The governance of water reuse at small scales: examples for Barcelona

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DEMOWARE

WATER REUSE CONFERENCE: Innovation for a competitive water reuse sector. Barcelona, 13-14 June 2016

Outline

- Some considerations about water governance
- Initiatives regarding greywater reuse in the Barcelona area
- The example of Sant Cugat del Vallès
- Final remarks

Governance: a definition

- “Governance comprises the complex mechanisms, processes, and institutions through which citizens and groups articulate their interests, mediate their differences, and exercise their legal rights and obligations” (UNDP 1997)

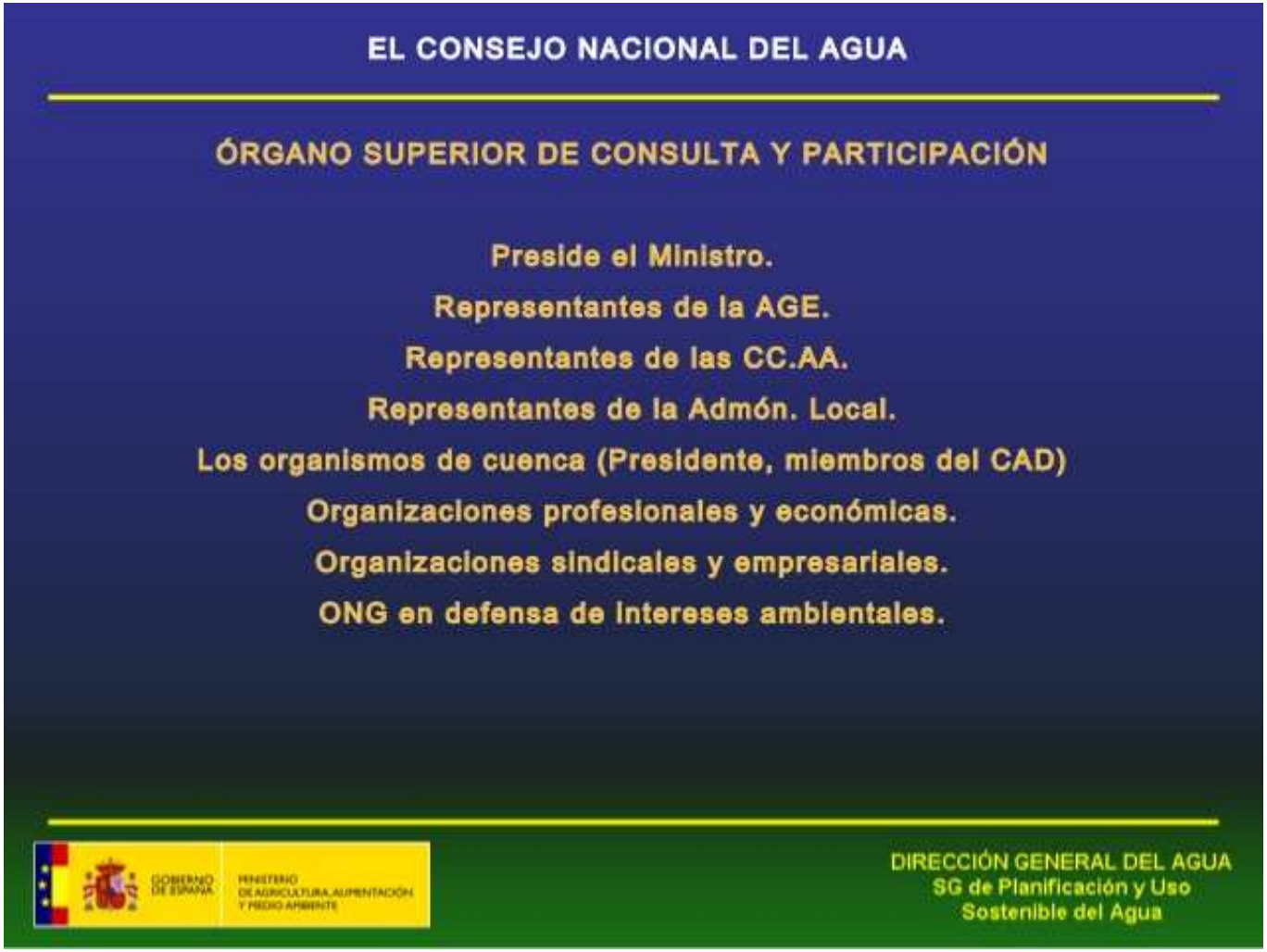
Water governance: three models

1.Command and control model led by a hierarchical centralized State system: top-down supply-driven approach based on technical expertise and a few corporate interests all in the name of the “common good”.

2. **Market-led** model led by private management and the logic of profit.

3. **Bottom-up** model, combining the experience, knowledge and understanding of a variety of individuals, groups and organizations with common interests.

Example of new water governance in Spain (many stakeholders, participation.....but strong power assymetries as well!!)



The specific case of water reuse

- The three models presented can reappear in the case of wate reuse projects.

- Focus on the governance of small scale, decentralized projects of domestic water reuse with the participation of users (bottom up model).

