

This fiche is part of the wider roadmap for cross-cutting KETs activities

'Cross-cutting KETs' activities bring together and integrate different KETs and reflect the interdisciplinary nature of technological development. They have the potential to lead to unforeseen advances and new markets, and are important contributors to new technological components or products.

The complete roadmap for cross-cutting KETs activities can be downloaded from:

<http://ec.europa.eu/growth/industry/key-enabling-technologies/eu-actions/ro-ckets>

Potential areas of industrial interest relevant for cross-cutting KETs in the Environment domain



This innovation field is part of the wider roadmap for cross-cutting KETs activities developed within the framework of the RO-cKETs study. The roadmap for cross-cutting KETs activities identifies the potential innovation fields of industrial interest relevant for cross-cutting KETs in a broad range of industrial sectors relevant for the European economy.

The roadmap has been developed starting from actual market needs and industrial challenges in a broad range of industrial sectors relevant for the European economy. The roadmapping activity has focused on exploring potential innovation areas in terms of products, processes or services with respect to which the cross-fertilization between KETs can provide an added value, taking into account the main market drivers for each of those innovation areas as well as the societal and economic context in which they locate.

Taking the demand side as a starting point, cross-cutting KETs activities will in general include activities closer to market and applications. The study focused on identifying potential innovation areas of industrial interest implying Technology Readiness Levels of between 4 and 8.

EV.1.2: Integrated water management aimed at water use minimization, reuse or recycling in industry

Scope:

Integrated water management aimed at water use minimization, water reuse or recycling especially aimed at water-intensive industrial activities, which exploits solutions for the reuse or recycle of process water in a closed-loop inside a factory or on a broader perimeter among different factories and/or solutions for optimizing water-energy coupling aimed in water cooling.

Demand-side requirements (stemming from Societal Challenges) addressed:

- Tackle the “climate action, resource efficiency and raw materials” challenge, indirectly also contributing to addressing challenges such as “food security, sustainable agriculture, marine and maritime research and the bio-economy” and “health, demographic change and wellbeing”

Demand-side requirements (stemming from market needs) addressed:

- Manage environmental hazards and pollution
- Reduce processing costs through recovery (of both energy and resources) in industrial activities
- Minimize waste thereby reducing related management costs

Specific technical/industrial challenges (mainly resulting from gaps in technological capacities):

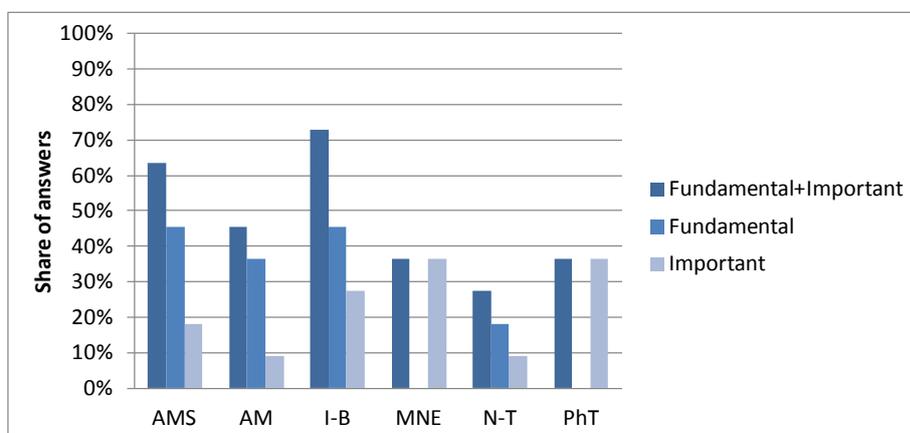
- Development of solutions for the reuse or recycle of process water in a closed-loop inside a factory or on a broader perimeter, among different factories
- Development of solutions for optimizing water-energy coupling aimed in water cooling while reducing the use of fresh water including by improved water reclamation through water recirculation on site (e.g. treat and reuse cooling tower/coke quenching blowdown water for dust collection; use recovered waste heat to turn water into steam for power generation, etc.)
- Planning of stormwater containment and processing, including runoff water recovery from coke ovens or coal stockpile
- Development of advanced filtration (such as micro-filtration (MF), ultra-filtration (UF) and nano-filtration (NF)) and reverse osmosis (RO) technologies to reduce the cost of effluent water post-processing and allow filtering out pollutions still hardly eliminated

