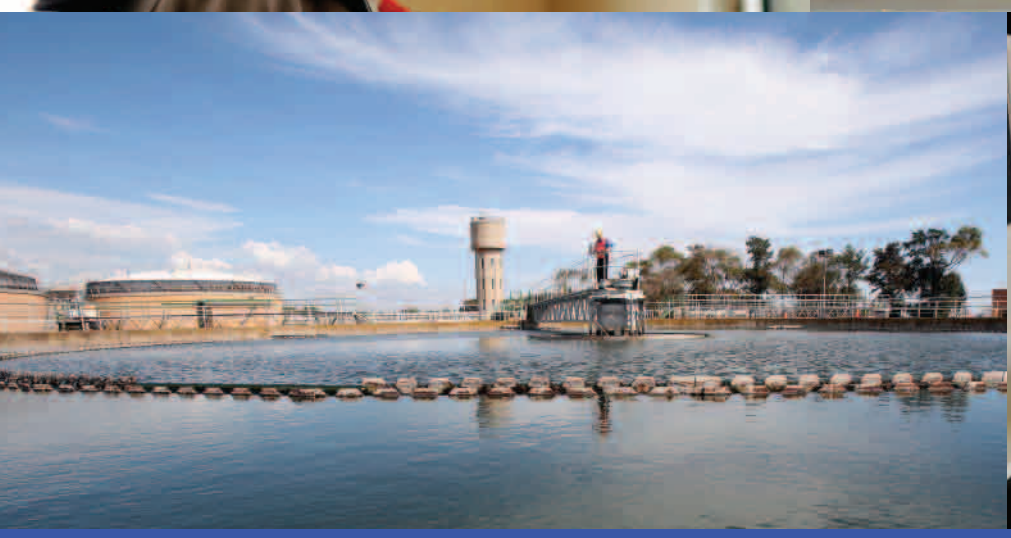

ACQUEAU

Σ!

A Eureka initiative

for

GROWTH AND INNOVATION IN WATER

Blue Book 1: Vision and Organisation

ACQUEAU
is the EUREKA Cluster for Water

ACQUEAU is the first industry driven initiative to fund innovation and RTD in the water sector.

ACQUEAU

ACQUEAU is an industry driven EUREKA initiative dedicated to water related technologies and innovation. It aims at promoting innovation and market driven solutions to develop new technologies in the European water sector.

The major goal is to facilitate the generation of market driven, pan-European collaborative water research and technological development projects for the benefit of the European Water Industry.

ACQUEAU is a non-profit association under Belgian law, it was founded by industrial companies from extended Europe.

ACQUEAU adresses industries that develop and sell their products or services dedicated to water catchment, production, distribution, collection and treatment, that use water in manufacturing processes and that have interest in developing technologies related to the water cycle.

www.acqueau.eu

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ANNEXE

The Strategic Research Agenda
A common vision for water innovation
published by the **WssTP,**
the European Technology Platform for Water

Introduction

ACQUEAU is an industry driven EUREKA initiative dedicated to water related technologies and innovation.

It is the first EUREKA Cluster in the environment sciences. In addition to being a fundamental and vital benefit for society, water is a major asset:

- The world market for drinking and waste water reached 250 Billion Euros (350 billion US$) in 2008 (Estimates vary from 250 Bn€ to 350 Bn€ according to different sources).
- Infrastructure assets worldwide are huge:
  - o More than 3.5 million km drinking water pipes
  - o More than 2.2 million km of waste water networks
- Corresponding investments represent more than 33 Bn€ annually.

The water sector also makes a large social impact involving around 600,000 jobs in Europe.

The European contribution within the global worldwide competition needs to be strengthened and improved.

The Lisbon protocol defined a target to increase R&D effort to a level of 3% of GDP. In 2005, this figure for Europe was 1.8%.

ACQUEAU, on behalf of the water sector, will enhance this R&D effort to strengthen the European water industry and increase its competitiveness:

- By stimulating applied R&D.
- By supporting creativity through direct industry initiatives
- By providing a framework to support SME's R&D.

The ACQUEAU strategy is the object of the present "Blue Book". It focuses on the main technological areas and promotes five major programmes. All those are derived from the SRA of the WssTP.

The WssTP promotes a vision and R&D in general,

ACQUEAU aims to encourage the development of new technological products and new services providing a complementary approach to that of the WssTP.

Strategic Research Agenda

A common vision for water innovation

WssTP
The European Water Platform

The basis of the strategy for ACQUEAU

The strategy of ACQUEAU is based on the SRA of the WssTP

In March 2000 the European Council set out the Lisbon Agenda, now referred to as the 2020 Strategy, for the European Union (EU), which aims to make the EU "the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment". The creation of the European Technology Platforms (ETPs) is one concrete measure translated from the goals of the 2020 Strategy.

The Water supply and sanitation Technology Platform (WssTP) is the European Technology Platform for Water. It was initiated by the European Commission in 2004 to stimulate collaborative, innovative, visionary and integrated research and technology development strategy for the European water sector and to meet the objectives of the 2020 Strategy.
Water and sanitation is a sector where services in Europe are provided by tens of thousands of public and private bodies of all sizes, with numerous organizations involved in research in all aspects of the water cycle. The WssTP is federating the research and technology development efforts of the European water sector (water utilities, industries, academics and research centres) in order to support the competitiveness of European water sector and services and to accelerate the implementation of new approaches, methods and technologies.

A common vision for water innovation

The core of the WssTP vision (WssTP Vision Document, October 2005) is that by 2030 the European water sector will be the leading international centre of expertise for providing safe, clean and affordable water services while protecting nature. The sector applies a variety of new integrated approaches to solve diverse and interlinked problems. It uses efficient and sustainable technologies which enhance the social, economic and environmental well-being of the community as well as the health and well-being of the planet and its peoples.

How the SRA was written?

The major goal of the Strategic Research Agenda (SRA) is to develop the long term vision of WssTP for the water sector and to identify the research priorities to tackle present and future challenges. To comply with our role and our mission as the European Technology Platform for water, the WssTP commits to provide key recommendations to boost the competitiveness and growth of the European water sector. The WssTP therefore engaged an open process organised on one hand on the consultation of its members and contributors and on the other hand on a public open and transparent consultation of interested stakeholders.
This update of the SRA 2010 was based on the first SRA published by WssTP in 2006 after intensive consultation. To prepare this updated edition, the WssTP organised an internal review throughout its operational bodies: the Pilot Programmes and Task Forces but also the Board and the Member State Mirror Group. More than 450 individuals contributed to the work of the WssTP of more than 25 countries and 150 organisations; 200 individuals directly contributed to the update of this document. A second phase consisted in launching an open and public consultation by Internet inviting comments and suggestions broadly from stakeholders involved in water activities or interested in the future of the water sector. The WssTP also invited specifically DG RTG, DG ENV and the European Environment Agency to comment on the SRA and finalised the actual content of the SRA based on all comments received. The stakeholder-driven approach to developing a research agenda empowered all stakeholders (private and public) to define the future of research, and to share the actual research and implementation activities. The SRA may be used as input for the definition of the 7th and 8th Framework Programmes, but also to facilitate a further coordination of research programmes in and between Member States.

The scope of the SRA

While the SRA acknowledges the importance of a system's approach and need for integrated solutions, WssTP appreciates that the SRA does not cover water in all its various uses and services and is somewhat biased towards technology and pollution control and less on ecosystem protection and management. Although the research agenda was analysed with the European perspective to address European challenges, it also tackles global issues such as the adaptation of the water sector to climate change.

WssTP decided to recognise the approach of Integrated Water Resources Management (IWRM) as overarching concept. This systems approach reconciles at the river catchment scale the needs of water supply, sanitation, water use in agriculture and industry and water needs in ecosystem, supported by the local framework of laws, regulations, and translated into practices. To make this leap forward, the WssTP will include research on water technologies in a social and economic context across all water users and their supply chains.

Integrated Water Resources Management

According to the Technical Committee of the Global Water Partnership , the IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. As such, the IWRM is a comprehensive, participatory planning and implementation tool for managing and developing water resources in a way that balances social and economic needs, and that ensures the protection of aquatic ecosystems for future generations. Beyond the participatory approach between several water users or industries, IWRM calls for more emphasis on regional or transboundary water supply challenges at the scale of river basins, including socio-economic development and governance perspectives.

Global Drivers

Coping with global trends

Worldwide, the water sector is facing a dramatic evolution because of major 'drivers'. The related challenges, if addressed proactively and responsively, could offer tremendous opportunities.

Water: a necessary abut low cost good

Water is fundamental for life, not only for direct consumption (potable water) but also for sanitary and health requirements, and for the production of food or basic industrial goods and commodities. Even though water is so central and absolutely necessary to the existence of any society, it is a low-added value good with production costs in industrialised countries typically below 1 EUR/m3 for potable water and below 2 EUR/m3 for treated wastewater. In developing countries and regions with extreme poverty (i.e. living with less than 1 USD a day) a substantial lower cost is required. The investment and operational costs associated with the collection / distribution and treatment of the municipal drinking water and wastewater and the water resource management need to match with the limited financial window of this low cost product.

Global trends

Major global drivers affect the water sector and its challenges. Those challenges, if addressed proactively and responsively, could offer tremendous opportunities.
These drivers are (i) demographic growth and urbanisation; (ii) globalisation and wealth growth; (iii) spatial and temporal pressure (coastal cities, tourism); and (iv) climate change. They are already taking place and can be measured and quantified as consequences of the growing industrialisation and the technical progress of the mankind. They are rapid and measurable at the scale of the human being, i.e. their increasing impacts can be perceived from one generation to one other.

Demographic growth and urbanisation

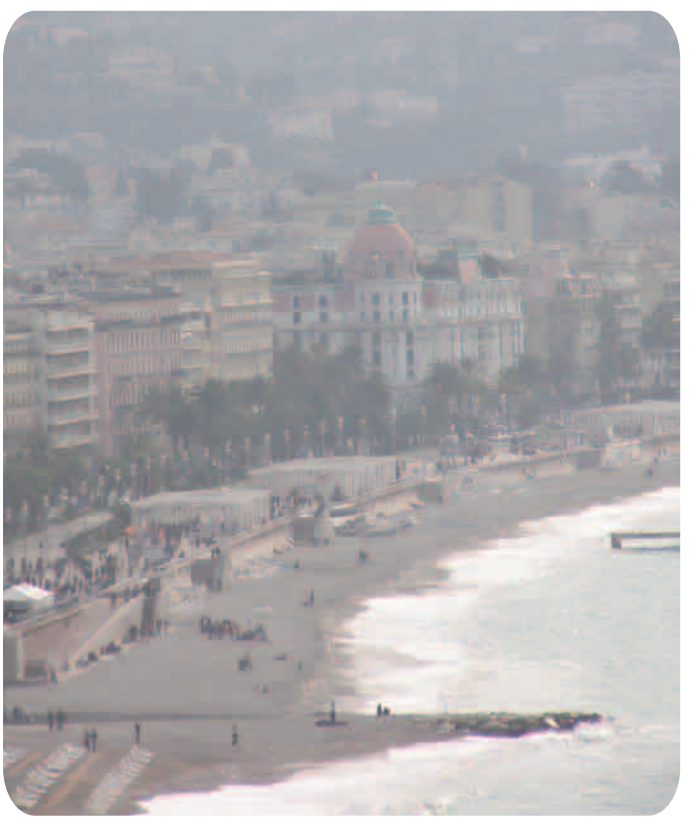
The earth, home of 6.7 billion people in 2010,
about 8 billion by 2030 (+80 million per year today)

The total population of the EU 27 countries has augmented from 400 million in 1960 to 497 million in 2007 (Eurostat, 2008a). The rising population naturally increased the water requirement over this period and the EU27 population is expected to grow to 521 million by 2035 (Eurostat, 2008b). These trends will put pressure on water resources and management.

At the global level, rapidly increasing urbanization is one of the most distinctive changes of the 20th and early 21st centuries. All over the world people are moving away from rural areas towards the cities. In many cases, this migration is triggered by poverty resulting from large scale destruction of natural resources e.g. deforestation, overgrazing and resulting erosion problems. The challenge of urban and peri-urban areas is the unpredictability and the rate of migration, which makes it difficult to plan and ensure appropriate water services. Flexible and innovative solutions are needed to cope with sudden and substantial changes in water demand for people and their associated economic activities in many regions of the world.
The migration also raises issues about safe food supply and its associated water requirements, due both to the concentration and increase of demand, and to the competition for land in peri-urban areas where urbanisation pressure pushes away agriculture, even from areas with high agronomical potential, but also providing opportunities for safe re-use of treated wastewater by peri-urban agriculture or landscape irrigation.

Increasing globalisation and wealth

Together with population growth and urbanisation, growth in globalisation and wealth is forcing rapid changes such as industrialisation and extensive agriculture in association with changing food consumption pattern leading to a dramatic increase in high-quality water consumption. The increase in wealth of low income countries increases water requirements in consumption habits favouring products and services with higher water footprint (meat-rich diets, more commodities, more packaging, more electricity, water demanding bio-energy etc.).
Frequently, this demand for water cannot be satisfied by the locally available water resources, while the discharge of insufficiently treated wastewater increases costs for downstream users and has detrimental effects on aquatic systems. The increased water demand and wastewater production leads to issues of water allocation and competition between the water users (domestic, industry, agriculture and environment).
Wealthy consumers in urban areas tend to be more critical and well informed, and expect a safer and higher quality of service. This requires increased security and monitoring as well as emergency systems.



Spatial and seasonal constraints

In the Mediterranean region, international tourist numbers have risen from 58 million in 1970 to more than 228 million in 2002, with France, Spain and Italy combined about 75 % of the current influx (UNEP, 2005). Up to 80 % of tourist stays in the region are concentrated in the period from May to September when water availability is at a minimum and water stress peaks (EEA). Tourists tend to concentrate locally in coastal areas which at the same time contains natural systems that provide more than half of the global ecosystem goods (e.g. fish, oil, minerals) and services (e.g. natural protection from storms & tidal waves, recreation), exacerbating the tensions on water demands, allocations and cross-impacts between water users.

The 'Global warming' driver

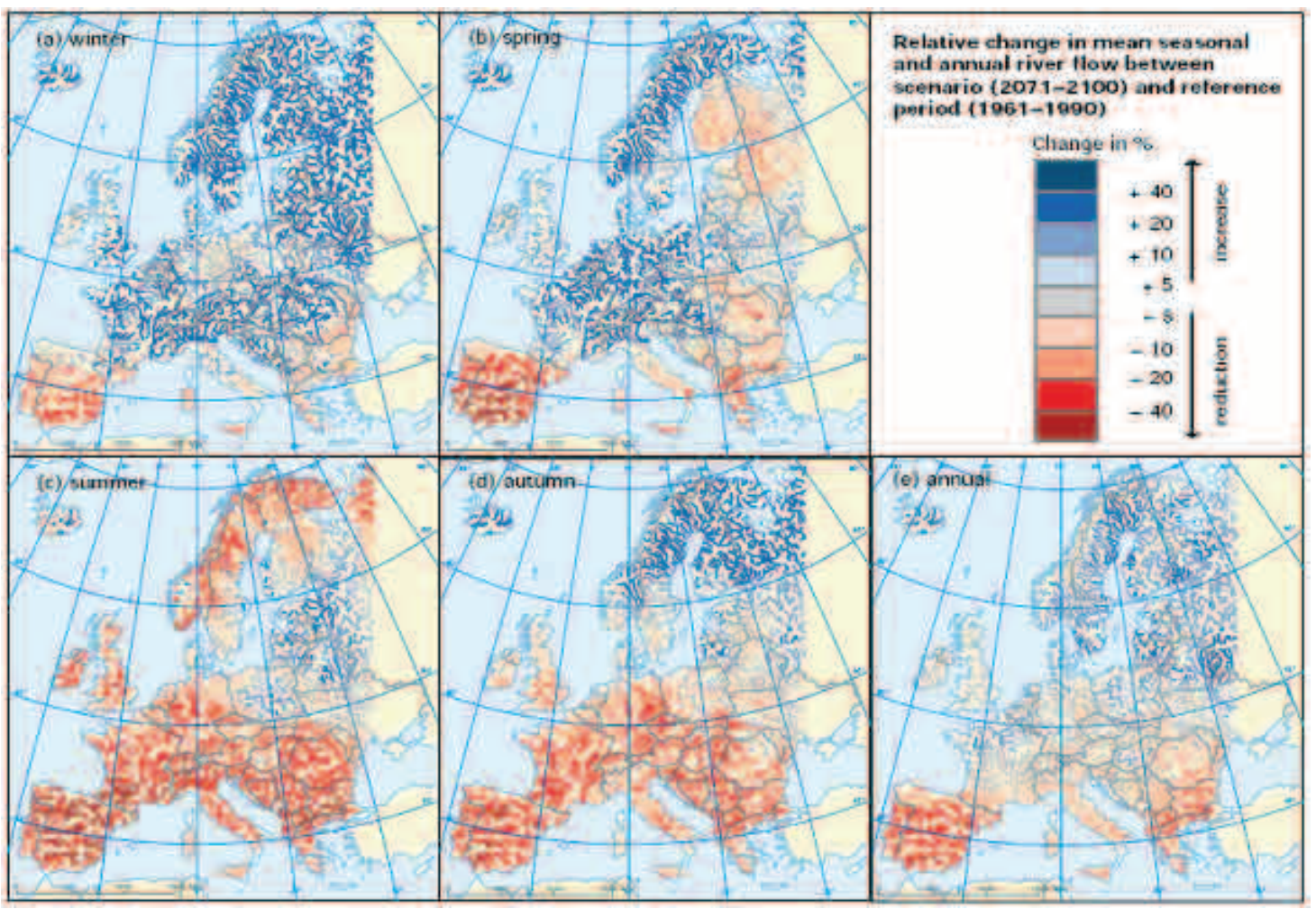
There is a general consensus on the fact that climate change is happening as a result of anthropogenic greenhouse gas emissions and changes in land use (deforestation, urbanisation…).

Recent observations confirm that the mean temperature in Europe has increased by 1.0 ºC compared with pre-industrial times (the global warming is 0.8 ºC). Projections from several General Circulation Models indicate further temperature increases, between 1.0 – 5.5 ºC in Europe by the end of the century. Changes in precipitation show more spatially variable trends across Europe, but annual precipitation patterns suggest an exacerbated difference between a wetter northern part and a dryer southern part (EEA-JRC-WHO, 2008).

These changes will affect the availability of water, especially in summer, and will increase the areas that suffer from water stress (Mediterranean region and some parts of Central and Eastern Europe) (Alcamo et al., 2007). Apart from impacts in the water quantity and availability (increased frequency and intensity of extreme events, emphasized temporal and spatial rainfall variability…), climate change may worsen the water quality and it can have economic impacts (need for additional investment to adapt infrastructures) and social consequences (conflicts over diminished water resources, migrations, loss of territory…).

There are two approaches to cope with climate change impacts: mitigation and adaptation. While mitigation aims at reducing the causes and the negative impacts, adaptation aims at learning to cope with the changes, by e.g. changing water consumption habits. The water sector needs to address a combination of both strategies (energy efficiency vs. system resilience).

Figure 1:
Projected changes in mean seasonal and annual river flow between 2071-2100 and the reference period 1961-1990, simulations with LISFLOOD driven by HIRHAM-HadAM3H based on IPCC SRES A2, Dankers and Feyen, 2008a (EEA-JRC-WHO, 2008, p.94)



Major Challenges
Facing a growing demand with less resources

Worldwide, 1 person out of 6 does not have access to clean water
1 person out of 3 does not have access to sanitation.
The global population threatened by floods and droughts will increase from 1 billion today to 2 billion in 2050.
(United Nations University)

Coping with increasing water stress (quantity & quality)

In the past years, the topic of water scarcity and drought has risen to the top of the European agenda: the 2007 Communication of the European Commission on Water Scarcity & Droughts stated that water stress as structural imbalance between water supply and demand affects 130 million inhabitants (30% of population in Europe) in Southern Europe but also in Northern countries such as Belgium, Denmark, Germany, Hungary and the United Kingdom.
Recent analyses predict that by 2050, 3 billion people will suffer from water scarcity and that worldwide about 200 km3 storage capacity will be required by 2025. As a consequence, it is expected that water related conflicts should increase worldwide. In March 2008, the EU Report 'Climate change & international security' drew the map of potential threats related to exacerbate situation of water scarcity and drought in numerous regions of the world.
Similarly, the current global trends will seriously impact or endanger the quality of the water bodies, both surface and groundwater, resulting in detrimental effects on the aquatic life and ecosystems, but also on potentially adverse health effects, and the related economic downturns. In Europe and worldwide, efforts will be required to preserve the physical, chemical and ecological status of the water bodies.

Reducing impact of extreme events (droughts and floods)

Simulation scenarios predict that climate change will increase the frequency and amplitude of acute and short term hydro climatic events such as droughts and floods and therefore increase the economical and social consequences of those events.
Floods are one of the most important hazards in Europe regarding both economic and life loss. In 2002, the direct costs of flooding amounted to €13 billion (EC, 2007) and it has been proved that the annual number of reported floods and damages in Europe increased during 1972-2002 period (Guha-Sapir et al., 2004). The consequences of more severe and frequent floods will be exacerbated in plain and valley areas by intensive land use including uncontrolled urbanisation, but also in coastal low lying areas such as the Netherlands by the risk related with the sea level rise following global warming.
According to the EU Report 'Water Scarcity and Drought', increased drought was observed in the past 30 years, affecting 100 million inhabitants (20% of population) in 4 events since 1989. The report concluded that in the past 30 years, drought events had a cost of €100 billion to the European economy (€8.7 billion only for the drought of 2003).
At the European level, work is being undertaken to develop indicators for water scarcity and drought as well as criteria for droughts management plans and a European Droughts Observatory. The European Commission is also in the process of conducting a Policy Review based on the 2007 Communication on Water Scarcity & Droughts to be released in 2012.

Managing aging or lacking infrastructure

Two challenges dominate, i.e. aging infrastructures in high revenue countries and lacking infrastructures in low revenue countries.
Urban areas around the world suffer from old and deteriorating water infrastructures that are very vulnerable to failure due to aging, damage from excavations or over-loading. It is a technological and financial challenge to maintain and upgrade them in such a way that quality water can continue to be delivered to all sectors and wastewater can be adequately collected and treated. The International Water Association (IWA) suggests an annual pipeline replacement rate of at least 1.5% in order to stabilise the leakage level in a water distribution system and containing the loss of "non-revenue water". The World Business Council for Sustainable Development estimates that the total costs of replacing aging water supply and sanitation infrastructure in industrial countries may be as high as $200 billion per year.
On the other side, many regions in low income countries of the world, and/or in rural or peri-urban areas, are not equipped today with central water supply and sewer networks. The financial needs to install basic facilities in these regions are high. The historical solutions of central infrastructures, proven in high income countries, may not always be technically appropriate or financially optimised in other circumstances. While existing water reuse options have to be further developed and implemented, the need for smaller scale, adaptable, local infrastructure systems is immense.

