

Socio-economic analysis based on a life cycle perspective: the comparison of existing and emerging production processes for trimethyl phosphite

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Overall research question

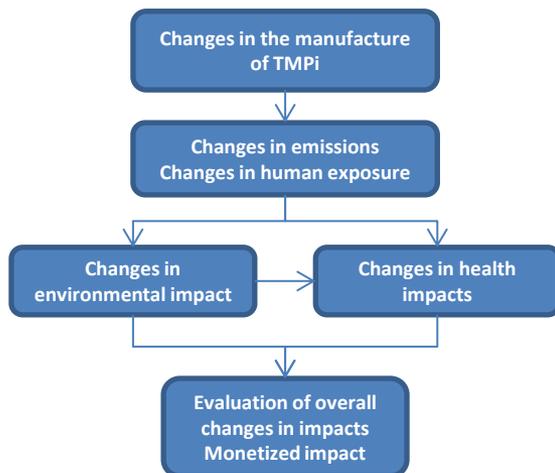
What are the net risks and benefits for human health and the environment associated with continued use of the TEA process compared to the new TRIALKYL process for the production of trimethyl phosphite (TMPI)?

Method

- Socio-Economic Analysis based on ECHA guidelines (ref?), supplemented with risk of fire/explosion and life lost
- Life cycle assessment data of the production processes e.g. human toxicity potential (HTP) as a proxy for exposure-risk relationship of the TMPI process

based on laboratory data and desing of the pilot line for the new Trialkyl process.

The approach is illustrated by the figure below.



Results

Yearly socio-economic benefits (avoided costs) and risks/costs associated with continued use of the TEA based process are summarised in the table below.

Type of cost by impact	Avoided costs = benefits of continued use of the TEA process	Cost of continued use of the TEA process	Net impact of continued use
Economic	Capital cost of Trialkyl: € 1.5 Mill Production losses during Trialkyl process construction: €590,000	Higher operational costs OPEX: €36,000/yr	A net economic benefit
Human Health	Risk of Trialkyl chemicals : €25,000/yr Trialkyl air pollution: €20,000/yr	Risk of TEA chemicals: €262,000/yr Air pollution: €266,000/yr	A net economic cost
Environment	Trialkyl climate: €19,000/yr Trialkyl water: €1,180,000/yr Trialkyl eutrophication: €5,000/yr Trialkyl aquatic toxicity: €44/yr	Climate: €322,000/yr Water: €3139,000/yr Waste Water: €367/yr Eutrophication: €43,000/yr	A net economic cost
Fire/explosion risk	Trialkyl methanol release/fire: €7.7E-3/yr	TEA methanol release/fire: €6.9E-3/yr	Likely to be no significant change
Social	Short term unemployment impacts	No significant change	Likely to be no significant change
TOTAL	Approx €7 Mill	Approx €20 Mill	A net economic cost

Conclusions

It can be concluded that the EU society benefits significantly from the shift to the Trialkyl process over the period considered.

The novel application of LCA data in an SEA context is useful for the health and environmental assessment and beneficial for the understanding of chemical risk management and decision making.

