BESSE newsletter 3

Newsletter 3

Brokering Environmentally Sustainable Sanitation for Europe

April 2011

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Brussels Seminar

AICCRE, the Italian Section of the Council of European Municipalities and Regions (CEMR), hosted the 1st Brussel Seminar of the BESSE project.

The purpose of the seminar was to emphasise crucial issues regarding existing water and sanitation knowledge or lack thereof.

Water and sanitation are important to the European Commission which has very specific guidelines and policies in place. It is clear that the general population is ignorant as to what water and sanitation services entail: 'We talk about most crucial problems to keep human settlements alive but it is invisible to people until things go wrong', Prof Wiebe Bijker from Maastricht University, said.

Water and sanitation is differently important to different role-players: the universities, research institutions, practitioners, policy makers and the general public all have different understandings and demands on these services. Cleavages exist between these different understandings. The question then arises: how do we link the different understandings and how do we get the agenda and the questions from the universities and research institutions into practice? The BESSE project calls the solution to this problem knowledge brokerage.

The BESSE project brings the solutions together by studying knowledge

Funding

SEVENTH FRAMEWORK PROGRAMME

Project No: 226744

Project Partners

21st century sanitation systems are stuck in the 19th century

Most current sanitation approaches in Europe are based on knowledge, technologies and management systems developed in the 19th and early 20th century. These approaches do not adequately respond to the sustainable development needs of the 21st century. Existing knowledge about sustainable sanitation is thus not implemented in sanitation settings, such as wastewater treatment plants.

Modern toilet design began in 1596, when Sir John Harington invented a device that released human waste into cesspools. In 1775, Alexander Cummings designed a toilet with a water trap under a bowl. In the late 1800s, the first recognisably modern toilets were developed by Thomas Crapper, a plumber who brought toilet design and manufacturing technology together.

Historically, sanitation design needs were awakened by cholera epidemics or other disasters and the systems were adjusted. For instance it was during a cholera epidemic in the mid 1800s that the connection was made between human waste and water supplies. During the same period a totally new sewer system was designed and built after the city of Hamburg burnt down. That new system was vented to or through the roof drains of the connected buildings, and a flushing system was created (flushed once per week utilising tide water) to clean the new mainline sewers. This new design philosophy for the sewering of a major metropolitan area was soon recognised as the model, and, thereafter, was used by other cities.

River Fleet photographed in 2007. One of the largest tributaries of the Thames in the early days of London was the River Fleet, which was a water source and transportation route from Roman times onward. As late as 1826, it was recorded that the river was 65 feet wide. In the 1850s, a series of sanitation crises led London to build a massive sewer network. A huge brick tunnel was built around the River Fleet as part of this effort, well over twenty feet high at its largest points, and it serves now as one of the largest sewer channels in the city.

Do we need another disaster to force technological, management and system changes? The effects of climate change on flooding and droughts throughout the world are enough of a disaster to force change. What is then blocking change?

The objective of the BESSE project is to understand the information blockages and factors that hinder the dissemination of available and modern knowledge. The second objective is to identify mechanisms of knowledge brokerage to overcome these identified obstacles.

Sources : http://www.sewerhistory.org/chronos/new_amer_roots.htm and http://www.leeds.ac.uk/lihs/psychiatry/research/TransferringKnowledgeIntoAction/documents/Knowledge%20Brokering%20Final%20report.pdf

WHAT ARE WE LEARNING?

It is important to understand knowledge brokerage in the context of environmentally sustainable sanitation technologies in Europe. Sanitation as a sub-sector is notorious for having a low profile everywhere. This extends to linkages between actors in the sub-sector, which are sub-optimal. As a result, the sector could do more to facilitate effective knowledge brokerage between actors in the sub-sector. This is what the BESSE project focus is about. As the project's first objective was to collect, review, and systematise existing knowledge, it focused on three distinct aspects, being to;

