AquaNES

Demonstrating Synergies in Combined Natural and Engineered Processes for Water Treatment Systems

Deliverable D5.1

EU Governance for cNES

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Project

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Executive Summary

This deliverable is concerned with understanding the relationships between combined natural and engineered systems (cNES) and wider governance frameworks. The work underpinning the report was geared towards developing a clearer picture of the governance factors affecting the potential adoption of cNES in the water and wastewater sector. Following approaches developed in previous research projects, this task explicitly sought to develop a system-level view of the governance landscape around cNES. We undertook interviews with key stakeholders, and compiled other relevant information, associated with different cNES schemes in different Member States (notably France and the Netherlands). Analysis of that data was used to produce a 'governance map' using visualisation software that clearly highlights and describes the influence of different factors, and the interlinkages between them. The map is online, publicly accessible, and interactive.

The overall findings highlighted that economic considerations, more than policy or regulatory considerations, are currently the primary drivers for the adoption of cNES. However, policy initiatives can have a very strong influence on economic feasibility, and this was clearly illustrated in the fact that several cNES benefited from targeted, policy-driven financing schemes geared towards enhancing sustainability. Despite their supportive influence, it was also clear that such financing schemes can also introduce inadvertent barriers to cNES adoption if they create inflexible project arrangements. Additionally, the adoption of cNES may be more significantly influenced in future by the emergence of more stringent discharge requirements for wastewater (increasing the attractiveness of cNES as a 'polishing' step), combined with requirements / incentives geared towards decarbonising the water and wastewater sector as a whole (as cNES typically have lower embedded carbon emissions and require less energy).

The task also resulted in three specific recommendations for cNES in the Netherlands (though they may be applicable elsewhere as well). These are: 1) Develop a clear picture of the characterisation and distribution of risk from early planning stages; 2) Investigate customer awareness / attitudes towards the use of water from cNES (vs. traditional sources); and 3) Improve flexibility in funding arrangements from public subsidies.

1 Introduction

The overall purpose of Task 5.2 within the AquaNES project is to understand the relationships between combined natural and engineered systems (cNES) and the wider governance frameworks around water and wastewater treatment. In general terms, the task sought to evaluate whether and how the adoption of cNES was made easier and/or harder by current policy and regulatory regimes, and whether the decision to adopt a cNES (or not) is shaped by any added complexity in the governance arrangements needed to put one in place. It is increasingly recognised that the factors shaping the uptake of cNES are not exclusively technical, but are also socio-political. Moreover, these socio-political factors can extend well beyond the water and wastewater sector. The natural elements of cNES could potentially have a range of environmental implications (for habitats, energy usage, amenity features, etc.) that can fall under the purview of a wide range of policy regimes. Understanding these complex relationships can give a better picture of potential pathways for wider cNES uptake.

2 Methodology

2.1 Data collection

The approach for this deliverable drew from previous work undertaken in the DEMOWARE project (notably Demoware *D5.1: Governance Issues and Response Maps*, which is not publicly available), which was focused on understanding governance enablers and constraints for water reuse projects. As mentioned above, the premise of Task 5.2 is to work with owners and operators of cNES, to understand the range of governance factors that might either help or hinder the wider uptake of such systems. In that vein, the primary data collection activity was a series of interviews with key informants at cNES sites (particularly Glasparel+ in NL, and Agon Coutaineville in FR). Key informants included those directly involved with the site, as well as other relevant stakeholders such as regulators, local government representatives and customers. Interviews were conducted between June and September 2018. The questionnaire used to guide the interviews is found in Appendix 1. It explores a wide range of governance factors, in order to try and identify which are the strongest potential enablers and the strongest potential constraints on cNES. It was accepted that not all of the governance factors would be relevant to all of the sites.

In addition to these dedicated interviews, governance-related information around cNES collected under other work packages (notably WP6 and WP7), both generally and in relation to other AquaNES sites (particularly Erftverband, who provided a governance-oriented case study to help populate the decision support system under WP6), has been used to inform the overall analysis of the governance landscape.

2.2 Visualisation

Where this work diverges and develops from the DEMOWARE work is in the application of an interactive systems mapping tool. Kumu (https://kumu.io/) is an online platform that allows the development and visualisation of complex system maps. Although the tool has never been applied to this type of analysis, it was thought to be a useful mechanism to a) facilitate a more in-depth understanding of the complex inter-linkages between different policy and governance; and b) provide a visualisation tool for partners to help navigate the complex arrangements. The purpose is to try and better identify potential 'pinch points' and/or leverage points within the governance landscape. Earlier

versions of the map were presented to, and circulated amongst, project partners, and their feedback (including from partners not involved in the initial interviews) helped develop the map further.

3 Results

As previously mentioned, full interview data was collected for the Glasparel+ and Waddinxveen sites in the Netherlands, as well as the Agon-Coutaineville site in France. These results, combined with information about Erftverband and from partners in the UK, were used to produce a governance landscape map, which can be found here:

https://kumu.io/hsmithcran/cnes-governance#map-TdBmFKf3

A copy of the map is provided in Figure 1. Because the map is public, care has been taken to avoid referencing any particular organisation or partner. The map is also interactive, so that if a user clicks on any element or link, further explanatory information appears with references to generalised examples.

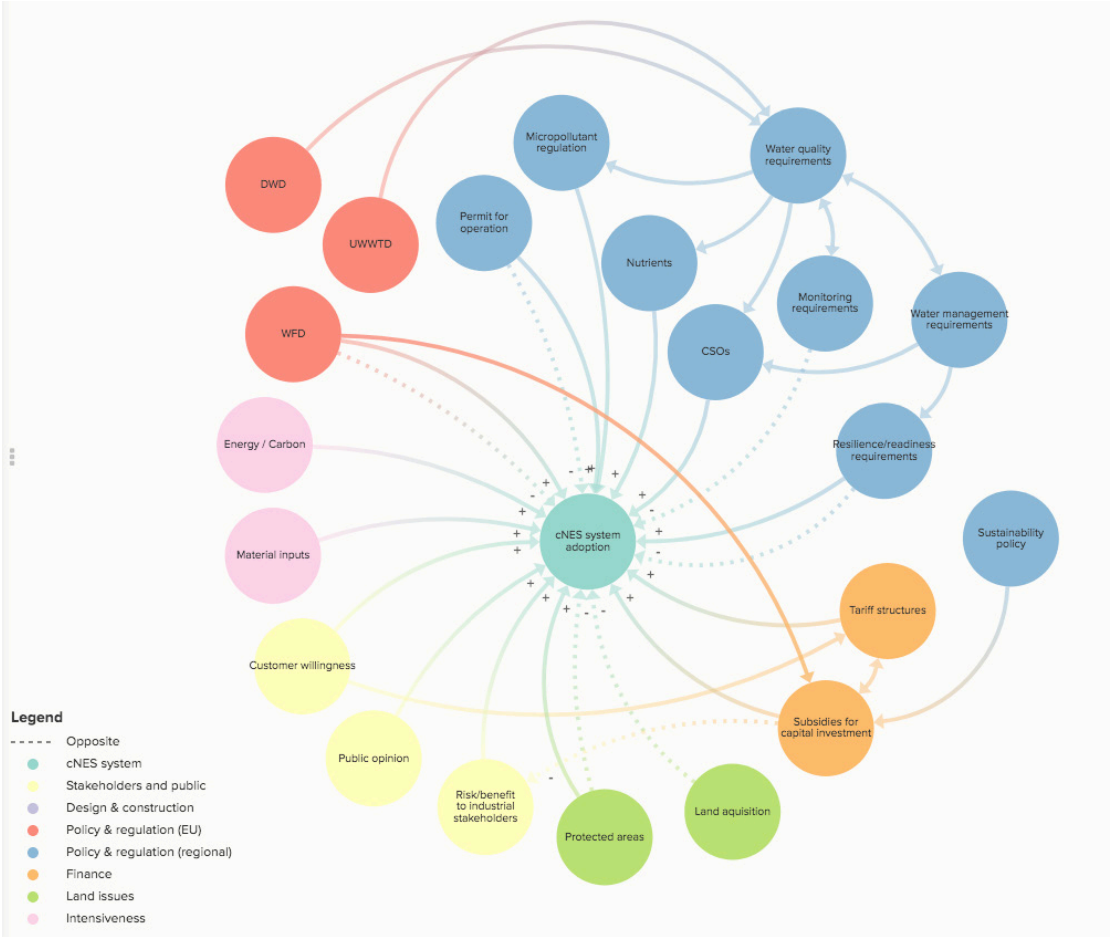

Figure 1 Snapshot of interactive governance map for cNES adoption

3.1 General findings

It is clear that economic considerations, more than policy or regulatory considerations, are currently the primary drivers for the adoption of cNES. In other words, cNES adopters are more concerned with the cost-effectiveness of such systems as options for achieving particular water quality or water management requirements – in some cases cNES have been adopted because they are the only viable solution to achieve particular requirements. The use of targeted, policy-driven public financing schemes in some contexts, aimed at incentivising the use of more innovative and/or sustainable treatment systems, have played a significant role in encouraging the implementation of cNES in the studied cases. However, as discussed in the next section, such financing schemes can also introduce inadvertent barriers if they create inflexible project arrangements.

However, new regulatory requirements – particularly the emergence of more stringent water quality requirements for wastewater discharges – are driving considerable interest in cNES as 'polishing' treatment steps. These new requirements could potentially provide stronger drivers of cNES adoption in future. Similarly, some countries are adopting specific incentives / requirements aimed at 'decarbonising' the water sector, both in terms of reducing the sector's direct emissions of greenhouse gases, and reducing the embedded carbon within assets and infrastructure. The latter may present a particularly strong driver for cNES adoption in future, especially in combination with more stringent discharge requirements. In such cases, the current pinch point is the limited availability of evidence on how effective cNES might be at addressing particular contaminants (such as micropollutants), as well as their relative carbon impacts.

Currently, governance drivers appear to be strongest for cNES that are used as part of stormwater management schemes. Such systems can also be supported by policies around climate change adaptation and improving resilience (dealing with increased rainfall and flooding). In many cases the use of such systems has been supported through the provision of financial incentives from regional governments.

Despite that fact that cNES can provide a wider range of ecosystem services compared to standard engineered systems – such as habitat provision, carbon sequestration, and amenity benefits – this does not appear to provide a strong governance driver. In the sites studied, the Water Framework Directive (WFD) generally did not have a strong influence over the adoption of cNES, although in the Netherlands it did have a role in *dis*couraging the use of conventional systems, namely desalination. However, results illustrated that cNES can sometimes face more hurdles under environmental legislation than standard systems, due to their potentially significant land requirements and the disturbances created from their installation and (sometimes) from their operation and maintenance. Where those disturbances might be seen as a degradation of the water environment (prohibited under WFD) or where they might affect protected areas (e.g. Natura 2000 areas), this can create barriers to the use of cNES, even though ultimately the system may be complementary to the natural landscape. Again, the particular pinch point here is the limited availability of evidence around the wider environmental impacts and benefits from cNES at different scales.

A summary of how different governance factors affect cNES adoption for the studied cases in the Netherlands and France is provided in Table 1.

Table 1 Summary table of how different governance factors affected cNES adoption for studied cases in Netherlands (NL) and France (FR)

Governance factors	Helped a lot	Helped a little	Neither helped nor hindered	Hindered a little	Hindered a lot
EU Legislation		NL	FR		
Financing			FR	NL	
Tariffs			NL / FR		
Land use			NL	FR	
Licensing			FR	NL	
Design standards			NL / FR		
Water quality standards		NL / FR			
Monitoring and reporting			NL	FR	
Customer attitudes			NL / FR		
Stakeholder collaboration		NL	FR		

3.2 Specific recommendations for case in the Netherlands

The AquaNES case in NL involved a private project developer who adopted a cNES (rainwater capture, managed aquifer recharge, and re-abstraction) to supply non-potable water to a particular group of commercial users (horticulturalists). The project benefitted from a targeted public subsidy aimed at supporting 'sustainable water management' systems in the region. The cNES was used as an alternative to the desalination of brackish water, which is a common source for horticultural users, but presents an environmental challenge through the disposal of brine, which has a negative impact on water quality. The use of these desalination systems is being discouraged under the current regulatory framework. The cNES was presented as a more sustainable alternative, and because it used rainwater capture, it had the additional benefit of enhancing stormwater management capabilities (suitable for climate change adaptation). However, the project did face some governance challenges, and our analysis of the case has generated some specific recommendations. These recommendations are intended primarily for future developers of cNES schemes in NL, although the lessons could apply to other countries as well.

1) *Develop a clear picture of the characterisation and distribution of risk* – One of the biggest challenges in this project was the need for the project developer to adjust to the risk perceptions of the water users. Because the water users are large companies whose commercial interests (horticulture) depend directly on having a reliable water supply of suitable quality, they were highly risk averse. This meant that the project developer had to make numerous changes to the initial project plan in order to manage perceived risks to the quality and supply of the water, including by transferring greater control over the supply (and the associated risk) to the users themselves. By developing a clear picture of perceived risks, and the desired distribution of those risks, amongst all stakeholders in the early planning stages of a project, the need for such adjustments in later stages could be avoided.