Facilitating technology transfer

The water sector is broad, fragmented and diverse. It consists of a number of different stakeholders from public institutions and utilities, industries, consultants and service providers, NGO's and trade associations, universities, research entities and citizens. The variety of actors and interests is a key challenge to build a strong European research for the water sector and to transfer and apply the outcomes of the research to local and regional users. As an ETP, the WssTP is a useful tool to accelerate knowledge and technology transfer, facilitating the coordination and communication efforts, enhancing synergy effects and mobilizing resources. In order to increase the industrial, commercial and societal impact of R&D projects, it is of paramount importance to involve stakeholders in the process of designing R&D projects and to make sure that the projects are of practical use. Methodologies for economic analysis of measures and impacts of R&D projects (such as patents, market

development, societal impact) should be used to optimise the R&D investment.
As the federating body, the WssTP has built a network of experts to address the full spectrum of research, from basic to applied research through effective demonstration to successful commercialization and will oversee efficient knowledge transfer along the whole knowledge chain, overcoming the traditional fragmentation of the water sector. It supports effective engagement with a range of businesses, regulators and academic institutions, as well as collaboration with public and private entities.

Establishing an "Enabling Framework"

In Europe and in other regions of the world, the smooth and efficient implementation of systemic integrated and site-specific integrated water solutions to solve the major water issues will require the establishment of an appropriate "Enabling Framework".
The two aims are to ensure the proper consideration, understanding and inclusion of social, economic, climatic, environmental, political, legal and regulatory concerns in the decision process used for selecting global and site-specific water solutions and to identify, understand and break the major barriers for cross cutting issues impeding the deployment of integrated water solutions at the local, regional, national or transnational level, namely: efficient and transparent governance structures including appropriate institutional framework and compliance with regulations and directives, public and political acceptance, financing of infrastructure and water value pricing.
It is accepted that monetary value assessment allows benefit-cost-analysis for policy guidance and thus ranking of alternative prevention, restoration and mitigation policy options. The total economic value includes the direct use values (irrigation, energy resource, etc.) but also the indirect use values (nutrient retention, storm protection, etc.) and other values (biodiversity, etc.), and may help devising sound water pricing and allocations to achieve efficient and sustainable water resources management.
The establishment of an "Enabling Framework" should include:

- Developing risk assessment and risk mitigation strategies to ensure the optimisation of the solution selection process, the public and political acceptance and the compliance with legal constraints
- Developing harmonised frameworks of Decision Support Systems taking into account specific local expertise as well as social, environmental, economical and political aspects. The harmonisation of procedures will rationalize and facilitate the decision-making process.
- Streamlining education and training process, key to break the public and political acceptance barrier (update water managers and stakeholders in general about best-practices and latest progresses).

Focus on...

The Millennium Development Goals (MDG) for Sustainable Water Supply and Sanitation Services in Developing Countries

International efforts are required for the regions superposing acutely the challenges faced by the water sector. The United Nations adopted the Millennium Declaration on the 8th of September 2000.
For the water sector, the goal 7 targets "environmental sustainability" and especially to "halve by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation". The same goal on water supply and sanitation was agreed by the delegates to the 2002 Johannesburg Summit.

Facts

- In 2002, an estimated 1.1 billion people lacked access to a safe water supply and 2.4 billion to improved sanitation.
- The Third World Water Forum (17th March 2003, Kyoto) highlighted the fact that there are a further 3 billion people who only use pit toilets, flush toilets, or sewers without any treatment before discharge to the environment
- Africa has 38% of its population unserved by safe water and 40% by sanitation; the figures for Asia are 19% and 52%, and 15% and 22% for Latin America and Caribbean.
- Over the next 25 years, the urban populations of Africa and Asia will almost double; the urban populations of Latin American and the Caribbean will increase by nearly 50%.
- The provision of full water and wastewater connections and primary wastewater treatment to the urban population would entail an annual cost of US$ 17 billion for water and US$32 billion for sanitation.

Research needs

- Research into sustainable application of system solutions in water supply and sanitation that are embedded in the local MDGs context. Make solutions more sustainable in the sense of operational life time, not solutions that are abandoned within a very short time frame and create technology graveyards in MDGs countries.
- Include participatory approaches, bottom up rather than top-down technological solutions. Investigate active learning societies to make solutions and their implementation more sustainable within the political and socio-economic context.
- Research into the small urban water cycle including new concepts as no-mix toilets and re-use of water and human and animal excreta and nutrient recovery for food production. Energy recovery from human and animal waste.
- Adaptation of water supply and sanitation solutions in MDGs areas to be more robust and able to cope with the impacts of climate change e.g. flooding and drought.
- Research into hydro-soil erosion to minimise both its contribution to water pollution and instead have additional positive impacts in terms of water availability.
- Research into alternative and simple water purification technologies that can be used in critical condition in both developing and developed countries inside and outside Europe.

Water in Europe

Facing challenges through Research and Innovation

The water availability among European countries is highly variable ranging from less than 100 m³/inh.yr in Malta to more than 500,000 m³/inh.yr in Iceland.

A Few facts on water in Europe

At least thirty European river basins located in thirteen Member States are impacted by water scarcity. At least 11% of the EU territory and 17% of the EU population have been affected so far by water scarcity situations.

It is estimated that in the south-eastern regions of Europe about 65% of the annual precipitation occurring in the plains is transferred by evapo-transpiration, 10% carried as surface runoff to the sea through rivers, and 25% percolates into the soil and is stored as groundwater in the aquifers.

According to recent Water Framework Directive and Daughter Directives implementation reviews, 20% of European surface waters are seriously threatened, 60% of its ground waters are overexploited and 50 % of its wetlands have 'endangered' status.

The Water Framework Directive

In 2000, the European Commission endorsed the Water Framework Directive (2000/60/EC). The WFD commits European Union member states to achieve good qualitative and quantitative status of all water bodies (including nearshore marine waters) by 2015. It is a framework in the sense that it prescribes steps to reach the common goal based on integrated risk assessment and management rather than adopting the more traditional limit value approach. It rationalised the Community's water legislation by replacing seven of the "first wave" directives: those on surface water and its two related directives on measurement methods and sampling frequencies and exchanges of information on fresh water quality; the fish water, shellfish water, and groundwater directives; and the directive on dangerous substances discharges.

The Water Framework Directive (WFD) commits European Union Member States to achieve good qualitative and quantitative status of all water bodies (including coastal / nearshore marine waters) by 2015. It is a framework in the sense that it prescribes steps to reach the common goal based on integrated risk assessment and management rather than adopting the more traditional limit value approach.

The Directive defines 'surface water status' as the general expression of the status of a body of surface water, determined by the poorer of its ecological status and its chemical status. Thus, to achieve 'good surface water status' both the ecological status and the chemical status of a surface water body need to be at least 'good', i.e. recovery to pristine conditions defined in the absence of anthropogenic influence. Ecological status refers to the quality of the structure and functioning of the aquatic ecosystems of surface waters. The Directive requires Member States "to encourage the active involvement of interested parties" in the implementation of the directive.