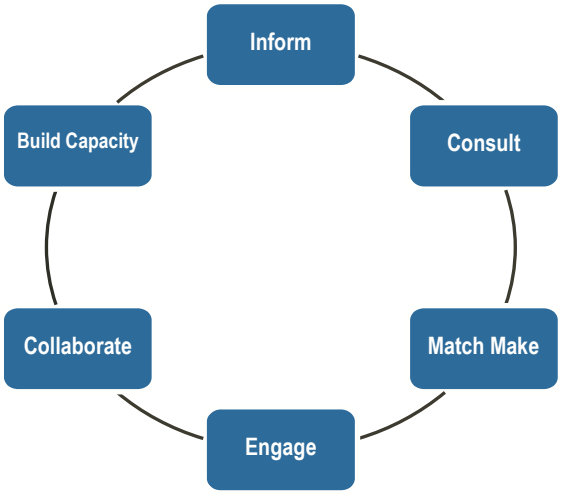
- ◊ Develop a map of innovative wastewater technologies - summarised on page 4
- ◊ Develop a listing of actors in sanitation - summarised on page 5 and
- ◊ Perform mini studies (case studies) that illustrate innovative use of wastewater technologies and that illustrate sustainable technologies in practice.

Together, these activities provide a baseline indicator of the level of advancement and innovation in the sanitation sector in Europe.

A lesson that we learnt from doing earlier work is that context is very important in the brokerage process. Information brokered successfully in one context may require different approaches in another. The aim of undertaking the case studies therefore was to understand the contextual dimension to the brokerage process. The purpose is to begin to understand the typology of contextual factors that affect brokerage. This is important as context is key to getting information used.

The working definition of brokerage within the project is 'Knowledge brokerage as a mediation process, consisting of transferring knowledge between different (social, professional, cultural, institutional, organisational, etc.) contexts'. This definition picks out the important elements – mediation, knowledge transfer, and disparate contexts.

The project framework conceptualises brokerage as having six facets that deploy as appropriate, being:



The case studies are linked to knowledge brokerage, adhering to the following definition: knowledge brokerage is a mediation process, consisting of transferring knowledge between different social, professional, cultural, institutional, organisational etc. contacts.

The case studies dealt with seven contextually different areas: three in eastern Europe, (Bulgaria and Hungary), and two each in Italy and the Netherlands.

The project developed a case study framework, which acted as a methodological guide during the interview, assessment and writing up processes. A single methodology was used in order to facilitate cross comparisons between the different scenario.

The case studies looked at what happens to the knowledge in brokerage process and what knowledge can and do the actors use. The difference in contexts had an important impact, namely that different problems looked at different routes for solutions. What the research found is that knowledge moves between the contexts and decision makers and that it is important what the actors do with the knowledge when it gets to the point when the components connect.

Case Study Findings

Some of the knowledge brokerage barriers and facilitators identified in the case studies are noted below. They only serve to give a flavour of the context within which the barriers and facilitators operate.

Innovation Barriers

Replacing infrastructure or technology

Dutch water boards are acutely aware of their need for accountability given that their income is from taxation. The water boards, in common with other wastewater treatment authorities in for example, the UK, are risk averse in public health terms and take the view that there is no point fixing something that is not broken.

Innovation can be expensive. There will normally be costs relating to technology development, pilots etc. To mitigate the financial risk of innovation, different actors will often come together to share the costs usually under the knowledge transfer partnership scheme set up by the EC.

Water boards are reluctant to spend resources on modifications to existing plants to accommodate new processes unless they are add-ons or tweaks. The preference is to wait until it is time to replace the plant.

Another identified barrier is inadequate technology. For instance in one of the case studies where only Unix-based systems were available to perform the required computing tasks. However, they were clunky and not portable and engineers had to use pen and paper for fieldwork. Today, software runs on laptops making the process much easier.

BESSE's Research Path

BESSE project is organised as a research path aimed at achieving the following four objectives:

- ◊ collect, review, and systematise existing knowledge;
- ◊ identify the factors that hinder and facilitate the effective dissemination of innovative knowledge geared to ESS;
- ◊ test the knowledge brokerage mechanisms in pilot studies;
- ◊ disseminate the knowledge produced with regard to environmentally sustainable sanitation as well as knowledge brokerage mechanisms to sanitation actors.

The BESSE project's state-of-the-art nature, is clear from the first two completed objectives; being the identification and systemisation of existing knowledge and the identification of hindrances and facilitating factors.

