

Figure captions

Figure 1. System boundaries and process chain under study corresponding to the Scenario I **(a)**, Scenario II **(b)** Scenario III **(c)**, Scenario IV **(d)** and Scenario V **(e)**. Gray boxes correspond to background processes. Black boxes correspond to excluded processes.

Figure 2. (a) Comparative profiles for the different valorization scenarios under study and **(b)** distribution of environmental impacts per subsystems involved in the different vine shoots based valorization routes. **(2b.1)** Scenario I; **(2b.2)** Scenario II; **(2b.3)** Scenario III; **(2b.4)** Scenario IV; **(2b.5)** Scenario V. Acronyms: ADP – Abiotic Depletion Potential; AP – Acidification Potential; EP- Eutrophication Potential; GWP – Global Warming Potential; ODP – Ozone Depletion Potential; HTP – Human Toxicity Potential; FEP – Freshwater aquatic Ecotoxicity Potential; MEP – Marine aquatic Ecotoxicity Potential; POP - Photochemical Oxidation Potential.

Figure 3. Distribution of environmental impacts (characterization results) per subsystems involved in Scenario I **(a)** and Scenario V **(b)**, per functional unit. Acronyms: ADP – Abiotic Depletion Potential; AP – Acidification Potential; EP- Eutrophication Potential; GWP – Global Warming Potential; ODP – Ozone Depletion Potential; HTP – Human Toxicity Potential; FEP – Freshwater aquatic Ecotoxicity Potential; MEP – Marine aquatic Ecotoxicity Potential; POP - Photochemical Oxidation Potential.

Figure 4. Distribution of environmental impacts per responsible processes involved in the delignification stage (SS7). **(a)** Scenario I; **(b)** Scenario V. Acronyms: ADP – Abiotic Depletion Potential; AP – Acidification Potential; EP- Eutrophication Potential; GWP – Global Warming Potential; ODP – Ozone Depletion Potential; HTP – Human Toxicity Potential; FEP – Freshwater aquatic Ecotoxicity Potential; MEP – Marine aquatic Ecotoxicity Potential; POP - Photochemical Oxidation Potential.

Figure 5. Distribution of environmental impacts per key factors involved in the enzymatic hydrolysis (SS8) corresponding to Scenario III. Acronyms: ADP – Abiotic Depletion Potential; AP – Acidification Potential; EP- Eutrophication Potential; GWP – Global Warming Potential; ODP – Ozone Depletion Potential; HTP – Human Toxicity Potential; FEP – Freshwater aquatic Ecotoxicity Potential; MEP – Marine aquatic Ecotoxicity Potential; POP - Photochemical Oxidation Potential

Figure 6. (a) Comparative environmental profiles considering 1€ of revenue as functional unit; **(b)** Comparison between alternative organosolv based scenaria. Scenario A (base case, ethanol), Scenario B (glycerol) and Scenario C (ethylene glycol). Acronyms: ADP – Abiotic Depletion Potential; AP – Acidification Potential; EP- Eutrophication Potential; GWP – Global Warming Potential; ODP – Ozone Depletion Potential; HTP – Human Toxicity Potential; FEP – Freshwater aquatic Ecotoxicity Potential; MEP – Marine aquatic Ecotoxicity Potential; POP - Photochemical Oxidation Potential; **(c)** Comparative environmental profiles in terms of global warming potential associated with different routes of oligosaccharides production. Acronyms: A and B correspond to pectin-based oligosaccharides (González-García et al., 2017); C and D correspond to galactoglucomannans (González-García et al., 2016); E-I correspond to xylooligosaccharides from our study.