Contribution by cross-cutting Key Enabling Technologies:

In respect to this Innovation Field, the integration of KETs could contribute to the development of more advanced integrated water management approaches aimed at water use minimization, water reuse or recycling especially aimed at water-intensive industrial activities.

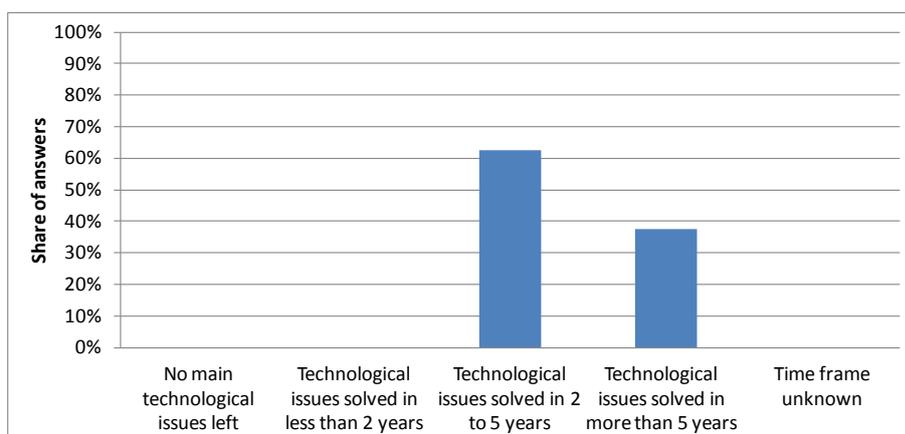
To this aim, the combination of KETs experts' opinions collected through the dedicated survey (whose result is depicted in the below bar chart), the examination of KETs-related patenting activity in respect to this Innovation Field, and desk research activities, have allowed identifying a rather strong interaction of KETs with respect to this Innovation Field, with either fundamental or important contribution mainly by the following KETs:

- Advanced Manufacturing Systems (AMS)
- Advanced Materials (AM)
- Industrial Biotechnology (I-B)



Timing for implementation:

According to the majority of KETs experts' opinions (whose result is depicted in the below bar chart), desk research, and in line with the KETs-related patenting activity in this field, it is considered that the main technological issues holding back the achievement of cross-cutting KETs based products related to this Innovation Field could be solved in a time frame of 2 to 5 years, yet significant consensus by experts indicates also longer periods being necessary:



Hence, depending on the specific technical and/or industrial challenges holding back the achievement of cross-cutting KETs based products related to this Innovation Field, the provision of support in the short to medium term should be taken into consideration within this framework.

Additional information according to results of assessment:

➤ **Impact assessment:**

- As in the case of urban water and wastewater treatment, industrial wastewater treatment market drivers are also dominated by the implementation of stricter regulations that are stimulating especially water-intensive industries in the take up of cost-effective integrated water and wastewater treatment solutions aimed at water use minimization and water reuse or recycling. This expanding practice exploits solutions for the reuse or recycle of process water in a closed-loop inside a factory or on a broader perimeter among different factories and/or solutions for optimizing water-energy coupling aimed in water cooling in order to recover the heat that is available in the water.
- Like in the case of urban water and wastewater treatment, also in the case of industrial wastewater treatment the need is to reduce energy costs.
- Within this framework, customized plant solutions and services are being offered by various companies that are providing the design and engineering, while in terms of technology suppliers these are often the same as for urban water and wastewater treatment solutions.

➤ **Results of patents scenario analysis:**

- No significant patent-related indicators can be reported in this field