The three demonstration/ pilot projects will test the knowledge brokerage mechanisms. This process will start in July 2011.

Policy guidelines and sanitation information knowledge dissemination mechanisms will be extracted on completion of the pilot projects at the end of the BESSE project in June 2012.

Communication factors

The case studies illustrated the difficulties that different professional groups can face in communicating with each other. For example, the software developers were often unable to fully understand or appreciate requests from the technical staff of the water company regarding software capabilities. The same issues arose in another case study where it was identified that actors such as the academics and policy makers had very little knowledge of the social and town-planning aspects of the project and did not initially comprehend the need for these aspects until much later into the project.

Innovation Facilitators

Perception of sustainability

The level of openness and willingness of the decision-makers are directly responsible for the success or failure of a brokerage activity.

The public perception of sustainability issues means that government agencies such as water boards are more likely to win support for developments if sustainability drives the process. An aspect of sustainability that gained particular traction is that of energy use and a number of water boards are looking into ways of producing energy as a by-product of their treatment processes.

There is good knowledge sharing around the operational aspects of wastewater technology in the Netherlands. This finding chimes with a similar finding in the UK. Overall, wastewater companies are open to technical knowledge sharing but are much more circumspect about sharing information on their business and operations models.

Knowledge flows

Where different actors are involved, it is important for them to understand their contribution to the infrastructure project and the expectations of their contribution.

The role of lobbyists in sensitising the populace and creating demand for environmental projects is important and can influence the shifting of the balance of power in agenda setting from decision-makers to the population whom they serve.

Cultural contexts

The case studies showed that the wastewater sector adopts only proven technologies and staff in the innovation units of wastewater companies find that their colleagues in operations are often a hindrance to adopting innovative technologies.

Trust is an important ingredient in effective knowledge brokerage. Part of this is the ability of participants to empathise with the others' drivers and perceived risks and to accommodate these. This helps to foster trust and feelings of being able to work together.

A cultural barrier to innovation which exhibits a strong drag effect was technology adoption by older people in the workplace who have relied on manual systems all their lives. Resistance to change is a key feature of change programmes where people need to re-learn their roles.

Nikolai Genov (REGLO) and Onneke Driessen (WBL) at the wastewater treatment plant Limmel near Maastricht

Mila Ktasteva (Pernik Municipality) and Ivan Iskrenov (REGLO) during the Steering Committee meeting in Maastricht

Alfieri Pollice (The Water Research Institute IRSA at National Council of Research – CNR); Andrea Declich, Luciano d'Andrea and Giovanni Caiati (Laboratory of Citizenship Sciences – LSC)

MAP OF TECHNOLOGIES

One of the primary outputs of the BESSE project is to ascertain where the knowledge gaps exist pertaining to sanitation technology.

An extensive literature review was undertaken to identify the state of environmentally sustainable sanitation in Europe and the rest of the world. The literature firstly identified the current as well as innovative technologies available for application in the sector. The literature review led directly to the identification of technologies to include in a map of technologies.

A technologies map was constructed to provide an inventory of cutting-edge, wastewater technologies available in the marketplace. The intention was not to develop a comprehensive inventory but rather to identify a small number of technologies used in each stage of the wastewater treatment process.

As the purpose of the map is to give users an indication of the type of technologies that are available in each area of the treatment process, it enables users to assess what technology option to pursue. The map also acts as an experiment in testing the brokerage efficacy of an inanimate intermediary.

We identified relevant technologies through a desk-based internet search. A sanitation expert then evaluated the technologies and referenced them against a list of important sustainability attributes identified by water companies in the BESSE project. The criteria identified were energy use, suitability for decentralization, environmental impact, and flexibility of design and use.

The map itself can be found on the BESSE project website (http://www.besse-project.info/) and exists as a matrix on a single webpage. The list of treatment processes are noted down the length of the first column with the first group of technologies relating to preliminary treatment and the last to system repair and renovation. The second column maps the technologies available in each dimension of the treatment process. This column also indicates the status of the technologies as either innovative, forerunner or operational. Subsequent columns identify the different sustainability attributes such as energy use, suitability for decentralization, environmental impact, and flexibility of design and use. Where a wastewater technology identified maps against any of these attributes, there is an entry in the relevant column.

