Application of AWARE for the quantification of the Water Scarcity Footprint of a pure Malt Beer produced by Birra Castello

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Goal and Scope

- The objective of this study is to test the application of the AWARE method in a real case study and compare the results with other alternative methods: AWARE 100 +50% EWR, DTA, DTAX. Results of this analysis will be used in the process of validation of AWARE

- Actual audience targeted is the WULCA group; potentially results will be made publicly available.

- The system understudy cover the production and distribution of a pure malt beer produced by Birra Castello SpA, located in the north east of Italy.

- A cradle to grave approach is adopted

- The functional unit is to provide one 50cl of beer packed with glass bottle at retail

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Product Description

- 50 cl of pure malt beer
- Most of the processes involved take place in different regions of Italy (from north to south)
- Main ingredients Barley malt, Wheat Malt, Malt Dye, Hop and Water
- The product is packed in a brown glass bottle produced in Italy (Veneto) and is ditributed at national level.

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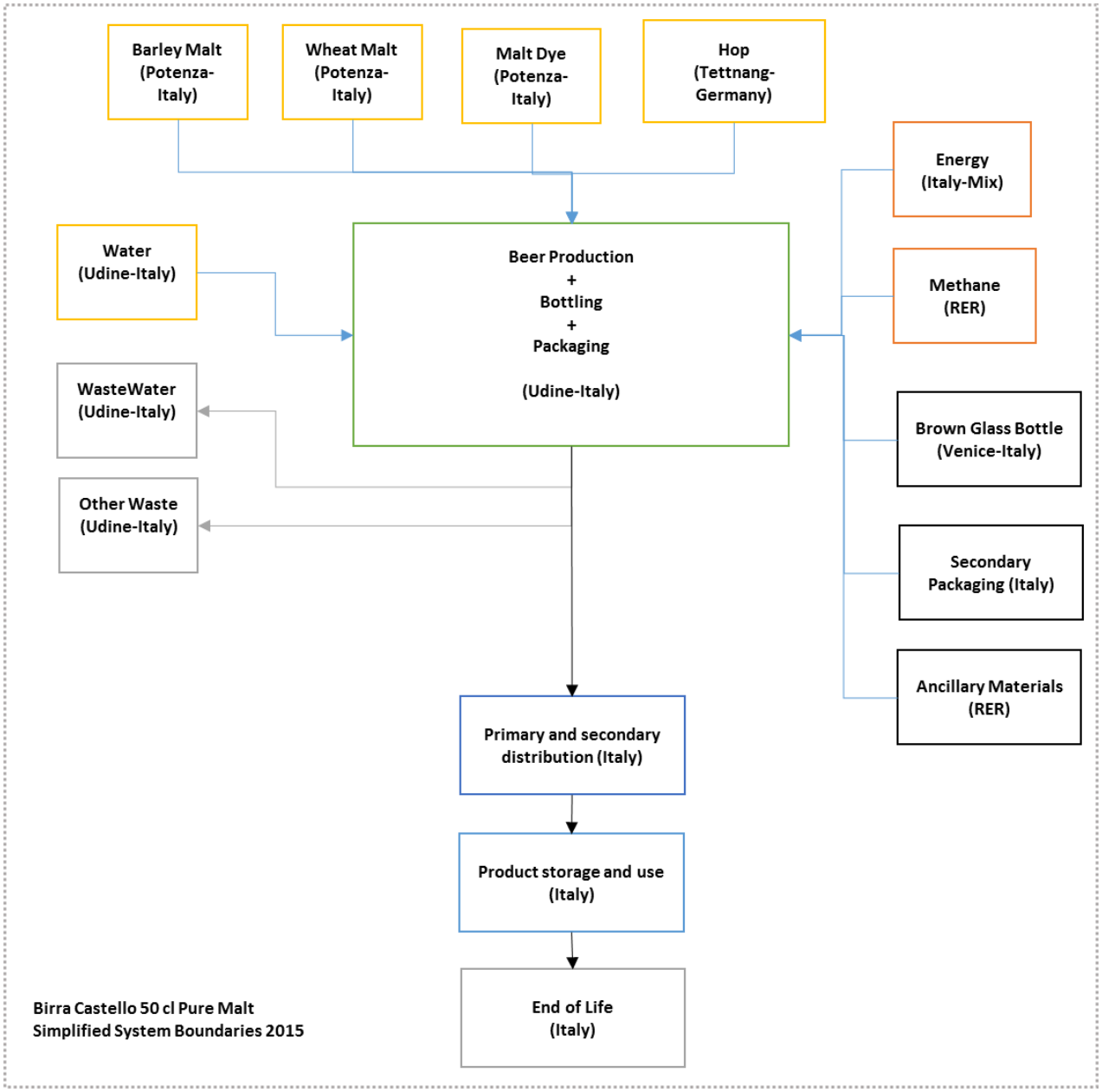
System Boundaries



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Inventory Data

Water Use Inventory		
Life cyce phases	**Description**	**Characterization Factor**
Raw materials	Barley Malt, Wheat malt and Malt Dye are mostly rainfed therefore water use is related to the other agricultural processes (e.g. fertilizer production) and malt processing acquired from database; Hop production water use are primary data acquired on a monthly basis.	Monthlys Local CF, Irri; RER average, Non Irri
Beer Production	Primary data on water use related to water incorporated into beer and other water used for production processes were acquired. Indirect water use from database is used for ancillary material, energy, methane production and distribution.	Local, NonIrri; RER Average, Non Irri; World Avaerage Non Irri
Packaging	Primary data on direct water use were acquired for glass production; Secondary data on other packaging production, energy use etc. are acquired from database.	Local, Non Irri; RER Average, Non Irri; World Average Non Irri
Transportation (Inbound/Primary/Secondary)	Direct and indirect water use are considered from database.	World Average Non Irri
Use	Water use related to the producction of energy to chill the product at home	Country average, Non Irri
End of life	Water used for the treatment of packaging waste from dataset	Country average, Non Irri

Activty data are generally primary data (except EoL and use stage) and refer to 2015

Results

Annual Average	AWARE100 [m3]	AWARE 100 +50%EWR [m3]	DTAx [m3]	DTA [m3]
Raw Material	6,38E-02	8,41E-02	3,40E-03	2,13E-03
Packagings	4,56E-03	8,59E-03	2,11E-03	2,49E-03
Productive Process	2,64E-03	6,42E-03	6,46E-04	8,13E-04
Distribution	4,61E-03	1,33E-02	4,02E-04	6,63E-04
Phase of Use	4,47E-03	1,29E-02	3,90E-04	3,69E-04
End Of Life	2,79E-06	8,07E-06	2,44E-07	2,31E-07
Total	8,01E-02	1,25E-01	6,95E-03	6,47E-03

- Results of AWARE 100+50%EWR are 56% higher than AWARE 100
- Absoulte value differences between AWARE different versions and DTAX,DTA depends also on their different scale

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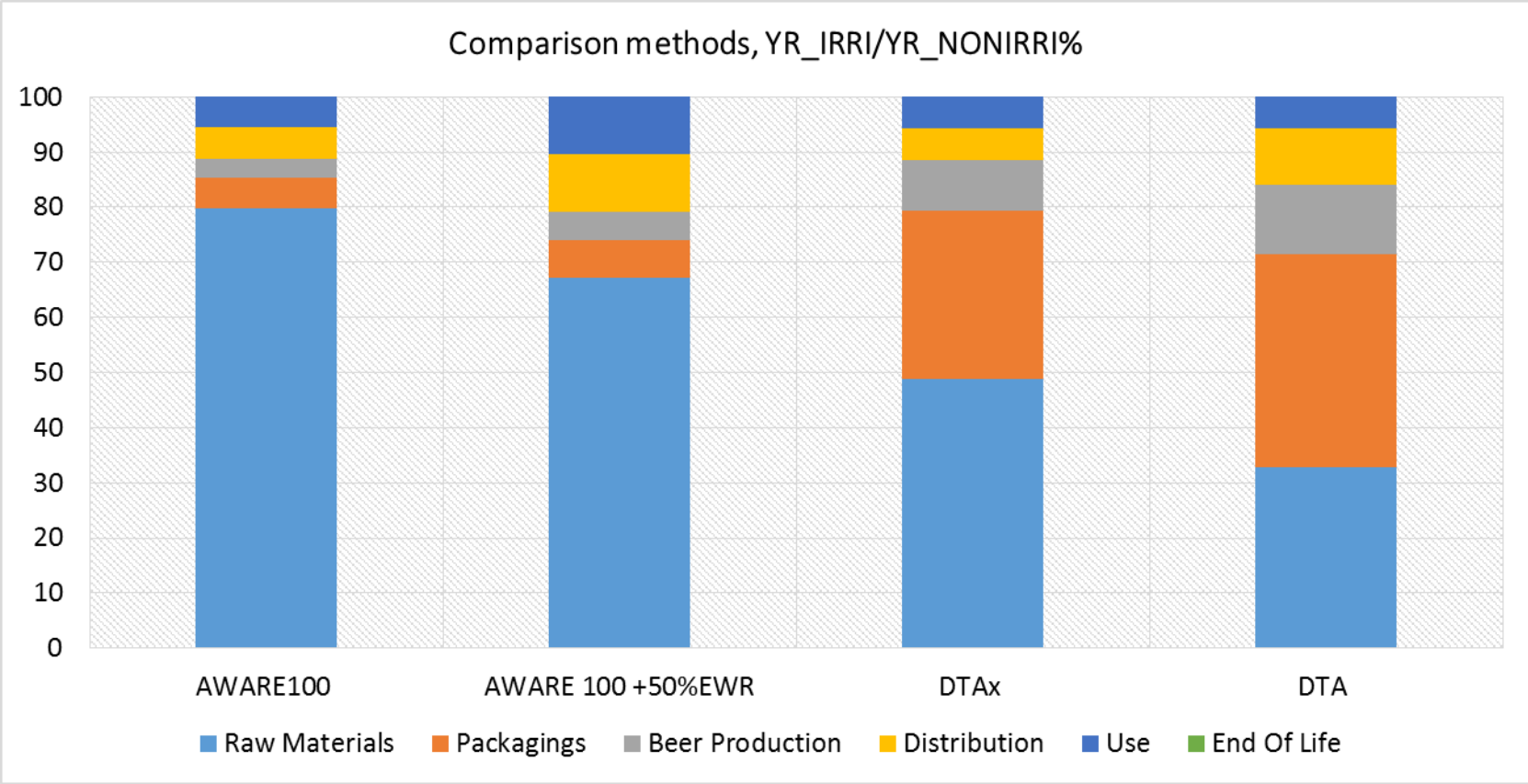
Results



- With all of the methods applied, Raw Materials production resulted to be an hotpsot
- Using DTA and DTAX also Glass production significantly contribute to the total water scarcity footprint