- CASE STUDY: GREYWATER USE IN SANT CUGAT DEL VALLÈS

GREYWATER REUSE

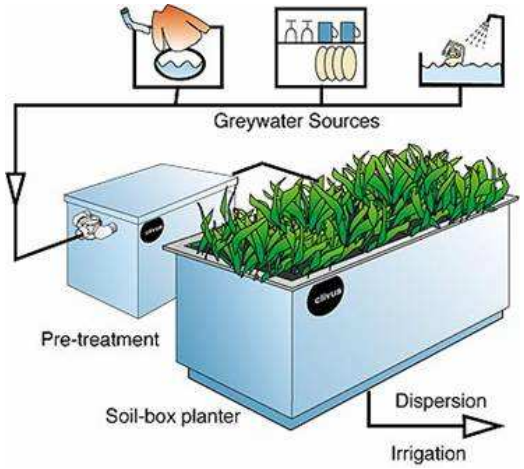
- Greywater is low polluted water which includes all the wastewater produced in a household with the exception of the wastewater from toilet flushing
- After treatment**, greywater may be reused on site**
- Uses given to greywater**: toilet flushing, garden watering and laundry**
- First systems**: chemical treatment (chlorine pills)**

Domènech, L. and Vallès, M. (2014) Local regulations on alternative water sources: Greywater and rainwater use in the Metropolitan Region of Barcelona. Investigaciones Geográficas, 61, 87–96.

GREYWATER SYSTEMS USED IN SUBURBAN AREAS OF BARCELONA

Chemical disinfection

Membrane technology



Biological systems

Domènech,L.; March, H.; Vallès, M., Sauri, D. 2015 Learning processes during regime shifts: Empirical evidence from the diffusion of greywater recycling in Spain, Environmental Innovation and Societal Transitions 15(1), 26-41

Greywater use in Sant Cugat: Context

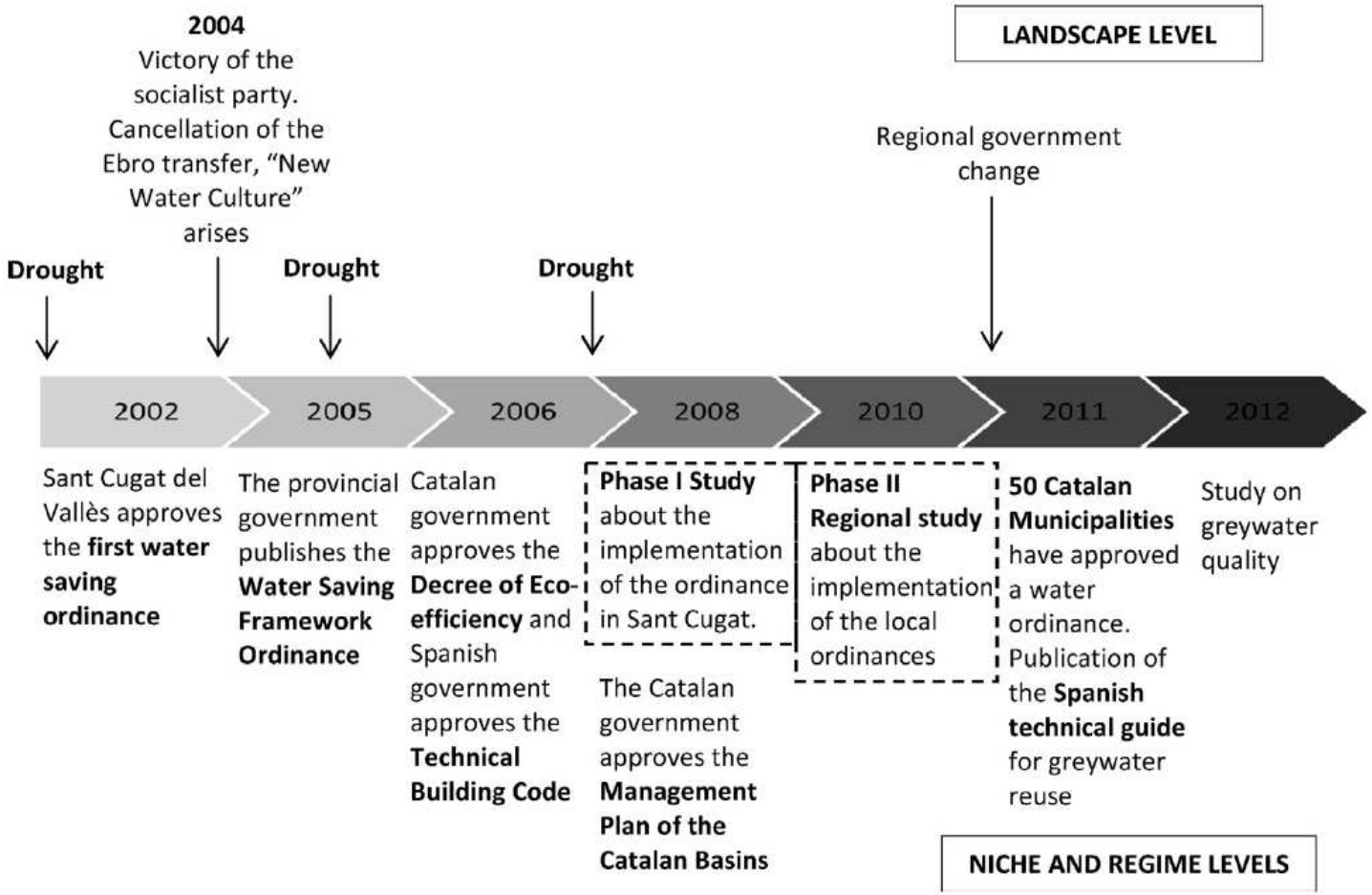
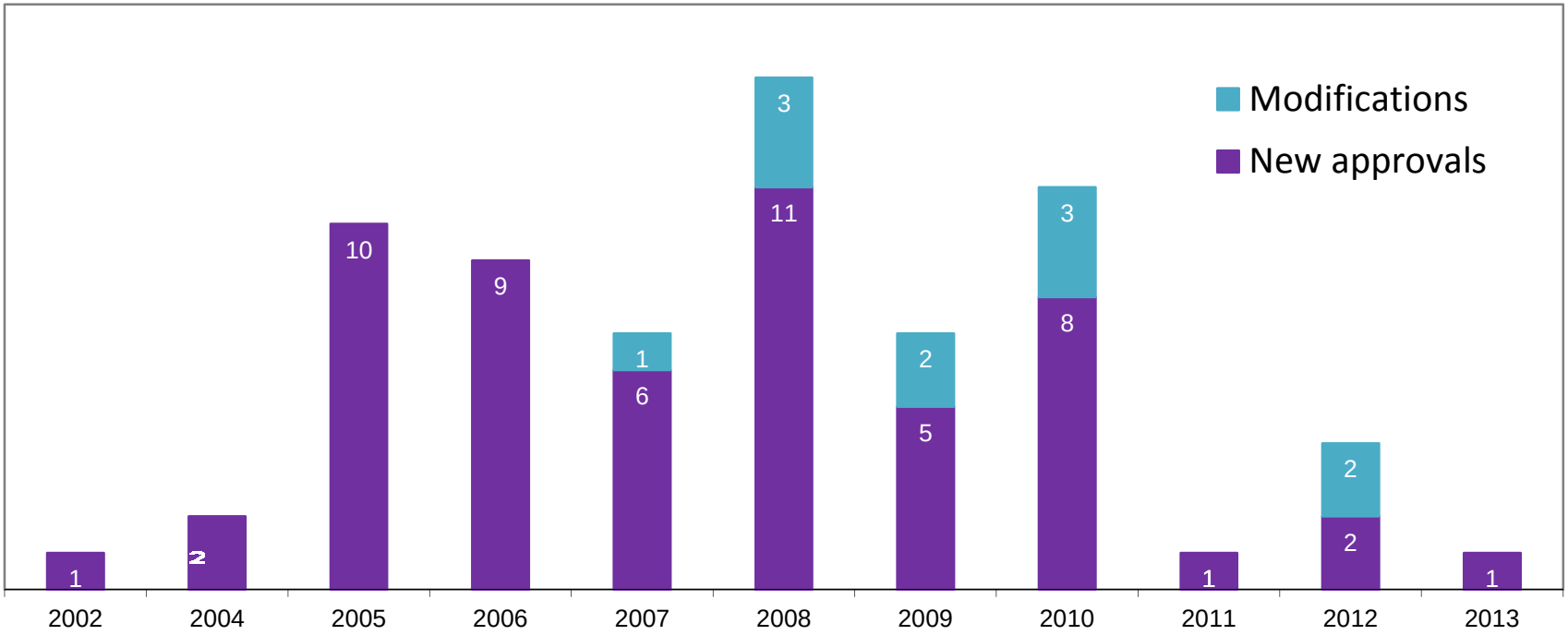