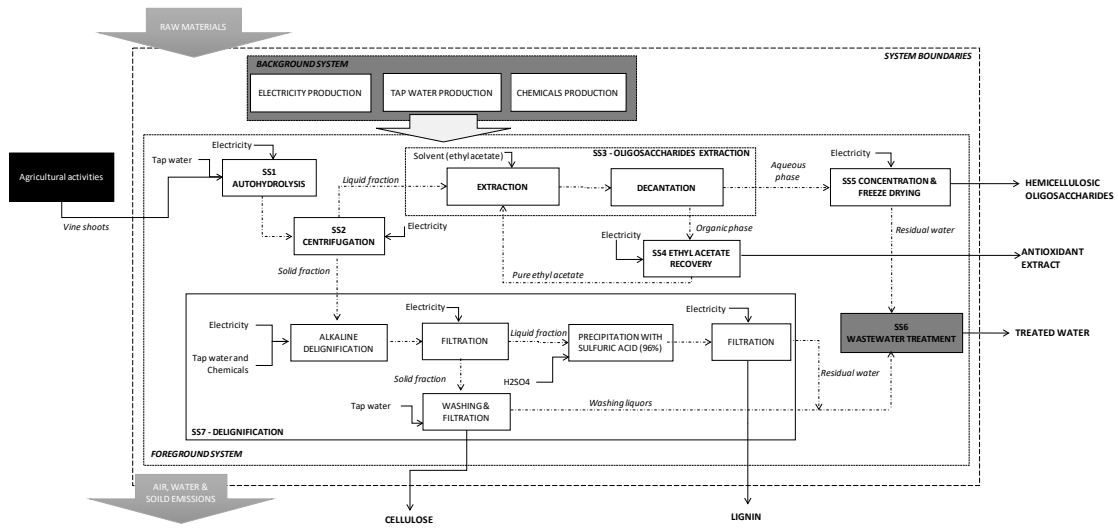


Figure 1a

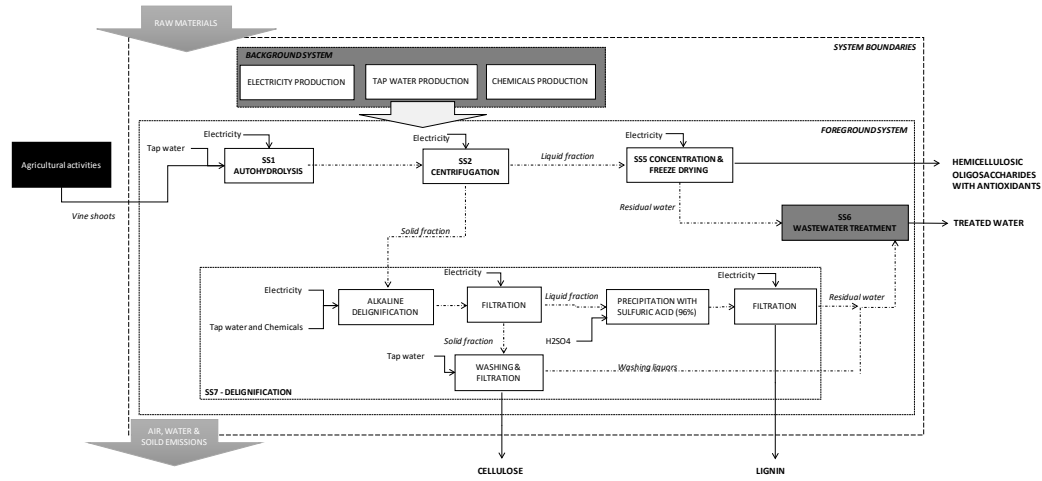


Figure 1b

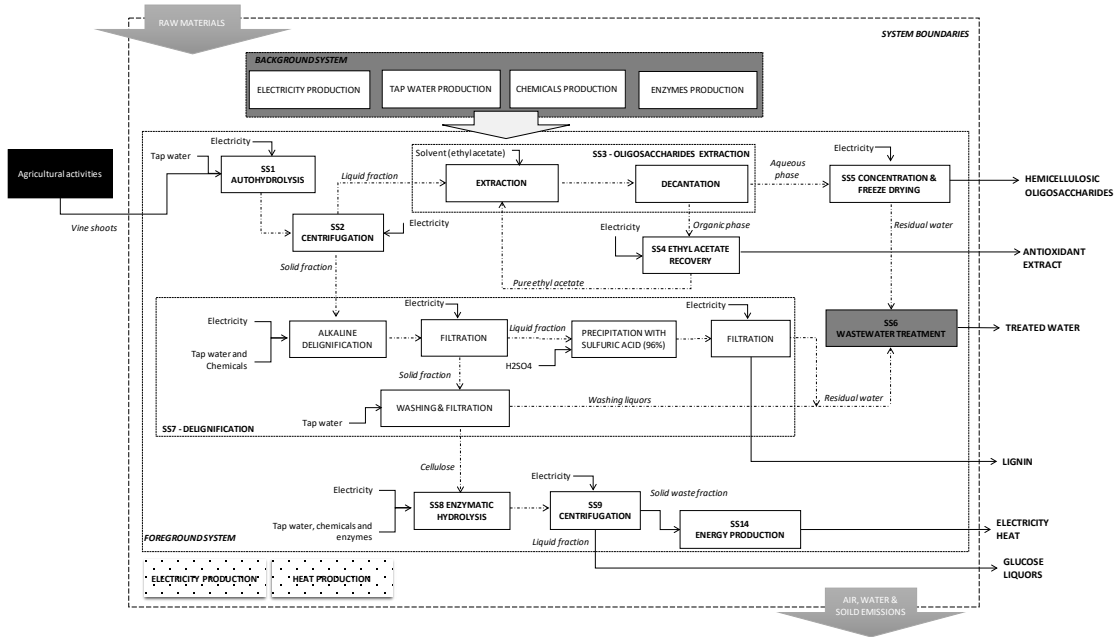


Figure 1c

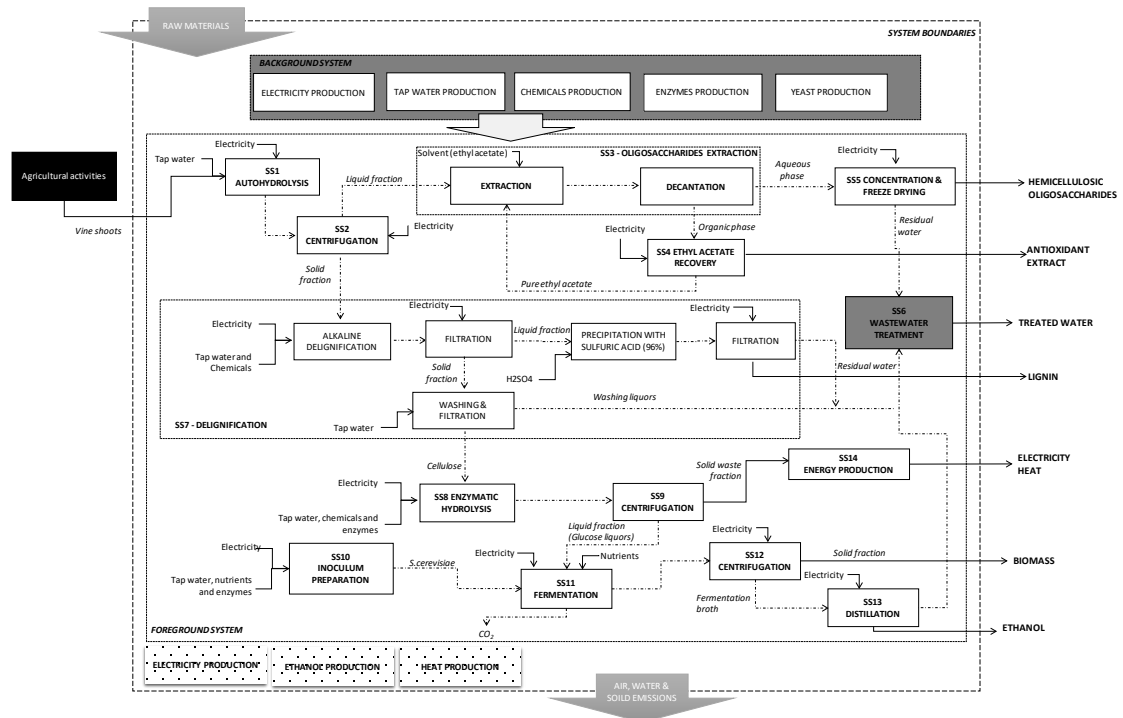


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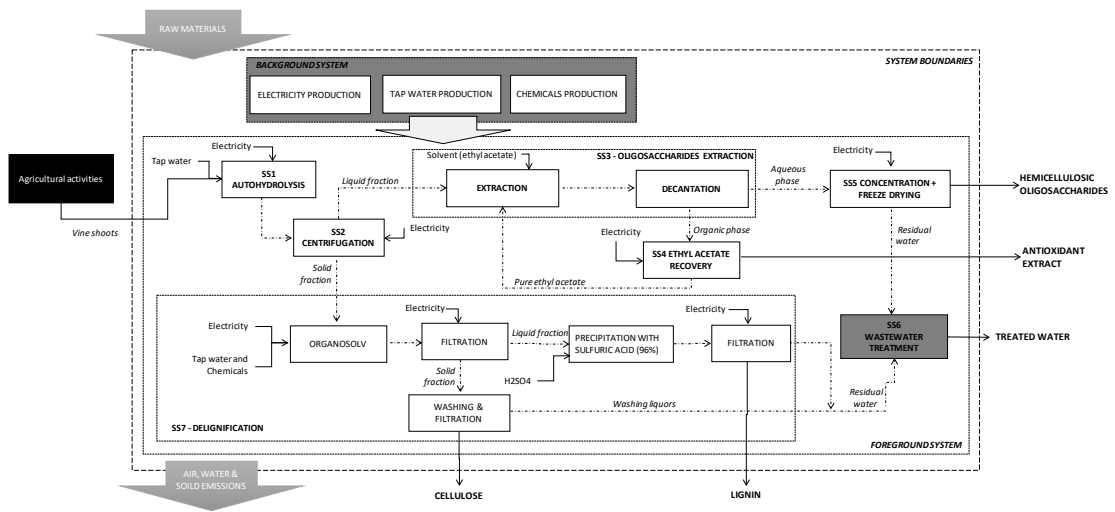


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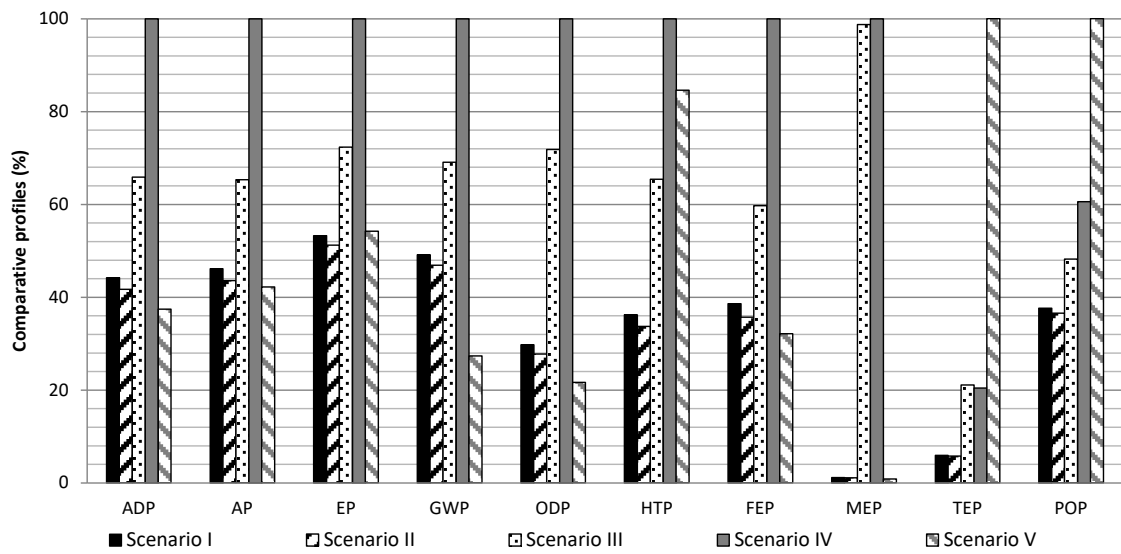
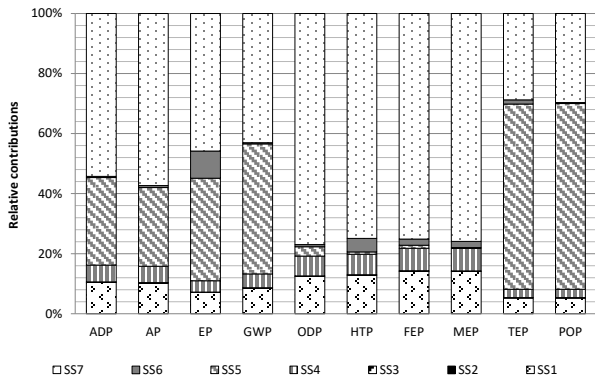
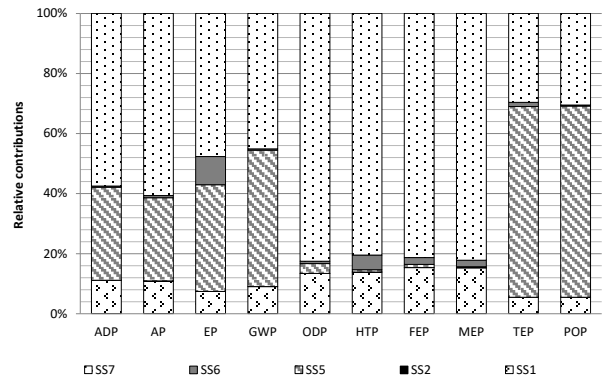


