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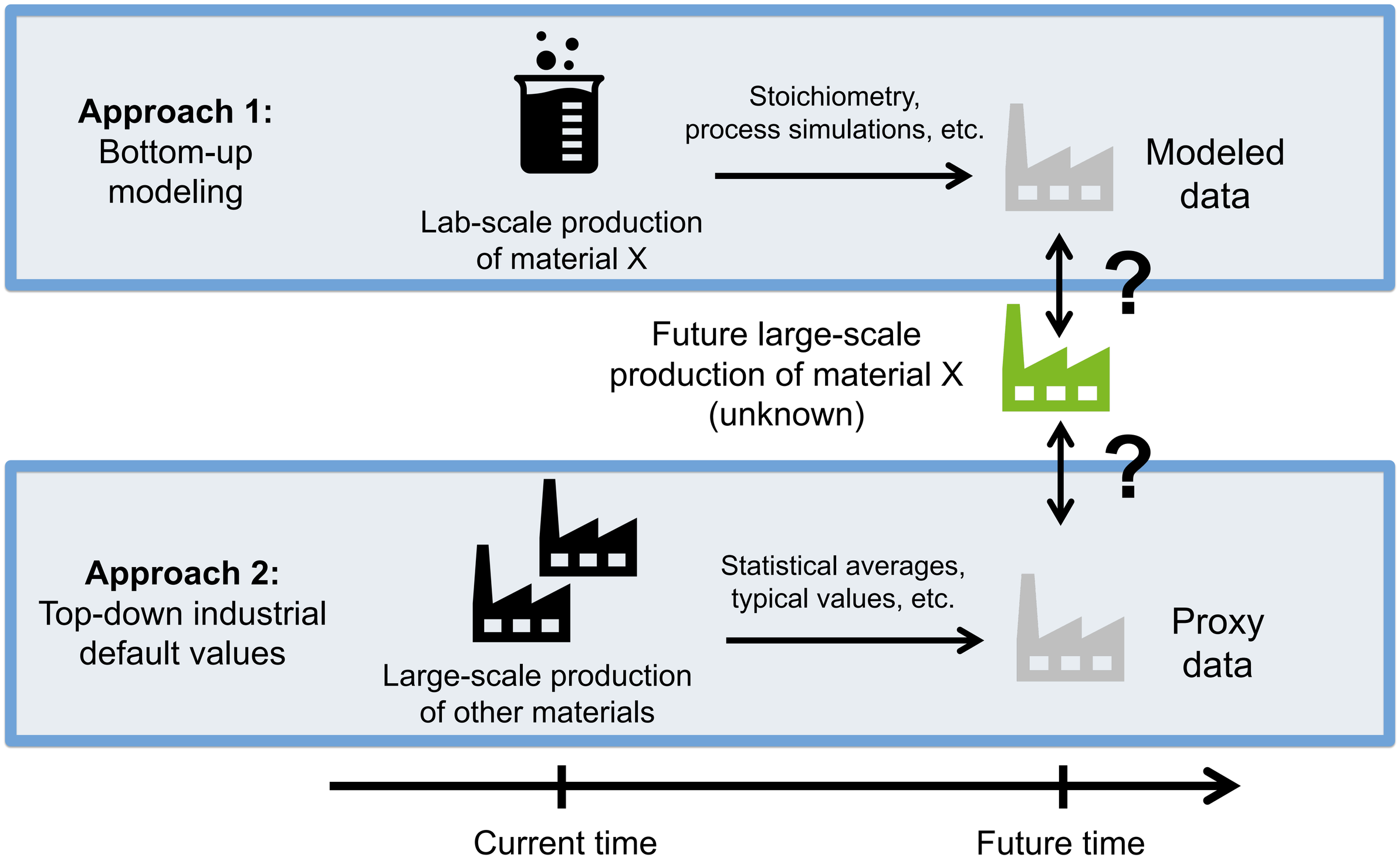
Environmental Systems Analysis

Using industrial default values for prospective modeling of new materials

The case of photon upconversion materials for solar modules



Prospective life cycle inventory modeling of new materials is about assessing impacts of future large-scale production (**the green factory**). This can be performed in two ways. **Approach 1** uses chemical engineering and process simulations to scale up laboratory data. **Approach 2** uses average or typical data for current industrial production of other materials. Both approaches have pros and cons. **Approach 1** is more material-specific, while **Approach 2** better captures impacts at factory level. We applied **Approach 2** in a study of the photon upconversion materials lead sulfide and lead selenide for use in solar modules (Wickerts et al. 2021, ACS Sust Chem Eng, 9, 14, 5187-5195).

Approach 2 was proven both feasible and yielded reasonable results. It is unclear which of the approaches gives most relevant results relative to the future material production. Further studies comparing the two approaches are recommended.

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