Fig. 1. Time-line of the main events of the water transition at the different levels.

Domènech,L.; March, H.; Vallès, M., Sauri, D. 2015 Learning processes during regime shifts: Empirical evidence from the diffusion of greywater recycling in Spain, Environmental Innovation and Societal Transitions 15(1), 26-41

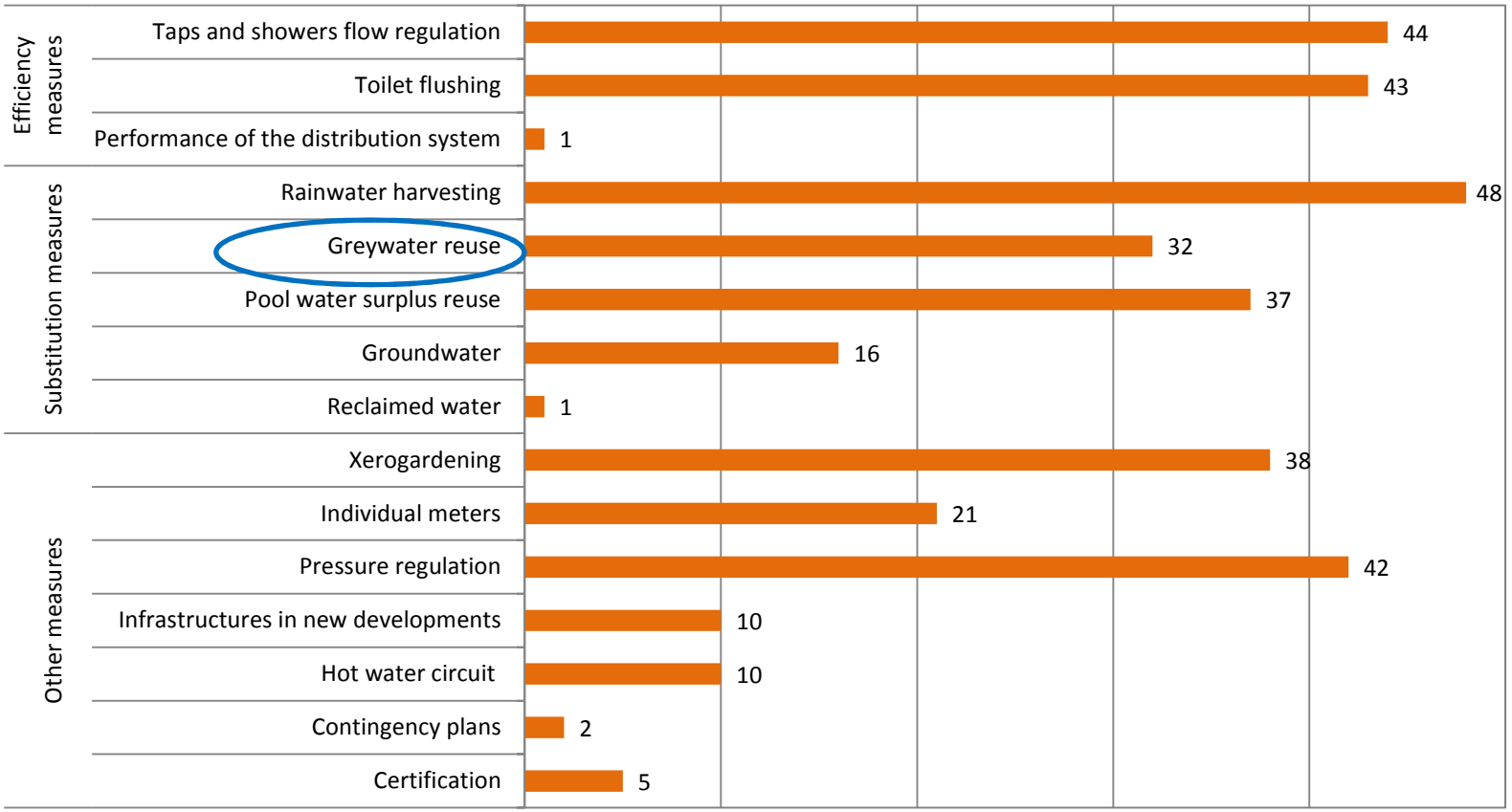
Local water ordinances approved in Catalonia: 2002-2013