The WFD calls for integrated water resource management at the scale of river basins. The overall goal of the WFD represents a shift from a paradigm focused on the exclusive uses of water. The goal is to ensure that the water demands of natural systems are environmentally balanced with the agricultural, industrial and domestic needs of societies. In particular, the WFD requires "the promotion of sustainable water use based on a long term protection of available water resources", controlling the negative environmental impacts that water users can have upon the water cycle. At different steps in the cycle, water will be considered as a valuable finite natural resource while wastewater can be considered as a source of beneficial compounds.

The need to conserve adequate supplies of a resource for which demand is continuously increasing is also one of the drivers behind what is arguably one of the Directive's most important innovations - the introduction of pricing. Adequate water pricing acts as an incentive for the sustainable use of water resources and thus helps to achieve the environmental objectives under the Directive. Member States will be required to ensure that the price charged to water consumers - such as for the abstraction and distribution of fresh water and the collection and treatment of waste water - reflects the true costs. These costs include in most cases a high percentage of fixed costs due to investment in infrastructure.

Despite the anticipated impacts of climate change on water quantity and quality, adaptation to climate change is not addressed explicitly in the Water Framework Directive.

Greening the European economy with water

In the context of the Water Framework Directive and the mitigation policies against climate change, the European water sector has strong assets to contribute to the European "Green economy", supporting regions and cities in their quest to maintain Europe's global leadership in the field of green technologies.

The financial crisis pushed further the need for cooperation and creating synergies in research and technology development (RTD) on green economy to tackle simultaneously environment and sustainable growth, jobs and competitiveness. Innovation should be based on Life Cycle Assessment to develop RTD focusing on eco-innovation and demonstration cases that will open new markets.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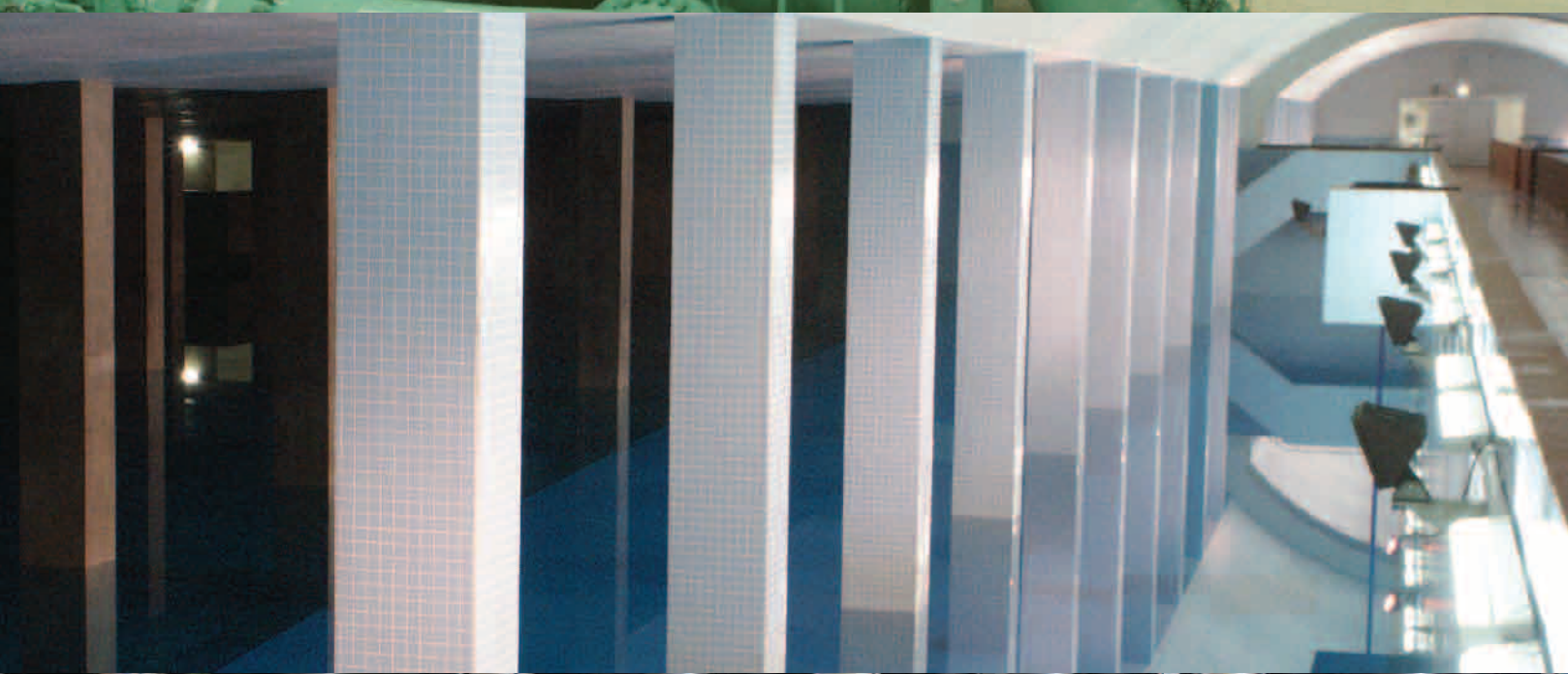


From Research and Vision to Industry driven initiatives

The development of a common vision for water innovation aims at ensuring that the European water sector will be the leading international centre of expertise for providing safe, clean and affordable water services while protecting the environment and managing the water resources for the next generations.

The different existing funds tend to focus more and more on innovative projects and new technologies. Several initiatives and European funds offer the possibilities to finance RTD projects, ACQUEAU is the first initiative in the water sector that is industry led and market oriented.

ACQUEAU is therefore a key initiative to push new markets and services. It should increase the involvement of industries, to push and to strengthen RTD efforts and innovation developments.

ACQUEAU is working to strengthen the competitiveness of the European water sector. It includes driving innovation and technology developments in the larger context of the different European programmes. Primarily, ACQUEAU is acting as a key cluster for:

- shaping standards and creating new markets, services and technologies at the European level;
- strengthening the sector by building new networks and new collaborative projects among different partners i.e. industries, SMEs, universities and research organizations;
- contributing to the growth of the economy through knowledge and innovation but also, to ensure the effective implementation and commercialization of the technologies developed.

ACQUEAU is the first industry driven initiative that will develop working areas and new technologies to promote a bottom-up approach and market driven projects.

What is ACQUEAU?

The EUREKA Cluster ACQUEAU is an 'Industry/Business led water network', whose ultimate aim is to facilitate the generation of market driven, pan-European collaborative water research and technological development projects for the benefit of the European Water Industry.

Through the WssTP employing the principle of Integrated Water Resources Management, a 'water vision' for Europe has been identified by utilizing knowledge from stakeholders, innovators, researchers, etc, involved in the water industry. This vision, supported by the Strategic Research Agenda (SRA), outlines the future scenario for the water industry. By employing the SRA the water cycle has been further examined and a 'technology roadmap' has been produced which 'leads the way' so that all players 'flow' in the right direction.

In order to facilitate the innovation of products, processes and systems needed on this roadmap the ACQUEAU Cluster will initiate RTD calls on a regular basis identifying key 'technology needs' that are described in the roadmap. Successful projects resulting from these ACQUEAU RTD Project calls will strengthen the technological base of the European Water industry. This in time will enable the sector to become more efficient and effective in serving the citizens of Europe and more competitive in the global markets for water services and related technologies.

Why do we need ACQUEAU?

AACQUEAU will complement other water programmes in the following ways:

- **More projects to fund applied research**

ACQUEAU collaborates with the WssTP to identify Research and Development Technology needs. ACQUEAU aims to fill gaps for applied research defined by the WssTP and the major industries related to the water sector. Based on the pilot programme activities of the WssTP, ACQUEAU will encourage the development of applied research and product/services oriented initiatives in order to boost the European market and exports.