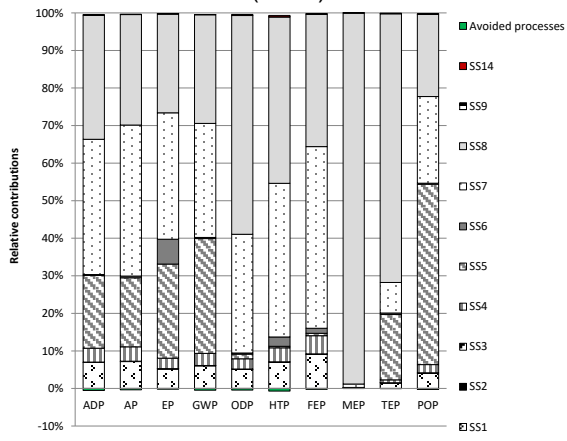
Figure 2.a



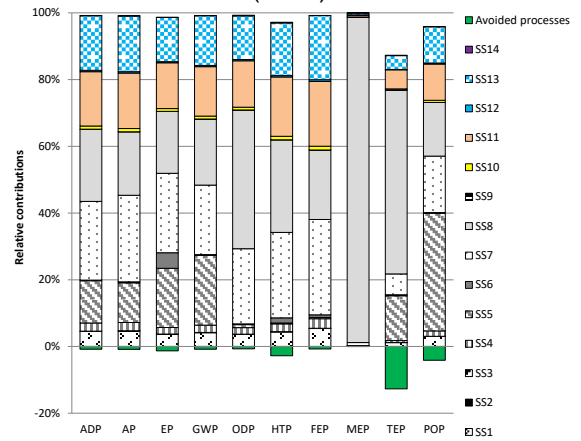
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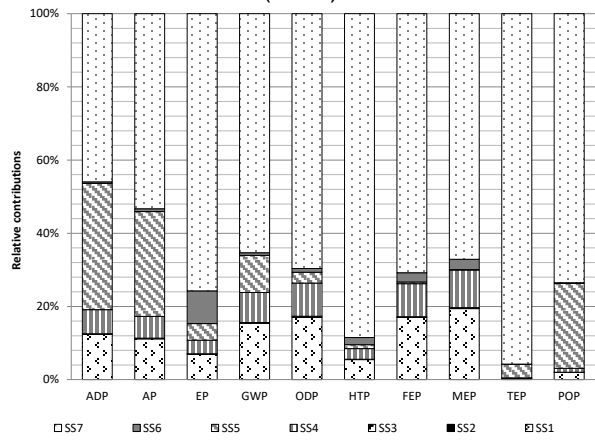
(2.b.3)



(2.b.3)

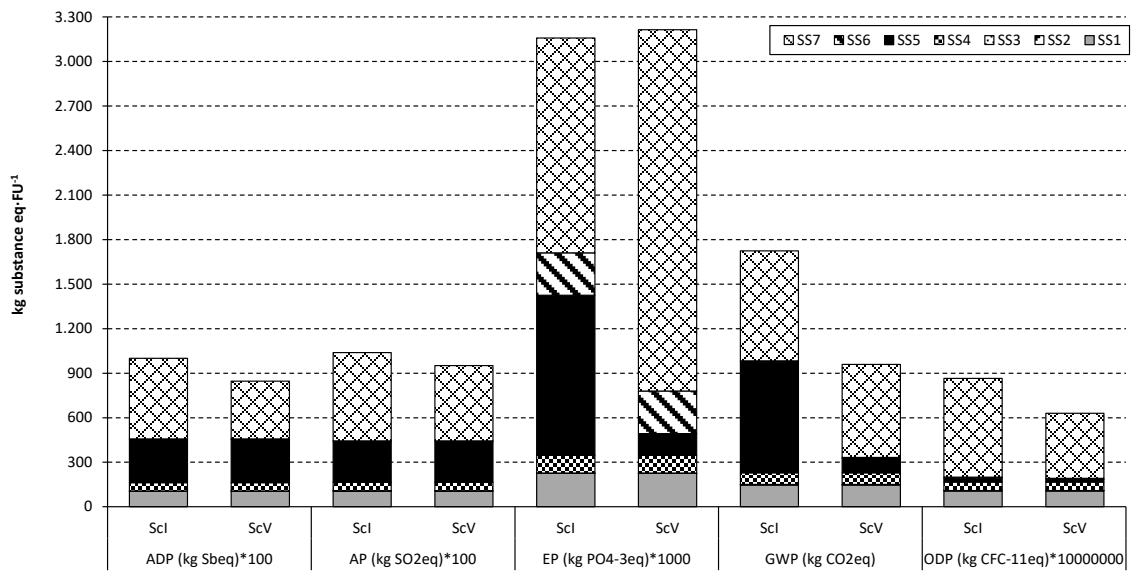


(2.b.4)

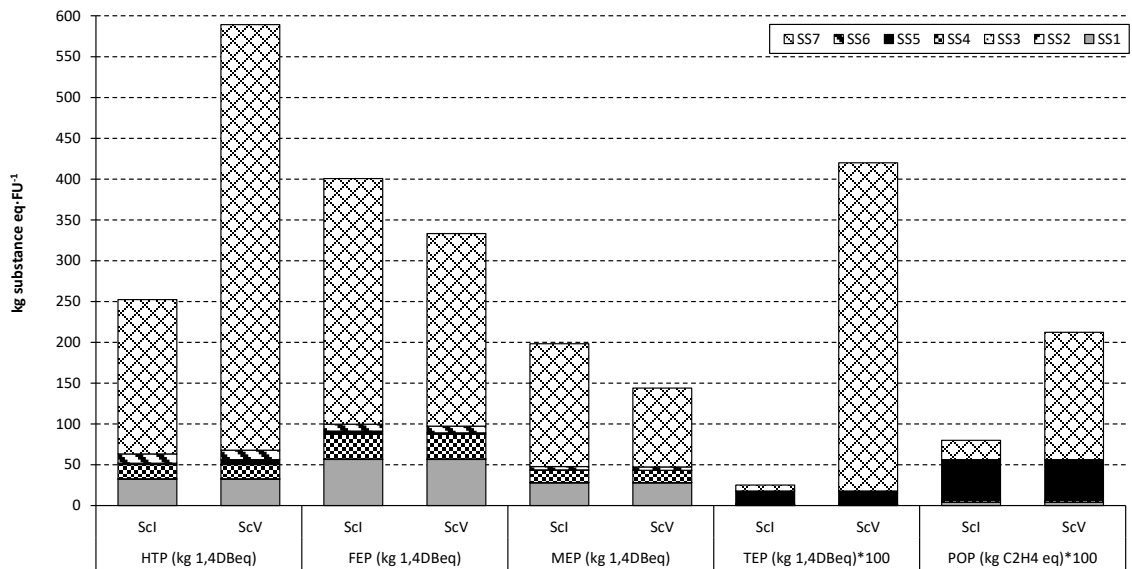


(2.b.5)