Vallès-Casas, 2016, unpublished

2015: 55 Catalan municipalities had approved **local water regulations (>1.3 milion people)**

Specific options selected



Why a water saving regulation in Sant Cugat?

2001

Population: 55.825

Domestic consumption:

193 liters/person/day

2014

Population : 87.118

Domestic consumption:

138,68 liters/person/day

Greywater systems: 170

Population with GS: 24.000 (27’5% of the total)

Oliver, 2015

Greywater in the water saving directive of Sant Cugat. 2002 and 2008

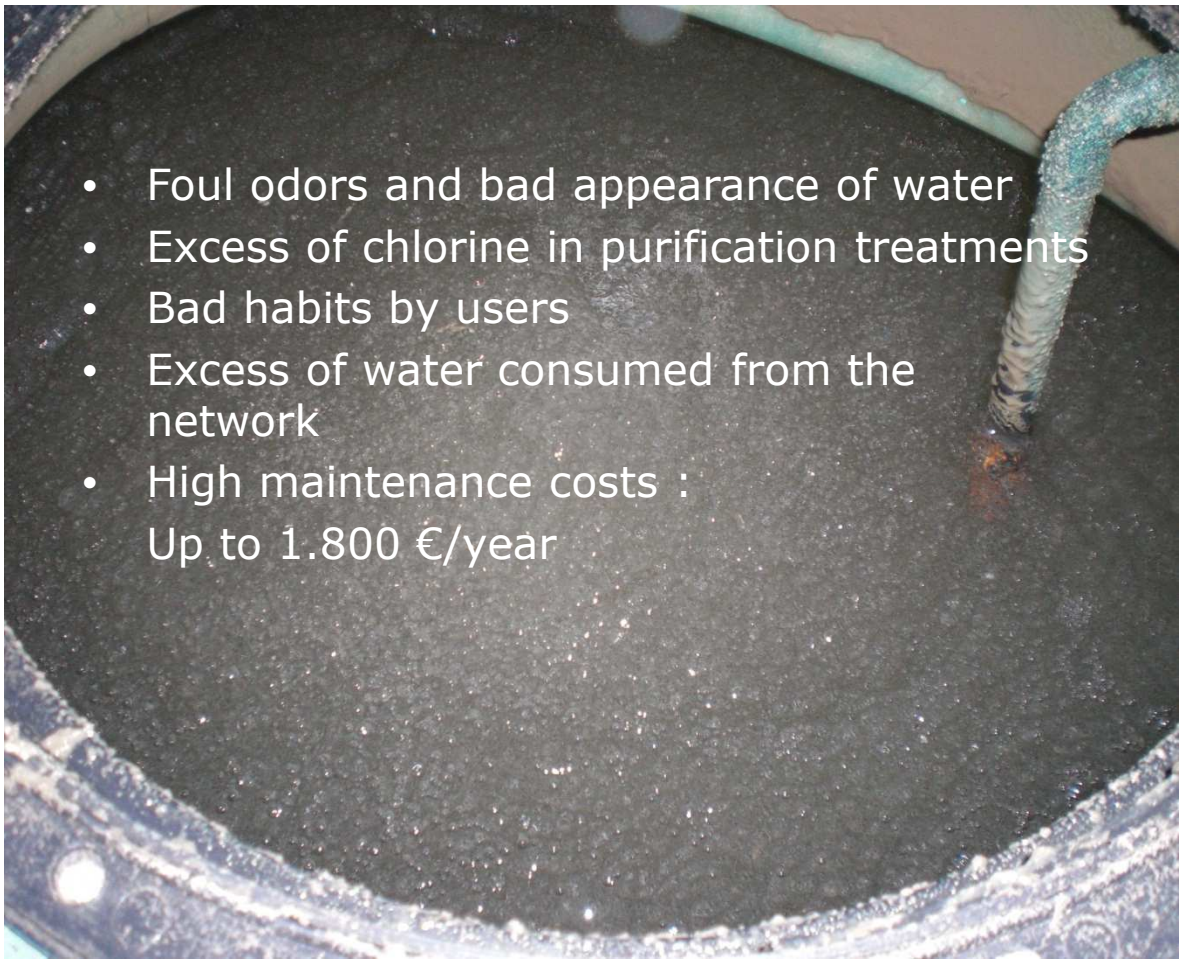
Table 1. Building characteristics for the implementation of water-saving measures and use of alternatives resources according to the water saving directive passed in 2002 and the modification of 2008.

