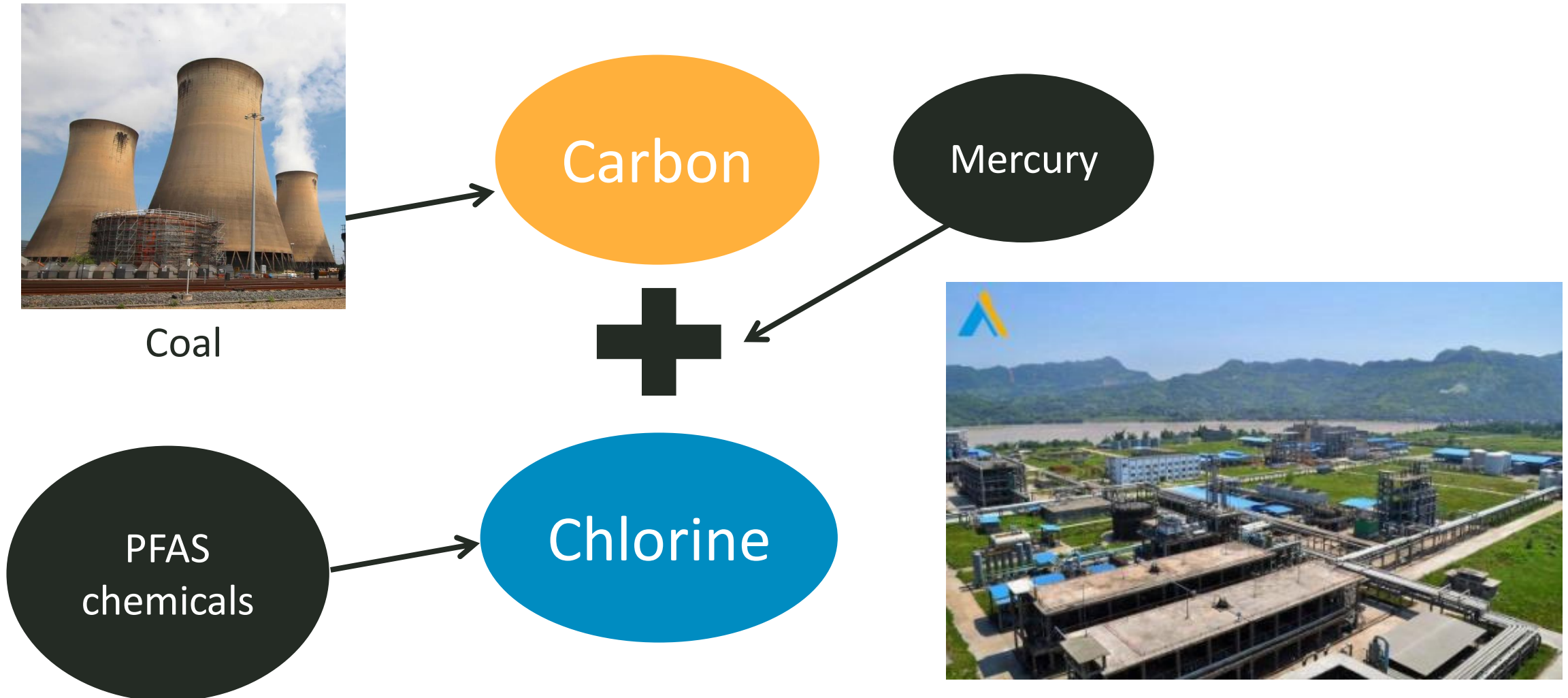
Ozone-depleting organochlorines are formed as a byproduct

Cancer-causing ethylene oxide is emitted into the air



Occidental Chemical

Production process at Yibin Haifeng Co., Yibin, China



Alternative to asbestos filters: “forever chemicals” used in Chinese vinyl production





Toxic PFAS chemicals used in chlorine gas production

- Membranes sprayed with PFAS (Nafion) are used instead of asbestos filters
- Chlorine is generated just as in the US process
- PFAS coating on the membrane needs to be continuously renewed
- Very little is known about PFAS releases from this process

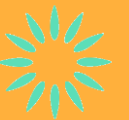
Saltwater brine for chlorine production



Lack of information on PFAS releases to surrounding environment in Yibin, China



Yibin Tianyuan Plant





Mercury salts used to create vinyl chloride monomer

- Mercury vapors are created in the production process
- Mercuric chloride salts can damage workers' lungs
- Used mercury catalyst is hazardous waste
- Mercury mined in China and pollutes local environment and communities





Coal is used as the carbon source in the Yibin plant

- Cheap coal is used as feedstock for the vinyl production process in China
- Vinyl production is energy intensive, requiring large amounts of coal and subsequently, high carbon dioxide emissions
- Burning coal releases soot, ozone polluting smog, and mercury





**Vinyl flooring: toxic
from beginning to
end**

What are the alternatives?

- As purchasers you have the power to demand less carbon intensive and safer alternatives to vinyl
- Ask vendors for greater transparency in supply chains
- Consider not just the carbon footprint but also the toxics used in flooring



Resilient Flooring and Carpet Shopping Guide

Healthier Resilient Flooring & Carpeting



A Guide for Purchasing Flooring & Carpeting Free of Key Harmful Chemicals

Last Updated
November 2021

The Center for Environmental Health (CEH) created this guide to help purchasers of resilient flooring and carpeting identify safer products without key chemicals of concern.

The products in this document have been self-reported by the manufacturer as being compliant with Health Care Without Harm's Healthy Flooring and Healthy Carpet Criteria. In 2020, Health Care Without Harm Launched Greenhealth Approved, a new seal that formally designates products as meeting the criteria. Products that have earned the Seal are designated as such.

Resilient flooring products are listed on sheet/tab 2. Carpet products are listed on sheet/tab 3.

Products are classified as meeting either Silver or Gold Level criteria. At the time of publishing, none of the products assessed met all of the Gold Level criteria. If you would like to purchase products classified as Gold Level, ask your supplier or manufacturer if they currently carry products that meet these criteria. If they do not yet have Gold Level products, encourage them to develop products that meet this standard.

Your Purchasing Power Can Move the Market

Market demand can influence the market faster than regulations or legislation





To Learn More about Healthier Flooring or Furniture

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Thank you!