Figure 2b

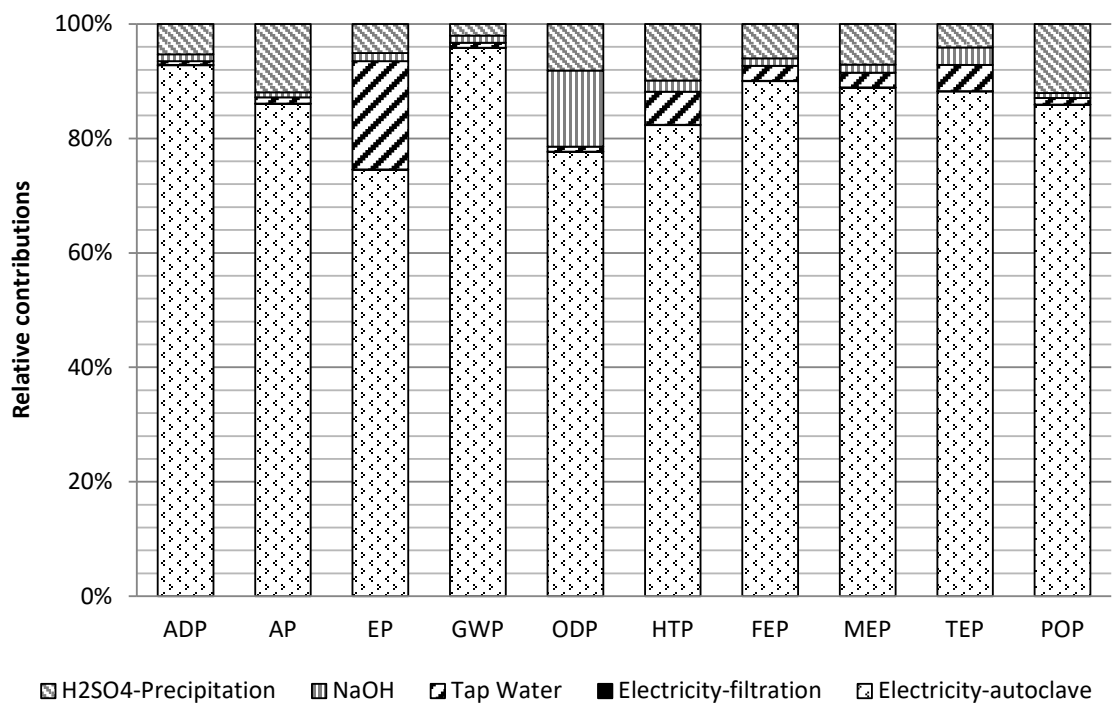


(a)