- **Boost competitiveness and innovation through SMEs**

ACQUEAU is based on good co-operation with small and medium-sized enterprises. This key partnership is needed to exploit fully the possibilities created by ACQUEAU in order to strengthen markets and develop innovation. In the water sector, SMEs are essential to develop a "green economy" and to encourage "eco-innovation".

- **Enforce collaboration to unleash the expertise of the water sector**

ACQUEAU emphasizes the collaboration with universities and research institutions. They are natural partners both to develop the required initial know-how base and to ensure the dissemination of acquired results. The strong cooperation between industries and research institutions is part of the fundamental purpose of ACQUEAU.

- **Strengthen the European competitiveness of the water industries**

Beyond the industrial scope of the ACQUEAU partners, there are several reference sectors with which cooperation is mandatory.

ACQUEAU supports the setting up of a general industrial cooperation encouraging the competitiveness of the European water sector to set the standards of tomorrow.

- **More flexibility**

The EU Framework Programme is very open, oriented to the long term and is generally non competitive. It's a long term process to set up proposals and too many can experience difficulty finding partners.

The JTI tries to combine some of the flexibilities of the EUREKA programme with extra funding from the Framework Programme but needs to be launched by the EU and will be submitted to the EU treaty.

- **Beyond EU, national and regional agendas**

National and regional programmes – including "pôles de compétitivité" – may be flexible but they are mainly defined by each state's own calendar whereas ACQUEAU is synchronised funding – a key feature in achieving partnership agreement. To develop a strong vision for the water sector, ACQUEAU is based on a short, medium and long term vision and on technological road mapping. Also, the Eureka membership is wider than just the EU, incorporating 39 full members within Europe.

The position of ACQUEAU

Technologies evolve and renew themselves rapidly. In the water sector, innovation and technological breakthroughs target long term investment for water infrastructures. They should adapt rapidly to the societal changes and economic needs. It is particularly relevant in the case of facing such environmental challenges as extreme events.
To encourage innovation for growth in Europe, ACQUEAU will address major societal challenges through the management of water. It will particularly emphasize efforts towards society and technology needs through new products and services, bringing more added value and employment.
ACQUEAU particularly enhances its added value compared to the main other European initiatives to boost competitiveness and RTD. Its major vision and way of working complements other initiatives and aims at promoting innovation and new developments through collaboration with other funds and institutions.
It is essential that ACQUEAU is fully incorporated to the European environment related to research and innovation.

Collaboration with other clusters

ACQUEAU is the first cluster entirely dedicated to a natural resource.

EUROGIA+ is a 5 year duration EUREKA initiative for low-carbon energy technologies. EUROGIA+ is the continuation of EUROGIA, the EUREKA cluster for energy, but also represents a major development as the first programme dedicated to the whole energy mix from fossil to renewable sources. EUROGIA+ therefore includes the challenges of producing energy from all available resources including natural resources such as coal, gas, wind and water. Energy is a key topic in the water field because of the water

sector's high consumption of energy Without further describing links between water and energy (cf. Topic on "water and energy" in the SRA of the WssTP), joint initiatives between EUROGIA+ and ACQUEAU could evolve towards strong new innovation and market driven projects to green the economy and to better match the use of energy with water technologies and needs.

The other existing clusters particularly target information technologies at different levels. CATRENE and EURIPIDES are working on electronics and information systems. The first is a cluster for nanoelectronics initially working on electronics from the successful experience of MEDEA. The second promotes Smart Systems and their relevant technologies: a bridge for joint activities between those initiatives and ACQUEAU should regroup working areas to improve the collection of data for the different water systems, in particular to inform the customer. For instance, in the case of Real Time System Management; there is a strong need for real time data transfer from sensors to databases and models. This kind of initiative will need technologies to support data collection, sampling, surveys, etc.

ITEA is an initiative aiming at improving software. In this regards, ACQUEAU could set up projects in the same area as just described in order to make advances in information collection and processing.

Lastly, CELTIC is fully dedicated to end-to-end telecommunication solutions. It developed technologies and system platforms in various areas including communication, transportation, energy, security, etc. The same kind of joint programmes can be defined and launched to further develop ICT in the water sector.

Position of ACQUEAU vis-à-vis the EUREKA programme

1. Relation with the EUREKA Secretariat

It means that the offices of ACQUEAU will be settled in the current offices of the Eureka Secretariat. The Eureka Secretariat offered to provide support in terms of logistics (offices, ICT, secretariat), communication (Internet, tools of communication) and networking (with clusters, NCP, HLG and other institutions that could be interested by the initiative of ACQUEAU).

2. Relation with existing umbrellas

The EUREKA initiatives are currently in process of setting water initiatives under both an umbrella and a cluster. The former targets public entities and governments to coordinate research working areas among universities and research organisations, the latter is ACQUEAU, a collaborative industrial R&D programme dedicated to developing innovation and technologies for the water sector.

This position confirms the need to support industry driven initiatives and the Technology Road Mapping set up by ACQUEAU.

3. Programme "Eurostars"

The EUREKA's Eurostars Programme is a European funding and support programme dedicated to SMEs. Eurostars aims at stimulating them to lead international collaborative research and innovation projects by easing access to support and funding. ACQUEAU will intend to adjust its organization of calls (coordination of funds) and strategic topics to attract more SMEs along with the framework of the Eurostars programme and the activities of the cluster.

Position of ACQUEAU vis-à-vis the 7th EU Framework Programme

The ACQUEAU programme will stimulate co-operation with the Framework Programmes of the European Union by close collaboration with the WssTP, the European Technology Platform for water. The Framework Programmes are characterised by a much wider scope than the ACQUEAU deliverables can cover.
The scope of ACQUEAU is much more focused on water technologies and market driven projects that will include technologies and applications at all levels of the water sector.
With reference to the work of the WssTP, the main available financing possibilities still need further industry driven approaches.

- The FP7 emphasises the importance of broadening collaboration between stakeholders to create a stronger European research area. It particularly aims at promoting integrated research involving all key stakeholders on specific research areas. The Strategic Technology Development that has been developed by the European Commission is a reference document to explore other possibilities beyond the Framework Programme. It involved supporting Private-Public financing mechanisms. It further pushed the European Union to support new initiatives as Private-Public Partnership (PPP). With the economic crisis, the EU launched a "recovery package" through three key initiatives. ACQUEAU would particularly collaborate through the WssTP with the initiative on "Energy Efficiency Buildings".

- Structural funds, the Competitive and Innovation programme (CIP) and LIFE+ don't fully address industry driven projects.

- The ERANET scheme supports the co-operation and co-ordination of research activities carried out at national or regional level. The scheme will be financed as part of the specific programme 'Integrating and strengthening the European Research Area'. Several ERANET have been created with FP6 related to water management on different topics (CRUE, SNOWMAN, etc.) or

initiative to better integrated information within the water communication and the IWRM (IWRM.NET). In 2009, the European Commission initiated two new ERANET through FP7. Upon the proposals of the national representatives and the acceptance of the European Commission, two new global ERANET should be created on "Eco-Innovation" and "Water". ACQUEAU will link with those ERANET through the WssTP in order to collaborate on strategic issues and to ensure a complementary approach between initiatives in order to avoid duplication. It will concretely mean exchange of Board members, consultation on the SRA and joint working groups on technology aspects.

Small and medium-sized enterprises

Good co-operation with small and medium-sized enterprises is needed to exploit fully the possibilities created by ACQUEAU. ACQUEAU will be an open programme that will welcome the participation of all interested companies to develop joint projects in order to encourage knowledge and expertise sharing. ACQUEAU recognizes the importance of SMEs to lead new innovation and research that can open markets and services.
In the water sector, many SMEs can be interested in joining ACQUEAU to develop competitive applications. The strengthening of close cooperation between SMEs and large industries will help to build a stronger European water sector to create new jobs, new services and also, new markets that will ensure a leading position of Europe worldwide.