There is a provision for visitors to the map on to add missing technologies using an online data entry form. All submissions will be subject to verification of claimed accuracy before going live. Thus, over time, the number of entries against each aspect of the treatment process should grow as users add to it. In addition, to further ensure the map's currency the project will update the map of technologies on an ongoing basis for the duration of the BESSE project.

Policy Implications

The BESSE project will identify the causes for the schism between available knowledge and sanitation operational and implementation practices. Through this identification, the policy implication is that the BESSE project will attempt to shift the current approaches from utilising archaic principles to principles in line with 21st century imperatives.

While sanitation *per se* has not attracted the interest that it warrants—reinforced by the technology in use—the sectors that it impacts on are high on the policy agenda. Neglecting the sanitation sector will have a major impact on reciprocally-connected sectors. It is therefore important that policies around sanitation are integrated into those of other European policies on environment, agriculture, energy, transport, tourism, etc.

The global push for energy efficiency is one factor that is directly linked to the sanitation sector. Another factor that is impacted on by the archaic sanitation technology is the use of water as a scarce resource.

Once the BESSE results are integrated and interpreted according to the project's theoretical framework, policy guidelines will be drafted to influence European Union policy makers as well as actors interested in knowledge brokerage as a tool to better integrate science, technology and society, also outside the domain of sanitation.

2011 MARBLE PROJECT

As a spin-off from BESSE, MU and the WBL started a teaching and research project on sustainable sanitation in 2010. The project was introduced in the previous BESSE newsletter.

Whereas the 2010 project centred around 'innovation in sanitation', the follow-up project in 2011 focuses on 'brokering sustainable sanitation'. Since February 2011 four students from the bachelor programmes 'European Studies' and 'Arts and Culture' (all in the top 20 per cent of the third-year bachelor students) are working on projects closely connected to the pilot project in the Netherlands (see this newsletter). These are expected to inform the Dutch pilot project and the overall BESSE project.

The first project focuses on how sustainability (or a green focus) is brokered within the water board company Limburg (WBL) (Lindsey Schwidder). The second goes beyond WBL and looks at external brokering of sustainability – it identifies the stakeholders of WBL through a stakeholder analysis and investigates the ideas about sustainability amongst the stakeholders (Peter Ulrich). The third concentrates on how Dutch and German knowledge platforms deal with issues around sustainable sanitation (Michael Stöckel). As these different actors may conceptualise and handle issues of sustainability differently and WBL wishes to experiment with a new approach – a consideration model or sustainability assessment tool – the fourth project addresses how and on the basis of which assumptions existing sustainability assessment tools have been constructed (Lisa Strauch). This may result in a list of questions that need to be addressed when developing a new sustainability assessment tool.

The students present their research proposals in the form of poster presentations at WBL on the 29th of April and will finish their work at the end of June 2011. They are supervised by Ragna Zeiss from Maastricht University, Onneke Driessen, Olaf Durlinger, and Andries Vonken from WBL, and Guus Rameckers from Weert municipality.

WASTEWATER DIRECTORY

The BESSE project developed a Wastewater Directory listing of actors engaged in an aspect of sustainable sanitation.

