Toxicity 101 for Early-Stage Investors

Every investment causes some material exchange, use, transformation, or consumption. This is especially true when investing in technologies that apply to material sectors of economic activity, such as agriculture, mining, energy, chemicals, or consumer products. Investors need to understand the chemicals and materials brought into the world by their portfolio companies to avoid the creation of new toxic materials, reduce regulatory and liability risk, and align capital with conscience.

Early-stage investors aim to support businesses that will eventually grow large, with a commensurate impact on the world. The potential toxicity of the chemicals and materials these businesses may bring into existence may affect their success. Hazardous materials are difficult to work with and require multiple layers of safety precautions, increasing production costs. They are also costly to manage at the end of their useful life. Products that contain hazardous materials may come under regulatory pressure or under public scrutiny. Pollution and contamination caused by hazardous materials can be an intractable liability.

Uncovering the risks and potential liabilities of hazardous materials should be a part of regular due diligence. Investors should understand the chemical composition, chemical hazards, process hazards, restricted substance lists, regulatory compliance, and safer alternatives involved. Investors should include chemical-hazard questions in their due diligence, request materials disclosure, and engage prospective and portfolio companies to use safer and more sustainable alternatives.

Investors should promote the use of the design approach, which integrates looking for ways to reduce or eliminate toxicity, use biobased chemicals, lower the carbon footprint, and increase the energy and materials efficiency, when designing new products and processes. Resources related to Green Chemistry show how chemical synthesis can be designed to be safer and more sustainable.

The following list of topics is intended to be a starting point for conversations between investors and early-stage companies about chemical safety and sustainability.

Chemicals Inventory

The first thing to find out is if the early-stage company has a (complete) materials and chemical inventory with identifiers, CAS numbers, trade names, functional uses, and concentrations wherever possible. The company should be able to share these details, although sometimes an NDA will be required.

Before signing an NDA, the company should be willing to share high level descriptions of their processes and materials, including the types or classes of chemicals being used, the company chemical management strategy, and the safety and sustainability of the materials used in the company's products and processes.

Investors should understand whether the company is making new materials and chemistries, or is using widely available ones, whether the materials involved are biobased or petroleum derived, and whether they are acutely toxic and may require precautions when working with them.

If an early-stage company lacks information about the chemicals and materials used in their products and manufacturing processes it could be a sign for the need to dig further.

Hazard Identification

The next step is to identify chemical hazard classifications. The investor should understand which chemicals used in a company's products and processes have been associated with specific toxicity end-points. Examples of toxicity end-points include carcinogenicity, reproductive toxicity, neuro developmental toxicity, endocrine disrupting potential, skin sensitization, eco or aquatic toxicity, persistence in the environment. Basic information on hazard classification can be found on material Safety Data Sheets (SDS) that should be available for all chemicals used at a facility. Detailed hazard analysis is recommended for key ingredients and materials used by the company, including screening chemicals against restricted substance lists.

Restricted Substance Lists

Restricted Substance Lists (RSL's) are lists of chemicals of concern, maintained by brands, retailers, and industry alliances, that name the chemicals and materials they do not want to have in their products and manufacturing processes. These lists often go beyond basic regulatory requirements and are valuable tools to identify potentially hazardous chemistries. A company may also create and maintain its own RSL.

Examples of industry groups or certification entities that publish RSL's in the textile and apparel include groups like ZDHC, AFIRM, GOTS, BlueSign, and Oeko-Tex. For beauty and personal care various retailers and certification bodies including the Environmental Work Group and Credo Beauty have published RSL's. For cleaning examples include GreenSeal and Safer Choice. Examples of brands chemicals policies that include RSL's include Nike's or Target's.

A company should understand and reference relevant RSL's for its products. Tools like Pharos, Scivera, and ChemForward can be useful in understanding chemical hazards and managing compliance.

Safer Alternatives Search

If the company uses any restricted chemicals or common classes of hazardous chemicals, such solvents, heavy metals, halogenated compounds, antimicrobials, etc., investors should ask whether they have evaluated safer alternatives.