Measures	*Directive 2002*	*Modification 2008*
Regulators of water pressure	All cases	
Aerators in showers and taps	All cases	
Dual flushing toilets or interruption discharge	All cases	
Rainwater tank	When garden area is > 1,000 m^2	When garden area is > 300 m^2
Greywater recycling system	Multifamily buildings with ≥ 8 apartments; other buildings with a water consumption in showers and baths > 400 m^3/y	
Swimming pool water reuse system	Surface area > 40 m^2	Surface area > 30 m^2
Water saving measures in gardens	Not included	All green areas
Groundwater use	Not included	Upon availability

Source: Authors' elaboration based on data from Sant Cugat del Vallès City Council.

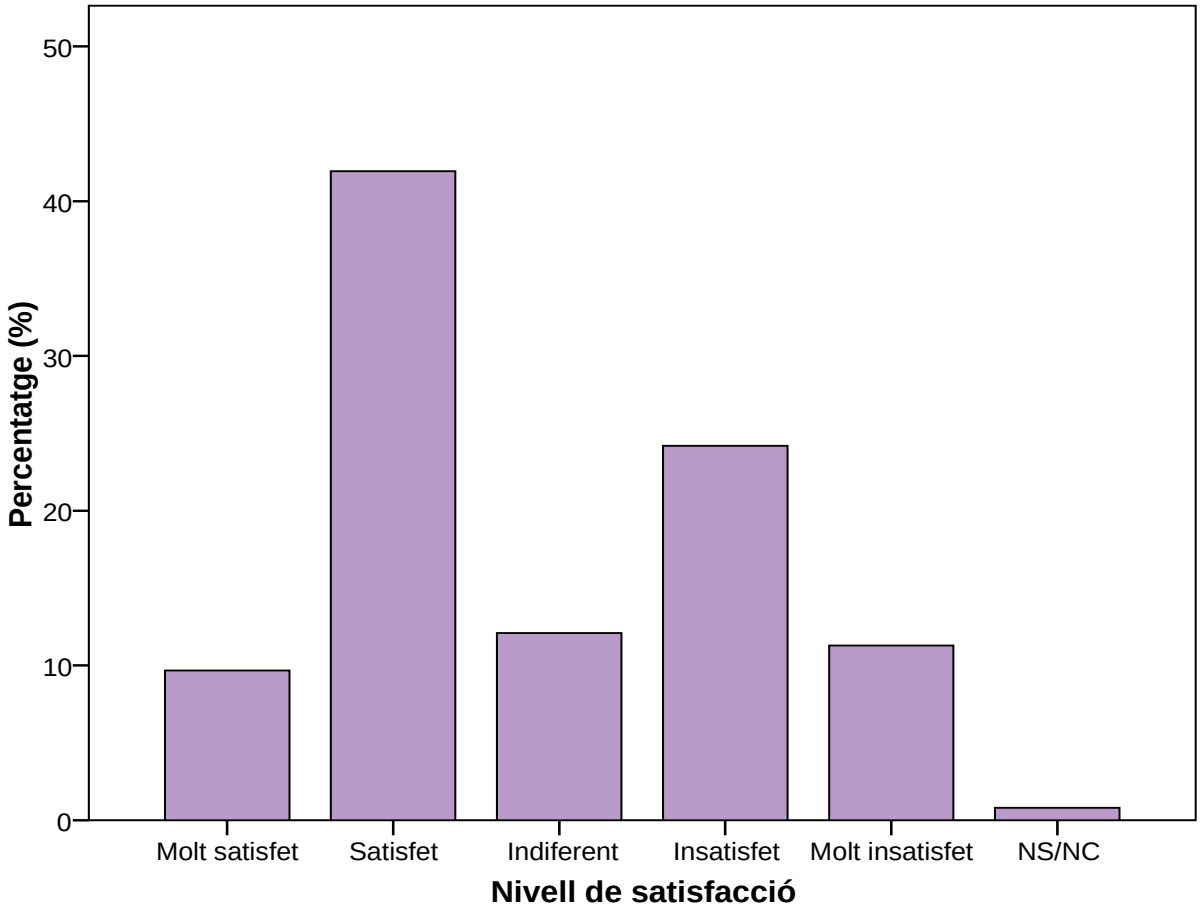
Vallès-Casas et al 2016 Decentralized and User-Led Approaches to Rainwater Harvesting and Greywater Recycling: The Case of Sant Cugat del Vallès, Barcelona, Spain, Built Environment , Vol. 42 (2)

FIRST EXPERIENCES AND FIRST PROBLEMS



- Foul odors and bad appearance of water
- Excess of chlorine in purification treatments
- Bad habits by users
- Excess of water consumed from the network
- High maintenance costs :
  Up to 1.800 €/year

User satisfaction with greywater (apartment blocks-N- and residents –n-; Sant Cugat del Vallès, July 2008, N=14; n=278)



Domènech, 2008, Survey on the perception of greywater use in Sant Cugat (unpublished)

FACTORS DETERMINING SOCIAL ACCEPTABILITY OF GREYWATER SYSTEMS. SANT CUGAT 2008

FACTORS	FINDINGS	RESPONSE
Preference/ Disgust over the concept	• 87.5 percent of the respondents valued highly having a greywater system • 75 percent of the respondents would chose to have a greywater system	The level of acceptability was satisfactory
Perceived benefits	• Water savings was the most appreciated benefit (score: 7.9). • Self -sufficiency scored 6.5 • Economic savings received the lowest score (5.9).	Water saving was the most appreciated benefit
Perception of risk for human health	• 84.2 per cent of respondents considered the risk to be low or very low • The perception of risk for human health increased when the water use involved a direct contact with the body	The perception of risk for human health was not a limitation