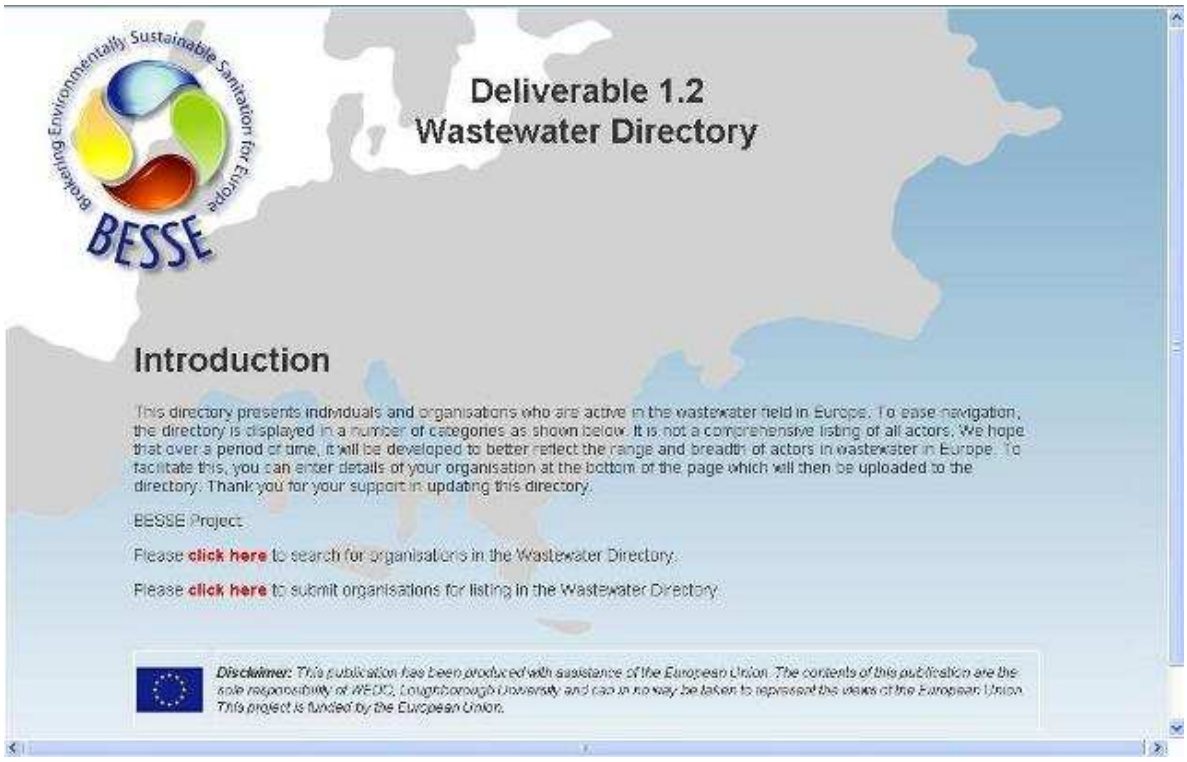
The directory presents individuals and organisations who are active in the wastewater field in Europe. To ease navigation, the directory is displayed in a number of categories as shown below. It is not a comprehensive listing of all actors and we hope that over a period of time, it will be developed to better reflect the range and breadth of actors in wastewater in the world. To facilitate this, the site provides an opportunity where organisations can enter their details which will then be uploaded so that it reflects on the search facility.

The following information is available for each entry, and where available more details are provided.

- Name
- Type
- Country
- Website
- Telephone contact

Additional information:

- The general objectives of the organisation
- Any specific knowledge or technology produced
- Any programmes or projects implemented in wastewater



Organisations are encouraged to provide their details in the directory.

This listing is arranged by category of actor, such as:

- Civil society organisations
- International and National level organisations
- Research agencies
- Wastewater Consultants
- Wastewater technology manufacturers / Wastewater companies

A category is selected from a drop-down menu.

ISSUES THAT HINDER OR FACILITATE DISSEMINATING SANITATION KNOWLEDGE

The availability of new knowledge notwithstanding, most sanitation approaches in Europe are still based on technologies developed in the 19th and 20th centuries—see cover story. These approaches and systems do not adequately respond to current sustainability needs such as energy costs; the reduction of environmental impact, etc. and in Europe, this has created a gap between the knowledge produced in scientific research areas and the knowledge that is being employed in the field.

Environmentally Sustainable Sanitation (ESS) is a controversial concept for Europe as it is a type of solution that has been spreading from developing countries to developed countries. There is furthermore also a lack of convergence on whether the different technological solutions are really sustainable or not. However, there is an urgent need for a solution which would move away from traditional sanitation technologies which are mostly not sustainable. It is at this juncture that the European Union's commitment to develop a widespread sustainable sanitation approach is crucial.

There are two research questions that one can ask against the sketched background:

1. What are the factors generating the problem? And
2. What is the role that knowledge brokerage can play for sustaining environmental sustainable sanitation?