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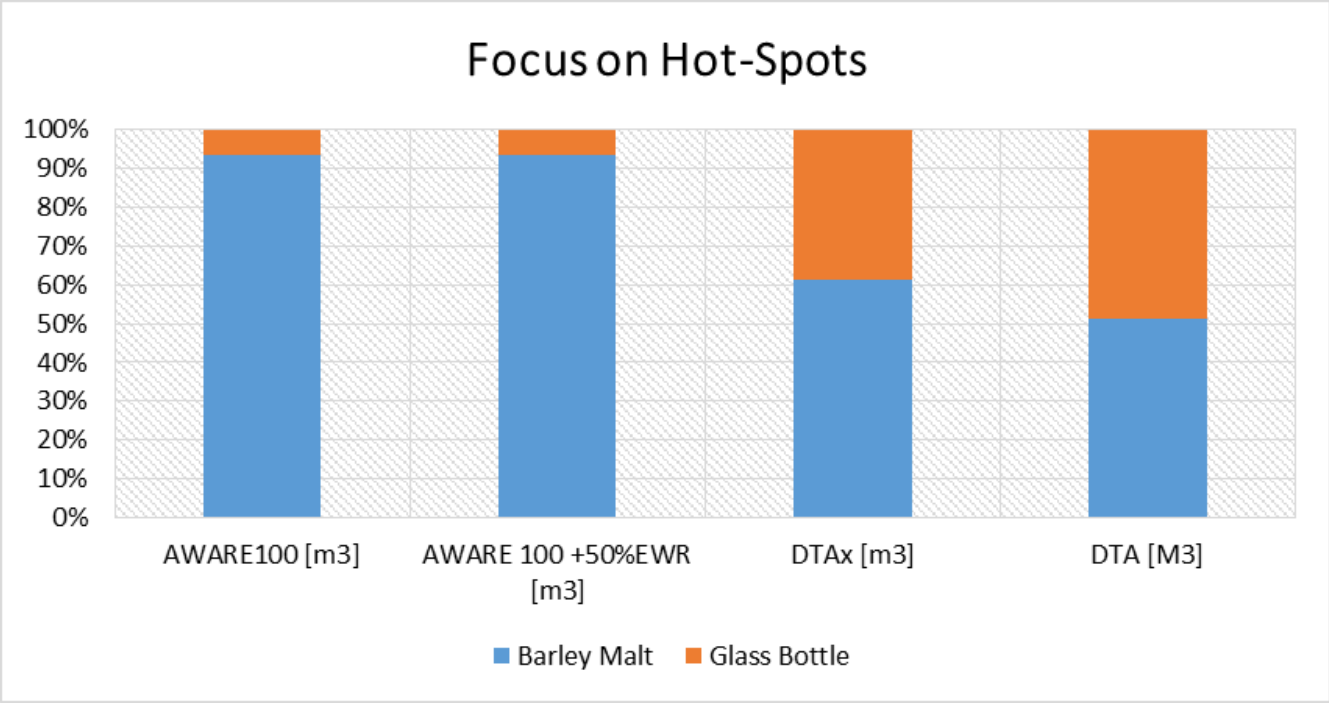
Results: hotspot



		YR_NONIRRI CF			
	Location	AWARE100 [m3]	AWARE 100 +50%EWR [m3]	DTAx [m3]	DTA [m3]
Barley Malt	RER	21	27,69	1,1	0,69
Glass	Basin 29612	0,93	1,21	0,43	0,41

Discussion

- Results are mostly influenced by the water used for Barley Malt production and primary packaging production (Brown glass bottle)
- AWARE and AWARE + 50%EWR gave consistent results
- AWARE gave different results in terms of hot-spot analysis when compared to DTA and DTAx.
- Results of the Water Scarcity Footprint are therefore highly influenced by the method selected.
- The analysis was also performed using monthly data (where available) and yearly average but no significant differences (absolute and realtive results) emerged

Lessons learned

- All of the methods were successfully applied to the same product
- The method presents different geographical and temporal scope that allows to investigate data acquired with different geographical and temporal information
- The use of monthly or yearly average values did not influence final results in this case study
- Results are significantly influenced by accuracy of information on location of the processes
- Using the different methods proved that the relative level of water scarcity of different locations may change significantly (Glass bottle vs Raw Materials)
- AWARE, AWARE+50% EWR can give consistent results

Reccomendations

- Considering that AWARE provides CF at different geographical scale, when performing a Water Footprint scarcity study it would be important to get specific information on the geographical location of processes and raw materials in order to avoid either overestimation or underestimation of results

- Considering that in this case study AWARE (both versions) presents different results than DTAx, DTA in hotspot analysis, it is reccomended to perform sensitivty analysis with different methods to to test and improve the robustness of the conclusion

Thank you

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