

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/rockets>

Potential areas of industrial interest relevant for cross-cutting KETs in the Mining, Quarrying and Extraction 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.

MI.1.3: Technologies and approaches for urban mining

Scope:

Metals, and other resources, can be widely found in structures, transportation, and the wide variety of products that are the hallmarks of modern life. Yet technological advances in dismantling, sorting, separation, recovery and processing of waste are needed in order to exploit this potential from urban waste.

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

- Tackle the “Climate action, resource efficiency and raw materials” societal challenge

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

- Secure the supply of raw materials and resources
- Reduce field operating costs while ensuring safety and decreasing environmental impacts
- Enable more efficient and sustainable resources utilisation
- Enhance productivity of mining, quarrying and other extractive activities
- Improve environmental management in mining, quarrying and other extractive activities
- Guarantee adequate waste management

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

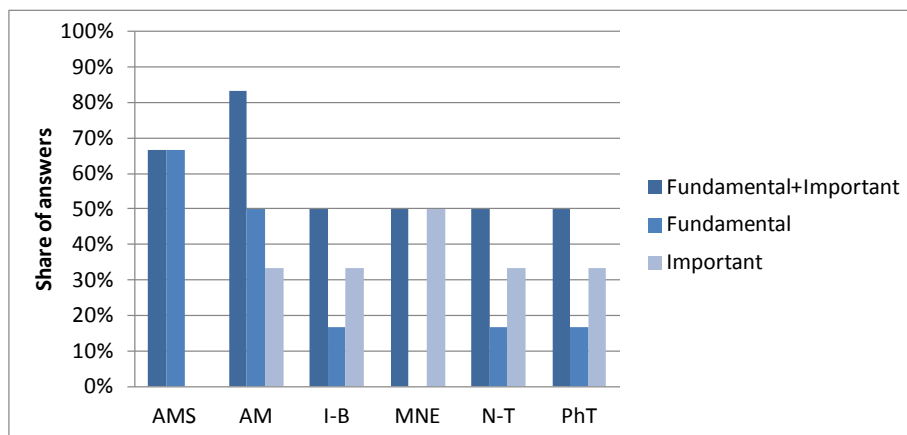
- Implementation of efficient and sustainable recovery operations (including logistics) for secondary raw materials
- Setting up of effective collection of obsolete and discarded equipment and assuring environmentally sound dismantling practices
- Technological advancements in dismantling, sorting, separation, recovery and processing of waste and scrap including Waste Electrical and Electronic Equipment (WEEE), end-of-life vehicles (ELV), batteries, structures, catalysts, slag, sludge and dusts

Contribution by cross-cutting Key Enabling Technologies:

In respect to this Innovation Field, the integration of KETs could contribute to technological advances in dismantling, sorting, separation, recovery and processing of waste and the implementation of more sustainable collection and recovery of obsolete equipment.

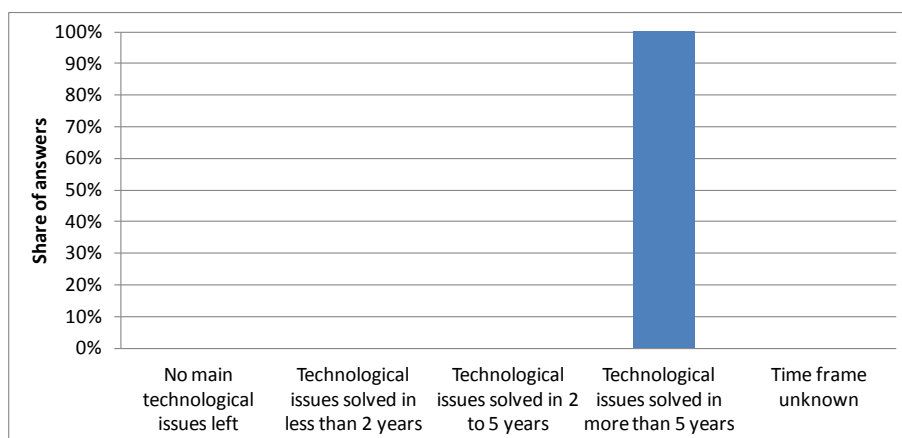
To this aim, the combination of KETs experts' opinions collected through the dedicated survey (whose result is depicted in the below bar chart), the examination of KETs-related patenting activity in respect to this Innovation Field, and desk research activities, have allowed identifying a rather strong 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)
- Photonics (PhT)
- Micro- and Nano-Electronics (MNE)
- Nanotechnologies (N-T)
- 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 more than 5 years:



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 medium term should be taken into consideration within this framework.