2) *Investigate customer awareness / attitudes towards different water options* – It was clear in the studied case that the commercial water users, and the retail outlets that they supplied, did not communicate anything about water supply options to the customers who purchased the horticultural produce. It appears as though none of the stakeholders have investigated whether the use of a 'more sustainable' cNES water supply option can be communicated to retailers and customers in an effective way, and whether that might enhance the commercial appeal of the products or the horticultural suppliers. We would recommend that such an investigation be undertaken. Work elsewhere in AquaNES has shown general public support for cNES, and in this case, if a mechanism could be found to communicate to customers that produce has been grown with water from a cNES, it could enhance to appeal of the products and draw trade for the retailer. This would, in turn, lend further support to the wider uptake of similar cNES schemes.

3) *Improve flexibility in funding arrangements* – As previously mentioned, this project benefited from a targeted provincial government subsidy, aimed at supporting more 'sustainable water management' projects. While this was important to the overall financial viability of the scheme, it also introduced some barriers. At the time the subsidy was granted, project specifications became enshrined in a funding agreement between the government and the project developer. It then became very difficult to alter the project specifications in light of new information or new priorities. While it was acknowledged that there was a need for some legal certainty in funding arrangements, both the project developer and the local water board felt that the lack of flexibility in the initial project specifications, and the general level of bureaucracy around the funding, was more of a hindrance than a benefit. This is a general challenge of supporting innovative systems that are relatively untested and whose implementation may need to be adjusted in light of emerging information. Targeted subsidies can be vital in ensuring that innovative systems can become financially viable. However, in order to ensure that such subsidies can be used most effectively, it is important to allow a degree of flexibility in the funding arrangements to enable some adjustments as projects develop.

Appendix 1 – Interview guide

Overall questions / aims:

Compared to the use of 'traditional' treatment systems, is cNES adoption more or less difficult under current policy and regulatory frameworks? Why?

What kinds of policy/regulatory initiatives (including changes to current frameworks) might facilitate the adoption of cNES?

Motivational factors

1. What are your main motivations for considering/using cNES over fully engineered systems?

EU legislation

2. To what extent is the consideration/use of cNES influenced by relevant EU legislation?
    a. Urban Wastewater Treatment Directive
    b. Water Framework Directive
    c. Floods Directive
    d. Habitats Directive
    e. Others?

Financing

3. Are there mechanisms to obtain capital financing to support the design and installation of cNES systems? How easy is it to obtain financing for cNES compared to fully engineered systems?

Tariffs

4. Does the use of cNES have any effect on the setting of relevant tariffs (drinking water, wastewater, stormwater)? Does it make relevant services more or less expensive to users? Can costs for cNES be recovered through tariffs?

Land use

5. How easy is it to acquire the necessary land, and obtain the necessary planning/development permits, to install cNES systems? Is it more or less difficult for fully engineered systems?

Licensing for systems

6. Are treatment systems subject to a licensing or permitting regime (i.e. did you need to obtain any permit(s) in order to operate)? If so, do these requirements easily allow for the use of cNES?

Design standards/codes

7. Are there relevant standards or codes for designing and constructing cNES?

Water quality standards

8. Are there legislated water quality standards drinking water/wastewater/stormwater? If so, do cNES make it easier or more difficult to adhere to these standards?

Monitoring and reporting

9. Are there legislated monitoring and reporting requirements (e.g. water quality, emissions, technical performance) for treatment systems? If so, do cNES make it easier or more difficult to adhere to these requirements?

Customer attitudes

10. Are the utility's customers aware of the use of cNES? If so, how have they become aware? Are they interested? Are there reactions generally positive/negative/mixed? Have any benefits or concerns been raised?

Stakeholder collaboration

11. Have any other stakeholders (e.g. NGOs, government bodies) been involved in the development and progress of the cNES scheme? If so, what has been their involvement?

General

12. Of all the governance factors discussed above, which do you feel are the most important for the future development of cNES in your country?
13. Which of the factors above require the most improvement?
14. Are there any other important factors that we've missed out?

EU Legislation	Helped a lot	Helped a little	Neither helped nor hindered	Hindered a little	Hindered a lot
	Please Explain				
Financing	Helped a lot	Helped a little	Neither helped nor hindered	Hindered a little	Hindered a lot
	Please Explain				
Tariffs	Helped a lot	Helped a little	Neither helped nor hindered	Hindered a little	Hindered a lot
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	Please Explain				
Monitoring and reporting	Helped a lot	Helped a little	Neither helped nor hindered	Hindered a little	Hindered a lot
	Please Explain				

Customer attitudes	Helped a lot	Helped a little	Neither helped nor hindered	Hindered a little	Hindered a lot
	Please Explain				

Stakeholder collaboration	Helped a lot	Helped a little	Neither helped nor hindered	Hindered a little	Hindered a lot
	Please Explain				