Sustainability assessment of an integrated innovative wastewater and greywater system for an optimal and safe closed water cycle in Mediterranean tourist facilities: demEAUmed solution

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OBJECTIVES

1. To conduct an integrated sustainability assessment (environmental and socio-economic) of demEAUmed solution and to demonstrate the benefits of demEAUmed solution in comparison with current non closed-loop water systems in Mediterranean resorts.
2. To detect the main environmental hot spots of demEAUmed's innovative technologies and to identify sustainable opportunities and improvements along the life cycle of technologies and make final recommendations in order to reduce their potential impacts.

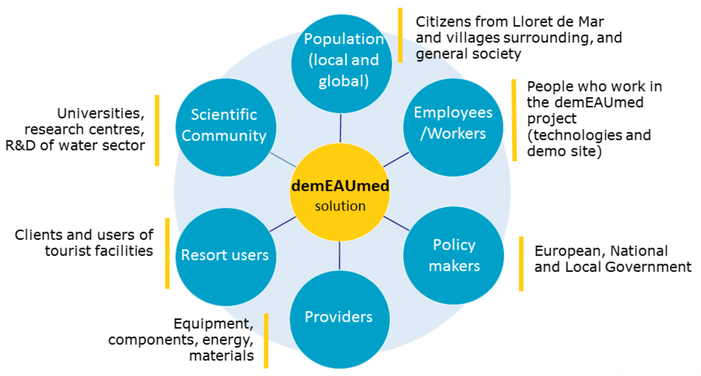
CONTEXT OF THE PROJECT

Euro-Mediterranean areas suffer water scarcity episodes, due to the unequally distribution of water resources in space and time. In areas with high touristic activity in summers, in where exists a mismatch between fresh water availability and water demand, this problematic is increased.
demEAUmed SOLUTION affords eight innovative technologies, monitoring and control systems and a decision support tool to improve sustainable water management in touristic facilities in light with also global touristic market.

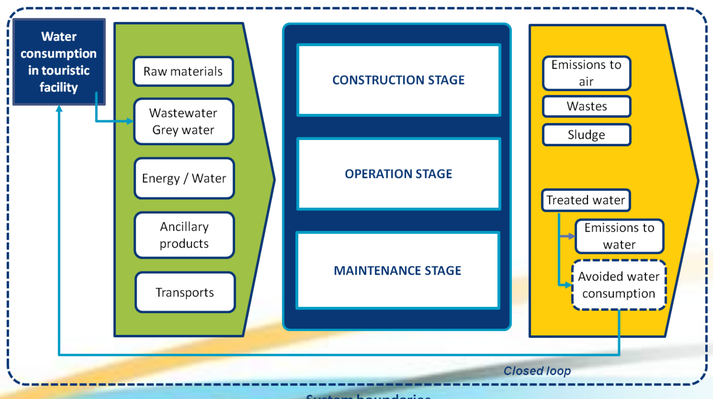
METHODOLOGY

Integrated sustainability assessment based on LCA methodology.

Functional Unit : 1m^3 of greywater/wastewater generated in a touristic facility and treated in order to be reused for different non-potable or potable uses.



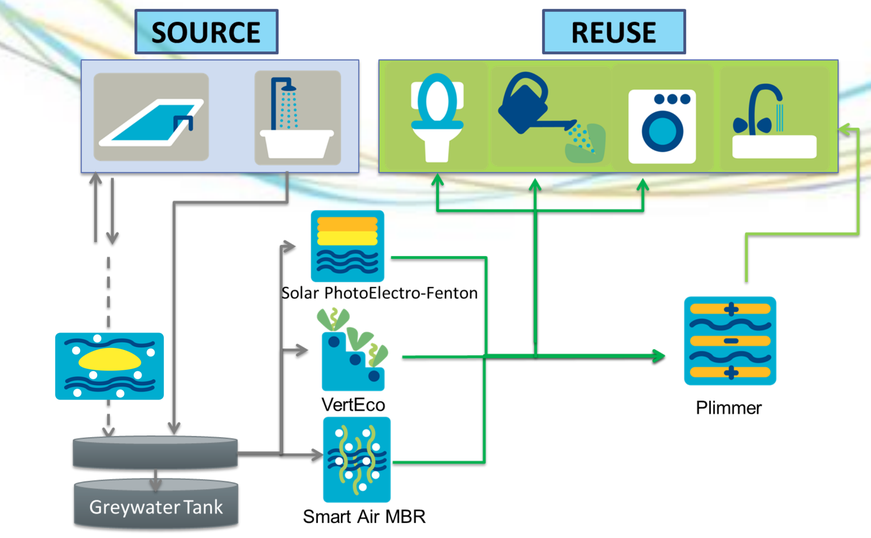
Map of the stakeholder categories analysed under the S-LCA