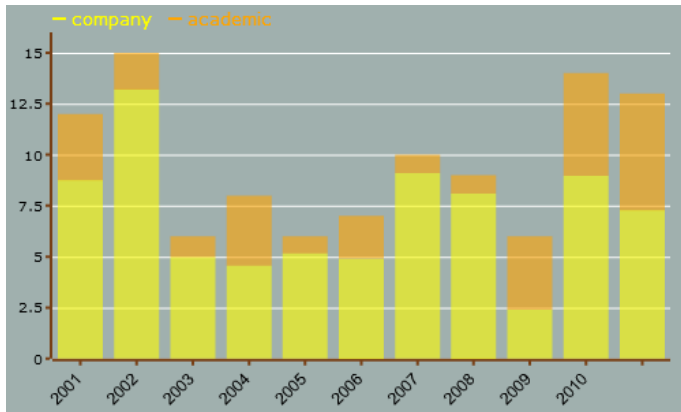
Additional information according to results of assessment:

➤ Impact assessment:

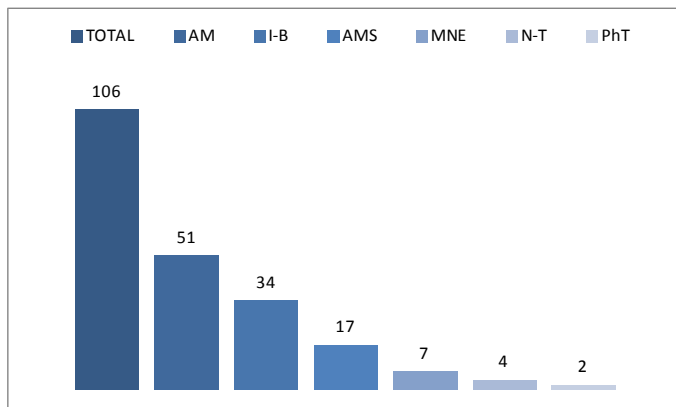
- According to the report by the analysts Frost & Sullivan titled "Global Opportunities in the Waste Electrical and Electronic Equipment (WEEE) Recycling Services Market," the global e-waste recycling (or urban mining) market was estimated to be worth 1 billion Euro in 2011. Moreover, the report predicts that the market will grow to 1.35 billion Euro by 2017 with a strong compound annual growth rate (CAGR) of 4%. That compound annual growth rate (CAGR) makes urban mining one of the fastest-growing sectors by volume within the global waste industry.
- Thanks to legislation, Europe is currently a world leader in urban mining. The EU's WEEE Directive requires all Member States to recover 45 tonnes of e-waste for every 100 tonnes of e-goods sold by 2016, with the recovery target increasing to 65% of sales by 2019 or 85% of all waste generated. Strong growth in the future is forecast as other global markets, mainly North America, are expected to grow aggressively to combat increasing waste volumes. Market momentum is maintained by a fast growth in e-waste volume, which is required to be appropriately managed as per evolving legislative targets (Source: Frost & Sullivan, Global Opportunities in the Waste Electrical and Electronic Equipment (WEEE) Recycling Services Market, 2012).

➤ **Results of patents scenario analysis:**

- 106 exclusively KETs-related patents identified in the period 2001-2011 for the specific Innovation Field
- Increasing trend curve (number of patents per year)
- Highest share of industrial applicants with intermittent relevant patenting activity by academic applicants, most probably standing for new technologies having been patented in the corresponding periods:



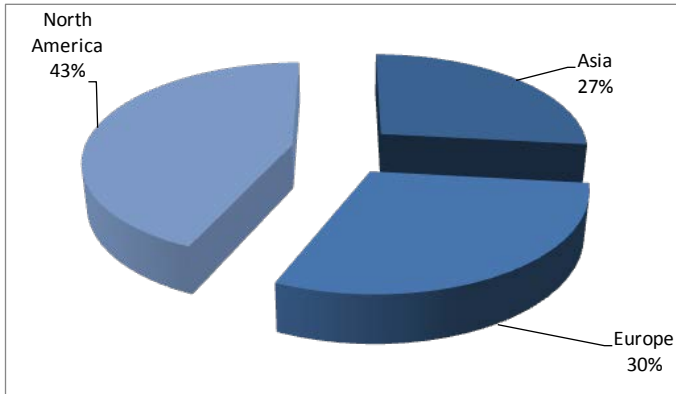
- Patents by KET(s):



- Patents by KET(s) and relevant combinations of KETs:

KET(s)	Number of patents
AM	51
AM / IBT	2
AM / N-T	3
AM / PhT	1
AMS	17
AMS / AM	2
IBT	34
MNE	7
MNE / PhT	1
N-T	4
PhT	2

- Patent distribution by (Applicant) organization geographical zone:



- Patent distribution by geographical zone of priority protection:

