

AN INTEGRATED TECHNO-SUSTAINABILITY ASSESSMENT FRAMEWORK FOR ALGAE-BASED TECHNOLOGIES

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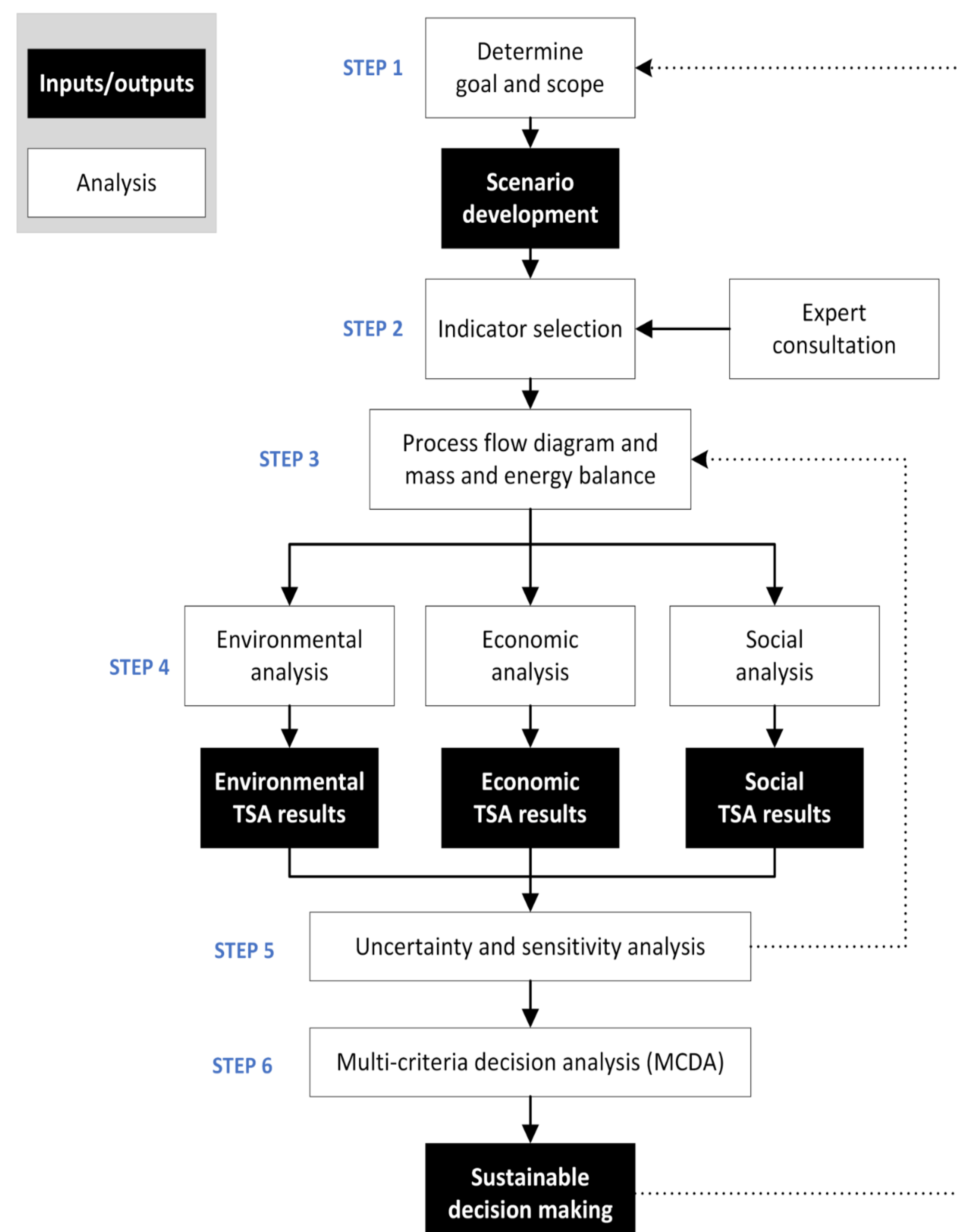
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Introduction and objective

A better understanding of the drivers of the **economic, environmental, and social sustainability** of **emerging algae technologies and products** can help decision-makers to identify sustainability hurdles and opportunities.

A novel **techno-sustainability assessment (TSA) framework** is developed, which compares the potential sustainability performance of different scenarios and helps to make better-informed decisions by evaluating and trading-off sustainability impacts in one holistic framework.