Process Conditions

In addition to hazardous chemicals, due diligence should identify any physical hazards that may arise from process conditions such high temperature, high pressure, and inhalation hazards (dust, nanosized particles, volatile compounds).

Waste

All manufacturing processes will generate waste. Some of that waste may be hazardous waste as defined by federal and state regulations. The company should know what waste will be produced and how it plans to manage it. It should be clarified how waste is classified, collected, treated, and disposed of, and confirmed that it is done appropriately under the applicable rules.

Packaging

What kind of packaging does the company use? Is there the opportunity to reduce the material volume and impact of the packaging?

Workplace Safety

If a company has any manufacturing operations, workplace safety should be a key component of due diligence. Companies should maintain Standard Operating Procedures (SOPs) for equipment and common procedures that establish, among other items, who can access and operate equipment and under what conditions. For example, the company should have “lock-out tag out” hard safety measures in place that make it impossible to power up any equipment while it is open for repairs or maintenance. Depending on the hazards associated with various processes, the SOPs should be reviewed by an Environmental Health and Safety expert who is familiar with relevant regulations and industry standards.

The due diligence should also confirm that the company has plans in place for emergency and accident response and verify that staff have completed safety training.

Regulatory & Compliance Verification

Regulatory approval may be required for new chemicals and materials in various applications and jurisdictions. The due diligence should make sure the company understands the regulatory requirements and has adequate regulatory support from its staff or consultants.

Examples of relevant regulatory considerations include:

- TSCA and REACH for industrial chemicals;
- EU Cosmetics, China INCI for cosmetic ingredients;
- FDA for food contact packaging and OTC products (sunscreen, hand sanitizer, acne, etc);
- EPA for pesticides including antimicrobials.

Certifications

For many products and chemistries there are certifications that verify various safer chemistry and material attributes that customers may be interested in, such as natural, bio-based, compostable. Examples of certifications that could be relevant include: USDA Bio-Preferred, EWG-Verified, BlueSign, Oeko-Tex, Safer Choice, Cradle to Cradle, Green Seal, BPI Compostable, TUV Home Compostable.

During the due diligence process, investors should discuss with the company which certifications are relevant to their products, if any, and how do they plan to use certifications to support their claims.

Life Cycle Assessments

Many companies commission Life Cycle Assessments (LCA's) which are formal reports that analyze the carbon emissions, water use, and other impacts of a product or process. Due diligence should ask for any LCA's the company may have conducted.

Safer Chemistry as Source of Competitive Advantage

Developing inherently safer chemicals and efficient processes can not only reduce costs and lower carbon emissions, but also provide a competitive edge and increase brand value.

In the due diligence process, it is helpful to understand if and how an early-stage company may differentiate on aspects of safety and sustainability, when compared with existing companies. Due diligence should seek to understand how the toxicity of the new chemistry or process compares to existing ones, and if any reductions in toxicity may enable consumer claims, reduce costs, or provide an easier path to market.

Conclusion

The chemicals and materials involved in a company's products and processes can affect costs, risks, and value creation potential. Undisclosed or hazardous chemistries create financial, legal, and reputational risks, while using safer, sustainable alternatives can lower regulatory barriers, improve operating efficiency, and allow for brand differentiation. Investors should treat the chemical and materials hazards as a regular part of their due diligence process and of the post investment engagement with portfolio companies.

Summary of Due Diligence Items and Questions

- Is the company using a design approach for its chemistry and materials work?
- Is there a complete chemicals and materials inventory?
- Is there a chemicals management strategy?
- What are the relevant Restricted Substance Lists?
- Have any hazardous end points been identified?
- Are there safer alternatives to the hazardous chemistries used?

- Are there any hazardous process conditions?
- What type of, and how is, waste generated and managed?
- What type of packaging does the company use?
- Are there appropriate measures and policies to ensure workplace safety?
- Is the company in compliance with the relevant regulations for its processes and products?
- What are the relevant Certifications?
- Have any Life Cycle Assessments been conducted?
- Are there any competitive advantages the company may enjoy from using safer chemistries and a design approach?