System boundaries

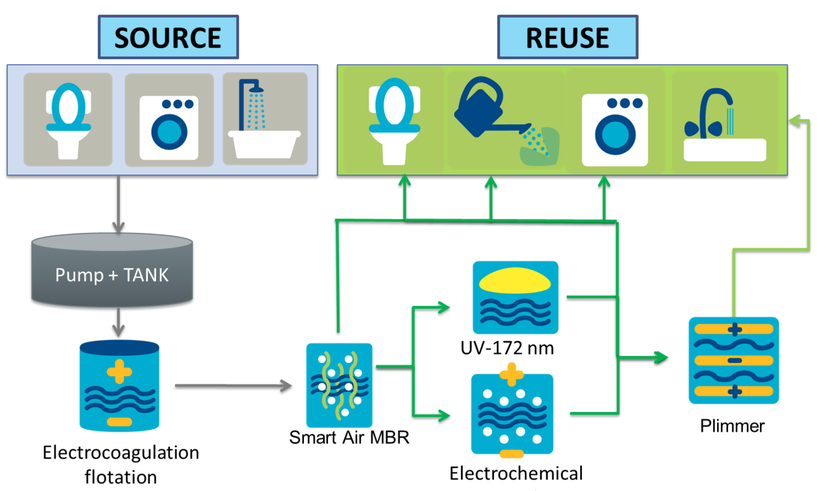
RESULTS

Greywater Roadmap



DEMEAUMED CONFIGURATIONS	NOT CONSIDERING SAVINGS FOM WATER REUSE				CONSIDERING SAVINGS FROM WATER REUSE			
	CO_2footprint (kg CO_2/m^3)	H_2O footprint (L/m^3)	CED (MJ/m^3)	Cost (€/m^3)	CO_2footprint (kg CO_2/m^3)	H_2O footprint (L/m^3)	CED (MJ/m^3)	Cost (€/m^3)
	2.09	16.78	36.63	1.34	-0.76	4.96	-1.88	-1.50
	3.97	25.76	75.70	13.59	1.13	20.81	36.71	10.74
	13.35	87.93	245.12	9.12	10.50	82.98	206.92	6.28
	15.24	103.78	284.50	21.37	12.39	98.83	245.51	18.52

Wastewater Roadmap



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	9.49	46.42	171.83	32.32	3.80	36.52	93.85	29.47
	6.86	37.17	127.21	22.09	2.59	29.75	68.72	19.25
	7.45	40.70	178.72	22.66	4.05	38.68	100.74	19.82

Social assessment: 17 fields and sub-field of impact determined and 28 indicators analysed.

Stakeholder	Field of impact	Subfield of impact	Indicator	Result
Employees	Equal opportunities	Gender distribution of workers	Woman in the labour force participation	22% of women involved.
Providers	Local providers (< 150 km)	Incomes to local providers	Economic expenses on locally-based suppliers	98,241.5€ expensed on local suppliers vs. 33,405.63€ expensed on no-local suppliers.
Resort Users	Health & safety living conditions	Perception of water quality	Water quality of: swimming pool, shower bathroom, WC, garden area and showers	Very high perception of water quality by resort users.
Resort Users	Access to high quality water resources	Water reuse acceptance	1. Acceptance about implementing greywater and wastewater (WW) treatment technologies	75% of acceptance of implementing greywater treatment technologies and 63% for WW.
			2. Acceptance about reusing reclaimed greywater and reclaimed wastewater	71% of acceptance of reusing reclaimed greywater and 54% for reusing reclaimed WW.
Resort Users	Environmental commitment	Water resources	Incorporation of demEAUmed solution in tourist facilities	93% of resort users agree with the incorporation of water reuse practices.
Local community	Community engagement	Environmental education	Communicative actions to local community	10 actions during three years.
Policy Makers	Ensure water availability	Environmental taxes	Willingness to pay an additional tax to protect natural water resources	63% of resort users agree with pay an additional tax to protect natural water resources.
Policy Makers	Provide legal framework	Promotion of new legislation	Should the competent administrations promote legislation on water reuse?	89% of resort users answered yes.

CONCLUSIONS

1. Important **environmental impact savings** have been achieved thanks to the greywater/wastewater recovery and water reuse.
2. Up to 730m^3/year of **saved freshwater** and up to 1036 **kg CO_2/year avoided** depending on the demEAUmed configuration selected.
3. The demEAUmed combined strategies **can reduce their total economic cost** accounting the economic savings from the reuse of reclaimed water.
4. demEAUmed has **contributed to boost local economies**, **generate social benefits**, incorporate sustainable **water management practices in tourist sector** and **create awareness** on water use in tourism sector.

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