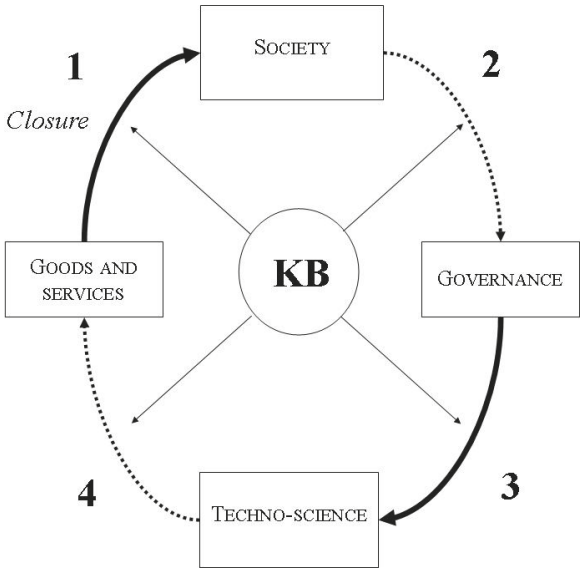
In an attempt to answer these research questions, the BESSE project embarked on research to identify hindering and facilitating factors that play a role in the transfer and dissemination of knowledge and technologies connected to environmentally sustainable sanitation.

All the information and data collected during the first phase of the research—through different sources such as literature and documentation reviews; case studies (see previous section); and interviews with roleplayers described in the previous sections —support the aims of achieving the second objective of the project, being the identification of hindering and facilitating actors in the effective dissemination of knowledge geared towards environmentally sustainable sanitation.

The first results of this component of the research was presented at the BESSE Brussels Seminar (noted on p1) in December 2010. The results included a 'Map of the hindering and facilitating factors to the transfer and dissemination of knowledge and technologies connected to environmentally sustainable sanitation' that contains the conceptual framework that emerged from the work done so far.

This map consists of a total of 142 items, including 61 obstacles; 29 facilitating factors; 52 practices adopted by sanitation players facing obstacles or enhancing facilitating factors.

The map of hindering and facilitating factors was developed by devising a techno-scientific innovation cycle, to properly 'place' each factor within a general picture.



Source: Micheals S., "Matching knowledge brokering strategies to environmental policy problems and settings", in Environmental Science and Policy 12, 2009

The model shows how knowledge brokerage plays a key role, not only in transferring knowledge from research to application, but in the other three phases of the innovation cycle, that is:

- in promoting a social pressure for innovation in the sanitation sector;
- in transforming this pressure into new demands for policy makers;
- in facilitating the devising or the enhancement of research policies in support of sanitation research.

Therefore, in the framework of the model, knowledge brokerage appears to be a mediation process comprising transferring knowledge between different contexts (cultural, social, professional, disciplinary) which can play a strategic role to accelerate innovation and to orient sanitation implementation decisions towards more environmentally sustainable perspectives.

A more comprehensive description of the hindrances and facilitating factors can be found in the BESSE Brussels Seminar report. (http://www.besse-project.info/viewe/file.aspx?fileinfoID=66

What are the tasks of a knowledge broker?

The job of a knowledge broker is to bring people — researchers, decision makers, practitioners and policy makers — together and build relationships among them that make knowledge transfer (more effective.

Much of the brokering going on is an unrecognized, largely unplanned activity; the BESSE project is one example of a concerted effort to recognize and formalize the work's importance in knowledge transfer.

The role of the broker depends on the organisation, but there is a basic skill set:

- The ability to bring people together and facilitate their interaction
- The ability to find academic research and other evidence to shape decisions
- The ability to assess evidence, interpret it and adapt it to circumstance
- Ability to identify emerging management and policy issues which research could help to resolve.

Source: Prof Alan Brown in http://www2.warwick.ac.uk/fac/soc/ier/glacier/learning/

DEMONSTRATION PROJECT IN THE NETHERLANDS:

Waterschapsbedrijf Limburg (WBL)

The demonstration/pilot project in the Netherlands involves the Waterschapsbedrijf Limburg (WBL). The company renovate and extend two wastewater treatment plants in Weert and Wijlre and build one new plant in Maastricht (Province Limburg).