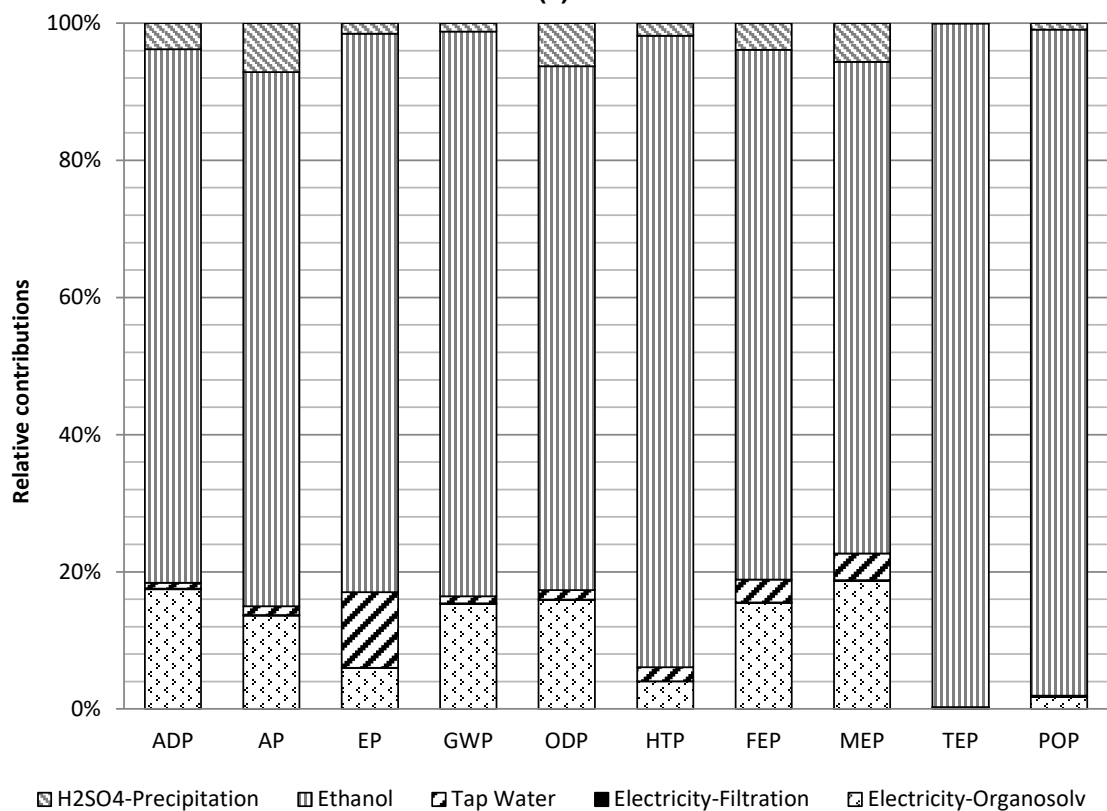


(b)

Figure 3



(a)



(b)