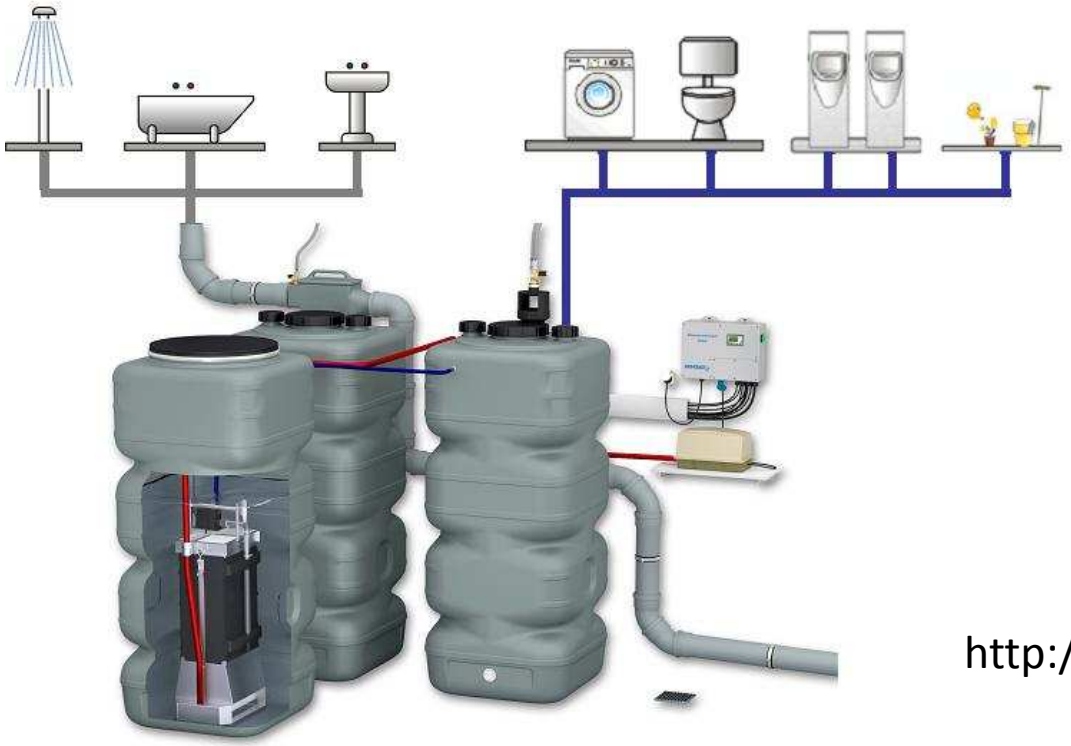
Domènech, 2008, Survey on the perception of greywater use in Sant Cugat (unpublished)

FACTORS DETERMINING SOCIAL ACCEPTABILITY (2)

FACTORS	FINDINGS	RESPONSE
Knowledge	• Only 43 percent of respondents knew that greywater came from the bath. • 89.5 percent of respondents considered that the level of information received was not adequate	The level of knowledge is very low and users feel uninformed
Perception of cost	• 36.7 percent of respondents did not know the cost of the system. • 30.9 percent of the users considered that the cost was high.	The cost is not generally perceived as high
Smooth operation	• Only 50 percent of the respondents were fully satisfied with their system • 41 percent of users said that their system did not function properly • 60 percent of the respondents had suffered from bad smells	Operation of the system is not always satisfactory which may generate refusal

Domènech, 2008, Survey on the perception of greywater use in Sant Cugat (unpublished)