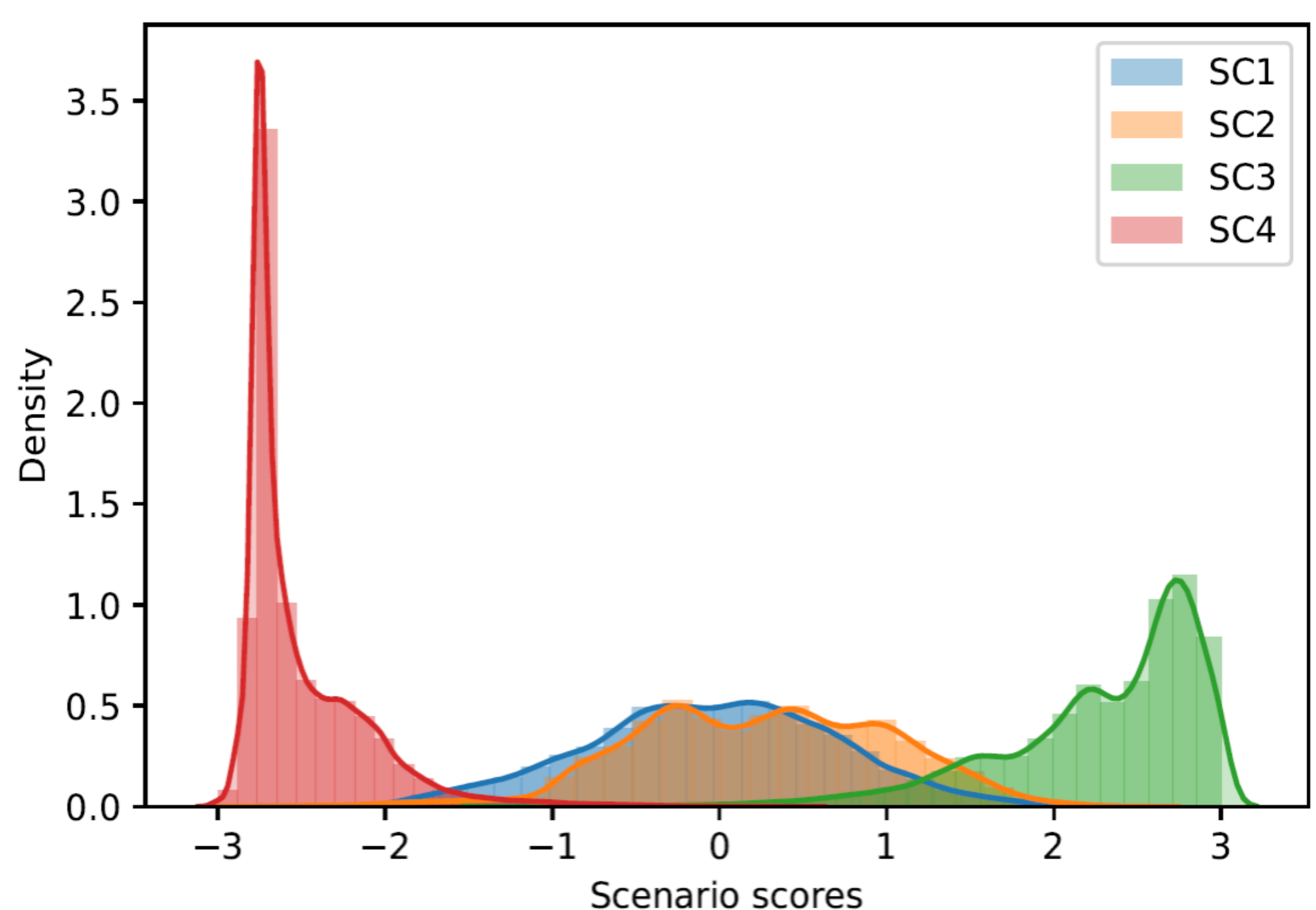
Method development



Microalgae production application

	Algae type	Cultivation type	Location
Scenario 1 (SC1)	<i>Porphyridium</i>	Photobioreactor	BE
Scenario 2 (SC2)	<i>Porphyridium</i>	Open pond	BE
Scenario 3 (SC3)	<i>Dunaliella salina</i>	Photobioreactor	FR
Scenario 4 (SC4)	<i>Dunaliella salina</i>	Open pond	FR

The integrated TSA enables a comparison of different technology or product scenarios (e.g., algae scenarios SC1 – SC4). The higher the score, the higher the relative sustainability performance. The graph below shows an example of an outcome of the integrated TSA model.



Conclusion

The **core advantages** of the TSA framework lie in:

- its ability to account for application-specific indicators;
- the dynamic quantification and integration of the selected environmental, economic, and social indicators;
- the development of a decision-making tool for a variety of stakeholders, and;
- the iterative character of the assessment, monitoring technologies and products during their development

[Source: Van Schoubroeck, S., Thomassen, G., Van Passel, S., Malina, R., Springael, J., Lizin, S., Venditti, R. A., Yao, Y. and Van Dael, M., 2021. An integrated techno-sustainability assessment (TSA) framework for emerging technologies. Green Chemistry. 23, 1700-1715.]