The role of universities and research institutions

The industrial partners of ACQUEAU hold universities and research institutions as their natural partners. From the network of the WssTP, the definition of strategic research areas and the Blue Book, ACQUEAU has included universities and research institutions as a base to define the working areas and the vision for ACQUEAU. The collaboration with universities and research institutions will ensure the required initial know-how base and the dissemination of acquired results.

General industrial co-operation

Beyond the industrial scope of the ACQUEAU partners, there are several sectors with which co-operation is required. The following list describes the realm of these other industries, with which partnership should be established:
- Manufacturers, Producers, Suppliers: Catalyst producers (eg titanium dioxide), lamp manufacturers (uV), disinfection equipment manufacturers, Pipes, valves… polymer supplier (petro-chemical industry), start-up companies (new processes), equipment supplier (extrusion and moulding industry).
- Chemical and petro-chemical industries.
- Engineering companies (modeling).
- Nano-industries.
- Environmental technologies and services.
- Start up companies for processes.
- Information systems, ICT, modeling, forecasting technologies, telecommunication network operators, software architectures and data system.

The structure of ACQUEAU

ACQUEAU is set up as a non-profit international association (AISBL) located in Brussels, Belgium. It is defined as the "Eureka cluster for water" in abbreviated form: ACQUEAU.

The Association does not pursue a profit-making object; it only serves the objectives of a Eureka cluster. Any income resulting from its activities or other sources will exclusively be used to pursue its corporate purpose.

The Association is open to legal entities of Belgian and foreign nationality and is composed of founding members and corporate members.

Mission

The Association pursues an international non-profit purpose with following objectives:
- Promote, organize and coordinate R&D projects in the field of water industry and the technologies it employs.
- Bring support to companies, research organizations, who request it and/or submit projects in the Eureka ACQUEAU Cluster, within the scope of this Blue Book.
- Contribute to the definition of the necessary rules for performing the ACQUEAU programmes.
- Analyse and help to coordinate programme financing.
- Monitor programme progress.
- Help and coordinate relations with other parties and involved public authorities.
- Promote ACQUEAU and related R&D results, in particular by organizing an annual event.

Governance

The governance of ACQUEAU is based on the work of funding members and corporate members. For purposes of performing the duties, ACQUEAU consists of a General Assembly, a Board of Directors, an Executive Committee and an executive office.

These four different bodies ensure of the completion of the objectives and missions of ACQUEAU.

The General Assembly essentially elects the Board of Directors and approves the annual report.

The Board of Directors (quarterly meetings) is responsible for all the functioning of ACQUEAU. In particular, it nominates experts of the Scientific Committee, validates the calls for proposals and labels the selected proposals.

The Executive Committee is composed of executive directors of the Board of Directors. It ensures the day-to-day operations; in particular, it manages the executive office.

The Executive office is the permanent office of ACQUEAU. It ensures the organisation of day-to-day operations including communication, organisation of meetings and relationship between the different bodies of ACQUEAU.

A pool of experts

The other important point for the organisation of ACQUEAU is the close work with both a Scientific Committee and a pool of experts.

The Scientific Committee is composed of top scientist from the water community.

The mission of the Scientific Committee is to advise and promote decisions to the Board based on their expertise and evaluation of scientific criteria of proposals. They will particularly:

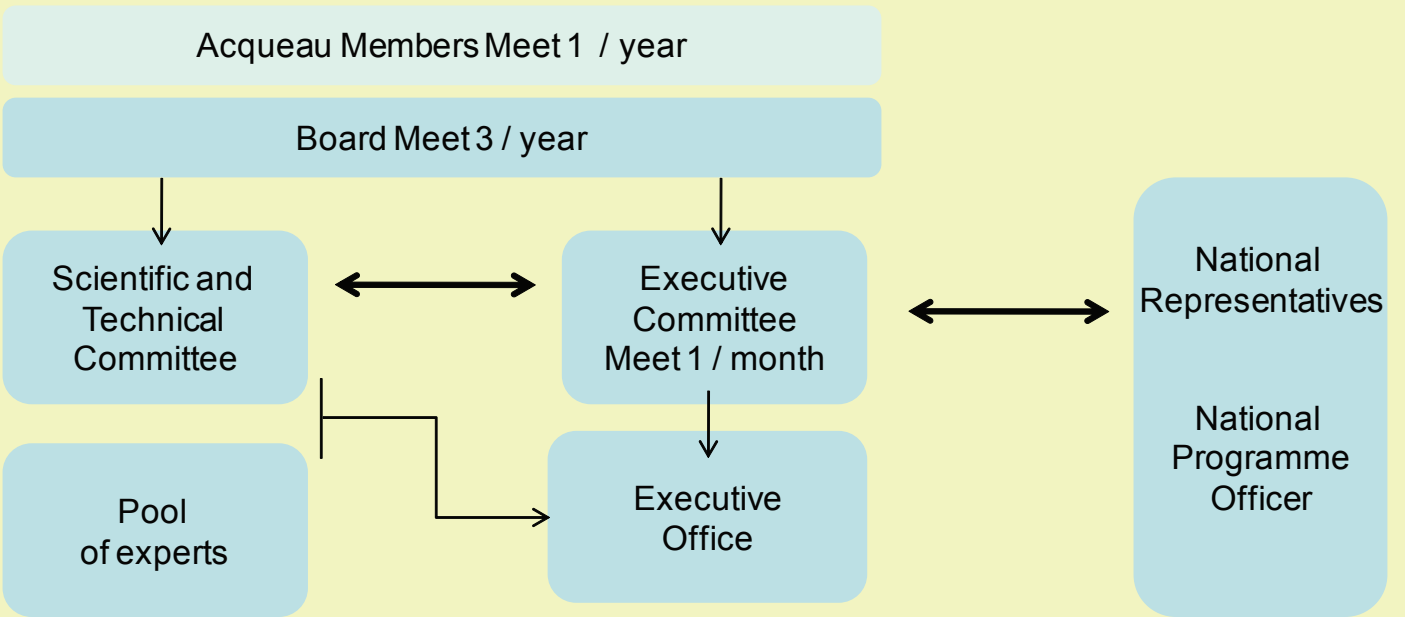
- Update the Blue Book.
- Write the technical content of calls.
- Provide recommendations for amending or labelling proposals.
- Support the project officers in supervising the projects from a technical point of view.

The pool of experts consists of a large database of experts from the scientific water community. They will evaluate independently, the project proposals and the progress of the programmes. The experts will be called upon by ACQUEAU as required. They will participate in the evaluation of the programme. ACQUEAU will guarantee their independent and transparent participation to the programme through rules of ethics that experts and board members will sign during the whole progress of the programme.

The project flow

ACQUEAU will set up an executive office to manage the project flow and to promote the initiative among different partners. To organise the administration of projects, ACQUEAU will follow the successful examples for managing projects that is in place in CATRENE, CELTIC and EURIPIDES. The different methods of programme management among the existing clusters underline the importance of adapting the organisation to the specificities of ACQUEAU. ACQUEAU will therefore establish its work starting from the examples of the existing clusters and the collaboration with the EUREKA secretariat and the WssTP.

ACQUEAU will launch two calls per year starting in July 2010. The process will be a “two-level proposals” with 1/ a first short proposal of two pages including a short description of the project, partners and fundings. 2/ the full proposal. The main challenge is to ensure in between the two proposals the coordination with NCP to confirm the interest of the project and the availability of funding. The Scientific Committee of ACQUEAU and in certain cases, experts would ensure of the quality and the coherence of the project. At the final stage, the Board of ACQUEAU will validate and label the project.