Greywater systems and sociotechnical transitions: Membrane technology

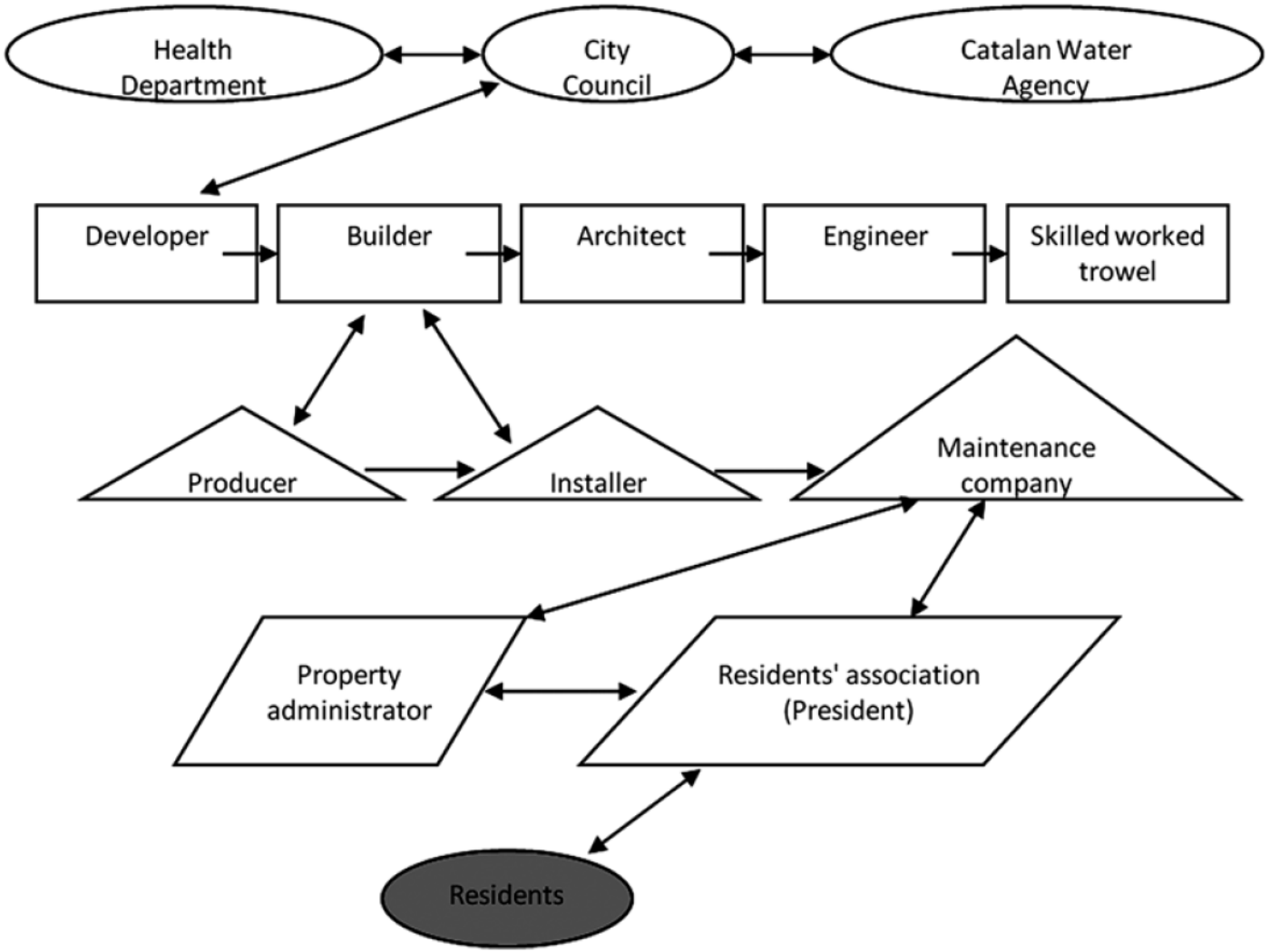


http://www.gep.es/

PROS: Better quality of effluent; longer maintenance periods (2-3 months); no odors; less health risks; more potential uses for recycled water

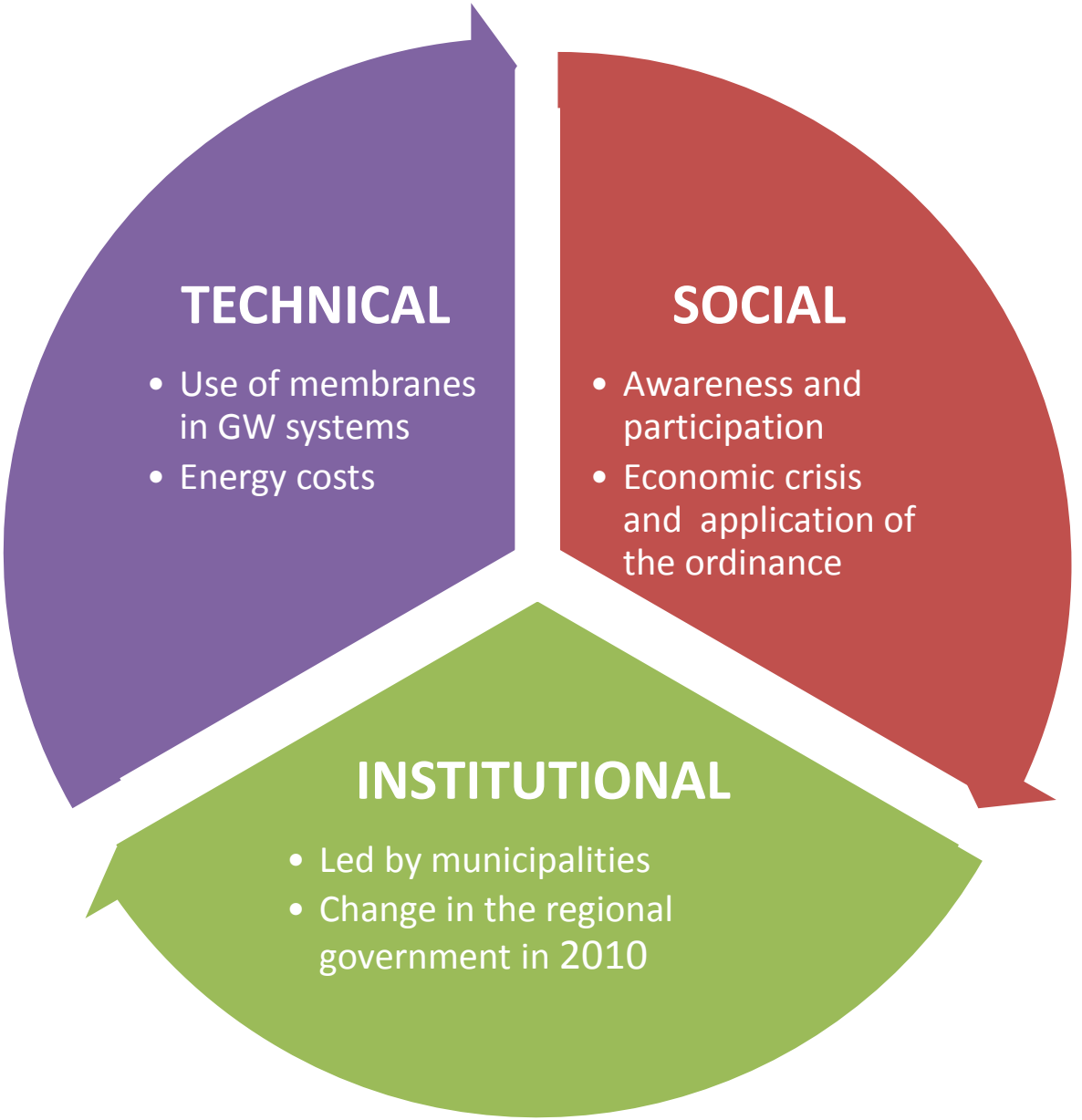
CONS: More expensive; higher energy consumption; less involvement by users and higher costs since operation and maintenance is performed by specialized companies

THE GOVERNANCE OF GREYWATER: ALTERNATIVE MANAGEMENT NETWORKS



Domènech and Saurí 2010 Socio-technical transitions in water scarcity contexts: Public acceptance of greywater reuse technologies in the Metropolitan Area of Barcelona. Resources, Conservation and Recycling, 55(1), 53–62.