Figure 4

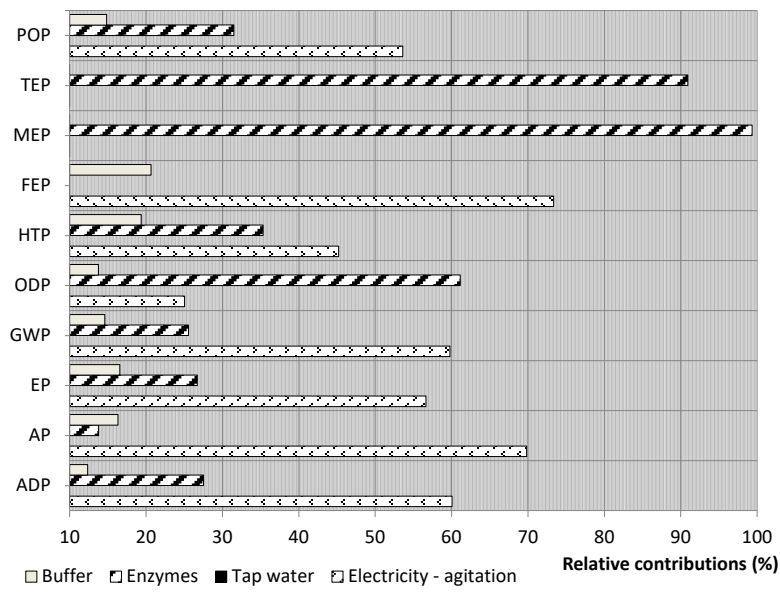


Figure 5

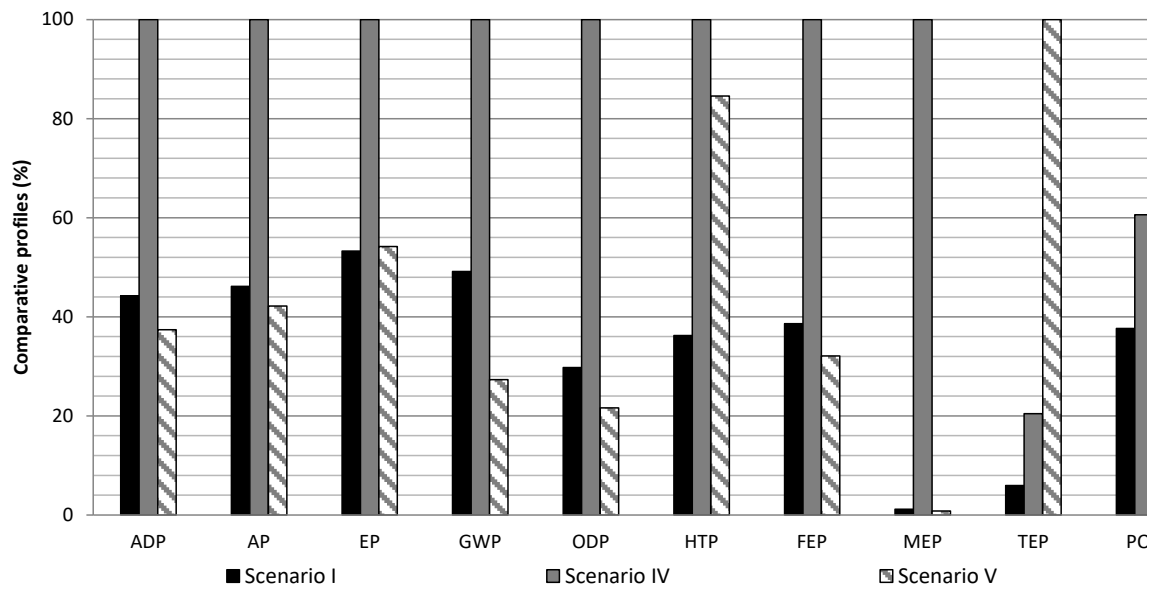


Figure 6a

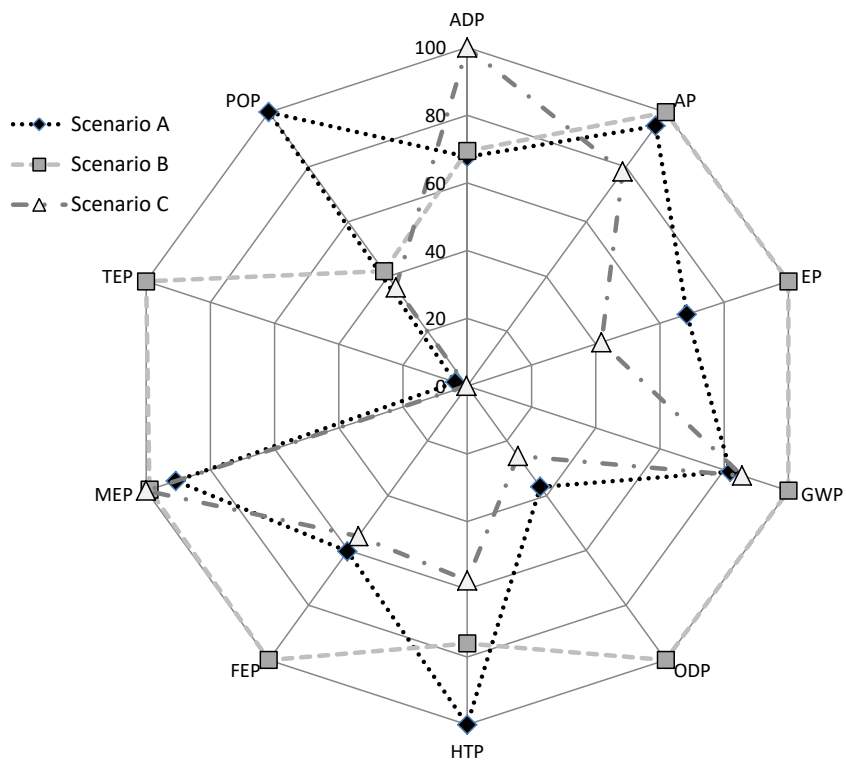


Figure 6b

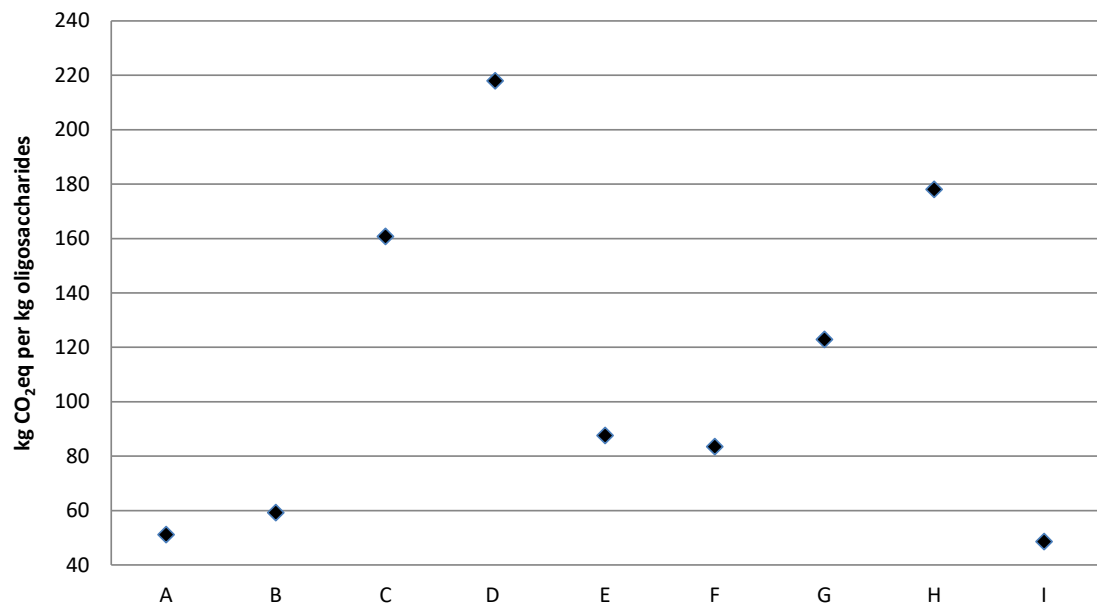


Figure 6c