The future scenario is to create a multi-purpose plant, including new techniques and technologies, and the way in which the plant will be constructed.

The pilot project entails changing the way in which decisions are made to implement treatment plants.

Background to the current situation

From research it is clear that sustainability in the sanitation sector in the Netherlands is not the overriding factor in the choice of technology. Costs and effluent quality remain the most important factors, although these are increasingly also defined in terms of energy use.

Generally, while water boards tend to be risk averse in the interest of public health, they are interested in new technologies. Concomitantly, discussions take place about ways in which to turn wastewater treatment plants into energy factories, nutrient factories and water factories. The larger challenge is therefore how to engage with more aspects of sustainability within or by changing existing practices and contexts. Against this background, the WBL pilot project will not be approached in a 'business as usual' manner.

Future scenario for sustainable sanitation

Directly opposed to the 'business as usual' approach is the focus on sustainable sanitation; a new 'green' concept in designing the treatment plants. For the pilot projects, the thinking includes

1. Green focus
2. Consideration model
3. Communication model

This then includes

1. Energy reduction
2. GHG reduction
3. Flexibility in building methods and materials
4. Re-use of raw materials and multi-purpose water
5. Full adaptation to environmental factors

This means that instead of focusing almost exclusively on the costs of various options, WBL will experiment with a new approach in which the different remodelling options are evaluated on the basis of a set of criteria (traditional ones such as overall costs and effluent quality, but also energy use, CO2 emission, use and reclamation of raw materials and greenhouse gasses), as well as increasingly 'green' approaches to these criteria in terms of minimum requirements (for example, effluent quality is set at measures of phosphorus and nitrogen in the effluent of (phosphorus) P=1 and (nitrogen) N=10 and energy use should be according to the agreement between water boards) and various levels of ambition (such as reducing emission in the effluent to P=0,5 and N=5 as a first level, and water re-use as a second one). This presents a number of new challenges and changes the relative importance of existing ones.

Maastricht - Limmel

Maastricht - Bosscherveld

Maastricht - Heugem

Waterschapsbedrijf Limburg (WBL) Cont ...

The process

The starting point for designing a new or extended treatment plant includes an internal assessment process within WBL. This includes what the plant should look like and the costs. With the assistance of engineering firms, the initial assessment is based on calculations taking into account the size of the plant and some ideas about which approach to treatment will be used. Normally this would be a relatively simple procedure, but the new, more experimental approach to the renovation and extension of the two plants makes it harder to arrive at a specific amount of money. The financial estimates are then included in the capital cost budget of WBL.

Once the plans for a new installation have been included in the multi-year budget, a tender is issued according to European regulations. Transparency principles are adhered to throughout the process.

For the plants in Weert and Wijlre this was especially challenging, since the new approach makes the comparison between different firms difficult because very little information about the relative costs and benefits of the different design choices (particularly in terms of sustainability) is available. Also, the new plants ask for a particular approach since it is not just a matter of finding the most suitable treatment process that is currently available, but is a matter of being prepared for the future. The plants need to be built in such a way that it is possible to extend and adapt them relatively easily in the future.

In order to be able to assess and compare the costs of different technologies in different parts of the treatment process (which is also important for the new, green approach) WBL uses a so-called 'cash value method' in which the costs of a technique are calculated for a multiple-year period (the length depends on the scope of the investment), including the price of purchase and installation, as well as a formula for calculating the costs of energy use (taking on board the likely development of energy prices), costs for maintenance, repair and operation, etc. For some of the new, unproven technologies this approach is very difficult; the variants that were eventually drawn up thus do not in detail discuss or evaluate the different criteria set out by WBL.

'Selling' the green approach to management and the rest of WBL staff and reporting about the process is important for two reasons:

1. Commitment from WBL staff, to show them how and why particular choices have been made and what this means for the organisation. Consultation and sharing knowledge is very important.
2. Secondly, it means that the approach to these two plants, and reporting about that process, can also be taken up as a learning trajectory for WBL. In that sense it can teach WBL staff how to deal with questions about sustainability in general, while it also shows how abstract objectives in this direction translate into a particular approach to designing a plant.

Weert Wastewater Treatment Plant

Wijlre Wastewater Treatment Plant

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