CHALLENGES IN THE TRANSITION PROCESS



Alternative water systems: contrasting the views of households and developers

SYSTEMS	HOUSEHOLDS		DEVELOPERS	
	Short Term	Long Term	Short Term	Long Term
RAIN WATER				
GREY WATER				
GROUNDWATER				

Acceptance

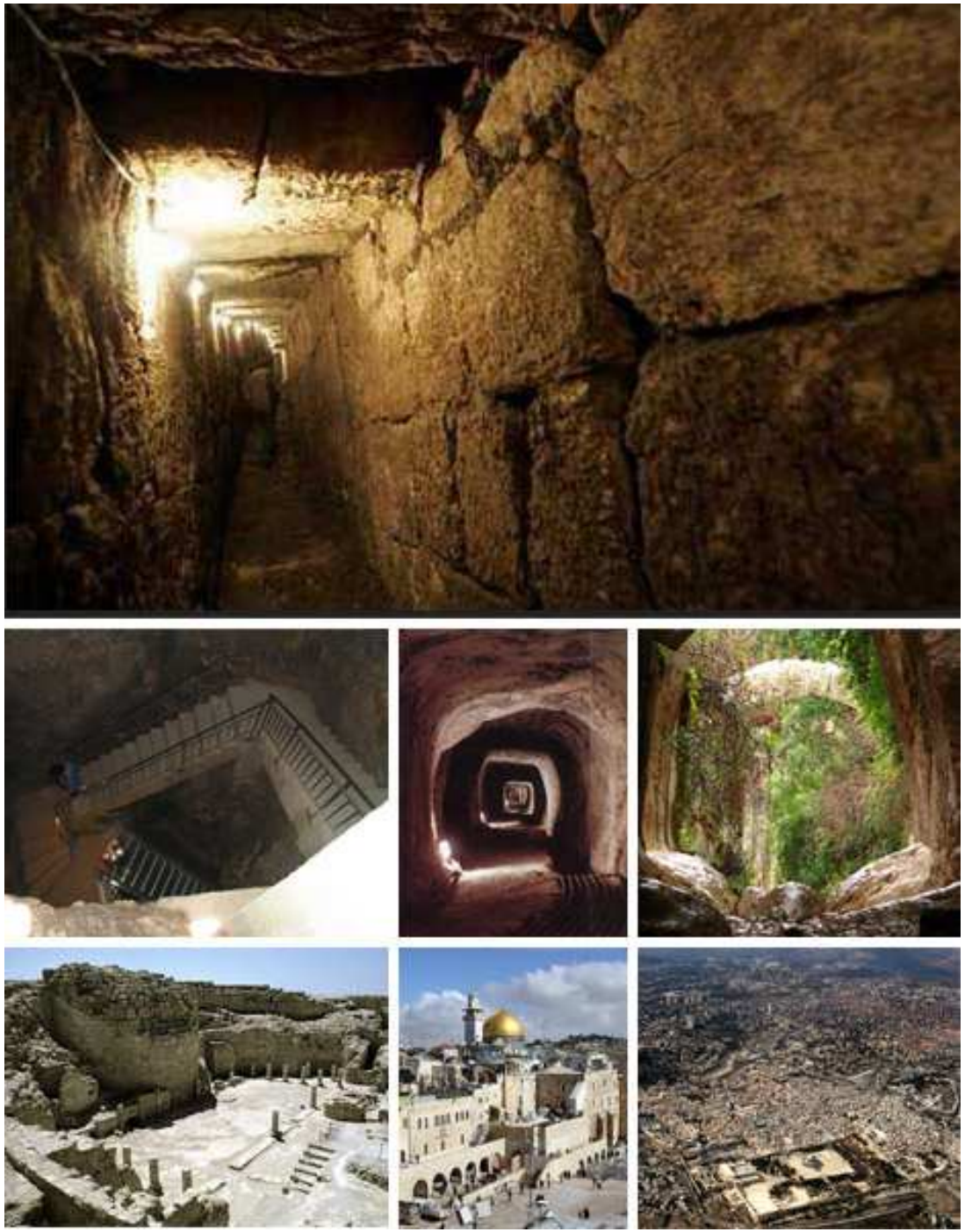
Good Mixed feelings Bad Unknown

Domènech, 2008, Survey on the perception of greywater use in Sant Cugat (unpublished)

Final Remarks

- **Technology**: constant progression(chlorine vs membranes). Better quality at higher costs?
- **Economics**: Domestic water prices in Catalonia were in 2014 approximately 50% higher than in 2008 (payback periods for membranes reduced)
- **Security in supply**: Droughts and episodes of water stress more likely in the future due to CC
- **Energy** : An increasing concern but we lack studies that include the whole life cycle of different alternatives
- **Environmental Awareness** : A very important component of new processes of social learning to conserve water

- **GOVERNANCE:** Small scale, decentralized systems; easier to control by final users; new areas of economic activity; important for the social learning of new and more sustainable technologies and habits...but also more demanding in terms of time and dedication?



THANK YOU VERY MUCH FOR YOUR ATTENTION!!

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(In Jerusalem) Sink water was conserved in basins and used to flush waste much like modern sewers but also saved to water gardens while particulates were filtered to provide fertilizer for surrounding fields.

http://webecoist.momtastic.com