The structure of ACQUEAU

The governance is be based on a two level Board with a core group of active members from water industries (Funding members) with a scientific and technical committee and independent experts contacted on request by the Board.

Nine Technological Areas for Innovation Introduction

The core activity of ACQUEAU is to facilitate the generation of market driven, pan-European collaborative water research and technological development projects for the benefit of the European Water Industry.

ACQUEAU has chosen key working areas to drive innovation and market-driven projects in the next five years. These working areas are based on the water cycle as described in the second part of the Blue Book. They cover the different areas of activity of the water sector. These key working areas are named "water components" as elements within the water cycle and therefore fitting the circumstances of the water sector.

1. Water resources

Water Resources are submitted to various pressures that include climate change, increasing demand, and greater pollution of resources. All these factors will increase the cost of water and the difficulty of balancing water demand and supply. The latter underlines the challenges of the imbalance between the growing water demand (domestic, industrial and agricultural) and availability of the resources. The use of less expensive and natural treatment technologies for water supply will be applied for well protected water sources. This will require the control of pollution and the maintenance or restoration of the quality of ecosystems.

Non-conventional resources may be used to an increasing degree by dedicated treatment technologies.

2. Water treatment

Water treatment plants (WTP) are producing drinking water from different sources of varying quality such as surface water, groundwater or seawater using various technologies including filtration, flocculation, precipitation, oxidation and adsorption. The main challenges are ensuring the quality of the water, safeguarding public health and reducing the energy consumption of WTPs. The technologies developed by ACQUEAU in this field will focus on new techniques for the water treatment such as membranes, disinfection processes, and treatment of brines, nanomaterials and sensors.

3. Water distribution

Water distribution systems are essential infrastructures for any modern society and key elements for public health, economic growth and human development. They represent 70% of the cost of the price of managing water. Water distribution systems will face the challenges imposed by a growing demand, climate change, energy efficiency, ageing infrastructure and increasingly stringent service standards. RTD will improve the efficiency of operation, monitoring and control and will develop new types of materials to increase the performance and capability of the systems.

4. Customer

The "customer" is at the same time a citizen, a user, a consumer and a taxpayer.

The expectations of the customers are linked with their specific situation and are very different depending on the level of service that is proposed. In countries where the service is not delivered 24h/24, the first request is for a constant supply. Then, once the quantity is sufficient to meet the needs, the quality of water and the price become important. Customers of Western countries are used to high-quality standards but remain concerned by the possible impact on health.
The fast-growing development of ICT tools and the evolution in the domestic tools of communication (such as the internet) has started to change profoundly the way service providers communicate with their customers. The customer now expects accurate and timely information on the water services provided.

5. Agriculture

Within Europe agriculture uses 30% of water abstracted, compared with the 17% used for the public water supply. The agricultural use of water is difficult to regulate. Much of the activity is currently unmonitored so it is difficult to obtain an accurate picture.

Innovation in the agricultural sector will need to tackle the different challenges of public health and water quality, the link between water and energy and the impact of climate change. Technological breakthroughs should target particularly reduced pollution, the safeguarding of water resources and food safety. Development can be foreseen in irrigation, cropping practices, pollution control (nutrient, pesticides, etc.)and drainage recycling.

6. Industry

Industrial activities use roughly 20% of the European water consumption. The goal of industrial wastewater treatment is first of all to produce an effluent that can be safely released into the environment and if possible to reuse the treated water. In the short/medium term, research will focus on the combination of new treatment modules to further improve existing plants. On the long term, there is a need to rethink the overall treatment by quantifying the energy and matter fluxes.

7. Urban drainage and Wastewater collection

Urban drainage refers to the provision and operation of infrastructure to carry away rainfall and waste water without causing flooding. For urban drainage, the main issues concern flood risk and uncontrolled wet weather overflows to receiving bodies, especially when they come from combined sewer systems, including waste water pollution. The key issue will be the development and implementation of technologies for and advanced management of waste water collection and urban drainage systems.

8. Wastewater treatment

Waste water treatment works (WWTWs, also known as sewage treatment works) are constructed at the end of waste water collection systems (sewerage systems) to remove contaminants before effluent is returned to a water course or re-used. They range in size from units serving single properties to those serving major cities. The major challenge will be to comply with future regulations, particularly the Water Framework Directive, whilst accommodating climate and demographic changes. This will have to be achieved whilst reducing energy and chemical consumption by making increasing use of "natural" and biological processes. Increasingly waste water will be viewed as a source of not only water for re-use but also of valuable by-products such as phosphorus.

9. Bio solids and other sludge

Wastewater biosolid is an unavoidable residue derived from wastewater treatment. Sludge management covers a broad range of challenges, including material reuse or disposal, environmental and health impacts, compliance with regulations, and public perception. The development of responses to these challenges has the last few years led to better raw material characterization, development of new technologies and improvements in energy recovery.

From Technological areas to major programmes

Addressing the RTD needs of each "water component" will shape the future of the European water sector aiming at spreading world standards. The definition of these standards could allow the European water sector and industries to maintain its leading position but also, to take a leadership role in new areas in particular in sustainable and environmental technologies.

The main outcomes of the "water components" include:

- Closing the water cycle and ensuring the sustainability of water treatment and use of the basic resource.
- Boost low carbon and low energy technologies to turn water and wastewater services into environmentally friendly industries.
- Anticipate the shortage of water resources as well as extreme events to better manage water resources in the context of Climate Change. It should secure the balance of supply and demand for the different types of users (customers, industries, agriculture) and in areas of differing population densities.

The main outcomes, benefits and technological breakthroughs expected from the definition of the nine water components are further explained in the second part of this Blue Book as part of the Technology Road Mapping established by ACQUEAU.

Conclusion

ACQUEAU is the first 'Industry/Business led water network' that will drive programmes and initiatives in innovation and RTD using a bottom-up approach to develop market driven solutions.

The main mission of ACQUEAU as a EUREKA Cluster is to contribute to the economic growth and the creation of new jobs in Europe. More importantly, ACQUEAU will boost the launch of new market to strengthen the leading role of the European water sector in the world.

ACQUEAU is an initiative whose ultimate aim is to facilitate the generation of market driven, pan-European collaborative water research and technological development projects for the benefit of not only the European Water Industry but also for water itself, a universal and vital resource.

Index, Credits and Contact

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Bn	Billion
EC	European Commission
EEA	European Environmental Agency
ETP	European Technology Platform
EU	European Union
FP	Framework Programme
GDP	Gross Domestic Product
GIS	Geogrraphical Information System
ICT	Information and Communication Technologies
IWA	International Water Association
IWRM	Integrated Water Resources Management
LCA	Life Cycle Assessment
RTD	Research and Technology Development
SME	Small and Medium Entreprise
SRA	Strategic Research Agenda
WFD	Water Framework Directive
WssTP	Water supply and sanitation Technology Platform
WTP	Water Treatment Plant
WWTW	Waste Water Treatment Works

Credits

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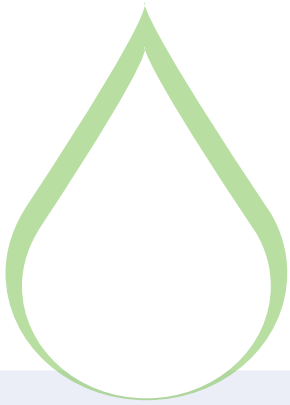

ACQUEAU
is the EUREKA Cluster
for Water

ACQUEAU is the first
industry driven initiative
to fund innovation and RTD
in the water sector.

ACQUEAU

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